Technical Specification for HTCT Meter

1	SCOPE	This specification covers the technical requirements of design, manufacturing, testing at meter manufacturer's works ,packing, forwarding, supply and unloading at store/site of Three Phase Four Wire, HT (CT and VT operated) AC Static Smart Meters of accuracy class as per below table (here after referred as meters) complete with all accessories for efficient and trouble free operation with **network communication module (NIC)** compatible with **4G** technology.

Sr. No.	PT Ratio (Ph to Ph)	CT Ratio (Ib)	Accuracy Class
1	-/110V	-/1A	0.2S
2	-/110V	-/5A	0.5S
3	-/110V	-/5A	0.2S
4	11kV/110V	-/5A	0.5S
5	11kV/110V	-/1A	0.5S
6	33kV/110V	-/5A	0.2S
7	33kV/110V	-/1A	0.2S

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. Suchcomponents 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 orderor not.

2	APPLICABLE STANDARDS	a.	IS 16444 part 2: 2017	A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S(Smart Meters)
		b.	IS15959 Part3: 2017	Data exchange for electricity meter reading, tariff and loadcontrol
		c.	IS 14697	A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S
		d.	IEC 60687 (1992-06)	AC Static Watthour Meters for active energy (class 0.2s and 0.5s)
		e.	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
		f.	IS 12346: 1999	Testing Equipment For Ac Electrical Energy Meters
		g.	IS 11000	Fire Hazard Testing
		h.	IEC 62052 Part 11 : 2003	Electricity metering equipment (AC) - General requirements , tests and test conditions – metering equipment
		i.	IEC 62053 Part 22: 2003	Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for activeenergy (classes 0,2 S and 0,5 S)
		j.	IS 15707: 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
		k.	IEC 60068	Environmental testing.
		l.	CBIP–TRNo.325	Specification for A.C. Static Electrical Energy Meters(latest amendment)
		m.	CEA Regulation (2019)	Installation and operation of meters
		n.	IS 60529	Degree of protection provided by enclosure
		o.	IEC 62056-61	Electricity metering- Object Identification system (OBIS)

		p.	ASTM D648	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
		q.	IS 11731-1	Methods of test for determination of the flammability of solid electrical insulating materials when exposed to an igniting source, Part 1: Horizontal specimen method
		r.	IS 11731-2	Methods of Test for Determination of Flammability of Solid Electrical Insulating Materials When Exposed to AnIgniting Source, Part 2: Vertical Specimen Method\
		s.	ISO 75 Part 1&2	Determination of temperature of deflection under load
3	CLIMATE CONDITIONS OF THE INSTALLATION	Max. Ambient Temperature : 70 deg.C Max. Daily average ambient temp. : 40 deg.C Min Ambient Temp : -10 deg C Maximum Humidity : 100% Minimum Humidity : 10% Average No. of thunderstorm days per annum : 50 Maximum Annual Rainfall : 760 mm Average No. of rainy days per annum : 60 days Rainy months : June to Oct. Altitude above MSL not exceeding : 300 meters Wind Pressure : 126 kg/sq m up to and elevation at 10 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 accessoriesshall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g			
4	GENERAL TECHNICAL REQUIREMNTS	SNO	DESCRIPTION	REQUIREMENT
		4.01	Type of the meter	Three Phase Four Wire, AC Static Current Transformer (CT) and Voltage Transformer (VT) operated Watthour and Var-hour Smart Meter. It consists of measuring elements(s), time of use of register(s) and display and plug in type bi-directional communication module all integral within the meter housing.
		4.02	Accuracy Class of the meter	Active / Reactive Energy Measurement, Class : as per above table no in clause no 1
		4.03	Basic Current (Ib)& rated Maximum Current (Imax)	Ib as per table no mentioned in clause 1, and Imax is equal to 2 time of Ib
		4.04	Reference conditionsfor testing the performance of the meter	Vref = 63.5 V (phase to neutral) Frequency = 50HzTemperature= 27^0C
		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 110V between phase andneutral (for minimum 5 min).
		4.06	Operating Frequency	50 Hz± 5%.

		4.07	Power Consumption	Voltage circuit: Maximum 5W and 15 VA Current Circuit :Maximum 1VA (The additional power requirement during data transmission shall not exceed 7W as mentioned in IS16444 part-2 whichever is lower, per communication module)
		4.08	Starting Current	0.1% of Ib – (5mA for Ib 5A) 0.1% of Ib – (1mA for Ib 1A)
		4.09	Short time over Current	20 times of Imax for 0.5sec
		4.10	Influence of heating	Temperature rise at any point of the external surface ofthe meter shall not exceed by more than 20K with an ambient temperature at 45^0 C.
		4.11	Rated Impulse withstand voltage	6 kV (shall be applied ten times with one polarity and then repeated with the other polarity and minimum timebetween each impulse to be 3 sec)
		4.12	AC withstand Voltagefor 1 min	4 kV
		4.13	Minimum Insulation resistance at test voltage 500+/- 50 Vdc a)Between frame & current ,voltage circuitsas well as auxiliary circuits connected together : b)Between each current (or voltage circuit) & each and every other circuit:	5 M ohm 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS14697& IS16444 part 2
		4.15	Resistance to heat andfire	The terminal block and Meter case shall ensure safetyagainst the spread of fire. They shall not be ignited bythermal overload of live parts in contact with them as per clause 6.8 of IS 14697. 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, butWithout suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 14697
		4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS14697.
		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause CBIP report325and IS
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS14697& IS16444 part-2
		4.20	Power factor range	Zero lag to Zero lead. Meter shall be programed at default Lag only configuration i.e. Lead to be treated asunity 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 providedon terminal cover.
		4.23	Self-Diagnostic feature	The meter shall have logging with date and time inmemory for un satisfactory / non-functioning of Real Time ClockRTC battery Non Volatile Memory Status of NIC (installed/ discovered/ normal)/SignalStrength
		4.24	Initial start-up of meter	Meter shall be fully functional within stipulated time as per IS .
		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	Internal diameter of theterminal holes: Depth of the terminal holes:	5 mm (minimum) 20 mm (minimum)
		4.27	Clearance between adjacent terminals	10 mm (minimum)
		4.28	Display	Backlit LCD, Scrolling, 10 seconds for each parameter minimum 8 digits for reading LCD display
		4.29	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 HHU / mobile App & HES connectivity including required training to use the software free of cost. If this software can be used in a device readily available in market and can connect to meter through optical port or other communication port without any security checks or with MR securities which OEM will provide then, OEM can provide only software, else the device on which this software will run is also to be provided along with technical specification of this device.
		4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. Similarly for metering mode from Import only to Export-Import (NET mode) and vice versa, through proper authentication process remotely over the air (OTA). The change should be recorded as Transaction Event. Billing should be done at that time of firmware upgrade so that readings at which this upgrade hashappened are logged in meter and system. While in Import – Export mode, Meter shall continue to work in Lag only configuration and forward metering mode should be stopped.
		4.33	Usage Application	Indoor

		4.34	Chemical Bonding	Meter cover and body should be continuous and seamless chemically bonded, so that meter should not open without leavingclear mark..	
		4.35	Communication module of meter for AMI	As per clause no 1.4 (b) of IS 16444 part-2. Meter should have provision of communication module compatible with both the variant mentioned in IS16444 part-2. This module should be able to get connected to the 4GNetwork . Meter should be able to provide required power supply to NIC card provided by communication provider .	
		4.36	Communication LayerProtocol	Should be as per clause 8.3 of IS 16444 part 2	
		4.37	Key Management and Security Feature	Should be as per IS 15959 part 2 and 3	
		4.38	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 30/15 minutes (as applicable) integration period in load survey. Accuracy of harmonics recording shall be as per meter accuracy class. The meter shall generate aflag whenever the threshold (user configurable) of the5% THD of the load current and voltage is breached.	
		4.39	The terminal pin arrangement	The terminal pin shall be 10 pin Zigzag / straight arrangementwith phase voltage terminal in between current terminals as mentioned in clause no. 5.2.11	

4.1	NIC MODULE DETAILS & INTEGRATION	With the service providers offering 4G services, TPXODL intends to leverage 4G as the communication technology for meter data acquisition. The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade 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. NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. NIC card for all type meter shall be same .

<table>
<tr><td></td><td></td><td>NIC shall also support on-demand / schedule reading, time sync, configuration and over the air firmware upgrade from the head-end system.
NIC shall have persistent network connectivity throughout as defined by 4Gstandards. It shall support self-configuring features.

NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field.
Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view.
NIC shall support standard security protocols. NIC
shall be compliant with cyber security norms.
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.
Attributes such as Firmware version, Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. Data must be encrypted.
LED indication for System, Power ON indicator.
Colour coded LED (a) For latching on to the network (b) For latched on to the network
(c) For data flow indication.
Meter display should have provision for showing if NIC card if
<table>
<tr><th>Error Details</th><th>Error ID</th></tr>
<tr><td>All Good</td><td>Err 00</td></tr>
<tr><td>Meter NIC communication failure</td><td>Err 01</td></tr>
<tr><td>NIC initialization failure</td><td>Err 02</td></tr>
<tr><td>SIM not detected</td><td>Err 03</td></tr>
<tr><td>SIM invalid</td><td>Err 04</td></tr>
<tr><td>No GPRS Network coverage</td><td>Err 05</td></tr>
<tr><td>GPRS Network registration failure</td><td>Err 06</td></tr>
<tr><td>GPRS registration denied</td><td>Err 07</td></tr>
<tr><td>APN not configured</td><td>Err 08</td></tr>
<tr><td>GPRS connection not established</td><td>Err 09</td></tr>
<tr><td>HES IP/Port not configured</td><td>Err 10</td></tr>
<tr><td>HES port not open</td><td>Err 11</td></tr>
</table>
</td></tr>
<tr><td>4.2</td><td>Communication capabilities and software feasibilities</td><td>4.2.1 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 viaPlug 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/handheld device shall be integrated to HES data base.</td></tr>
<tr><td></td><td></td><td>4.2.2 It should be the responsibility of the bidder to ensure integration of meter into HES. .</td></tr>
<tr><td></td><td></td><td>4.2.3 It shall be possible to reconfigure the meters for RTC, TOD slots reprogramming, DIP (Demand Integration period), billing date, display parameters, RTC etc. through proper authentication process locally through MRI 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.</td></tr>
<tr><td></td><td></td><td>4.2.4 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.</td></tr>
<tr><td></td><td></td><td>4.2.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having propersealing arrangement.</td></tr>
</table>

		4.2.6 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 handover the SIM cards to OEM and supply will be accepted with SIM cards
		4.2.7 Meter should be supplied to TPXODL along with NIC card. NIC card should be plug in type with proper sealing arrangement. The guarantee of NIC card shall be same as meter and shall be replaced by bidder free of cost. 5 Nos of NIC card on 100 No of Meter should be supply as free of cost, for troubleshooting of faulty NIC cards and should be replenish on return of faulty NIC card. *4.2.8 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. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI/ Mobile App), BCS / 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.* *4.2.9 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/HHU in separate PC/laptop. Android based or windows based HHU / mobile App shall be preferred.* *4.2.10 For purpose of exercising control, like outage management, the meter should send abnormalities at the consumers' end like Power failure (Last Gasp) instantly, Power Restoration (First Breath) as event. Additional exceptional events should also be communicated to HES by meter immediately after the occurrence through4G. It should also indicate the restoration of the same event.* *4.2.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede.* *4.2.14 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for 4G shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission.*
		4.2.15 Integration of meter software's with HES / MDMS for seamless transfer of data will also bein 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. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter.
		4.2.16 Communication of the meter at optical port /FOTA (NAN/WAN) should be as per IS 15959(Part-2):2016. The optical port should be with proper lockable mechanism
		4.2.17 Communication 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.
		4.2.19 The required OBIS codes will be finalized with successful bidder as per IS 15959. and tata power specific OBIS code

4.2.20 Meter display should have provision for showing if NIC card if :

Error Details	Error ID
All Good	Err 00
Meter NIC communication failure	Err 01
NIC initialization failure	Err 02
SIM not detected	Err 03
SIM invalid	Err 04
No GPRS Network coverage	Err 05
GPRS Network registration failure	Err 06
GPRS registration denied	Err 07
APN not configured	Err 08
GPRS connection not established	Err 09
HES IP/Port not configured	Err 10
HES port not open	Err 11

4.2.21 If any tamper occurs in power off situation, it should be pushed as soon as the meter ispowered on.

4.2.22 Bidder to provide facility for Up-gradation / Modification of Firmware

4.2.23 Following parameters may be updated multiple times during life cycle of meters over the air :
Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.

4.3	**Immunity against external influencing signals**	**4.3.1. Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 14697:1999 Cl.11.2 and variation in limits of error (up to 100% Imax) shall be as per the table 13 of IS 14697. Meter shall be immune to any 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 actions: Meter shall log the event in its memory as" Magnet" with date and time stamp along with snapshot and the event logging threshold values as per table no.1 in 4.5 The energy recording to shift on I max, Vref. with UPF. **Abnormal Magnetic field is defined as below:** a. Continuous DC magnetic induction: >0.20 Tesla ± 5% (Value of the magneto motive force to beapplied shall be generally >10000 AT. b. AC magnetic induction: >10 milli Tesla (if produced with circular metal core with squarecross section as specified in CBIP latest report with 2800 AT) c. Permanent Magnet**:** Immune up to 0.5T and Event logging >0.5T.

<table>
<tr><td></td><td></td><td>4.3.2 Electrostatic Discharge (ESD)
a. Meter shall be immune up to 50 kV and shall record accurate energy as per IS-14697:1999/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 4.5.
b. 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. Meter should immune to high/ low frequency jammer devices. Meter shall log the event in itsmemory as” JAMMER” with date and time stamp along with snap shot, the threshold values as per table no. 1 in 4.5.</td></tr>
<tr><td>4.4</td><td>Neutral Disturbance & other tampers</td><td>4.4.1 The meter shall log the event in memory on thresholds defined in table 1 in 4.5

4.4.2 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/ DCsignal/ DC pulse up to 330V (both + & - DC) and for any value beyond this, of any low frequency and harmonics. Meter shall log the event into memory as ‘Neutral Disturbance’ with date & time stamp the thresholds are as per table no. 1 in clause 4.5 below.</td></tr>
<tr><td>4.5</td><td>Abnormal Tamper conditions</td><td>4.5.1 The meter shall record forward energy under all abnormal tampering conditions and shall becapable of recording occurrence and restoration of abnormal events listed in table no. 1 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.
4.5.2 For all tamper events the time stamp and snapshot parameters shall be recorded at thestart time of event for occurrence (T1) and for restoration the time stamp and snapshotparameters shall be recorded at the end time of the event (T3).
4.5.3 During abnormal & tamper conditions, the current shall be recorded as active current and linecurrent. Each such event shall be provided with minimum count 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.
4.5.4 Multiple occurrences of same event, with different time stamps should not be logged withoutrestoration of first occurrence, except for the case of Top Cover Open.

4.5.5 All tamper/event logging thresholds values shall be configurable remotely over the air(OTA).
Table No.1
Meter shall be provided with feature for terminal cover opening with time stamping.
<table>
<tr><th>Persistence Time for Occurrences</th><th>Persistence Time for Restoration</th><th>Threshold Value for Occurrence of Events</th><th>Threshold Valuefor Restoration of Events</th><th>Compartment Size</th></tr>
<tr><td>ESD/JAMMER
= immediate (record only 1 event on first application & only one event for next 1min)(ESD)</td><td>ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)</td><td>Immunity up to 50 KV with NIC and logging of event >50KV</td><td>Removal of ESD/JAMMER signal</td><td>25</td></tr>
<tr><td>Magnet
= 0 Hr 1 Min 0 sec (MAGNET/MAG)</td><td>Magnet = 0 Hr 1 Min 0 sec (MAGNET/MAG)</td><td>a) Permanent magnet > 0.5 Tesla

b) DC magnetic induction > 0.2Tesla

C) AC magnetic induction > 10 mT (of any frequency)</td><td>a) permanent magnet < 0.5 Tesla

B DC magnetic induction < 0.2T

c) AC magnetic induction <10 mT</td><td>25</td></tr>
</table>
</td></tr>
</table>

		Meter Top Cover Open(TCOpen) immediate	Meter Top Cover Open(TCOpen) 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 < 70% ofVref AND current > 2% Ibasic	Voltage > 70% of Vref AND current > 2% Ibasic	25
		Voltage Unbalance =0 Hr 30 Min 0 sec (VU)	Voltage Unbalance =0 Hr 2 Min 0 sec	20% or more between thephases and current > 2%Ibasic	Shall be less than 10 % between the phases and current > 2% Ibasic	25
		CT Open (phase wise) = 0Hr10 Min 0sec	CT Open (phase wise) = 0Hr 2 Min 0 sec	Phase Current < 1%of Ibasic AND Current on other phases > 10% of Ibasic with all current positive	Phase Current > 10% of Ibasic with allcurrent positive	25
		CT Reversal = a) Unidirectional 0Hr10 Min 0sec (CTR) **b) Bi Directional** (logged when only one OR two phases are revered) 0Hr10 Min 0 sec (CTR) . No log if all three phases are reverse	a) CT Reversal =0 Hr 2 Min 0 sec b) CT Reversal 0 Hr 2 Min 0 sec	a) Active Current negative and energy recording forward direction b) One OR two phase Active Current negative and energy recording in as per respective direction	a) Active Current positive AND > 2 % Ibasic b) Active Current positive AND > 2 % Ibasic	25
		Invalid Phase Association **Current Unbalance** =0 Hr 30 Min 0 sec (CU)	Invalid Phase Association (Immediate) Current Unbalance =0 Hr 2 Min 0 sec	Incorrect Phase connections (logic to be provided by bidder) Current difference > 10%between	Correct Phase Connections (logicto be provided by bidder) Current difference < 5% between the	5
		Current Unbalance =0 Hr 30 Min 0 sec (CU)	Current Unbalance =0 Hr 2 Min 0 sec	Phases and Imin 10% of Ibasic	phases and Imin >5% of Ib	25
		Low Power Factor =0 Hr 30 Min 0 sec(LPF)	Low Power Factor =0 Hr 2 Min 0 sec	I >1% of Ib and Power Factor ≤ 0.5 in any phase	I >1% of Ib 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 Vref & Current >10% Ib OR Frequency < 47Hz OR Frequency > 53Hz	Voltage <115% of Vref & Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 53	25

				OR DC voltage / signal/ pulse/chopped signal injection	Hz	
		Invalid Voltage 10 Min	2 Min	Angle between two Phases differ more than ±10 degree	Angle between two Phases differ less than ±10 degree	*25*
		Power On Off =0Hr 02 Min 0 sec	Power On Off =immediate	Actual Voltage off	Actual Voltage On	50
		Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage =0 Hr 2 Min 0 sec	Voltage > 120% of Vref ignoring the current value	Voltage <115% of Vref , ignoring the current value	25
		Over current = 0hr30min 0sec(OL)	Over Current =0hr2min 0sec	>Preset value (default value set) at120%Ib)	I<100%Ib	25
		Microwave immediate (record only 1eventon first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10mT (or mutually decided)	Removal of device	25
		NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
		4.5.6 Meter shall latch & store cumulative counts of 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. 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 forward direction and separately in defraud mode i.e. in case of CT reversal (import /Unidirectional Mode) , meter shall record scalar (not vector sum) sum of energy. The meter shall accurately distinguish between actual CT reversal and condition due to faulty reactive power compensation devices/ capacitor banks. Appropriate logics for the same shall be provided in meter. In Bi-directional mode , the meter register the energy in export mode if all three phases are reverse & there shall be no tamper logged . If one or two phases are in export mode while one or two are in import mode condition , meter shall register the CT reversal tamper & record energy as per respective direction				
		4.5.7 The meter shall register correctly if supply neutral is not available at the meter neutral terminal. The meter shall work in absence of any two incoming wires. It shall keep recording correctly in case of unbalance system voltage also as defined above. The 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. The Cover Open tamper detection should be through heavy duty, sturdy micro switches with OR gate logic such that it should not log false event on vibration or impact during handling or testing. OEM should provide all required features as per OERC billing criteria in meter even if it is not mentioned in the specifications.				

4.6	**Event Compartments**	For event compartments IS 15959 Part-3 shall be referred. The size of the event compartments should be such that all above events (in table no.1and 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 .

5	**GENERAL CONSTUCTIONS**	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. All parts, which are subject to corrosion under normal working conditions, shall be protectedeffectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. 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 ofhighest 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 TPXODL

SNo	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	USA: Analog Devices, Cyrus Logic, Atmel, Phillips, Free scale semiconductor, Texas Instruments, South Africa: SAMES, Japan: NEC
2	Memory chips/NVM	The memory chips should not be affected by the external parameters likesparking, high voltage spikes or electrostatic discharges. The life of NVM shall be 15 years.	USA: Atmel, National, Semiconductors, Texas Instruments, Phillips, Microchip,
			Japan: Hitachi or Oki, Swiss: 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 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.	Taiwan: Holtek, Singapore: Bonafied, Technologies, Korea: Advantek, China: 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	USA: National, Semiconductors, Holland / Korea: Phillips, Taiwan: MAXIM, Everlight, Japan: Hitachi
		5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6mm	A class consumer
		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.	USA: National, Semiconductors, Atmel, Phillips, Texas, Instruments,Vishay, Japan: Hitachi, Oki, AVX or Ricoh, Korea:Samsung,
		7	Battery	Lithium-ion battery with guaranteed lifeof 15 years	Varta / Tedirun / Vitzrocell / Sanyo
		8	Microcontroller 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 circuit. The micro controller shall be of superior quality from reputed make with long life.	USA: Philips , Dallas, Atmel, Motorola, Texas Instruments, Japan: Renesas, NEC or Oki
5.1	**Meter Body**	5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulatingvirgin material (protective Class II) with FV0 Fire Retardant, self - extinguishing, UV stabilize, recyclable and Anti oxidation properties. 5.1.2 The minimum thickness of the meter enclosure shall be 2mm. 5.1.3 Meter base shall be opaque with virgin polycarbonate LEXAN 500R or equivalent(i.e. chart ofLexan 500R compared with the alternative material) on prior approval			

		from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid) 5.1.4 Meter cover shall be transparent with virgin polycarbonate LEXAN 143R/943A or equivalent (i.e. chart of Lexan 500R compared with the alternative material) on prior approval from the TPXODL. (If different material offered the bidders should submit materialdata sheet in technical bid) 5.1.5 Meter cover & base shall be provided with continuous and seamless Chemical welding such that it cannot be 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 thatattempts can be proved in court of law. 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). 5.1.7 During meter manufacturing the meter seal fixing should be tightened such that the sealbody should be close to meter body and TPXODL seals should be installed at the right hand side of the meters. 5.1.8.Unidirectional screws to be used on meter covers where ever required. 5.1.9 The Meter body shall be such that the liquid or chemical shall not reach the electronic parts(in installed condition), 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 Pushbuttons etc.

5.2	**Terminals, Terminal Block**	5.2.1 Even after any attempts the terminal block should get 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& shouldbe traceable in such a way that attempts can be proved in court of law. 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 virgin materials for the terminal block adequate testing of materials shall be taken into account. 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 135°C and pressure of 1.8 MPa as mentioned in IS 14697.Tested as per ISO75-2/A or ASTM D648. 5.2.4. The terminal block shall be of opaque with virgin polycarbonate LEXAN500R or equivalent(complying with above requirement) on prior approval from the TPXODL.(The bidders should submit material data sheet in technical bid) 5.2.5 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 material and plating details of terminals screw shall be submitted bythe bidder.
		5.2.6 The manner of fixing the conductors to the terminals shall ensure adequate and durablecontact such that there is no risk of loosening or undue heating. Terminal& screw shouldnot be damaged during regular opening and tightening. 5.2.7 Temperature sensor to be provided 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. 5.2.8 Internal diameter of the terminal holes shall be minimum 5 mm; minimum clearance between adjacent terminals shall be 10 mm. Minimum Depth of the terminal holes shall be of 20 mm. 5.2.9 Minimum two number of terminal screws to be provided per terminal wire. 5.2.10 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 isnot transmitted through insulating material. 5.2.11 Meter terminal should have 10 terminals arrangement. The terminals should have center tocenter distance of min. 11.5mm. Terminal configuration shall be R-Cin,R volt, R-Cout, Y- Cin, Y volt, Y-Cout, B-Cin, B-volt, B-Cout, Neutral.

5.3	**Terminal Cover**	5.3.1 Terminal cover shall be short type and transparent with virgin polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPXODL (the bidders should submitthe relevant material data sheet in technical bid). 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 theseals. Terminal cover should be of short type 20-25 mm length. The system connection diagram shall be provided on the terminal cover. 5.3.3 The terminal cover design should be such that the sealing screw locking provision on covershould have min dimension of 3mmx3mm. (Excluding seal lock hole) 5.3.4 The terminal cover should open on the top side, during connection of the cables. The sideopening of terminal cover is not acceptable due to additional opening space requirement.
5.4	**Sealing of meter, terminal cover andNIC cover**	5.4.1 The system connection diagram shall be provided on the terminal cover. Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons. 5.4.2 For this, one no. Polycarbonate seal and three no. Hologram seal with unique serial numbers (on Left, Right & Top side) shall be provided by the bidder. *One Nos of polycarbonateseal shall be provided by the TPXODL. This seal shall be fix on right hand side of meter.* 5.4.3 All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.4 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 andas per the TPXODL specification. Rear side sealing arrangement shall not be accepted. 5.4.5 Bidder shall provide seals be as per CEA regulation (2006) and amendment thereof . Only patented seals to be usedas per CEA requirements. The bidder shall provide TPXODL(MMG and MTL) the soft record of polycarbonate seal and hologram seal serial used against each meter serial number along with its position RHS/LHS/Top/Meter body/NIC Cover) in tabular formfor every lot of meter number and also provide the NIC card serial number details along with NSP SIM number , IMEI number . 5.4.6 Plug in type NIC card cover should have proper sealing arrangement and should be sealedwith manufacturer's polycarbonate seal.

5.5	**TOD Feature**	The meter shall be capable of measuring Cumulative Energy (kWh & kVAh)both for IMPORT and IMPORT – EXPORT mode, wherever applicable and MD (kW & kVA) with time of day (TOD) registers having 8 zones & time slot shall beprogrammable by MRI/ Over the air with adequate security level and in one to one /broadcast mode over the air). Current TOD (during tender) to be given is as below: **Slots** / **Time Slot** Solar Hour - 08:00 Hrs to 16:00 Hrs Normal Hour - 16:00 Hrs to 18:00 Hrs Peak Hour - 18:00 Hrs to 24:00 Hrs Normal Hrs - 24:00 Hrs to 08:00 Hrs **The bidder to ask TPXODL for latest TOD timing slots before manufacturing of every lot.*

5.6	**MD Integration**	The MD integration period shall be 15 minutes, as applicable (integration period-programmable by MRI/HHU at site and also through HES 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 three digits after decimal points. MD integration shall be of sliding Type at an interval of 5 min & it can be configured to 30/15 minute
5.7	**Parameters in Meter**	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 15 years. It is to be ensured that any data which is pushed / pulled from meter must have Meter Sr. No. as one of the parameters. Time-sync with RTC and over-writes on drift threshold. Clarity on event logged in memory and server time-stamps matching. 'Fail' to be log in memory in the following conditions: RTC fail NVM memory fail Battery fail
5.7.1	**Load survey (for post-paid& NET meter mode)**	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Default load survey integration period is 15 minute & can be configured to 30/15 minute. The load survey data shall be recorded for 45 days with 15 minute IP & 90 days with 30 minute IP . Voltage for each phase Current of each phase Average PF (Lag / Lead with sign) Average frequency Average kWh Average kVAh (lag only, for import only) kVArh(Q1,Q2,Q3,Q4) Demand (KW) Demand(KVA) Temperature near terminal block (˚C) THD Voltage phase wise THD Current phase wise Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh/kVAh, kW/kVA for 45 days. Midnight energy value of cumulative KWh, KVAh along Signal Strength with H1 KW and KVA along with daily consumption kWh & kVAH should be available in metermemory for last 45 days. Load survey data should be at least with 5 decimal place When the meter is configured for Import & Export all the relevant parameter of Export should also be provided along with import parameters as listed above in this clause.

5.7.2	**Instantaneous Parameters**	Meter serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for following Instantaneous Parameters in Memoryand should be available in HES.

Meter Sr.No.	TPXODLXXXXXXXX
Meter Type	3P4W HTTV
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
		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
		Present Cumulative Energy	Active ,Reactive Lag/Lead,Apparent
		Cumulative Power Off Duration	00000
		Cumulative Power ON Duration	00000
		Cumulative Tamper count	00000
		Terminal Block Temperature (˚C)	
		Cumulative Billing Count	00000
		Last Billing date	dd:mm:yy
		No of Power failure	00000
5.7.3	**General Information**	Meter shall be capable for providing below mentioned general parameters in memory Meter Serial number Firmware Version Manufacture Name Manufacture Date (DD/MM/YYYY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile showing timing Metering Mode Export or Import # if any additional key is required to see this value, it should be provided without any additional cost to TPXODL .	

5.7.4	**Billing Parameters**	1. Meter serial number shall be recorded and communicated for allprofiles of data. **All these below mentioned data should be available for Import Mode and Export-Import Mode, as applicable**. 2. Cumulative kWh, kVAh (lag only for import mode), kVArh lead, lag (all import and export) and kWh for TOD1 to TOD 4 , kVAh (lag only for import mode) for TOD 1 to TOD 4 , For present and last 12 Resets (reset date for all resets/history, time zone register wise). 3. Maximum Demand Absolute Active Load and Absolute Apparent load and kW for TOD 1 to TOD 4 , kVA (lag only for import mode) for TOD 1 to TOD 4 ,TOD2), for present and last 12 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. 4. Consumption (Reading date, Current Month & 12 History, time zone register wise) kWh, kVAh & kVARh (Lag & Lead) 5. Billing Dates(12History) 6. Cumulative Billing count 7. TOD details with day time 8. Monthly power On/Off hours Cumulative energy parameters kWh, kVAh (lag only), kVArh lead, lag (all import and export) and kWh (TOD1 to TOD 4), kVAh (lag only) TOD 1 to TOD 4 . The meter shall be capable of measuring Cumulative Energy (kWh & kVAh) both for IMPORT and IMPORT – EXPORT mode, wherever applicable. Note : Meter must have provision of 8 time zones.
5.7.5	**Transactions**	All the changes in software of meter to be logged along with date & time stamp and readings indicating the particular parameter which has been programmed. Meter should do billing if any transaction is done.
5.7.6	**Tamper Events**	All events should be logged as per table no-1. The meter should not have any other event logging or any logic other than desired in specs. If any other logic is present then bidder has to disclose during tender and offering of lot and get approval for same. All other logics not mentioned in specification should be removed or disabled in meter firmware if not approved by TPXODL.
5.8	**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˚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. The display should be readable in direct sunlight. The back lit must be green in color for good visibility of digits in sunlight. The kWh & kVAh register shall have minimum 8 digits LCD display and size of the digits shall be minimum 10mm x 5mm. 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).
5.8.1	**Auto Scroll mode & Push-button mode for Import and Export-Import Modes in the Meter**	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 025.238 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. Display should not be stuck for any tamper events. Following shall be continuously displayed in auto scroll and push button mode in the given order:

For IMPORT Mode:			
Display	**Display 1**	**Display 2**	**Display 3**
Scroll Process	**Auto**	**Push**	**Battery**
LCD Check	1	1	1
Meter Sr. No	2	2	2
Date	3	3	3
Time	4	4	4
Cum. kWh	5	5	5
Cum. kVAh	6	6	6
Cum. kVARh (Lag)	7	7	
Cum. kVARh (Lead)	8	8	
TOD Cum. kWh (T1to T4)	9,10,11,12	9,10,11,12	9,10,11,12
TOD Cum. kVAh (T1 toT4)	13,14,15,16	13,14,15,16	13,14,15,16
Current Month MD kW	17	17	17
Current Month MD kVA	18	18	18
Last Month (history 1) kWh	19	19	
Last Month (history 1) kVAh	20	20	
Last Month (history 1) TOD Cum. kWh (T1to T4)	21,22,23,24	21,22,23,24	
Last Month (history 1) TOD Cum. kVAh (T1to T4)	25,26,27,28	25,26,27,28	
Last Month (history 1) MD kW		29	
Last Month (history 1) MD kVA		30	
Last Month (history 1) Power Factor	29	31	
Phase Voltages (Vr, Vy, Vb)	30,31,32	32,33,34	
Phase Currents (Ir, Iy, Ib)	33,34,35	35,36,37	
Inst. Active Power (kW)	36	38	
Inst. Apparent Power (kVA)	37	39	
Display	**Display 1**	**Display 2**	**Display 3**
Inst.Power Factor	38	40	
Voltage Sequence (R-Y-B)	39	42	
Current Sequence (R-Y-B)	40	43	
Current Month TOD MD kW with date & Time	-	44	-
Current Month TOD MD kVA with date & Time	-	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	-

High Resolution Mode
Meter Should have high resolution Mode for Kwh, KvAh,kvarh,Lag and Lead upto 4 decimal place .this Mode should be activated on holding the push button f 10 seconds and meter should come automatically out Of this mode after 5 minutes if no further command is Given.

5.9	**Output Device**	**5.9.1 Pulse Rate:** The meters shall have a suitable test output device. 2 nos of Red color blinkingLED (marked as imp per kWh and imp per Kvarh /kVAH) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters.Meter constant shall be indelibly printed on the name plate as imp / KWh & imp / kVArh . Meter constant shall be as per actual without multiplying factor. **5.9.2 Communication LCD indicator**-Meter display shall have  indication in context toNIC. The blinking should be slow when NIC is detected; blinking should be fast when NIC had searched the network and it should be stable when it is successfully latched to the HES. **5.9.3 Phase indication** : Individual phases should be displayed on LCD display of meter and shallglow with minimum operating voltage (as defined in 4.05 of GTR)

6.0	**NAME PLATE AND MARKING**	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 (Pantone 2727C) indelibly and distinctly marked with all essential particulars as per relevant standards along with the following: Manufacturer's name Type designation Number of phases and wires Serial number (Meter serial number shall be laser printed on name plate instead on sticker). Meter serial number shall be alpha numeric. Alphanumeric part detail shall be shared by TPXODL . Month and Year of manufacture (MM/YYYY) Unit of measurement Reference voltage ,frequency Ref. temperature if different from 27 deg. C Rated basic and maximum Current Meter constant (imp/kWh, Imp/kVArh) 'BIS' Mark Class index of meter "Property of TPXODL " Purchase Order No. & date Guarantee period. Rated frequency Sign of double square Country of manufacture. Firmware version for meter Category Communication Tech for WAN However the following shall be printed in bar code on the meter nameplate(shall be laserprinted on nameplate instead of any sticker). All data shall be laser printed on meter along
		with Sr.NO and date of manufacturing. No sticker to be used to avoid loss of data in event of fire. Content Format for bar code: TPXODL MMYY XXXXXXXXX (9-digit Serial no.) The PCB Serial number should be printed on the PCB instead of sticker. Bidder should ensure that each NIC provided in meters are having laser printed Sr. No., MFG date, 'Property of TPXODL' marked, PO date and no. (same as that of meter PO)
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 from CPRI/ERDA.
7.1	**TYPE TEST**	All type-tests defined in IS 16444 (Part-2) and IS 15959 (Part-3):2016 Test against abnormal magnetic influence as per CBIP TR 325. Test for Material used for Terminal Block and meter body as per relevant standards. IP test for IP 51 as per IS 60529 Bidder/BA must submit valid BIS license for manufacturing smart energy meters asper IS 16444 and IS 15959 (Part-3) with all requisite inclusions.
7.2	**ROUTINE TEST**	AC High Voltage test (Clause no. 12.7.6.3 of IS 14697) Insulation test (Table 18 of Clause no. 12.7.6 of IS 14697) Test on limits of error (Clause no. 11 of IS 14697) Test of starting current (Clause no. 12.13 of IS 14697) Test of no load condition (Clause no. 12.12 of IS 14697) Communication check of NIC (Table27 of IS 15959 (Part 3); Clause no. 9.5 & 10 of IS16444 Part -2)
7.3	**ACCEPTANCETEST**	AC High Voltage test (Clause no. 12.7.6.3 of IS 14697) Insulation test (Table 18 of Clause no. 12.7.6 of IS 14697) Test on limits of error (Clause no. 11 of IS 14697) with following loads:

120% Imax	Imax (10A)	Ib (5A)	0.1 Ib	0.02 Ib	0.05Ib	0.01Ib
UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5lag	UPF, 0.8 lead and 0.5lag	UPF, 0.8 lead and 0.5lag	UPF	UPF

		All tests as defined in IS 15959(Part-3):2017 (clause 27 & 28) Functionality of communication module IS 16444 part2 Meter reading on HES demand, Scheduled meter reading from HES, remote firmware upgrade from HES and all programming request from HES to be simulated andchecked during inspections (as per this technical specification). Physical check of NIC and replaceable ease of the NIC module in meter (as per this technical specification). Any other test required as per latest IS 16444, 15999 and relevant parts shall be tested during inspections.
7.4	Special Test	The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests.
8.0	TYPE TEST CERTIFICATE	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 BIS 16444 part-2. For communication testing any national approved laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TPXODL. For technical evaluation of the tender, we may consider Type test report as per IS 14697.In such case the Bidder should provide IS16444-2 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 .
9.0	PRE-DESPATCH INSPECTION	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. 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. Following documents shall be sent along with material)Test reports MDCC issued by TPXODL Invoice in duplicate Packing list Drawings & catalogue Guarantee / Warrantee card Delivery Challan Other Documents (as applicable) One no. leaflet with each meter 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. One copy of the report shall be sent to Plant Engineering department. Two meters from the offered lot, if deemed necessary, shall be tested for all tampers at TPXODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. BA should check and ensure each meter and reset each meter for any event logged for any tamper.

10.0	INSPECTION AFTER RECEIPTAT STORE	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.
11.0	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 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 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 bidderor from the " Security cum Performance Deposit" as the case may be. Bidder shall own responsibility for all internal component with an end to end agreement with individual component manufacturer.
12.0	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. Individual meter should be packed in separate box. Routine test report (with manufacturing company logo) of the individual meter shall be kept inside each card board carton of the meter. On back side of routine test certificate (RTC) the bidder shall print a picture of the meter with its small details like for consumer to know about meter or display parameters sheet. The softcopy of the routine test certificate of each meter to be provided with each lot to TPXODL, MMG . The routine test certificate shall contain results & all tests of clause no. 7.2. Bar code containing information of meter Sr. No should be pasted on the outer most box in which single / group of meters are transported
13.0	Material Supply & Dispatch	The supply of meter shall be within 45 days.
13.0	SAMPLE	Tendering stage: Bidders are required to manufacture 03 numbers of sample meters(Two 11 KV, One 33 KV) 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. Address of Dispatch: Meter Testing Lab Pre-manufacturing approvals: The successful bidder shall submit two 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 shall get GTP approval before mass manufacturing. Further, for 33kV Smart Meters, one sample may be asked for demonstration and compliance as per specifications, prior to the manufacturing approval. Following accessories to be submitted along with sample at both the tendering stage &pre-manufacturing approvals stages: Detailed manual Communication cords Tamper logic sheet Display parameter annunciator BCS Internal connection diagram.

14.0	TRAINING	Suitable training to be arranged for TPXODL representatives, for operation and handling of every software and hardware regarding communication between meter & HHU, meter& HES, without any cost implications towards TPXODL if applicable.
15.0	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. 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 aging 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. TPXODL's engineer(s) or its nominated representative(s) shall have free access to the bidder's/manufacturer's works to carry out inspections.
16.0	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 0.02 accuracy or better and NABL accredited Lab for acceptance test.
17.0	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.
18.0	SPARES, ACCESSORIESAND TOOLS	Bidder to be provide free of cost 02 nos. of jig (irrespective of order lot) 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. Five (5) nos. of optical cord against each 100 meter lot on pro-rata basis for retrieving the data of meter through optical port should be provided, if design of optical port is changed from those of previously supplied meters. 10 Lug & ferrule per meter , 5 NIC card per 100 Meter .
19.0	DRAWINGS AND DOCUMENTS	Following drawings & Documents shall be prepared based on TPXODL specificationsand statutory requirements and shall be submitted with the bid: Completely filled-in Technical Parameters. General arrangement drawing of the meter Terminal Block dimensional drawing Mounting arrangement drawings. General description of the equipment and all components with makes and technical requirement Type Test Certificates Experience List After the award of the contract, soft 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	√		√
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 andType Test Certificates	√	√	√

Bidder shall subsequently provide soft copy of all the drawings, GTP, data-sheet of dis-connector switch, data-sheet/ comparative analysis (of material of terminal block, terminal cover, terminal screw, meter body, meter base), Test certificates and integration documents with HES for the final approval of TPNODL, before mass manufacturing. All the documents & drawings shall be in English language.

20.0	**GUARANTEED TECHNICAL PARTICULARS**	Clause-wise compliance to this technical specification. (Require 10 optical cord per 100 Meter for data downloading through CMRI / Mobile , 10 Lug & ferrule per meter , 5 NIC card per 100 Meter)

Annexure : OBIS Code

Bidder shall provide the OBIS code as per IS 15959-Part3 , IS 15959-Part2 , IS 15959-Part1 and DISCOM specific OBIS code . The finalization of OBIS code will be done by respective Discom as per HES requirement . The Discom will provide the OBIS code after release of RC .

Integration of meter with HES is responsibility of bidder.

Three phase HT meter Parameters list

General Parameter's details:-

1. TPCODL specific OBIS code for self-diagnostic- 1.0.96.5.1.255 IC-1

2. Default TOD timing for Three phase HT CT meter is as per below
   TOD-1 00:00 Hrs to 08:00 Hrs Normal
   TOD-2 08:00 Hrs to 16:00 Hrs Solar
   TOD-3 16:00 Hrs to 18:00 Hrs Normal
   TOD-4 18:00 Hrs to 24:00 Hrs Peak

   Note:- TOU (Time ZON) timing can programmed by using activity calendar for times zone (0.0.13.0.0.255) The same OBIS code shall be used for reading the configured TOU timings.

3. Three phase default display parameter shall be configured as Post-paid & shall be programmable through HES (OTA) for following combinations.
   a. Post-paid with TOD
   b. Net mode (Import/export)

4. Meter serial number shall be alpha numeric and with 9 digits. Alphabetic part detail shall be shared by TPCODL

5. Communication LCD indicator-Meter display shall have  indication in context to NIC. The blinking should be slow when NIC is detected; blinking should be fast when NIC had searched the network and it should be stable when it is successfully latched to the HES.

6. Billing shall be done at following programming events and programing can be done OTA.
   a. Metering mode change
   b. Communication driven MD reset
   c. Time zone activation
   d. Demand integration period change
   e. Display parameter configuration
   f. Firmware upgrade
   g. Kvah configuration Lag or Lag+Lead (OBIS code 1.0.128.5.131.255,event ID 192, value 0= Lag+Lead & value 1 = Lag only)

7. Following annexures are added in this document
   a. Push data list – Annexure-A
      I. Instantaneous Profile (Four times in a Day i.e at 00:00, 06:00, 12:00 and 18:00)
      II. Daily Energy Profile (Every day at 00:00)
      III. Monthly Energy Profile (As and when MD rest Occur)
      IV. Event Flag (As and when Occur)
   b. Downloadable parameter list- Annexure-B
   c. Display parameter list - Annexure-C
   d. Tamper threshold table- Annexure-D
   e. Error Code – Annexure-E
8. Default MD integration period is 15 minute (sliding interval time 5 minute) & it can be configured to 30/15 minute

9. Default load survey integration period is 15 minute & can be configured to 30/15 minute. The load survey data shall be recorded for 45 days with 15 minute IP & 90 days with 30 minute IP
10. KVAH calculation shall be lag only by default it shall be configurable to lag + lead/lag only
    OBIS code 1.0.128.5.131.255, event ID 192, (value 0= Lag+Lead & value 1 = Lag only) shall be used for KVAH energy configuration

11. All DATE should be in DDMMYYYY format.

Three phase HT meter Push data list

Annexure -A

S. No.	Event Push data (This data shall be push when any event (Tamper, First breath, last gasp etc) is occurred)	OBIS Code	OBIS Source
1	Device ID	0.0.96.1.2.255	IS 15959 part-3
2	Event Push SM(Smart Meter) to HES	0.4.25.9.0.255	IS 15959 part-3
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-3
4	Event Status Word 1	0.0.94.91.18.255	IS 15959 part-3
5	Meter serial number	0.0.96.1.0.255	IS 15959 part-3
Note- This data shall be pushed to HES only			

S. No.	Periodic Schedule Push Profile (Meter shall push default at every 6 hours & push time is configurable by HES	OBIS Code	OBIS Source
1	Device ID	0.0.96.1.2.255	IS15959-Part-3
2	Periodic Push SM (Smart Meter)to HES	0.0.25.9.0.255	IS15959-Part-3
3	Periodic Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part-3
4	Instantaneous Profile (All instantaneous profile parameters which are mentioned in Instantaneous profile – 1.0.94.91.0.255)	1.0.94.91.0.255	IS 15959 part-2
Note- This data shall be pushed to HES only			

S. No.	Daily survey profile (Mid night) push data (This data shall be pushed at every midnight)	OBIS Code	OBIS Source
1	Device ID	0.0.96.1.2.255	IS 15959 part-3
2	Mid Night (daily) push SM(Smart Meter) to HES	0.6.25.9.0.255	TPCODL Specific
3	Real Time Clock - Date and Time	0.0.1.0.0.255	IS15959-Part-3
4	Daily survey profile (All daily survey profile parameters which are mentioned in daily profile – 1.0.99.2.0.255)	1.0.99.2.0.255	IS 15959 part-3
Note- This data shall be pushed to HES only			

S. No.	Billing Push Data (This data shall be pushed at every month end)	OBIS Code	OBIS Source
1	Device ID	0.0.96.1.2.255	IS 15959 part-3
2	Billing Push SM(Smart Meter) to HES	0.99.25.9.0.255	TPCODL Specific
3	Real Time Clock - Date and Time	0.0.1.0.0.255	IS15959-Part-3
4	Daily survey profile (All daily survey profile parameters which are mentioned in daily profile – 1.0.98.1.0.255)	1.0.98.1.0.255	IS 15959 part-3
Note- This data shall be pushed to HES only			

Three phase HT meter Downloadable Parameters List: - **Annexure-B**

Three Phase HT Meter			
S. No.		OBIS Code	OBIS Source
	Instantaneous Profile	1.0.94.91.0.255	IS15959-Part-3
1	Real Time Clock - Date and Time	0.0.1.0.0.255	IS15959-Part-3
2	Current – IR	1.0.31.7.0.255	IS15959-Part-3
3	Current – IY	1.0.51.7.0.255	IS15959-Part-3
4	Current – IB	1.0.71.7.0.255	IS15959-Part-3
5	Voltage – VRN	1.0.32.7.0.255	IS15959-Part-3
6	Voltage – VYN	1.0.52.7.0.255	IS15959-Part-3
7	Voltage - VBN	1.0.72.7.0.255	IS15959-Part-3
8	Signed Power Factor - R phase	1.0.33.7.0.255	IS15959-Part-3
9	Signed Power Factor - Y phase	1.0.53.7.0.255	IS15959-Part-3
10	Signed Power Factor - B phase	1.0.73.7.0.255	IS15959-Part-3
11	Signed three Phase Power Factor - PF	1.0.13.7.0.255	IS15959-Part-3
12	Frequency	1.0.14.7.0.255	IS15959-Part-3
13	Apparent Power - KVA	1.0.9.7.0.255	IS15959-Part-3
14	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS15959-Part-3
15	Signed Reactive Power - kVAr (+ Lag; - Lead)	1.0.3.7.0.255	IS15959-Part-3
16	Number of power failures	0.0.96.7.0.255	IS15959-Part-3
17	Cumulative power-failure duration in Min	0.0.94.91.8.255	IS15959-Part-3
18	Cumulative Tamper count	0.0.94.91.0.255	IS15959-Part-3
19	Cumulative Billing count	0.0.0.1.0.255	IS15959-Part-3
20	Cumulative programming count	0.0.96.2.0.255	IS15959-Part-3
21	Billing Date	0.0.0.1.2.255	IS15959-Part-3
22	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part-3
23	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS15959-Part-3
24	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part-3
25	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS15959-Part-3
26	MD kW, Import/Forwarded with date & time	1.0.1.6.0.255	IS15959-Part-3
27	MD kVA, Import/Forwarded with date & time	1.0.9.6.0.255	IS15959-Part-3
28	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part-3
29	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part-3
30	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part-3
31	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part-3
32	Cumulative power on duration (min)	0.0.94.91.14.255	IS15959-Part-3
33	Temperature	0.0.96.9.128.255	TPCODL
34	R Phase active Current	1.0.31.7.128.255	TPCODL
35	Y Phase active Current	1.0.51.7.128.255	TPCODL
36	B Phase active Current	1.0.71.7.128.255	TPCODL
37	MD kW, Export with date & time	1.0.2.6.0.255	IS15959-Part-3
38	MD kVA, Export with date & time	1.0.10.6.0.255	IS15959-Part-3
39	Angle between R-Y phase voltage	1.0.81.7.10.255	TPCODL
40	Angle between R-B phase voltage	1.0.81.7.20.255	TPCODL
41	Phase Sequence	1.0.128.7.0.255	TPCODL
42	Signal Strength (CSQ value)	0.1.96.12.5.255	TPCODL
43	NIC IMEI number (Serial number)	0.0.96.1.5.255	TPCODL
44	SIM ICCID (serial number)	0.0.96.1.9.255	TPCODL
45	Meter Serial number	0.0.96.1.0.255	IS 15959 Part-3
Note- This data shall be read through BCS & HES			

S. No.	Billing Profile	OBIS Code	OBIS Source
	Billing Profile	1.0.98.1.0.255	IS15959-Part-3
1	Billing Date	0.0.0.1.2.255	IS15959-Part-3
2	System Power Factor For Billing Period for Import /Forwarded	1.0.13.0.0.255	IS15959-Part-3
3	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part-3
4	Cumulative Energy kWh TZ1, Import/Forwarded	1.0.1.8.1.255	IS15959-Part-3
5	Cumulative Energy kWh TZ2, Import/Forwarded	1.0.1.8.2.255	IS15959-Part-3
6	Cumulative Energy kWh TZ3, Import/Forwarded	1.0.1.8.3.255	IS15959-Part-3
7	Cumulative Energy kWh TZ4, Import/Forwarded	1.0.1.8.4.255	IS15959-Part-3
8	Cumulative Energy kWh TZ5, Import/Forwarded	1.0.1.8.5.255	IS15959-Part-3
9	Cumulative Energy kWh TZ6, Import/Forwarded	1.0.1.8.6.255	IS15959-Part-3
10	Cumulative Energy kWh TZ7, Import/Forwarded	1.0.1.8.7.255	IS15959-Part-3
11	Cumulative Energy kWh TZ8, Import/Forwarded	1.0.1.8.8.255	IS15959-Part-3
12	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part-3
13	Cumulative Energy kVAH TZ1, Import/Forwarded	1.0.9.8.1.255	IS15959-Part-3
14	Cumulative Energy kVAH TZ2, Import/Forwarded	1.0.9.8.2.255	IS15959-Part-3
15	Cumulative Energy kVAH TZ3, Import/Forwarded	1.0.9.8.3.255	IS15959-Part-3
16	Cumulative Energy kVAH TZ4, Import/Forwarded	1.0.9.8.4.255	IS15959-Part-3
17	Cumulative Energy kVAH TZ5, Import/Forwarded	1.0.9.8.5.255	IS15959-Part-3
18	Cumulative Energy kVAH TZ6, Import/Forwarded	1.0.9.8.6.255	IS15959-Part-3
19	Cumulative Energy kVAH TZ7, Import/Forwarded	1.0.9.8.7.255	IS15959-Part-3
20	Cumulative Energy kVAH TZ8, Import/Forwarded	1.0.9.8.8.255	IS15959-Part-3
21	MD kW, Import/Forwarded with date & time	1.0.1.6.0.255	IS15959-Part-3
22	MD kW TZ1, Import/Forwarded with date & time	1.0.1.6.1.255	IS15959-Part-3
23	MD kW TZ2, Import/Forwarded with date & time	1.0.1.6.2.255	IS15959-Part-3
24	MD kW TZ3, Import/Forwarded with date & time	1.0.1.6.3.255	IS15959-Part-3
25	MD kW TZ4, Import/Forwarded with date & time	1.0.1.6.4.255	IS15959-Part-3
26	MD kW TZ5, Import/Forwarded with date & time	1.0.1.6.5.255	IS15959-Part-3
27	MD kW TZ6, Import/Forwarded with date & time	1.0.1.6.6.255	IS15959-Part-3
28	MD kW TZ7, Import/Forwarded with date & time	1.0.1.6.7.255	IS15959-Part-3
29	MD kW TZ8, Import/Forwarded with date & time	1.0.1.6.8.255	IS15959-Part-3
30	MD kVA, Import/Forwarded with date & time	1.0.9.6.0.255	IS15959-Part-3
31	MD kVA TZ1, Import/Forwarded with date & time	1.0.9.6.1.255	IS15959-Part-3
32	MD kVA TZ2, Import/Forwarded with date & time	1.0.9.6.2.255	IS15959-Part-3
33	MD kVA TZ3, Import/Forwarded with date & time	1.0.9.6.3.255	IS15959-Part-3
34	MD kVA TZ4, Import/Forwarded with date & time	1.0.9.6.4.255	IS15959-Part-3
35	MD kVA TZ5, Import/Forwarded with date & time	1.0.9.6.5.255	IS15959-Part-3
36	MD kVA TZ6, Import/Forwarded with date & time	1.0.9.6.6.255	IS15959-Part-3
37	MD kVA TZ7, Import/Forwarded with date & time	1.0.9.6.7.255	IS15959-Part-3
38	MD kVA TZ8, Import/Forwarded with date & time	1.0.9.6.8.255	IS15959-Part-3
39	Billing Power ON Duration in Mins	0.0.94.91.13.255	IS15959-Part-3
40	Cumulative Energy - kWh Export	1.0.2.8.0.255	IS15959-Part-3
41	Cumulative Energy - kVAh Export	1.0.10.8.0.255	IS15959-Part-3
42	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part-3
43	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS15959-Part-3
44	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS15959-Part-3
45	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS15959-Part-3
46	Cumulative MD kW Import/Forwarded	1.0.1.2.0.255	TPCODL
47	Cumulative MD kVA Import/Forwarded	1.0.9.2.0.255	TPCODL

48	Billing Reset Type	1.0.96.50.2.255	TPCODL
49	MD kW, Export with date & time	1.0.2.6.0.255	IS15959-Part-3
50	MD kVA, Export with date & time	1.0.10.6.0.255	IS15959-Part-3
51	Meter serial number	0.0.96.1.0.255	IS 15959 Part-3
Note:- 1. Energy consumption's are derived parameters & same shall be available at HES /MDM & BCS end			
With 12 Month history			

S. No.	Block Load Profile (90 days with 30 min IP and 45 days with 15 minute IP)	OBIS Code	OBIS Source
	Block Load Profile	1.0.99.1.0.255	IS15959-Part-3
1	RTC	0.0.1.0.0.255	IS15959-Part-3
2	Average Current - IR	1.0.31.27.0.255	IS15959-Part-3
3	Average Current - IY	1.0.51.27.0.255	IS15959-Part-3
4	Average Current - IB	1.0.71.27.0.255	IS15959-Part-3
5	Average Voltage - VRN	1.0.32.27.0.255	IS15959-Part-3
6	Average Voltage - VYN	1.0.52.27.0.255	IS15959-Part-3
7	Average Voltage - VBN	1.0.72.27.0.255	IS15959-Part-3
8	Block Energy – kWh- Import/Forwarded	1.0.1.29.0.255	IS15959-Part-3
9	Block Energy – kWh-Export	1.0.2.29.0.255	IS15959-Part-3
10	Block energy. kvarh-Q1/Lag	1.0.5.29.0.255	IS15959-Part-3
11	Block energy. kvarh-Q2\Lead	1.0.6.29.0.255	IS15959-Part-3
12	Block energy. kvarh-Q3\Lag	1.0.7.29.0.255	IS15959-Part-3
13	Block energy. kvarh-Q4/Lead	1.0.8.29.0.255	IS15959-Part-3
14	Block Energy – kVAh- Import/Forwarded	1.0.9.29.0.255	IS15959-Part-3
15	Block Energy – kVAh-Export	1.0.10.29.0.255	IS15959-Part-3
16	%THDV R- Phase Average	1.0.32.128.124.255	TPCODL
17	%THDV Y- Phase Average	1.0.52.128.124.255	TPCODL
18	%THDV B- Phase Average	1.0.72.128.124.255	TPCODL
19	%THDI R- Phase Average	1.0.31.128.124.255	TPCODL
20	%THDI Y- Phase Average	1.0.51.128.124.255	TPCODL
21	%THDI B- Phase Average	1.0.71.128.124.255	TPCODL
22	Average Temperature	0.0.96.9.129.255	TPCODL
23	Signal strength (CSQ value)	0.1.96.12.5.255	TPCODL
24	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note-1: Block energies data shall be with 3 decimal place Note-2: Demand KW ,KVA & Signed Power factor shall be derived at HES/MDMS & BCS end Note-3: Block load profile parameters shall be field programmable by TPCODL specific OBIS code. On changing capture object LS data will be reset Note-4: This data shall be read by through BCS , HES/MDM			

S. No.	Daily Load Profile (45days data)	OBIS Code	OBIS Source
	Daily Survey Profile	1.0.99.2.0.255	IS 15959 part-3
1	Real Time Clock – Date & Time	0.0.1.0.0.255	IS 15959 part-3
2	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-3

3	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-3
4	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-3
5	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-3
6	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-3
7	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-3
8	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-3
9	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	IS 15959 part-3
10	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	IS 15959 part-3
11	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	IS 15959 part-3
12	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	IS 15959 part-3
13	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-3
14	Cumulative Energy kVAh TZ1 Import/forwarded	1.0.9.8.1.255	IS 15959 part-3
15	Cumulative Energy kVAh TZ2 Import/forwarded	1.0.9.8.2.255	IS 15959 part-3
16	Cumulative Energy kVAh TZ3 Import/forwarded	1.0.9.8.3.255	IS 15959 part-3
17	Cumulative Energy kVAh TZ4 Import/forwarded	1.0.9.8.4.255	IS 15959 part-3
18	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.5.255	IS 15959 part-3
19	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.6.255	IS 15959 part-3
20	Cumulative Energy kVAh TZ7 Import/forwarded	1.0.9.8.7.255	IS 15959 part-3
21	Cumulative Energy kVAh TZ8 Import/forwarded	1.0.9.8.8.255	IS 15959 part-3
22	Maximum Demand KW Import/forwarded (With Date & Time)	1.0.1.6.0.255	IS 15959 part-3
23	Maximum Demand KW TZ1 Import/forwarded (With Date & Time)	1.0.1.6.1.255	IS 15959 part-3
24	Maximum Demand KW TZ2 Import/forwarded (With Date & Time)	1.0.1.6.2.255	IS 15959 part-3
25	Maximum Demand KW TZ3 Import/forwarded (With Date & Time)	1.0.1.6.3.255	IS 15959 part-3
26	Maximum Demand KW TZ4 Import/forwarded (With Date & Time)	1.0.1.6.4.255	IS 15959 part-3
27	Maximum Demand KW TZ5 Import/forwarded (With Date & Time)	1.0.1.6.5.255	IS 15959 part-3
28	Maximum Demand KW TZ6 Import/forwarded (With Date & Time)	1.0.1.6.6.255	IS 15959 part-3
29	Maximum Demand KW TZ7 Import/forwarded (With Date & Time)	1.0.1.6.7.255	IS 15959 part-3
30	Maximum Demand KW TZ8 Import/forwarded (With Date & Time)	1.0.1.6.8.255	IS 15959 part-3
31	Maximum Demand KVA Import/forwarded (With Date & Time)	1.0.9.6.0.255	IS 15959 part-3
32	Maximum Demand KVA TZ1 Import/forwarded (With Date & Time)	1.0.9.6.1.255	IS 15959 part-3
33	Maximum Demand KVA TZ2 Import/forwarded (With Date & Time)	1.0.9.6.2.255	IS 15959 part-3
34	Maximum Demand KVA TZ3 Import/forwarded (With Date & Time)	1.0.9.6.3.255	IS 15959 part-3
35	Maximum Demand KVA TZ4 Import/forwarded (With Date & Time)	1.0.9.6.4.255	IS 15959 part-3
36	Maximum Demand KVA TZ5 Import/forwarded (With Date & Time)	1.0.9.6.5.255	IS 15959 part-3
37	Maximum Demand KVA TZ6 Import/forwarded (With Date & Time)	1.0.9.6.6.255	IS 15959 part-3
38	Maximum Demand KVA TZ7 Import/forwarded (With Date & Time)	1.0.9.6.7.255	IS 15959 part-3
39	Maximum Demand KVA TZ8 Import/forwarded (With Date & Time)	1.0.9.6.8.255	IS 15959 part-3
40	Cumulative Reactive Energy – Q1	1.0.5.8.0.255	IS 15959 part-3
41	Cumulative Reactive Energy – Q2	1.0.6.8.0.255	IS 15959 part-3
42	Cumulative Reactive Energy – Q3	1.0.7.8.0.255	IS 15959 part-3
43	Cumulative Reactive Energy – Q4	1.0.8.8.0.255	IS 15959 part-3
44	Maximum Demand KW Export (With Date & Time)	1.0.2.6.0.255	IS 15959 part-3
45	Maximum Demand KVA Export (With Date & Time)	1.0.10.6.0.255	IS 15959 part-3
44	Meter serial number	0.0.96.1.0.255	IS 15959 part-3
Note: 1-Daily consumption of energies shall be derived at HES & BCS end Note:-2-This data shall be read through BCS ,HES/MDM			

S. No.	Name Plate Profile	OBIS Code	OBIS Source
	Name Plate Profile	0.0.94.91.10.255	IS15959-Part-3
1	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
2	Device ID	0.0.96.1.2.255	IS15959-Part-3

3	Manufacturer Name	0.0.96.1.1.255	IS15959-Part-3
4	Firmware Version for meter	1.0.0.2.0.255	IS15959-Part-3
5	Meter Type (1Phase/3P-3W/3P-4W)	0.0.94.91.9.255	IS15959-Part-3
6	Category	0.0.94.91.11.255	IS15959-Part-3
7	Current rating	0.0.94.91.12.255	IS15959-Part-3
8	Meter Year of TPCODL	0.0.96.1.4.255	IS15959-Part-3
9	Internal CT Ratio	1.0.0.4.2.255	IS 15959 Part1
10	Internal PT Ratio	1.0.0.4.3.255	IS 15959 Part1
11	Meter Constant	1.0.0.3.0.255	TPCODL
12	Meter Voltage Rating	0.0.94.91.15.255	TPCODL
13	NIC Firmware version number	0.128.96.0.9.255	TPCODL
14	MD integration period	1.0.0.8.0.255	IS15959-Part-3
15	Load survey integration period	1.0.0.8.4.255	IS15959-Part-3
16	Kvah Energy definition (Lag only /Lag + Lead)	1.0.128.5.131.255	TPCODL
17	NIC IMEI number (Serial number)	0.0.96.1.5.255	TPCODL
18	SIM serial number (SIM ICCID)	0.0.96.1.9.255	TPCODL
Note- This data shall be read by through BCS & HES			

S. No.	Profile for Voltage(e=0), Current(e=1) & Other events(e=4) event	OBIS Code	OBIS Source
	Voltage related events Profile	0.0.99.98.**e**.255	IS15959-Part-3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part-3
2	Event Code (voltage events)	0.0.96.11.**e**.255	IS15959-Part-3
3	Current - IR	1.0.31.7.0.255	IS15959-Part-3
4	Current - IY	1.0.51.7.0.255	IS15959-Part-3
5	Current - IB	1.0.71.7.0.255	IS15959-Part-3
6	Voltage - VRN	1.0.32.7.0.255	IS15959-Part-3
7	Voltage - VYN	1.0.52.7.0.255	IS15959-Part-3
8	Voltage - VBN	1.0.72.7.0.255	IS15959-Part-3
9	Signed R Phase Pf	1.0.33.7.0.255	IS15959-Part-3
10	Signed Y Phase Pf	1.0.53.7.0.255	IS15959-Part-3
11	Signed B Phase Pf	1.0.73.7.0.255	IS15959-Part-3
12	KWH Import/Forwarded	1.0.1.8.0.255	IS15959-Part-3
13	KWH Export	1.0.2.8.0.255	IS15959-Part-3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part-3
15	KVAH Import/Forwarded	1.0.9.8.0.255	IS15959-Part-3
16	KVAH Export	1.0.10.8.0.255	IS15959-Part-3
17	R Phase active Current	1.0.31.7.128.255	TPCODL
18	Y Phase active Current	1.0.51.7.128.255	TPCODL
19	B Phase active Current	1.0.71.7.128.255	TPCODL
20	Total PF	1.0.13.7.0.255	IS15959-Part-3
21	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note- This data shall be read by BCS & HES			

S. No.	Profile for Power fail(e=2), Transaction(e=3), Non Rollover(e=5) & Control events (e=6) events	OBIS Code	OBIS Source
	Power Fail event profile	0.0.99.98.e.255	IS15959-Part-3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part-3
2	Event Code (power fail events)	0.0.96.11.e.255	IS15959-Part-3
3	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note- This data shall be read through BCS & HES			

S. No.	Profile for TPCODL Temperature compartments	OBIS Code	OBIS Source
	TPCODL events compartments profile	0.0.99.98.128.255	TPCODL
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part-3
2	Event Code (Non Standard events)	0.0.96.11.128.255	TPCODL
3	Current – IR	1.0.31.7.0.255	IS15959-Part-3
4	Current – IY	1.0.51.7.0.255	IS15959-Part-3
5	Current – IB	1.0.71.7.0.255	IS15959-Part-3
6	Voltage – VRN	1.0.32.7.0.255	IS15959-Part-3
7	Voltage – VYN	1.0.52.7.0.255	IS15959-Part-3
8	Voltage – VBN	1.0.72.7.0.255	IS15959-Part-3
9	R Phase Pf	1.0.33.7.0.255	IS15959-Part-3
10	Y Phase Pf	1.0.53.7.0.255	IS15959-Part-3
11	B Phase Pf	1.0.73.7.0.255	IS15959-Part-3
12	KWH Import/Forwarded	1.0.1.8.0.255	IS15959-Part-3
13	KWH Export	1.0.2.8.0.255	IS15959-Part-3
14	Cumulative tamper count	0.0.94.91.0.255	IS15959-Part-3 A1
15	KVAH Import/Forwarded	1.0.9.8.0.255	IS15959-Part-3
16	KVAH Export/Forwarded	1.0.10.8.0.255	IS15959-Part-3
17	R Phase active Current	1.0.31.7.128.255	TPCODL
18	Y Phase active Current	1.0.51.7.128.255	TPCODL
19	B Phase active Current	1.0.71.7.128.255	TPCODL
20	Total PF	1.0.13.7.0.255	IS15959-Part-3
21	Temperature	0.0.96.9.128.255	TPCODL
22	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note- This data shall be read through BCS & HES			

S. No.	Phasor profile	OBIS Code	OBIS Source
	Phasor Profile	1.0.99.128.128.255	TPCODL
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS15959-Part-3
2	Current – IR	1.0.31.7.0.255	IS15959-Part-3
3	Current – IY	1.0.51.7.0.255	IS15959-Part-3
4	Current – IB	1.0.71.7.0.255	IS15959-Part-3
5	Voltage – VRN	1.0.32.7.0.255	IS15959-Part-3
6	Voltage – VYN	1.0.52.7.0.255	IS15959-Part-3
7	Voltage – VBN	1.0.72.7.0.255	IS15959-Part-3
8	Signed Power Factor –R phase	1.0.33.7.0.255	IS15959-Part-3
9	Signed Power Factor –Y phase	1.0.53.7.0.255	IS15959-Part-3
10	Signed Power Factor –B phase	1.0.73.7.0.255	IS15959-Part-3
11	Signed Three Phase Power Factor – PF	1.0.13.7.0.255	IS15959-Part-3
12	Frequency	1.0.14.7.0.255	IS15959-Part-3
13	Apparent Power – KVA	1.0.9.7.0.255	IS15959-Part-3
14	Signed Active Power – kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS15959-Part-3
15	Signed Reactive Power – kVAr (+ Lag; - Lead)	1.0.3.7.0.255	IS15959-Part-3
16	Signed R Phase Active Power	1.0.21.7.0.255	TPCODL
17	Signed Y Phase Active Power	1.0.41.7.0.255	TPCODL
18	Signed B Phase Active Power	1.0.61.7.0.255	TPCODL
19	Angle Between Y- R Phase voltage	1.0.81.7.10.255	TPCODL
20	Angle Between B- R Phase voltage	1.0.81.7.20.255	TPCODL
21	Angle between two phase voltage	1.0.81.7.128.255	TPCODL

22	Phase Sequence	1.0.128.7.0.255	TPCODL
23	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note- This data shall be read through BCS only			

S. No.	Accuracy Check Data Profile (High Resolution Energy with 4 digit after decimal)	OBIS Code	OBIS Source
	Accuracy Check data Profile	1.0.99.128.129.255	TPCODL
1	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS15959-Part-3
2	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS15959-Part-3
3	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS15959-Part-3
4	Cumulative energy, kVArh (QII)	1.0.6.8.0.255	IS15959-Part-3
5	Cumulative energy, kVArh (QIII)	1.0.7.8.0.255	IS15959-Part-3
6	Cumulative energy, kVArh (QIV)	1.0.8.8.0.255	IS15959-Part-3
7	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS15959-Part-3
8	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS15959-Part-3
9	Meter Serial number	0.0.96.1.0.255	IS15959-Part-3
Note- This data shall be read through BCS only			

S. No.	Programmable Parameters	OBIS Code	Event IDs	OBIS Source
1	Real Time clock change	0.0.1.0.0.255	151	IS15959-Part-3
2	Demand Integration Period change	1.0.0.8.0.255	152	IS15959-Part-3
3	Profile captured period	1.0.0.8.4.255	153	IS15959-Part-3
4	single-action schedule for billing dates	0.0.15.0.0.255	154	IS15959-Part-3
5	Activity calendar for times zones	0.0.13.0.0.255	155	IS15959-Part-3
6	new firmware (image) activated	0.0.44.0.0.255	157	IS15959-Part-3
7	Metering Mode	0.0.94.96.19.255	167,(177=Forward,178= Import/Export)	IS15959-Part-3
8	Current Association MR (LLS secret change)	0.0.40.0.2.255	161	IS15959-Part-3
9	Current Association US (HLS Key change)	0.0.40.0.3.255	162	IS15959-Part-3
10	Current Association FW (HLS Key change)	0.0.40.0.5.255	163	IS15959-Part-3
11	Global key change	0.0.43.0.e.255	164	IS15959-Part-3
12	ESWF	0.0.94.91.26.255	165	IS15959-Part-3
13	MD Reset	0.0.10.0.1.255	166	IS15959-Part-3
14	Image activation single action schedule	0.0.15.0.2.255	169	IS15959-Part-3
15	Display Parameters Auto Scroll	0.0.96.128.0.255	760	TPCODL
16	Display Parameters Push Button	0.0.96.128.1.255	760	TPCODL
17	Display Parameters High Resolution Button	0.0.96.128.2.255	760	TPCODL
18	Missing potential Threshold Configuration	1.0.12.129.131.255	758	TPCODL
19	Over Voltage Threshold Configuration	1.0.12.129.129.255	758	TPCODL
20	Low Voltage Threshold Configuration	1.0.12.129.130.255	758	TPCODL
21	Voltage unbalance Threshold Configuration	1.0.12.129.128.255	758	TPCODL
22	Current Reversal Threshold Configuration	1.0.11.129.128.255	758	TPCODL
23	CT Open Threshold Configuration	1.0.11.129.129.255	758	TPCODL
24	Current unbalance Threshold Configuration	1.0.11.129.130.255	758	TPCODL

25	Over Current Threshold Configuration	1.0.11.129.132.255	758	TPCODL
26	CT Bypass Threshold Configuration	1.0.11.129.131.255	758	TPCODL
27	Very Low PF Threshold Configuration	1.0.13.129.128.255	758	TPCODL
28	Temperature rise Threshold Configuration	0.0.96.128.3.255	758	TPCODL
29	Missing potential Persistence time Configuration	1.0.12.130.131.255	759	TPCODL
30	Over Voltage Persistence time Configuration	1.0.12.130.129.255	759	TPCODL
31	Low Voltage Persistence time Configuration	1.0.12.130.130.255	759	TPCODL
32	Voltage unbalance Persistence time	1.0.12.130.128.255	759	TPCODL
33	Current Reversal Persistence time Configuration	1.0.11.130.128.255	759	TPCODL
34	CT Open Persistence time Configuration	1.0.11.130.129.255	759	TPCODL
35	Current unbalance Persistence time	1.0.11.130.130.255	759	TPCODL
36	Over Current Persistence time Configuration	1.0.11.130.132.255	759	TPCODL
37	CT Bypass Persistence time Configuration	1.0.11.130.131.255	759	TPCODL
38	Power ON-OFF Persistence time Configuration	0.0.96.128.4.255	759	TPCODL
39	Magnetic influence Persistence time	0.0.96.128.5.255	759	TPCODL
40	Very Low PF Persistence time Configuration	1.0.13.130.128.255	759	TPCODL
41	Over load Persistence time Configuration	1.0.1.130.128.255	759	TPCODL
42	Temperature rise Persistence time Configuration	0.0.96.128.6.255	759	TPCODL
43	Load Profile capture Objects	1.0.96.128.2.255	761	TPCODL
44	Single Action Schedule for Daily (midnight) data	0.6.15.0.4.255	798	TPCODL
45	Single Action Schedule Billing data push	0.6.15.0.4.255	799	TPCODL
46	Kvah configuration Lag or Lag+lead	1.0.128.5.131.255	value 0= Lag+Lead value 1 = Lag only	TPCODL
Note:- This Data Can set through BCS & HES				

Three phase HT Meter common Display list for all combinations **Annexure-C**

1. Forward mode
2. Net meter mode

S.No	Display list	Auto	Push	Mode of metering
1	LCD Check	YES	YES	
2	Meter Serial number	YES	YES	
3	Date(DD:MM:YY)	YES	YES	
4	Time (HH:MM:SS)	YES	YES	
5	Cumulative kWh(Import/Forwarded)	YES	YES	
6	Cumulative kVAh(Import/Forwarded)	YES	YES	
7	Cumulative kWh-Export	YES	YES	Applicable for “net meter” mode
8	Cumulative kVAh-Export	YES	YES	
9	Cumulative kVArh Lag (Q1)	YES	YES	
10	Cumulative kVArh Lead (Q4)	YES	YES	
11	Cumulative kVArh Lead (Q2)	YES	YES	Applicable for “net meter” mode
12	Cumulative kVArh Lag (Q3)	YES	YES	
13	Current Month MD – kW (Import/Forwarded) with Date &	YES	YES	
14	Current Month MD - kVA(Import/Forwarded) with Date &	YES	YES	
15	Current Month TOD - kW (Import/Forwarded)- TZ1-TZ4	-	YES	
16	Current Month TOD - kVA (Import/Forwarded)- TZ1-TZ4	-	YES	
17	Current Month MD – kW(Export) with Date & Time	YES	YES	Applicable for “net meter” mode
18	Current Month MD – kVA(Export) with Date & Time	YES	YES	
19	Cumulative TOD KWH -TZ1 – TZ4	YES	YES	
20	Cumulative TOD KVAH -TZ1 – TZ4	YES	YES	
21	Last Month (history 1) kWh (Import/Forwarded)	YES	YES	
22	Last Month (history 1) kVAh (Import/Forwarded)	YES	YES	
23	Last Month (history 1) kWh (Export)	YES	YES	Applicable for “net meter” mode
24	Last Month (history 1) kVAh (Export)	YES	YES	
25	Last Month (history 1) Cumulative TOD kWh TZ1 – TZ4	YES	YES	
26	Last Month (history 1) Cumulative TOD kVAh TZ1 – TZ4	YES	YES	
27	Last Month (history 1) MD kW (Import/Forwarded)	YES	YES	
28	Last Month (history 1) MD kVA(Import/Forwarded)	YES	YES	
29	Last Month (history 1) MD kW (Export) with Date & Time	YES	YES	Applicable for “net meter” mode
30	Last Month (history 1) MD kVA(Export) with Date & Time	YES	YES	
31	Last Month (history 1) MD kW(Import/Forwarded) TZ1-TZ4	-	YES	
32	Last Month (history 1) MD kVA(Import/Forwarded) TZ1 – TZ4	-	YES	
33	Last Month (history 1) Power Factor	YES	YES	
34	R Phase Voltages (Vr)	YES	YES	
35	Y Phase Voltages (Vy)	YES	YES	
36	B Phase Voltages (Vb)	YES	YES	
37	R Phase Current (Ir)	YES	YES	

38	Y Phase Current (Iy)	YES	YES	
39	B Phase Current (Ib)	YES	YES	
40	Signed R phase Power Factor	YES	YES	
41	Signed Y phase Power Factor	YES	YES	
42	Signed B phase Power Factor	YES	YES	
43	Instant Signed Three phase Power Factor	YES	YES	
44	Instant Signed Active Power (kW)	YES	YES	
45	Instant Apparent Power (kVA)	YES	YES	
46	Voltage Sequence (R-Y-B).	YES	YES	
47	Current Sequence (R-Y-B)	YES	YES	
48	High Resolution kWh (Import/Forwarded)	YES	YES	
49	High Resolution kVAh (Import/Forwarded)	YES	YES	
50	High Resolution kWh -Export	YES	YES	Applicable for “net meter” mode
59	High Resolution kVAh -Export	YES	YES	
60	High Resolution kVArh Lag \Q1	YES	YES	
61	High Resolution kVArh Lead\Q4	YES	YES	
62	High Resolution kVArh Lead \Q2	YES	YES	Applicable for “net meter” mode
63	High Resolution kVArh Lag \Q3	YES	YES	
64	Magnetic Tamper count	--	YES	
65	Latest Magnetic tamper occurrence date	--	YES	
66	Latest Magnetic tamper occurrence Time	--	YES	
67	ESD Tamper count	--	YES	
68	Latest ESD tamper occurrence date	--	YES	
69	Latest ESD tamper occurrence time	--	YES	
70	2nd Last Month (history 2) kWh (Import/Forwarded)	--	YES	
71	2nd Last Month (history 2) kVAh	--	YES	
72	2nd Last Month (history 2) MD kW	--	YES	
73	2nd Last Month (history 2) MD kVA	--	YES	
74	2nd Last Month (history 2 Average PF	--	YES	
75	2nd Last Month (history 2) kWh (Export)	--	YES	Applicable for “net meter” mode
76	2nd Last Month (history 2) kVAh (Export)	--	YES	
77	2nd Last Month (history 2) MD kW (Export) with	--	YES	
78	2nd Last Month (history 2) MD kVA (Export)with	--	YES	
79	Cumulative MD-KW	--	YES	
80	Cumulative MD-KVA	--	YES	
81	Self-diagnostic check	--	YES	
82	Rising Demand in KW with elapsed time	--	YES	
83	Rising Demand in KVA with elapsed time	--	YES	
84	Cover Open tamper count	--	YES	
85	Cover Open occurrence date of very first event	--	YES	
86	Cover Open occurrence time of very first event	--	YES	
87	Current month power On duration	--	YES	
88	RTC Status	--	YES	
89	RTC Battery Status	--	YES	
90	NVM (Memory) Status	--	YES	
91	Signal strength (CSQ value)	--	YES	
92	NIC card status(As per Annexure E)	--	YES	
93	SIM serial number (SIM ICCID)	--	YES	
94	SIM IP	--	YES	
95	Meter display firmware version number	--	YES	
96	Meter PT Ratio	--	YES	
97	Meter CT Ratio	--	YES	

Tamper Table Annexure-D

S.No.	Tamper Type	Event ID Code (Occurrence / Restoration)	Occurrence Threshold	Restore Threshold	Persistence time		Compartment Capacity
					Occurrence (Minutes)	Restoration (Minutes)	
Table 5: Voltage Related							75
1	Potential Missing	Occ:1, 3, 5 Rest:2, 4, 6	Voltage <70% of Vref, Current > 2% of Ib	Voltage >80% of Vref, Current > 2% of Ib	10	2	
2	Over Voltage	7, 8	>130% of Vref	<110% of Vref (In all 3 phases)	30	2	
3	Voltage Unbalance	11, 12	Voltage >=20% between phases and current >2% of Ibasic	<10% between phases & current >2% Ibasic	30	2	
Table 6: Current Related							120
4	CT Reverse	Occ:51, 53, 55 Rest:52, 54, 56	Active Current Negative Voltage in tampered Phase > 70% Vref, PF in tampered Phase > 0.1	Active Current Positive AND >2% Ibasic Voltage in tampered Phase > 70% Vref PF in tampered Phase > 0.1	30	2	
5	CT Open	Occ 57,59,61, Rest 58,60,62	Phase current <1% of Ibasic AND current on other phases>10% of Ibasic with all current positive	Phase Current >10% of Ibasic with all current positive	10	2	
6	Current Unbalance	63, 64	Current difference ≥ **1**0% of Highest current between phases AND Imin > 10% Ib	**Current difference < 5**% of Highest current between phases AND Imin > 5% Ib	30	2	

7	Over Current	67, 68	Current >120% Ib	Current <100% Ib (in all 3 phases)	30	2	
Table 7: Power Related							25
8	Power Failure	101, 102	Actual Voltage Off	Actual Voltage On	2	Immediate	
Table 9: Others							
9	Magnetic Tamper	201, 202	Meter shall be either immune or shall run at Vref, Imax & UPF (in case not immune) and shall log the occurrence & restoration of magnet event as per stipulation of CBIP 325.	After Removal of Abnormal Magnet	2	2	150
10	Neutral Disturbance	203, 204	Voltage >145% of Vref & Current >l0% of Ib OR Frequency <47Hz OR Frequency >53Hz OR DC Voltage/signal/pulse/chopped signal injection	Voltage <115% of Vref & current >10% Ib AND Frequency >47Hz & Frequency <53 Hz	1	2	
11	Low PF	205, 206	Current >1% of Ibasic AND **PF ≤** 0.50 in any phase	Current>1 % of Ibasic AND **PF ≥** 0.70 in all 3 phases	30	2	
12	ESD/JAMMER	801, 802	Meter shall be either immune or log the event in case meter is not immune		1	1	
13	Temperature Rise	951, 952	>70^{O}C	<60^{O}C	30	2	

14	Invalid Phase association	25, 26	Incorrect phase connection	Correct phase connection	Immediate	Immediate	
15	NIC card removed	209, 210	On removal of card	On insertion of card	Immediate	Immediate	
16	Microwave	Meter shall not be able to identify this condition. Jig shall be provided to download the data					
17	Terminal Cover Open	We shall provide meter cover open in place of terminal cover open.					
Table 10: Non Rollover							
18	Meter Cover Open	251	If meter top cover is open	NA	Immediate	NA	5 (Stay put type)

Reference Voltage: 63.5V (P-N)

Basic Current (Ib): 5A

Annexure-E

Error Codes:-

Sr No	Error Details	Error ID
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