

Technical Specification for Three Phase Whole Current Energy Meter

1	SCOPE	<p>This specification covers the technical requirements of design, manufacturing, testing & integration with network integration card (NIC) of 4G communication being used at TPXODL at meter manufacturer's works, packing, forwarding, supply and unloading at store/site of three phase four wire, 3x230 voltage, 20-100A, whole current static smart energy meters of accuracy class 1.0 (here after referred as meters) complete with all accessories for efficient and trouble free operation with communication module (NIC) compatible with 4G technology along with meter box.</p> <p>It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPXODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.</p>																																	
2	APPLICABLE STANDARDS	<p>The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.</p> <table border="1" data-bbox="522 913 1534 1690"> <tr> <td>a</td><td>IS 16444 Part-1 : 2015</td><td>A.C. Static Direct connected Watt hour Smart meter class 1.0 and 2.0</td></tr> <tr> <td>b</td><td>IS 13779 : 1999</td><td>A.C. Static Watt hour meter class 1.0 and 2.0</td></tr> <tr> <td>c</td><td>IS 15884 : 2010</td><td>A.C. direct connected static prepayment meters for active energy (class 1 & 2)</td></tr> <tr> <td>d</td><td>IS 15959 Part 1: 2011</td><td>Data exchange for electricity meter reading, tariff and load control</td></tr> <tr> <td>e</td><td>IS 15959 Part 2 : 2016</td><td>Data exchange for electricity meter reading , tariff and load control</td></tr> <tr> <td>f</td><td>IEEE 802.15.4 : 2003</td><td>Standard for local and metropolitan area networks</td></tr> <tr> <td>g</td><td>IS 9000</td><td>Basic Environmental testing procedure for electrical and electronic items.</td></tr> <tr> <td>h</td><td>IEC 62052-11: 2003</td><td>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.</td></tr> <tr> <td>i</td><td>IEC 62053-21: 2003</td><td>A.C. Static Watt hour meter for active energy Class 1.0 and 2.0</td></tr> <tr> <td>j</td><td>IS 15707 : 2006</td><td>Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.</td></tr> <tr> <td>k</td><td>IEC 60068</td><td>Environmental testing.</td></tr> </table>	a	IS 16444 Part-1 : 2015	A.C. Static Direct connected Watt hour Smart meter class 1.0 and 2.0	b	IS 13779 : 1999	A.C. Static Watt hour meter class 1.0 and 2.0	c	IS 15884 : 2010	A.C. direct connected static prepayment meters for active energy (class 1 & 2)	d	IS 15959 Part 1: 2011	Data exchange for electricity meter reading, tariff and load control	e	IS 15959 Part 2 : 2016	Data exchange for electricity meter reading , tariff and load control	f	IEEE 802.15.4 : 2003	Standard for local and metropolitan area networks	g	IS 9000	Basic Environmental testing procedure for electrical and electronic items.	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.
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Technical Specification for Three Phase Whole Current Energy Meter

		I	CBIP-TR No.325	Specification for A.C. Static Electrical EnergyMeters (latest amendment)
		m	CEA Regulation (2006)	Installation and operation of meters Dtd: 17/03/2006.
		n	IS 12346:1999	Testing Equipment For Ac Electrical Energy Meters
		o	IS 11000	Fire Hazard Testing
		p	IS 60529	Degree of protection provided by enclosure
3	CLIMATE CONDITIONS OF THE INSTALLATION	<p>a) Max. Ambient Temperature : 70 deg.C b) Max. Daily average ambient temp. : 40 deg.C c) Min Ambient Temp : -10 deg C d) Maximum Humidity : 100% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Maximum 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 : 126 kg/sq m up to an elevation at 10 m.</p> <p>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.</p>		
4	GENERAL TECHNICAL REQUIREMENTS	S.No.	DESCRIPTION	REQUIREMENT
		4.01	Type of the meter	Three phase four wire, static watt-hour direct connected type smart meter without application of any multiplication constant. It consisting of measuring elements(s),time of use of register(s),display, load switch and plug in type bi-directional communication module all integral within the meter housing.
		4.02	Accuracy Class of the meter	1.0
		4.03	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 20A; Imax= 100 Amps (Meter shall be able to continuously carry 120% of Imax Meeting the accuracy requirements)
		4.04	Reference Conditions for testing the performance of the meter	Vref = 230V Frequency = 50Hz Temperature= 27°C
		4.05	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).

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4.06	Operating Frequency	50 Hz± 5%.	
4.07	Power Consumption	Voltage circuit: Maximum 5.0 W and 15 VA Current Circuit :Maximum 18.4 VA as per IS 16444 part 1 (amendment)	
4.08	Starting Current	80mA (0.4% of Ib) (phase current) as per IS 13779	
4.09	Short time over Current	3000 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 20 ^o C with an ambient temperature at 50 ^o 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	Minimum Insulation resistance at test voltage 500+/- 50 V dc a) Between frame & current ,voltage circuits as well as auxiliary circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit. :	a) 5 M ohm b) 50 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 clause 6.8 of IS 13779. Fire retardant material shall be used.	
4.16	Protection against penetration of dust and water.	Degree of protection :IP 51 as per IS 12063/60529, but Without suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 13779	
4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 13779.	

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		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause 4.5 & 5.5 of IS 15884.
		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. & meter shall be programmed at default lag only configuration i.e. Lead to be treated as unity for kVA&kVAh calculations
		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 (iv) NIC card
		4.24	Initial start up 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 meter power failure , reading/data should be retrieved with the help of battery or other power source.
		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	9.5mm (minimum) 20 mm (minimum)
		4.28	Clearance between adjacent terminals	10 mm (minimum)
		4.29	Display	Backlit LCD, Scrolling, 10 seconds for each parameter. minimum 8 digits LCD display
		4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication ,firmware selection from remote etc.
		4.31	Software and communication compatibility	The bidder shall supply software required for local (MRI / Mobile App), BCS & remote (AMI) connectivity including required training to use the software free of cost.
		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, DIP(billing & load survey), billing date, display

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				parameters etc. shall be reconfigure through MRI and remotely over the air (OTA)
		4.33	Communication module of meter for AMI	As per clause no 1.2 (b) of IS 16444. Meter should have provision of communication module compatible with both the variant mentioned in IS 16444. This module should be able to get connected to the 4G Network provided by Network Service Provider . Meter should be able to provide required power supply to NIC card provided by communication provider recommended by TPXODL. Size /form factor of NIC card will be provided by TPXODL to the bidder and bidder should make necessary arrangement for the same.
		4.34	Communication Layer Protocol	Should be as per clause 9.3 of IS 16444
		4.35	Key Management and Security Feature	Should be as per IS 15959
		4.36	Harmonics recording	The meter should record the current and voltage THD. The meter should record harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD. THD values shall have 30 minutes integration period in load survey. Accuracy of harmonics recording shall be as per meter accuracy class. The meter shall generate a flag whenever the threshold (user configurable) of the 5% THD of the load current and voltage is breached.
		4.37	Usage Application	Indoor and Outdoor
		4.38	Chemical Bonding	Meter cover and body should be seamlessly chemically bonded, so that meter should not open without leaving clear mark.

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4.1	DISCONNECTOR	<p>The meter shall have the facility of disconnecting and re-connecting the load of the meter from the remote and by authenticated command through Laptop/HHU at site by means of a built-in contactor. This operation shall be conducted with the help of a third party software which is owned by us and in addition to the manufacturer's own software. Each operation of the switches shall be logged by the meter as an event with date and time stamp and reading parameters. This operation should be in line with clause 11 of IS 16444. Meter should display reason for disconnection in meter display (if available). The cumulative number of ON/OFF operations shall also be made available.</p> <p>Switch shall be in compliance to IS 15884. The make of the load switch should be of reputed make like Grooner (German) or equivalent and same shall be confirmed by the bidder during tendering. The brief technical particulars of this Disconnector/load switch are furnished below:-</p> <table border="1" data-bbox="483 957 1528 1493"> <thead> <tr> <th>S.No.</th><th>DESCRIPTION</th><th>REQUIREMENT</th></tr> </thead> <tbody> <tr> <td>1</td><td>Operating Voltage range</td><td>130 V to 470 V</td></tr> <tr> <td>2</td><td>Operating Current range</td><td>20 mA to 120 A</td></tr> <tr> <td>3</td><td>Maximum switching power</td><td>22 kVA per phase/ per IS 15884 Annex G</td></tr> <tr> <td>4</td><td>No. of poles</td><td>3 nos (one in each R,Y,B phases)</td></tr> <tr> <td>5</td><td>Operation of switches</td><td>Simultaneous</td></tr> <tr> <td>6</td><td>Utilization Categories</td><td>UC1 or better</td></tr> <tr> <td>7</td><td>Min. Number of operation</td><td>1500 (close, open each)</td></tr> <tr> <td>8</td><td>Relay Disconnection / Connection status</td><td>Should be displayed in Meter</td></tr> <tr> <td>9</td><td>Default Relay operation</td><td>Relay should be disconnect when current reached to 105% I_{max}</td></tr> </tbody> </table>	S.No.	DESCRIPTION	REQUIREMENT	1	Operating Voltage range	130 V to 470 V	2	Operating Current range	20 mA to 120 A	3	Maximum switching power	22 kVA per phase/ per IS 15884 Annex G	4	No. of poles	3 nos (one in each R,Y,B phases)	5	Operation of switches	Simultaneous	6	Utilization Categories	UC1 or better	7	Min. Number of operation	1500 (close, open each)	8	Relay Disconnection / Connection status	Should be displayed in Meter	9	Default Relay operation	Relay should be disconnect when current reached to 105% I _{max}
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4.2	NIC MODULE DETAILS & INTEGRATION	<p>With the service providers offering 4G services, TPXODL intends to leverage 4G as the communication technology for meter data acquisition.</p> <ul style="list-style-type: none"> a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444 and IS15959. d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. f) NIC shall also support on-demand / schedule reading, connect / disconnect, time sync, configuration and over the air firmware upgrade from the head-end system. g) NIC shall have persistent network connectivity throughout as defined by 4G standards. It shall support self-configuring and self-healing features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate / key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It shall be recognized in the HES as authorized node. m) Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Data must be encrypted. o) LED indication for System, Power ON indicator. p) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication. q) Meter display should have provision for showing various Status as per below table
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		Sr. No	Error Details	
		1	All Good	Err 00
		2	Meter NIC Communication failure	Err 01
		3	Modem Initialization failure	Err 02
		4	SIM not detected	Err 03
		5	SIM invalid	Err 04
		6	No GSM Network Coverage	Err 05
		7	GPRS Network Registration Failure	Err 06
		8	GPRS Registration denied	Err 07
		9	No APN Configured	Err 08
		10	GPRS Connection not establish	Err 09
		11	HES IP/Port not configured	Err 10
		12	HES Port not Open	Err 11
4.3	Communication capabilities and software feasibilities	<p>4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) / Mobile App (Using optical port/NIC card), BCS and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/ hand held device shall be integrated to HES data base.</p> <p>4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES.</p> <p>4.3.3 It shall be possible to reconfigure the meters for RTC, TOD slots reprogramming, DIP (Demand Integration period), billing date, display parameters etc. through proper authentication process locally through MRI / Mobile App, BCS and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above-mentioned attribute is changed. The change should be recorded as upgrade event.</p> <p>4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPXODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPXODL without any cost implication.</p> <p>4.3.5 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.</p> <p>4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. TPXODL reserves the right that if required, TPXODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards. Details of SIM card installed in each meter will be provided by bidder. This details should be submitted alongwith other details at GRN stage.</p>		

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		<p>4.3.7 Meter should be supplied to TPXODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement.</p> <p>4.3.8 The bidder shall supply software required for local (MRI) / BCS & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPXODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES.</p> <p>4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES / MRI/ laptop in separate PC/laptop.</p> <p>4.3.10. Meter Should send alerts instantly alongwith timestamp. Events with time stamp & snapshot data send to HES as per push periodicity,</p> <p>4.3.11If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede.</p> <p>4.3.12Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system.</p> <p>4.3.13The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS(procured by TPXODL) to configure, command, read and control smart meters installed at site.The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above.</p> <p>4.3.14Integration of meter software's with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired. meter firmware up gradation/selection should be available over the air.</p> <p>Meter should be able to change from post-paid to prepaid or vice versa mode remotely. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter.</p> <p>4.3.15Communication of the meter at optical port /OTA should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism</p> <p>4.3.16Communication NIC/network should be immune with any external Magnetic field/ESD/Jammer/HV voltage influence such that it shall not affect the normal overall functionality.</p> <p>4.3.17The required OBIS codes shall be as per IS 15959 and Tata Power defined OBIS Code. Details will finalized during Engineering stage with successful Bidder.</p>
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	Meter display should have provision for showing various NIC card status as per below table																																							
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	<p>4.3.18If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on.</p> <p>4.3.19Bidder to provide facility for Up-gradation / Modification of Firmware</p> <p>Following parameters may be updated multiple times during life cycle of meters over the air :</p> <p>Post Paid to Prepaid mode and vice versa</p> <p>Import mode to Import - export Mode and vice versa. (default is in Import Mode). Meter must be lag only even during Import – Export mode. meter should be stopped forward mode during Import – Export mode.</p> <p>Accordingly Display parameters shall be updated remotely.</p>																																							

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4.4	Immunity against external influencing signals	<p>a) Continuous DC magnetic induction: $>0.20 \text{ Tesla} \pm 5\%$ (Value of the magneto motive force to be applied shall be generally $>10000 \text{ AT}$).</p> <p>b) AC magnetic induction: $>10 \text{ milli Tesla}$ (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT)</p> <p>c) Permanent Magnet: Immune up to 0.5T and Event logging $>0.5\text{T}$.</p> <p>4.4.2 Electrostatic Discharge (ESD): Meter shall be immune up to 50 kV and shall record accurate energy as per IS- 13779:1999/CBIP-325. Meter shall log the event into memory as ' ESD' with date & time stamp for any ESD greater than 50 Kv with snap shot, the event logging threshold values as per table no. 1 in 4.6</p> <p>4.4.3 The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side.</p> <p>4.4.4 Meter should immune to high/low frequency jammer devices. Meter shall log the event in its memory as" JAMMER" with date and time stamp, the threshold values as per table no. 1 in 4.6.</p> <p>4.4.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.6.</p>
4.5	Neutral Disturbance & other tampers	<p>4.5.1 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 Chopped signal/ DC signal/ DC pulse upto 330V and for any value beyond this. Meter shall log the event into memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.6</p> <p>4.5.2 The meter should log event as 'High Neutral current' with snapshot when all three phase currents are zero and neutral current is present.</p>
4.6	Abnormal and Tamper conditions	<p>4.6.1 The meter shall record forward energy under all abnormal tampering conditions and shall be capable of recording occurrence and restoration of abnormal events listed below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply.</p> <p>4.6.2 For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3).</p> <p>4.6.3 During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count</p>

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of as per table no.1 to avoid missing of data amidst usual events (like power failure) due to the limitation of FIFO. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table no. 1 given below.

4.6.4 The events for which the restoration not occurred those should not be removed from meter memory and FIFO should not be applicable for unrestored event.

4.6.5 Tamper event logging along with snapshot during occurrences & restorations shall be as per table no.1. The smart meters manufacturing samples should start recording the abnormal influencing signals as defined in the specifications.

4.6.6 All tamper/event logging thresholds values shall be configurable from remotes.

4.6.7 On request Meter should be able to provide historic data also.

Table No.1

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)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event>50 KV	Removal of ESD/JAMMER signal	25
Magnet = 0 Hr2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	>0.5 Tesla for permanent magnet OR DC magnetic induction >0.2T OR AC magnetic induction > 10 mT (of any frequency)	<0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	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)
Potential Missing = 0 Hr 10 Min 0 sec (PM)	Potential Missing = 0 Hr 2 Min 0 sec	Voltage < 60% of Vref AND current > 2% Ibasic	Voltage > 80% of Vref AND current > 2% Ibasic	25

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			Voltage Unbalance = 0 Hr 30 Min 0 sec (VU)	Voltage Unbalance = 0 Hr 2 Min 0 sec	20% or more between the phases and current > 2% I _{basic}	Shall be less than 10 % between the phases and current > 2% I _{basic}	25
			CT Open (phase wise) = 0 Hr 10 Min 0 sec	CT Open (phase wise) = 0 Hr 2 Min 0 sec	I _r + I _y + I _b + I _n ≥ 10 % of I _{basic} (vector Sum) AND Phase current < 1% of I _{basic} with All current positive	I _r + I _y + I _b + I _n < 5 % of I _{basic} . (vector Sum) AND Phase current > 10% of I _{basic} with All current positive	25
			CT Reversal = 0 Hr 30 Min 0 sec (CTR)	CT Reversal = 0 Hr 2 Min 0 sec	Active current negative	Active current positive AND > 2 % I _{basic}	25
			Current Unbalance = 0 Hr 30 Min 0 sec (CU)	Current Unbalance = 0 Hr 2 Min 0 sec	Current difference ≥ 30% between the phases and I _{min} 10% of I _{basic}	Current difference < 20% between the phases and I _{min} > 5% of I _b	25
			Low Power Factor = 0 Hr 30 Min 0 sec (LPF)	Low Power Factor = 0 Hr 2 Min 0 sec	I > 1% of I _b and Power Factor ≤ 0.5 in any phase	I > 1% of I _b and Power Factor ≤ 0.7 in respective phase	25
			Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 2 Min 0 sec (ND)	Voltage > 145% of V _{ref} & Current > 10% I _b OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection	Voltage < 115% of V _{ref} & Current > 10% I _b AND Frequency > 47 Hz OR Frequency < 53 Hz	25
			Power On Off = 0 Hr 05 Min 0 sec	Power On Off = immediate	Actual Voltage off	Actual Voltage On	25
			Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage = 0 Hr 2 Min 0 sec	Voltage > 130% of V _{ref}	Voltage < 110% of V _{ref}	25
			Over current = 0 hr 30 min 0 sec (OL)	Over Current = 0 hr 2 min 0 sec	> Preset value (default value set at 120% I _b)	I < 100% I _b	25

Meter shall be provided with feature for terminal cover opening with time stamping.

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			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 1min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT (or mutually decided)	Removal of device	25
			Temperature Rise = 0 Hr 30 Min 0 sec (TR)	Temperature Rise = 0 Hr 02 Min 0 sec (TR)	Temperature >70°C	Temperature <60°C	25 (Stay put type)
			NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
			Invalid Ph Association (0 Hr 10Min 0 Sec)	Invalid Ph Association (0 Hr 2 min 0Sec)	Change of phase Association	Restoration of phase Association	5
			High Neutral Current (HNC) 0 Hr 10 Min 0 sec	High Neutral Current (HNC) 0 Hr 02 Min 0 sec	When phase current are zero & neutral current >10% Ib	neutral current <10% Ib	20
		<p>Note: "Meter shall have neutral CT for tamper identification and analysis."</p> <p>4.6.9 Meter shall latch & store cumulative count and cumulative durations all the tampers events which have logged /occurred/stored in memory of meter from the date of energization till life of meter. Total tamper storage should be as per table 1 above.</p> <p>4.6.10 The meter shall record in export registers in case of reversal of all CT terminals. The meters are to be used for registration of energy consumed by the consumer, as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of all CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal, meter shall record scalar (not vector sum) sum of energy.</p> <p>4.6.11 The meter shall register correctly if supply neutral is not available at the meter neutral terminal.</p> <p>4.6.12 The meter shall work in absence of any two incoming wires.</p> <p>4.6.13 It shall keep recording correctly in case of unbalance system voltage also.</p>					

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		<p>4.6.14The meter shall keep working accurately irrespective of the phase sequence of the supply. The meter shall be functional even if somehow change in the phase sequence takes place. Meter shall sufficiently record this event as reverse sequence.</p> <p>4.6.15The Meter Shall be able to differentiate between actual CT reversal and condition arising out of unbalanced / unhealthy capacitor bank. The logics for the same to be provided in tender samples also.</p> <p>4.6.16The Cover Open tamper detection should be through heavy duty, sturdy two number micro switches with OR gate logic such that it should not log false event on vibration or impact during handling or testing. Meter Cover Open Event should log Attributes like Voltage, Current, pf, Active energy etc.)</p>				
4.7	Event compartments	<p>4.7.1 The event compartments shall be IS 15959 Part-1 table 9.</p> <p>4.7.2 The size of the event compartments should be such that all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment. i.e. if in case of voltage compartment assigned to 4 number of events then the minimum size of this compartment should be such that it should accommodate sum of all maximum number of events as marked above table 1</p> <p>4.7.3 Transaction events compartment size shall be minimum 100 events.</p>				
5	GENERAL CONSTRUCTIONS	<p>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.</p> <p>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.</p> <p>The meters shall be designed and manufactured using SMT (Surface Mount Technology) components</p> <p>There should not be any connector or joint in the CT connection & PT Connections from PCB. All CT secondary shall be soldered on PCB. The battery cell shall be button/coin type leak proof.</p> <p>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 if there is any change then prior approval required from TPXODL:</p> <table><tr><td>S No</td><td>Component Function</td><td>Requirement</td><td>Makes and Origin</td></tr></table>	S No	Component Function	Requirement	Makes and Origin
S No	Component Function	Requirement	Makes and Origin			

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		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> Analog Devices, Cyrus Logic, Atmel, Phillips, Freescale semiconductor <u>South Africa:</u> SAMES <u>Japan:</u> NEC
		2.	Memory chips/NVM	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or Electro static discharges. The life of NVM shall be 15 years.	<u>USA:</u> Atmel, National Semiconductors, Texas Instruments <u>Phillips,</u> Microchip <u>Japan:</u> Hitachi or Oki <u>Swiss:</u> STMicro
		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 be disturbed with the life of display. Should be with Green LED background. 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, Truly semiconductor
		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. It should be magnetic locking type	<u>USA:</u> National Semiconductors <u>Holland / Korea:</u> Phillips <u>Taiwan:</u> MAXIM, Everlight <u>Japan:</u> Hitachi
		5.	P.C.B.	Glass Epoxy, fire resistance grade with minimum thickness 1.6 mm	<u>A class consumer</u>
		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.	<u>USA:</u> National Semiconductors, Atmel, Phillips, Texas Instruments, Vishay <u>Japan:</u> Hitachi, Oki, AVX or Ricoh <u>Korea:</u> Samsung
		7.	Battery	Lithium with guaranteed life of 15 years	Varta / Tedirun / Vitzrocell / Sanyo
		8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The microcontroller shall be of superior quality from reputed make with long life.	<u>USA:</u> Philips , Dallas, Atmel, Motorola <u>Japan:</u> NEC or Oki

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		9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter. USA: Philips , Dallas, Atmel, Motorola <u>Japan:</u> NEC or Oki
Note: Neutral CT should be of same make & same accuracy class as that of Phase CT.				
5.1	Meter Body	<p>5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FV0 Fire Retardant, self - extinguishing, UV stabilize, recyclable and Anti oxidation properties.</p> <p>5.1.2 The minimum thickness of the meter enclosure shall be 2mm.</p> <p>5.1.3 Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent on prior approval from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid)</p> <p>5.1.4 Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid)</p> <p>5.1.5 Meter cover & base shall be provided with continuous and seamless 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 damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.</p> <p>5.1.6 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).</p> <p>5.1.7 Unidirectional screws to be used on meter covers where ever required.</p> <p>5.1.8 During meter manufacturing the meter seal fixing should be tightened such that the seal body should be close to meter body.</p> <p>5.1.9 The Meter body shall be such that the liquid or chemical shall not reach the electronic parts if liquid is injected from any side of meter body such as meter terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.</p> <p>5.1.10 OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.</p>		

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5.2	Terminals, Terminal Block	<p>5.2.1 Terminal block should be in single mould with meter body base. (Not separate)</p> <p>5.2.1 After any attempts the terminal block should not be able to disengaged, opened or loosen from any side. Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally & should be traceable in such a way that attempts can be proved in court of law.</p> <p>5.2.2 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.</p> <p>5.2.3 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 Heat Deflection temperature test given in ISO 75 for temperature of 180°C and pressure of 1.8M Pa. Tested as per ISO 75-2/A or ASTM D648.</p> <p>5.2.4 The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent on prior approval from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid)</p> <p>5.2.5 The terminals and connections shall be suitable to carry up to 120 % of I_{max} continuously (I_{max} 100 A). The size, design & material of Busbar /Shunt/Terminal shall be with suitable cross sectional area so that temperature rise will not be more than 20 °C above ambient temperature of 45°C at 120% of I_{max} loading for 06hrs continuous. This test of temp. rise shall be done on tender samples & will also be done on any samples from any supplied lot.</p> <p>5.2.6 To get the desired temp rise & avoid hot spots the design of the each terminal screw, terminal screw shall be an minus head screw brass (nickel coated) and bottom of screw should be flat.</p> <p>5.2.7 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.</p> <p>5.2.8 Temperature sensor to be provided from inside near the terminal block of the energy meter for sensing the temperature and meter should be programmed in such way that on reaching the threshold value set (as per tamper table no. 1) the event/alert should go to HES/MDMS.</p> <p>5.2.9 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 with minus head screw with at least 8 mm dia for better contact area. Terminal & screw should not be damaged during regular opening and tightening. (MS terminals not accepted)</p>
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		<p>5.2.10 Internal diameter of the terminal holes shall be minimum 9.5 mm; minimum clearance between adjacent terminals shall be 10 mm. Minimum Depth of the terminal holes shall be of 20 mm.</p> <p>5.2.11 Minimum two number of terminal screws to be provided per terminal wire.</p> <p>5.2.12 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.</p> <p>5.2.13 The Aluminum cable of 4x50sq.mm shall be used as service line. Hence the terminals shall be provided with Zinc plating or tinning or suitable compatible coating to avoid the bimetallic effect at the joints with AL core of cable.</p> <p>5.2.14 The preferred arrangement of terminals shall be linear and if any change is offered then suitable arrangement for testing at our testing lab (MMG and MTL) to be provided by bidder free of cost as per requirement.</p>
5.3	Terminal Cover	<p>5.3.1 Terminal cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPXODL.</p> <p>5.3.2 Appropriate space shall be available for incoming /outgoing cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPXODL approval). After sealing the cover, terminals shall not be accessible without breaking the seals.</p> <p>5.3.3 The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole)</p>
5.4	Sealing of meter& terminal cover	<p>5.4.1 Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons.</p> <p>5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal (on Left, Right & Top side) shall be provided by the bidder.</p> <p>5.4.3. One no polycarbonate seal shall be provided by the TPXODL. This seal shall be fix on right hand side of meter.</p> <p>5.4.4. All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection.</p> <p>5.4.5 Two 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 TPXODL specification. Rear side sealing arrangement shall not be accepted. Bidder will provide complete seal details at the time of GRN in predefined format.</p>

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		<p>5.4.6 Plug in type NIC card cover should have proper sealing arrangement and should be sealed with TPXODL polycarbonate seal.</p> <p>5.4.7 The bidder shall provide TPXODL(MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/ NIC Cover) in tabular form for every lot of meter.</p>										
5.5	TOD Feature	<p>The meter shall be capable of measuring Cumulative Energy (kWh &kVAh), and MD (kW & kVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones& time slot shall be programmable by MRI with adequate security level and in one to one /broadcast mode over the air). Current TOD (during tender) to be given is as below,</p> <table><tr><td>Slots</td><td>Time Slot</td></tr><tr><td>Normal Hours</td><td>00:00-08:00</td></tr><tr><td>Solar Hours</td><td>08:00-16:00</td></tr><tr><td>Normal Hours</td><td>16:00-18:00</td></tr><tr><td>Peak Hours</td><td>18:00 – 24:00</td></tr></table> <p>The bidder to ask TPXODL for latest TOD timing slots before manufacturing of every lot.</p>	Slots	Time Slot	Normal Hours	00:00-08:00	Solar Hours	08:00-16:00	Normal Hours	16:00-18:00	Peak Hours	18:00 – 24:00
Slots	Time Slot											
Normal Hours	00:00-08:00											
Solar Hours	08:00-16:00											
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Peak Hours	18:00 – 24:00											
5.6	MD Integration	<p>The MD integration period shall be 15 minutes (integration period-programmable by MRI / Mobile App remotely with required security. 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 six MD values shall be stored in the memory and one to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points.MD integration shall be of sliding Type at an interval of 5 min.</p>										
5.7	Parameters in BCS	<p>All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years. Last six months history data (kWh & kVAh (lag only) current & TOD reading and MD(kW &kVA(lag only) current & TOD) with data and time) and at least last 25 tamper events for each tamper shall be available in the non volatile Memory.</p> <p>Fail to be log in memory in the following conditions only in BCS not in display</p> <ul style="list-style-type: none">a) RTC failb) NVM memory failc) Battery faild) NIC card fail <p>‘High THD’ to be log in memory in the following conditions only in BCS not in display</p> <ul style="list-style-type: none">a) THDV any phase higher than thresholdb) THDI any phase higher than threshold <p>*Meter shall be programed at default ‘lag only’ configuration i.e. Leading power factor to be treated as unity for kVA & kVAh calculations.</p> <p>All the parameters shall be as per actual without multiplying factor.</p>										

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5.7.1	Load survey (for pre-paid & postpaid meter mode)	<p>The meter shall be capable of recording 15 minutes average of the following parameters not limited to mentioned below (refer IS 15959) for at least last 45 power ON days,</p> <ul style="list-style-type: none">a) Voltage for each phaseb) Current of each phasec) Actual neutral currentd) Average PFe) Average kWhf) Average kVAh (lag only)g) kVArh((All 4 quadrant)i) Temperature near terminal block (°C)j) THD Voltage phase wisek) THD Current phase wisel) Demand(KW)m) Demand(KVA) <p>During Import -Export Mode, Active Energy & Apparent Energy shown separately for Import & Export</p> <p>Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh, kVAh, kW, kVA in BCS for 45 days. Midnight energy value of cumulative kWh, kVAh and daily consumption kWh, kVAh should be available in meter memory for last 45 days.</p> <p>Load survey data should be at least with 5 decimal place</p>																																												
5.7.2	Instantaneous Parameters	<p>Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.</p> <table><tr><td>Meter Sr. No.</td><td></td></tr><tr><td>Meter Type</td><td></td></tr><tr><td>Meter date & Time</td><td>DD MM YYYY HH MM SS</td></tr><tr><td>Voltage –R</td><td>000.000V</td></tr><tr><td>Voltage –Y</td><td>000.000V</td></tr><tr><td>Voltage –B</td><td>000.000V</td></tr><tr><td>Line Current –R</td><td>00.000A</td></tr><tr><td>Line Current –Y</td><td>00.000A</td></tr><tr><td>Line Current –B</td><td>00.000A</td></tr><tr><td>Actual Neutral Current</td><td>00.00A</td></tr><tr><td>Active Current –R</td><td>00.000A</td></tr><tr><td>Active Current –Y</td><td>00.000A</td></tr><tr><td>Active Current –B</td><td>00.000A</td></tr><tr><td>Reactive Current-R</td><td>00.000A</td></tr><tr><td>Reactive Current-Y</td><td>00.000A</td></tr><tr><td>Reactive Current-B</td><td>00.000A</td></tr><tr><td>Power factor-R</td><td>0.000</td></tr><tr><td>Power factor-Y</td><td>0.000</td></tr><tr><td>Power factor-B</td><td>0.000</td></tr><tr><td>Average Power factor</td><td>0.000</td></tr><tr><td>Instantaneous Frequency</td><td>00.000Hz</td></tr><tr><td>Instantaneous Load</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr></table>	Meter Sr. No.		Meter Type		Meter date & Time	DD MM YYYY HH MM SS	Voltage –R	000.000V	Voltage –Y	000.000V	Voltage –B	000.000V	Line Current –R	00.000A	Line Current –Y	00.000A	Line Current –B	00.000A	Actual Neutral Current	00.00A	Active Current –R	00.000A	Active Current –Y	00.000A	Active Current –B	00.000A	Reactive Current-R	00.000A	Reactive Current-Y	00.000A	Reactive Current-B	00.000A	Power factor-R	0.000	Power factor-Y	0.000	Power factor-B	0.000	Average Power factor	0.000	Instantaneous Frequency	00.000Hz	Instantaneous Load	Active ,Reactive Lag/Lead, Apparent
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Average Power factor	0.000																																													
Instantaneous Frequency	00.000Hz																																													
Instantaneous Load	Active ,Reactive Lag/Lead, Apparent																																													

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		<table><tr><td>Present Cumulative Energy</td><td>Active ,Reactive Lag/Lead, Apparent</td></tr><tr><td>Cumulative PowerOff Duration</td><td>00000</td></tr><tr><td>Cumulative PowerON Duration</td><td>00000</td></tr><tr><td>Cumulative Tamper count</td><td>00000</td></tr><tr><td>Cumulative Tamper duration</td><td>00000</td></tr><tr><td>Last Billing date</td><td>dd:mm:yy</td></tr><tr><td>Terminal Block Temperature(°C)</td><td></td></tr><tr><td>Vector/phasor diagram (also showing neutral current)</td><td></td></tr><tr><td>No. of disconnector operation (Open)</td><td>00000</td></tr><tr><td>No. of disconnector operation (Close)</td><td>00000</td></tr></table>	Present Cumulative Energy	Active ,Reactive Lag/Lead, Apparent	Cumulative PowerOff Duration	00000	Cumulative PowerON Duration	00000	Cumulative Tamper count	00000	Cumulative Tamper duration	00000	Last Billing date	dd:mm:yy	Terminal Block Temperature(°C)		Vector/phasor diagram (also showing neutral current)		No. of disconnector operation (Open)	00000	No. of disconnector operation (Close)	00000
Present Cumulative Energy	Active ,Reactive Lag/Lead, Apparent																					
Cumulative PowerOff Duration	00000																					
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Vector/phasor diagram (also showing neutral current)																						
No. of disconnector operation (Open)	00000																					
No. of disconnector operation (Close)	00000																					
5.7.3	General Information	<p>Meter shall be capable for providing below mentioned general parameters in memory</p> <p>Meter Serial number Software Name Version Manufacture Name Manufacture Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile</p> <p># if any additional key is required to see this value, it should be provided without any additional cost to TPXODL.</p>																				
5.7.4	Billing Parameters	<p>1) Cumulative kwh, kVAh (lag only), kVArh lead, KVArhlag (all import and export) and for all ToD defined in the document (kWh, kVAh (Lag only), kVArh (all Quad) , For present and last 06 Resets (reset date for all resets/history, time zone register wise)</p> <p>2) Maximum Demand Absolute Active Load and Absolute Apparent load and for all ToD also. for present and last 06 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. Monthly power on/off hrs.</p> <p>3) <u>Billing Dates (06 History) Mode of operation of disconnector switch</u></p> <p>Last five modes with date & time of switching with cumulative energy parameters kWh, kVAh (lag only), kVArh lead, KVArh lag (all import and export) and all ToD wise parameters</p>																				
	PUSH Parameters & Periodicity	<p>Parameters should be pushed as per defined periodicity. The indicative parameters mentioned above.</p> <p>Billing Profile : once in a month Instantaneous Profile: 4 times in a day Event Profile: once in day</p>																				

Technical Specification for Three Phase Whole Current Energy Meter

		<p>Mid night Profile: once in a day (alongwith ToD data)</p> <p>Nameplate Profile: whenever meter starts</p> <p>Alerts: as when occurred</p>																																	
5.7.5	Transactions	All the changes in software of meter to be logged along with date & time stamp and readings. Meter should do billing if any billing related transaction is done.																																	
5.8	Display units	<p>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 70°C and minimum temperature withstands 0 °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.</p> <p>The display should be readable in direct sunlight. The back lit must be green in color for good visibility of digits in sunlight.</p> <p>The kWh & kVAh register shall have minimum 8 digits LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh & kVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing).</p>																																	
5.8.1	Auto Scroll mode & push button mode in Post paid mode	<p>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 10 sec, if push button is not operated.</p> <p>Display should not be stuck for any tamper events. All energy values should be without decimal.</p> <p>Following shall be continuously displayed in auto scroll and push button mode in the given order; (Final list shall be approved during GTP approval stage)</p> <table border="1"> <thead> <tr> <th>Display</th><th>Display 1</th><th>Display 2</th></tr> <tr> <th>Scroll Process</th><th>Auto</th><th>Push</th></tr> </thead> <tbody> <tr> <td>LCD Check</td><td>1</td><td>1</td></tr> <tr> <td>Meter Sr. No</td><td>2</td><td>2</td></tr> <tr> <td>Date</td><td>3</td><td>3</td></tr> <tr> <td>Time</td><td>4</td><td>4</td></tr> <tr> <td>Cum. kWh</td><td>5</td><td>5</td></tr> <tr> <td>Cum. kVAh</td><td>6</td><td>6</td></tr> <tr> <td>Cum. kVARh (Lag)</td><td>7</td><td>7</td></tr> <tr> <td>Cum. kVARh (Lead)</td><td>8</td><td>8</td></tr> <tr> <td>TOD Cum. kWh (T1,T2,T3, T4)</td><td>9,10,11, 11A</td><td>9,10,11, 11A</td></tr> </tbody> </table>	Display	Display 1	Display 2	Scroll Process	Auto	Push	LCD Check	1	1	Meter Sr. No	2	2	Date	3	3	Time	4	4	Cum. kWh	5	5	Cum. kVAh	6	6	Cum. kVARh (Lag)	7	7	Cum. kVARh (Lead)	8	8	TOD Cum. kWh (T1,T2,T3, T4)	9,10,11, 11A	9,10,11, 11A
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Technical Specification for Three Phase Whole Current Energy Meter

		TOD Cum. kVAh (T1,T2,T3, T4)	12,13,14, 14A	12,13,14, 14A
		Current Month MD kW	15	15
		Current Month MD kVA	16	16
		Last Month (history 1) kWh	17	17
		Last Month (history 1) kVAh	18	18
		Last Month (history 1) TOD Cum. kWh (T1,T2,T3, T4)	19,20,21, 21A	19,20,21, 21A
		Last Month (history 1) TOD Cum. kVAh (T1,T2,T3 T4)	22,23,24, 24A	22,23,24, 24A
		Last Month (history 1) MD kW	25	25
		Last Month (history 1) MD kVA	26	26
		Last Month (history 1) Power Factor	27	27
		Phase Voltages (Vr, Vy, Vb)	28,29,30	28,29,30
		Phase Currents (Ir, Iy, Ib)	31,32,33	31,32,33
		Inst. Active Power (kW)	34	34
		Inst. Apparent Power (kVA)	35	35
		Inst.Power Factor	36	36
		Voltage Sequence (R-Y-B)	37	37
		Current Sequence (R-Y-B)	38	38
		Status of Load Switch (connected or disconnected)	39	39
		High Resolution kWh	-	40
		High Resolution kVAh	-	41
		High Resolution kVARh (Lag)	-	42
		High Resolution kVARh (Lead)	-	43
		Magnetic Tamper count	-	44
		Latest Magnetic tamper occurrence date	-	45
		Latest Magnetic tamper occurrence Time	-	46
		ESD Tamper count	-	47
		Latest ESD tamper occurrence date	-	48
		Latest ESD tamper occurrence time	-	49
		TC Open tamper count	-	50
		TC Open occurrence date of very first event	-	51
		TC open occurrence time of very first event	-	52
		Count of Connect	-	53
		Date & Time of Last Occurrence	-	54,55
		Count of disconnect	-	56
		Date & Time of Last Occurrence	-	57,58

Hold the push Button for 10 sec to enter in the high resolution mode and hold, and meter should come out if no further command given for 5 min.

Technical Specification for Three Phase Whole Current Energy Meter

5.8.2	Auto Scroll mode & push button in Pre-paid mode	<p>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 10 sec, if push button is not operated.</p> <p>Display should not be stuck for any tamper events.</p> <p>All energy values should be without decimal.</p> <p>Following shall be continuously displayed in auto scroll and push button mode in the given order list is indicative; (Final list shall be approved during GTP approval stage)</p> <table border="1"> <thead> <tr> <th>Display</th><th>Display 1</th><th>Display 2</th></tr> </thead> <tbody> <tr> <td>Scroll Process</td><td>Auto</td><td>Push</td></tr> <tr> <td>LCD Check</td><td>1</td><td>1</td></tr> <tr> <td>Meter Sr. No</td><td>2</td><td>2</td></tr> <tr> <td>Date</td><td>3</td><td>3</td></tr> <tr> <td>Time</td><td>4</td><td>4</td></tr> <tr> <td>Cum. kWh</td><td>5</td><td>5</td></tr> <tr> <td>Cum. kVAh</td><td>6</td><td>6</td></tr> <tr> <td>Cum. kVARh (Lag)</td><td>7</td><td>7</td></tr> <tr> <td>Cum. kVARh (Lead)</td><td>8</td><td>8</td></tr> <tr> <td>TOD Cum. kWh (T1,T2)</td><td>9,10,</td><td>9,10,</td></tr> <tr> <td>TOD Cum. kVAh (T1,T2)</td><td>11,12,</td><td>11,12</td></tr> <tr> <td>Current Month MD kW</td><td>13</td><td>13</td></tr> <tr> <td>Current Month MD kVA</td><td>14</td><td>14</td></tr> <tr> <td>Last Month (history 1) kWh</td><td>15</td><td>15</td></tr> <tr> <td>Last Month (history 1) kVAh</td><td>16</td><td>16</td></tr> <tr> <td>Last Month (history 1) TOD Cum. kWh (T1,T2,)</td><td>17,18,</td><td>17,18,</td></tr> <tr> <td>Last Month (history 1) TOD Cum. kVAh (T1,T2,)</td><td>19,20</td><td>19,20</td></tr> <tr> <td>Last Month (history 1) MD kW</td><td>21</td><td>21</td></tr> <tr> <td>Last Month (history 1) MD kVA</td><td>22</td><td>22</td></tr> <tr> <td>Last Month (history 1) Power Factor</td><td>23</td><td>23</td></tr> <tr> <td>Phase Voltages (Vr, Vy, Vb)</td><td>24,25,26</td><td>24,25,26</td></tr> <tr> <td>Phase Currents (Ir, Iy, Ib)</td><td>27,28,29</td><td>27,28,29</td></tr> <tr> <td>Inst. Active Power (kW)</td><td>30</td><td>30</td></tr> <tr> <td>Inst. Apparent Power (kVA)</td><td>31</td><td>31</td></tr> <tr> <td>Inst.Power Factor</td><td>32</td><td>32</td></tr> </tbody> </table>	Display	Display 1	Display 2	Scroll Process	Auto	Push	LCD Check	1	1	Meter Sr. No	2	2	Date	3	3	Time	4	4	Cum. kWh	5	5	Cum. kVAh	6	6	Cum. kVARh (Lag)	7	7	Cum. kVARh (Lead)	8	8	TOD Cum. kWh (T1,T2)	9,10,	9,10,	TOD Cum. kVAh (T1,T2)	11,12,	11,12	Current Month MD kW	13	13	Current Month MD kVA	14	14	Last Month (history 1) kWh	15	15	Last Month (history 1) kVAh	16	16	Last Month (history 1) TOD Cum. kWh (T1,T2,)	17,18,	17,18,	Last Month (history 1) TOD Cum. kVAh (T1,T2,)	19,20	19,20	Last Month (history 1) MD kW	21	21	Last Month (history 1) MD kVA	22	22	Last Month (history 1) Power Factor	23	23	Phase Voltages (Vr, Vy, Vb)	24,25,26	24,25,26	Phase Currents (Ir, Iy, Ib)	27,28,29	27,28,29	Inst. Active Power (kW)	30	30	Inst. Apparent Power (kVA)	31	31	Inst.Power Factor	32	32
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		Voltage Sequence (R-Y-B)	33	33
		Current Sequence (R-Y-B)	34	34
		Status of Load Switch (connected or disconnected)	35	35
		Current Balance Amount (Current Balance)	36,37	36,37
		Current Balance Date & Time	38,39	38,39
		Total Balance at Last Recharge(Previous Balance)	40,41	40,41
		Last Recharge Amount	42,43	42,43
		Last Recharge Date & Time	44,45	44,45
		High Resolution kWh	-	46
		High Resolution kVAh	-	47
		High Resolution kVARh (Lag)	-	48
		High Resolution kVARh (Lead)	-	49
		Magnetic Tamper count	-	50
		Latest Magnetic tamper occurrence date	-	51
		Latest Magnetic tamper occurrence Time	-	52
		ESD Tamper count	-	53
		Latest ESD tamper occurrence date	-	54
		Latest ESD tamper occurrence time	-	55
		TC Open tamper count	-	56
		TC Open occurrence date of very first event	-	57
		TC open occurrence time of very first event	-	58
		Count of Connect		59
		Date & Time of Last Occurrence	-	60,61
		Count of disconnect	-	62
		Date & Time of Last Occurrence	-	63,64
		TOD Timing – as defined in this document above, this is to be confirmed before manufacturing of lot.		
		Following parameters may be updated multiple times during life cycle of meters over the air :		
		Enabling Post Paid to Prepaid mode and vice versa		
		remotely Import mode to export Mode and vice versa.		
		Accordingly Display parameters shall be updated remotely		

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5.9	Output Device	<ol style="list-style-type: none"> 1. Pulse Rate: The meters shall have a suitable test output device. 2 nos of Red color blinking LED (marked as imp/kWh and imp/kVArh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have constant pulse rate of (preferred value- 400) pulse / kWh & pulse/kVArh. Meter constant shall be indelibly printed on the name plate as imp / kWh & imp/kVArh. 2. Communication LCD indicator- The meter shall be provided with suitable LCD indication for communication in progress. 3. Load Switch LCD indicator- The meter shall be provided with suitable LCD indication for condition of load switch (Close/open). LCD should show when load switch is open. 4. Phase indication : Individual phases should be displayed on LCD display of meter and shall glow with minimum operating voltage (as defined in 4.05)
6.0	NAME PLATE AND MARKING	<p>Meters shall have a name plate clearly visible and effectively secured against removal. The name plate data should be laser printed. The base color of Name plate shall be blue (as of TPXODL logo) indelibly and distinctly marked with all essential particulars as per relevant standards along with the following.</p> <ol style="list-style-type: none"> i. Manufacturer's name ii. Type of Meter iii. Number of phases and wires iv. Serial number (Meter serial number shall be laser printed on name plate instead of sticker). v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage , frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh & Imp/kVArh) xi. 'BIS' Mark xii. Class index of meter xiii. "Property of TPXODL" xiv. Purchase Order No. & date xv. Guarantee period. xvi. Rated frequency xvii. Sign of double square xviii. Country of manufacture. xix. Symbol of load switch. xx. Communication Tech for WAN xxi. Category <p>However the following shall be printed in bar code / QR Code 1 on the meter nameplate.(shall be laser printed on name plate instead of sticker).</p>

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		<ol style="list-style-type: none"> 1) Manufacturer's code No.(given by TPXODL) 2) RO / PO NoTPXODL Property 3) Month/Year of manufacture. <p style="text-align: right;">Barcode 2/ QR code 2 should have only Meter Sr No.</p> <p>Bidder should ensure that NIC provided in meters are having laser printing of Sr. No., MFG date, 'Property of TPXODL' marked, PO date and no. (same as that of meterPO)</p>
7.0	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 TPXODL/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.
7.1	TYPE TEST	<ol style="list-style-type: none"> 1) All tests as defined in IS 16444 Part-1: 2015 /IS 13779:1999 & IS15959 Part-2: 2016. 2) Test against abnormal magnetic influence as per CBIP TR 325. 3) Meter shall be type tested as per BIS16444 part-1
7.2	ROUTINE TEST	<ol style="list-style-type: none"> 1) AC High Voltage test 2) Insulation test 3) Test on limits of error 4) Test of starting current 5) Test of no load condition
7.3	ACCEPTANCE TEST	<ul style="list-style-type: none"> • AC High Voltage test • Insulation test • Test on limits of error • Test of meter constant • Test of starting current • Test of no load condition • Test of repeatability of error. • Test of power consumption. • Test for Immunity against external influencing signal as per the TPXODL specification • Test for Immunity against DC Immunity as per the TPXODL specification • Test for Immunity against Tamper conditions as per the TPXODL specification • Error measurements with all abnormal condition along with ESD, magnet, • Test to Influence of Harmonics • Supply voltage and frequency variation test • Testing of self diagnostic features • Tamper count increment and logging with date and time in meter database • All tests as defined in IS 15959(Part-2):2016 • Functionality of communication module is 16444 part2 • smart meter communicability as per provision of 28 IS 15959 (part-3) • Meter reading on HES demand, Scheduled meter reading from HES, remote firmwareupgrade from HES and all programming request from HES to be simulated and checked during inspections. • Physical check of NIC and replaceable ease of the NIC module in meter. <p>Any other test required as per latest IS 16444, 15999 and relevant parts shall be tested during inspections.</p>

Technical Specification for Three Phase Whole Current Energy Meter

	a) METER BOX	<p>Acceptance Tests</p> <p>Physical verification of dimensions of the box.</p> <p>Compatibility of the box for housing the Meter, and ensuring ease of connecting and reading the meter.</p> <p>Test for mechanical strength.</p> <p>.</p> <p>Routine Tests :</p> <p>The routine test certificates for the following shall be furnished for approval of the purchaser.</p> <p>Physical verification of dimension of the box.</p> <p>Compatibility of the box for housing the meter ensuring ease of connecting and the reading the meter.</p> <p>Meter box shall be of polycarbonate transparent type (Degree of protection-IP55) Meter Box should have push button compatible with meters push button.</p> <p>Box should have optical port grove in line with meter optical port slot. There should be locking provision available for meter optical cord. The arrangement should be such that meter can be read through optical cord without opening the meters box.</p> <p>Terminal of the meters should not be accessible through Glands of the meters once the cable in installed.</p> <p>Cable Entry & Exit through Side of Box.</p> <p>There should be minimum 20 mm spacing between meter and meter box from all sides. From front it should be minimum 10 mm and behind it should be minimum 5 MM.</p>
7.4	Special Test	<p>1) The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests.</p> <p>2) Temperature rise of terminal block with 120% I_{max} for 6 hours.</p>
8.0	TYPE TEST CERTIFICATE	<p>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/ UL laboratory as per BIS 16444 part-1. For communication testing TPXODL production / Testing HES will be used to ensure that the Data Model is correct. Activated SIM Card will be provided by TPXODL.</p> <p>For technical evaluation of the tender, we may consider Type test report as per IS 13779. In such case the Bidder should provide IS16444 compliant test report before starting of supply of meters. 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 TPXODL.</p>

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9.0	PRE-DESPATCH INSPECTION	<p>Inspection may be made at any stage of manufacture at the discretion of the TPXODL of the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection.</p> <p>Equipment shall be subject to inspection by a duly authorized representative of the TPXODL. Bidder shall grant free access to the places of manufacture to TPXODL's representatives at all times when the work is in progress. Inspection by the TPXODL or its authorized representatives shall not relieve the bidder 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 TPXODL.</p> <p>Following documents shall be sent along with material</p> <ul style="list-style-type: none"> a) Pre dispatch Inspection Test reports b) MDCC issued by TPXODL c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan h) Installed SIM details along with Meter No in predefined format i) Installed Seals with Meter No in predefined format j) Key of the Meter to Authorized person of TPXODL without marking to any other person k) Other Documents (as applicable) <p>Note-Photographs of packed lot clearly showing s.no of meters whose inspection call has been requested should be sent along with letter for inspection call.</p> <p>Two meters from the offered lot shall be tested for all tampers at TPXODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall be free to take any two meters from offered lot for testing at our Lab.</p> <p>Bidder should check and ensure each meter and reset each meter for any event logged for any tamper.</p>
10.0	INSPECTION AFTER RECEIPT AT STORE	<p>The material received at TPXODL'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 Plant Engineering department.</p>
11.0	GUARANTEE	<p>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 TPXODL 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</p>

Technical Specification for Three Phase Whole Current Energy Meter

		<p>at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the TPXODL 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.</p> <p>In the event of any defect in the equipment/materials, arising out of faulty design, inferior quality of raw material used or bad workmanship within the guarantee period, the seller shall guarantee to replace/repair to the satisfaction of purchaser- TPXODL the defective equipment/materials free of cost. Should however the manufacturer fails to do so within a reasonable time, the purchaser reserves the right to recover the amount from the seller either from the bills pending or may recover from the performance guarantee submitted by the Firm.</p> <p>If during the defect liability period any services performed found to be defective, these shall be promptly rectified by seller at its own cost (including the cost of dismantling and reinstallation) on the instructions of the purchaser.</p> <p>The rate of failure of meters within guarantee period shall not exceed more than 1% of the entire supplied quantity (lot wise). In exceeding the rate of failure by 1% TPXODL reserves the right to forfeit and invoke the CPBG.</p> <p>Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.</p>
12.0	PACKING	<ol style="list-style-type: none"> 1. 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 IS15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with min. tests as defined in 7.2) of the individual meter shall be kept inside each card board carton of the meter. 3. On back side of RTC the bidder shall print a picture of the meter with its small details like for consumer to know about meter. 4. The softcopy of the routine test certificate of each meter to be provided with each lot to TPXODL, MMG stores. 5. The routine test certificate shall contain results & all tests of clause no. 7.2.

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13.0	SAMPLE	<p>Tendering stage:</p> <p>Bidders are required to manufacture 04 numbers of sample meters as per the TPXODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits) and submit the samples (non-returnable) along with bid for approval. The tender sample as per IS 13779 & IS 15959 shall be acceptable for verification and other checks. The samples shall be retained at TPXODL.</p> <p>Address of Dispatch: Meter Testing Lab, TPXODL, address will be provide later.</p> <p>Pre-manufacturing approvals:</p> <p>The successful bidder shall submit four prototype samples of meters at Meter Testing Lab, at location informed by TPXODL during submission time, for further testing and compliance as per specifications and get approval before mass manufacturing.</p> <p>Following accessories to be submitted along with sample at both stages:</p> <ol style="list-style-type: none"> 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS 6) Internal connection diagram. <p>All meters shall be supplied with 4G enabled Sim cards. Bidder to demonstrate all communication features and performance SLA on their HES.</p>
14.0	QUALITY CONTROL	<p>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.</p> <p>Quality should be ensured at the following stages:</p> <p>At PCB manufacturing stage, each board shall be subjected to computerized bare board testing.</p> <p>At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation.</p> <p>Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs).</p> <p>Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 DegC temperature and atmospheric humidity under real-life condition at its ful load current. After 24 hours meter should work satisfactorily.</p> <p>TPXODL's engineer or its nominated representative shall have free access to the bidder's/manufacture's works to carry out inspections.</p>

15.0	MINIMUM TESTING FACILITIES	<p>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 NABL calibrated Reference Standard meter of Class 0.02 accuracy or better for Acceptance Test Scope. Other equipment should be calibrated and traceable to NPL.</p>
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Technical Specification for Three Phase Whole Current Energy Meter

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 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.																																													
17.0	SPARES, ACCESSORIES AND TOOLS	<div>1. Bidder should provide 5 Nos of NIC card for 100 Meters or part of for troubleshoot communication problem. TPXODL will return faulty NIC cards and replenish with New NIC card so that non-communication problem can addressed.</div> <div>2. Bidder to be provide free of cost 02 nos of jig for retrieving data from memory of meter with every new design of meter in which previous jig is supplied cannot be used. Jig should be such that NVM can be push fit on this jig and data can be retrieve from this NVM.</div> <div>3. Fifty (50) nos. of optical cord to be provided in first lot for retrieving the data of meter through optical port. Once supplied, it is not required in subsequent lots.</div>																																													
18.0	DRAWINGS AND DOCUMENTS	<div>Following drawings & Documents shall be prepared based on TPXODL 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</div> <div>After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval:</div> <table><tr><th>S. No.</th><th>Description</th><th>For Approval</th><th>For Review Information</th><th>Final Submission</th></tr><tr><td>1</td><td>Technical Parameters</td><td>√</td><td></td><td>√</td></tr><tr><td>2</td><td>General Arrangement drawings</td><td>√</td><td></td><td>√</td></tr><tr><td>3</td><td>Terminal block Dimensional drawings</td><td>√</td><td></td><td>√</td></tr><tr><td>4</td><td>Mounting arrangement drawing.</td><td>√</td><td></td><td>√</td></tr><tr><td>5</td><td>Manual/Catalogues</td><td></td><td>√</td><td></td></tr><tr><td>6</td><td>Transport/ Shipping dimension drawing</td><td></td><td>√</td><td>√</td></tr><tr><td>7</td><td>QA & QC Plan</td><td>√</td><td>√</td><td>√</td></tr><tr><td>8</td><td>Routine, Acceptance and Type Test Certificates</td><td>√</td><td>√</td><td>√</td></tr></table>	S. No.	Description	For Approval	For Review Information	Final Submission	1	Technical Parameters	√		√	2	General Arrangement drawings	√		√	3	Terminal block Dimensional drawings	√		√	4	Mounting arrangement drawing.	√		√	5	Manual/Catalogues		√		6	Transport/ Shipping dimension drawing		√	√	7	QA & QC Plan	√	√	√	8	Routine, Acceptance and Type Test Certificates	√	√	√
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Technical Specification for Three Phase Whole Current Energy Meter

		<p>Bidder shall subsequently provide Soft copy of all the drawing, GTP, Test certificates for the final approval of TPXODL.</p> <p>All the documents & drawings shall be in English language.</p>																																																																																
19.0	GUARANTEED TECHNICAL PARTICULARS	<p>A) Meter details-</p> <table><tr><th>Sr.No</th><th>Description</th><th>Units</th><th>As Furnished by Bidder</th></tr><tr><td>1</td><td>Type of meter</td><td></td><td></td></tr><tr><td>2</td><td>Accuracy Class of the meter</td><td></td><td></td></tr><tr><td>3</td><td>Ib & I_{max}</td><td>A</td><td></td></tr><tr><td>4</td><td>a. Operating Voltage for meter b. Operating Voltage with communication unit functionality</td><td>V</td><td></td></tr><tr><td>5</td><td>Operating Frequency</td><td>Hz</td><td></td></tr><tr><td>6</td><td>Power Consumption and Burden</td><td></td><td></td></tr><tr><td>7</td><td>Starting Current</td><td>mA</td><td></td></tr><tr><td>8</td><td>Short time over current</td><td>A</td><td></td></tr><tr><td>9</td><td>Influence of heating</td><td></td><td></td></tr><tr><td>10</td><td>Rated impulse withstand voltage</td><td>KV</td><td></td></tr><tr><td>11</td><td>AC withstand Voltage for 1 min</td><td>KV</td><td></td></tr><tr><td>12</td><td>Insulation resistance a) Between frame & Current, voltage circuits connected together: b) Between each current(or voltage circuit) & each and every other circuit.</td><td>M ohm</td><td></td></tr><tr><td>13</td><td>Mechanical requirement as per IS 13779</td><td></td><td></td></tr><tr><td>14</td><td>Resistance to heat and fire (As per specification)</td><td></td><td></td></tr><tr><td>15</td><td>Degree of protection</td><td></td><td></td></tr><tr><td>16</td><td>Resistance against climatic influence (as per IS 13779)</td><td></td><td></td></tr><tr><td>17</td><td>Electromagnetic Compatibility (EMC)</td><td></td><td></td></tr><tr><td>18</td><td>Accuracy requirements (As per IS 13779)</td><td></td><td></td></tr><tr><td>19</td><td>Power factor range</td><td></td><td></td></tr></table>	Sr.No	Description	Units	As Furnished by Bidder	1	Type of meter			2	Accuracy Class of the meter			3	Ib & I _{max}	A		4	a. Operating Voltage for meter b. Operating Voltage with communication unit functionality	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			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)			18	Accuracy requirements (As per IS 13779)			19	Power factor range		
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Technical Specification for Three Phase Whole Current Energy Meter

			20	Energy measurement		
			21	Connection Diagram for system on terminal cover	Yes/No	
			22	Self diagnostic features		
			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 b) Internal diameter of terminal holes c) Clearance between adjacent terminals	mm mm mm	
			25	Communication capabilities as per clause 4.3		
			26	Immunity & logging against abnormal Magnetic influence, as defined in Cl. 4.4		
			27	Immunity & logging against ESD/Jammer as defined in Cl. 4.4		
			28	DC & other tampers Immunity and logging as defined in Cl. 4.5		
			29	Abnormal tamper events and logging with snapshot in all Conditions as per table no-1	Yes/No	
			30	Grade/Name of material used for a) Meter base b) Meter cover c) Terminal block d) Terminal cover		
			31	Tamper counters	Yes/No	
			32	Recording forward energy in all tamper conditions	Yes/No	
			33	Display back lit color		
			34	Non Volatile memory (Retention period)		
			35	Measuring elements used in the meter		
			36	Power supply to circuit in case of supply failure		

Technical Specification for Three Phase Whole Current Energy Meter

		37	Display of measured values (As per specification –clause 5.8)	Yes/No	
		38	LCD display (Type and viewing angle)		
		39	Pulse rate	Imp/kWh, Imp/kVArh	
		40	Name plate marking with laser printer	Yes/No	
		41	Routine test certificates	Yes/No	
		42	Acceptance test Certificates	Yes/No	
		43	Type test certificates	Yes/No	
		44	Guarantee certificates	Yes/No	
		45	Output Device(LEDs)As per Cl.5.9	Yes/No	
		46	Make of Disconnect Switch		
		47	Disconnect Technical particular as per Specification Cl no- 4.1	Yes/No	
		48	Terminal Screw dia.		
		49	Allen Screw head size & Screws per wire (Terminal Screw)		
		50	Fire retardant category of the material a. Meter body b. Terminal block		
		51	Meter sealing as per clause 5.4		
		52	Temperature Sensor near terminal block at incoming side		
		53	Chemical welding of cover and base		
		54	Providing zig for NVM data retrieval after meter		
			damaged at site as per clause no. 17		
		55	NIC module with cover & sealing arrangement		

Technical Specification for Three Phase Whole Current Energy Meter

56	Meter shall be programed at default 'lag only' configuration i.e. Leading power factor to be treated as unity for KVA & KVAh calculations, except for instantaneous parameters where values and Vector Diagram should show actual kVAh considering lead and Lag both.		
57	Dimensions of the meter LxBxH		
58	Terminal material		
59	Terminal Screw material and plating details		
60	Harmonics Recording- The recording of harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD.		
61	Accuracy of harmonics recording		

B) Component data

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	
2.	Memory chips/NVM	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or Electrostatic discharges. The life of NVM shall be 15 years.	
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	

Technical Specification for Three Phase Whole Current Energy Meter

				<p>should not disturbed with the life of display. Should be with Green LED background. It should be trans-reflective STN Type industrial grade with extended temperature range.</p>	
		4.	Optical port	<p>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. It should be magnetic locking type</p>	
		5	P.C.B.	Glass Epoxy, fire resistance grade with minimum thickness 1.6 mm	
		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.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt. The microcontroller shall be of superior quality from reputed make with long life.	
		9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	