<table>
<tr><td>1</td><td>SCOPE</td><td>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,3x230 voltage,100/5A, 200/5A current transformer operated ac static meters of accuracy class 0.5S (here after referred as meters) complete with all accessories for efficient and trouble free operation with communication module (NIC) compatible with 4G technology.

It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the TPXODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.</td></tr>
<tr><td>2</td><td>APPLICABLE STANDARDS</td><td>The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

<table>
<tr><td>a</td><td>IS 16444 part 2 : 2017</td><td>A.C. Static Transformer operated watt hour and VAR-hour meters, class 0.2s, 0.5s & 1.0S</td></tr>
<tr><td>b</td><td>IS 15959 Part 3 :2017</td><td>Data exchange for electricity meter reading, tariff and load control</td></tr>
<tr><td>c</td><td>IS 9000</td><td>Basic Environmental testing procedure for electrical and electronic items.</td></tr>
<tr><td>d</td><td>IS 12346:1999</td><td>Testing Equipment For Ac Electrical Energy Meters</td></tr>
<tr><td>e</td><td>IS 11000</td><td>Fire Hazard Testing</td></tr>
<tr><td>f</td><td>IEC 62052 Part 11 : 2003</td><td>Electricity metering equipment (AC) - General requirements , tests and test conditions – metering equipment</td></tr>
<tr><td>g</td><td>IEC 62053 Part 22 : 2003</td><td>Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)</td></tr>
<tr><td>h</td><td>IS 15707 : 2006</td><td>Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.</td></tr>
<tr><td>I</td><td>IEC 60068</td><td>Environmental testing.</td></tr>
<tr><td>J</td><td>CBIP–TR No.325</td><td>Specification for A.C. Static Electrical Energy Meters (latest amendment)</td></tr>
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		K	CEA Regulation (2006)	Installation and operation of meters Dtd: 17/03/2006.
		l	IS 60529	Degree of protection provided by enclosure
		j	IEC62056-61	Electricity metering- Object Identification system (OBIS)
3	**CLIMATE CONDITIONS OF THE INSTALLATION**	a) Max. Ambient Temperature : 70 deg.C b) Max. Daily average ambient temp.: 40 deg.C c) Min Ambient Temp :-10 deg C d) Maximum Humidity : 100% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Maximum Annual Rainfall : 760 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300 meters k) Wind Pressure : 126 kg/sq m up to an elevation at 10 m. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.		
4	**GENERAL TECHNICAL REQUIREMNTS**	**S.No.**	**DESCRIPTION**	**REQUIREMENT**
		4.01	Type of the meter	Three phase four wire, current transformer operated static watt-hour meter. It consisting 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	0.5S
		4.03	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 5A; Imax= 10 Amps
		4.04	Reference Conditions for testing the performance of the meter	Vref = 230 V Frequency = 50Hz Temperature= 27 ^{0}C
		4.05	Operating Voltage	Meter shall be operational with required accuracy from0.6 Vref to 1.2 Vref. However meter shall withstand the maximum system Voltage of

				440Vbetween phase and neutral (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 7Was mentioned in IS 16444 whichever is lower, per communication module)
		4.08	Starting Current	5mA (0.1% of Ib)
		4.09	Short time over Current	200 A for 0.5sec (20Imax)
		4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 50^0 C.
		4.11	Rated Impulse withstand voltage	6KV (shall be applied ten times with one polarity and then repeated with the other polarity and minimum time between each impulse to be 3 sec)
		4.12	AC withstand Voltage for 1 min	4 KV
		4.13	Minimum Insulation resistance at test voltage 500+/- 50 V dc a) Between frame & current ,voltage circuits as well as auxiliary circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit. :	a) 5 M ohm b) 50 M ohm.
		4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 14697 and IS16444 part 2
		4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per clause 6.8 of IS 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, but Without 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 IS 14697.	
		4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause CBIP report 325 and IS14697	
		4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 14697& 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 as unity for kVA&KVAh calculations'	
		4.21	Energy measurement	Fundamental energy +Energy due to Harmonics	
		4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.	
		4.23	Self Diagnostic feature	The meter shall have logging with date and time in memory for un satisfactory /non-functioning of (i)Real Time Clock (ii) RTC battery (iii) Non Volatile Memory (iv) NIC card status	
		4.24	Initial start up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.	
		4.25	Alternate mode of supply to the meters	In case of meter power failure , reading/data should be retrieved with the help of battery.	
		4.26	Sleep Mode	Meter shall not go in sleep mode. Display should not be 'off' at any point of time when power up.	
		4.27	Internal diameter of the terminal holes Depth of the terminal holes	5mm (minimum) 20 mm (minimum)	
		4.28	Clearance between adjacent terminals	10 mm (minimum)	
		4.29	Display	Backlit LCD, Scrolling, 10 seconds for each parameter minimum 8 digits for reading LCD display	
		4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication, firmware selection from remote etc.	
		4.31	Software and communication compatibility	The bidder shall supply software required for local (MRI – conventional/4G) & remote (AMI) connectivity& Mobile Apk & BCS including required training to use the software free of cost. 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.
		4.32	Calibration		Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. However parameters like RTC,TOD slots, DIP(billing & load survey), display parameters, billing date, etc. shall be reconfigure through MRI and remotely over the air (OTA)and any other support will be provided without any additional cost to TPXODL till the useful life of the meters.
		4.33	Usage Application		Indoor and Outdoor
		4.34	Chemical Bonding		Meter cover and body should have seamless chemically bonded, so that meter should not open without leaving clear 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 IS 16444 part 2. This module should be able to get connected to the WAN network of service provider (4G) of TPXODL. TPXODL intends to leverage 4G as the primary communication technology with hot swappable . Meter should be able to provide required power supply to NIC card provided by communication provider recommended by TPXODL. Size /form factor of NIC card will be provided by TPXODL to the bidder and bidder should make necessary arrangement for the same.
		4.36	Communication Layer Protocol		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 15 minutes integration period in load survey. Accuracy of

					harmonics recording shall be as per meter accuracy class. The meter shall generate a flag/event whenever the threshold (user configurable) of the 5% THD of the load current and voltage is breached.
			4.39	The terminal pin arrangement	The terminal pin shall be 12 pin,zig zag arrangement with phase voltage terminal in between current terminals as mentioned in clause no. 5.2.12&13 (LTCT Box Sample to be taken from TPCODL for Terminal Fitment Check .
			4.40	The preferred meter size shall be	235x300x120mm (further the bidder can check details space available in existing LTCT box at our TPCODL MMG store before design)
4.1	**NIC MODULE DETAILS & INTEGRATION**	With the service providers offering 4G services, TPXODL intends to leverage 4G as the communication technology a) The Network Interface Card for 4G shall be modular and pluggable. The NIC shall be interoperable for service provider b) NIC card shall support remote Device Management Capability such as Reset, Configuration, Log Check, Ping, and over the air Firmware upgrade c) NIC shall support two-way communications between smart meter & head-end system such as data exchange, configuration parameters exchange, alarms, operational commands, firmware upgrade of the meter as defined in IS16444 and IS15959. d) NIC shall support push services, alarms services of the smart meter as defined in IS16444 and IS15959. e) 4G NIC card shall support communication protocols as prescribed by 4G HES supplier. f) NIC shall also support on-demand / schedule reading, time sync, configuration and over the air firmware upgrade from the head-end system. g) NIC shall have persistent network connectivity throughout as defined by 4G standards. It shall support self-configuring features. h) NIC shall operate 24*7 and shall recover from any deadlock situation immediately in the field. i) Support for possibility for provision of a unique certificate/key in each card for mutual authentication with the HES from security point of view. j) NIC shall support standard security protocols. k) NIC shall be compliant with cyber security norms. l) NIC shall register with network i.e. login and logout of each terminal to the HES. It shall be recognized in the HES as authorized node. m) Attributes such as Firmware version Billing profile ,Events and Instantaneous parameter, Midnight Profile Hardware version, Signal strength values, packet error rate, should be pushed periodically to HES for effective communication management. n) Billing profile once in a month Instantaneous parameter 4 times a day, Events once a day and alert as and when logged by meter , midnight profile once a day. Parameter Time of pushing of these profiles will be shared in GTP. o) Data must be encrypted with AES-256 bit. p) LED indication for System, Power ON indicator. q) Colour coded LED (a) For latching on to the network (b) For latched on to the network (c) For data flow indication. r) Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES			

4.2	**Communication capabilities and software feasibilities**	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI) (Using optical port/NIC card) and remotely by 4G with proper security via Plug in type NIC. Data transfer locally through optical port via MRI is desired along with data transfer through NIC card. The data downloaded in MRI/hand held device shall be integrated to HES data base. 4.3.2 It should be the responsibility of the bidder to ensure integration of meter into HES.For cellular fallback, the Module should have backward compatibility. The fall back provision shall be taken through optical port with external modem by TPXODL. Meter should be capable for sending all data from 4G NIC and optical port. 4.3.3 It shall be possible to reconfigure the meters for RTC,TOD slots reprogramming, DIP (Demand Integration period), billing date ,display parameters etc. through proper authentication process locally through MRI & BCS and remotely over the air (OTA). Meter data should remain intact with timings. And billing should be done whenever any above mentioned attribute is changed. The change should be recorded as upgrade event. 4.3.4 Necessary keys if required for performing this reconfiguration operation should also be provided along with supply of meter lot & training to TPXODL staff on how to use it free of cost. Bidder to provide this support on a later stage also on the request of TPXODL without any cost implication. 4.3.5 Optical Communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 5 minutes OTA. 4.3.6 Bidder to ensure integration of meter data with head end for data transfer as mentioned in specification. 4.3.7 Meter should be supplied to TPXODL along with integrated NIC card. NIC card should be plug in type with proper sealing arrangement. 4.3.8 The bidder shall supply software required for local (MRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs for communication with meter through local (MRI) / remote (AMI) as and when required by TPXODL free of cost during life time of meter. The bidder should provide DLMS compliance for Communication with the meter at Optical port and at HES. 4.3.9 Bidder should also provide software for changing/upgrading meter firmware in mass and should support integration of this software with HES. Bidder should also provide base computer software (BCS) for viewing the data downloaded through HES/MRI/laptop/HHU in separate PC/laptop. Android based or windows based HHU shall be preferred.

		4.3.10 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 through 4.3.11 List of events to be reported should be configurable over the air(OTA).The meter should have "Last Gasp" and “First Breath” feature to facilitate sending alerts to the HES during fully powered off / On condition. 4.3.12 If there are 2 requests given for communication one from HES and other from local device, request from local device should supersede. 4.3.13 Last mile mesh network must support auto-registration and self-healing feature to continue operation using easiest possible available route in case of failure of any communication device in the mesh. Self-registrations in first communication. 4.3.14 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. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission. 4.3.15 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS(procured by TPXODL) to configure, command, read and control smart meters installed at site.The Bidder shall extend all necessary assistance in developing the adaptor software through a third-party for facilitating the above. 4.3.16 Integration of meter software’s with HES / MDMS for seamless transfer of data will also be in scope of bidder till the expiry of warranty of the meters. It is desired meter firmware up gradation/selection should be available over the air. Meter should be able to change to import/export mode if required with firmware upgrade/Profile Activation. In Import/Export Mode meter should work in Lag only configuration during import Instances and forward metering mode should get deactivated The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter. 4.3.17 Communication of the meter at optical port /OTA (WAN) should be as per IS 15959 (Part-2):2016. The optical port should be with proper lockable mechanism 4.3.18 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. 4.3.19 Meter once powered up with NIC card should be self-detected by network and its basic name plate details & current readings are transferred to HES.Note- TPXODL Is also going to devlope provision of downloading instantenious data immediately after installation of the meter

4.3.20 The required OBIS codes will be finalized with successful bidder. The bidder can offer desired codes from Blue Book ensuing the codes reserved or standardized by Bureau of Indian standards. The reserved codes in BIS are to be used/utilized as per guidelines of BIS and remaining codes from blue book can be used for communication of additional features mentioned in this specifications. This is to be done strictly with written approval from TPXODL after verification of proposed codes by manufacturer. In future if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes after in consultation and approval of TPXODL competent authority.

4.3.21 Meter display should have provision for showing if NIC card if : 1. Installed, 2. Getting Network, 3. Latched with HES, 4. Communicating with HES If there are any other codes OEM to specify the same. Preferred codes as given in the table below.

Table : Error Details:-

Sr. No	Error Details	
1	All Good	Err 00
2	Meter NIC Communication failure	Err 01
3	Modem Initialization failure	Err 02
4	SIM not detected	Err 03
5	SIM invalid	Err 04
6	No GSM Network Coverage	Err 05
7	GPRS Network Registration Failure	Err 06
8	GPRS Registration denied	Err 07
9	No APN Configured	Err 08
10	GPRS Connection not establish	Err 09
11	HES IP/Port not configured	Err 10
12	HES Port not Open	Err 11

4.3.22

4.3.23 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on.

4.3.24 Bidder to provide facility for Up-gradation / Modification of Firmware till the usefull life of meter which is assumed to be atleast 10 years

4.3.25 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 (upto 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: a. 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 b. 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 be applied shall be generally >10000 AT. b. AC magnetic induction: **>**10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT) **c.** Permanent Magnet: Immune up to 0**.**5T and Event logging **>**0**.**5T. **4.3.2Electrostatic Discharge (ESD)**
		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. 4.3.3 The shielding around the meter shall be such that it does not get affected by high Voltage and high energy or low energy impulse when comes in contact with meter from any side. 4.3.4 Meter should immune to high/low frequency jammer devices. Meter shall log the event in its memory as" JAMMER" with date and time stamp along with snapshot, the threshold values as per table no. 1 in 4.5. 4.3.5 The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.5.

4.4	**Neutral Disturbance & other tampers**	4.4.1 The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse upto 330V and for any value beyond this. Meter shall log the event into memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.5 4.4.2 The meter should log event with snapshot when all three phase currents are zero and neutral current is present. 4.4.3 An event to be provided for invalid phase association with name 'Invalid phase association'
4.5	**Abnormal Tamper conditions**	4.5.1 The meter shall record forward energy under all abnormal tampering conditions and shall be capable of recording occurrence and restoration of abnormal events listed below along with date & time and snap shots of individual voltages, currents, power factors, active energy and apparent energy at the time of occurrence of abnormal event and restoration of normal supply. 4.5.2 For all tamper events the time stamp and snapshot parameters shall be recorded at the start time of event for occurrence (T1) and for restoration the time stamp and snapshot parameters shall be recorded at the end time of the event (T3). 4.5.3 During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count
		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 The events for which the restoration not occurred those should not be removed from meter memory and FIFO should not be applicable for unrestored event. 4.5.5 Tamper event logging along with snapshot during occurrences & restorations shall be as per table no.1. The smart meters manufacturing samples should start recording the abnormal influencing signals with intensity values as defined in the specifications. 4.5.6 All tamper/event logging thresholds values shall be configurable from remotes. **Table No.1**

Persistence Time for Occurrences	**Persistence Time for Restoration**	**Threshold Value for Occurrence of Events**	**Threshold Value for Restoration of Events**	**Compartment Size**

		ESD/JAMMER=immediate (record only 1 event on first application & only one event for next 1min) (ESD)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to 50 KV with NIC and logging of event>50 KV	Removal of ESD/JAMMER signal	25
		Magnet = 0 Hr2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	>0.5 Tesla for permanent magnet OR DC magnetic induction >0.2T OR AC magnetic induction > 10 mT (of any frequency)	<0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT	25
		Meter Top Cover Open (TC Open) Immediate	Meter Top Cover Open (TC Open) Immediate	If meter top cover is opened	NA	05 (Stay put Type)
		Potential Missing = 0 Hr 10 Min 0 sec (PM)	Potential Missing = 0 Hr 2 Min 0 sec	Voltage < 70% of Vref AND current > 2% Ibasic	Voltage > 80% 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 the phases and current > 2% Ibasic	Shall be less than 10 % between the phases and current > 2% Ibasic	25
		CT Open (phase wise) = 0 Hr 10 Min 0 sec	CT Open (phase wise) = 0 Hr 2 Min 0 sec	Ir + Iy + Ib + In ≥ 10 % of Ibasic (vector Sum) AND Phase current < 1% of Ibasic with All current positive	Ir + Iy + Ib + In <5 % of Ibasic. (vector Sum) AND Phase current > 10% of Ibasic with All current positive	25
		CT Reversal = 0 Hr 30 Min 0 sec (CTR)	CT Reversal = 0 Hr 2 Min 0 sec	Active current negative	Active current positive AND > 2 % Ibasic	25
		Current Unbalance = 0 Hr 30 Min 0 sec (CU)	Current Unbalance = 0 Hr 2 Min 0 sec	Current difference ≥20% between phases for 100/5A (10% for 200/5A ratio) and I min 10% of Ibasic	Current difference <10% between the phases for 100/5A (5% for 200/5A)and I min>5% of Ib	25

Low Power Factor = 0 Hr 30 Min 0 sec (LPF)	Low Power Factor = 0 Hr 2 Min 0sec	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 < 47 Hz OR Frequency > 53 Hz OR DC voltage / signal/ pulse/ chopped signal injection	Voltage <115% of Vref&Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 53 Hz	25
Power On Off = 0 Hr 02 Min 0 sec	Power On Off = immediate	Actual Voltage off	Actual Voltage On	25
Over Voltage = 0 Hr 30 Min 0 sec	Over Voltage = 0 Hr 2 Min 0 sec	Voltage > 130% of Vref	Voltage <110% of Vref	25

Over current= 0hr 30min 0sec (OL)	Over Current = 0hr 2min 0sec	>Preset value (default value set at 120%Ib)	I<100%Ib	25
Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves > 10 mT (or mutually decided)	Removal of device	25
Temperature Rise = 0 Hr 30 Min 0 sec (TR)	Temperature Rise = 0 Hr 02 Min 0 sec (TR)	Temperature >70 C	Temperature <60 C	25 (Stay put type)
NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of card	On insertion of card	20
Invalid Ph Association (Immediate)	PhAssociation (Immediate)	Change of phase Asssociation	Restoration of phase Association	5

Note: “Meter shall have neutral CT for tamper identification and analysis.”

4.5.7 Meter shall latch & store cumulative count and cumulative durations all the tampers events which have logged /occurred/stored in memory of meter from the date of energization till life of meter. Total tamper storage should be as per table1 above.

4.5.8 The meter shall record in export registers in case of reversal of all CT terminals. The meters are to be used for registration of energy consumed by the consumer,as such the meters shall be programmed for import mode and in case of reversal of energy direction (reversal of all CT terminals) meter shall register energy separately in export mode i.e. in case of CT reversal, meter shall record scalar (not vector sum) sum of energy.

4.5.9 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.

		4.5.10 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. Meter shall sufficiently record this event as reverse sequence. 4.5.11 An event to be provided for invalid phase association with name 'Invalid phase association' 4.5.12 The Meter Shall be able to differentiate between actual CT reversal and condition arising out of unbalanced / unhealthy capacitor bank. The logics for the same to be provided in tender samples also. 4.5.13 The Cover Open tamper detection should be through heavy duty, sturdy two number micro switches with OR gate logic such that it should not log false event on vibration or impact during handling or testing. 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**	4.6.1 The event compartments shall be IS 15959 Part-1 table 9. 4.6.2 The size of the event compartments should be such that all above events (in table no.1 and other required events defined in various clauses of this documents) are accommodated in the assigned event category compartment. i.e. if in case of voltage compartment assigned to 4 number of events then the minimum size of this compartment should be such that it should accommodate sum of all maximum number of events as marked above table 1 . 4.6.3 Transaction events compartment size shall be minimum 100 events.
5	**GENERALCONSTRUCTIONS**	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 protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. The meters shall be designed and manufactured using SMT (Surface Mount Technology) components All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of TPXODL:

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	USA:Anolog Devices, Cyrus Logic, Atmel, Phillips, Freescale semiconductor South Africa: SAMES Japan: NEC
2.	Memory chips/NVM	The memory chips should not be affected by the External parameters like sparking, high voltage spikes or electrostatic discharges. The life of NVM shall be 15 years.	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 of0.5m and 2m. The construction ofthe modules should be such that thedisplayed 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,Trulysemiconductor
4.	Optical port	Optical port should be used totransfer the meter data to meter reading instrument. The mechanical constructionof the port should be such to facilitate the data transfer easily. Itshould be magnetic locking type	USA: National Semiconductors Holland / Korea: Phillips Taiwan: MAXIM, Everlight Japan:Hitachi
5	P.C.B.	Glass Epoxy, fire resistance gradewith minimum thickness 1.6 mm	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 with guaranteed life of 15years	Varta / Tedirun/Vitzrocell / Sanyo

		8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The microcontroller shallbe of superior quality from Reputed make with long life.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki
		9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	USA: Philips , Dallas, Atmel, Motorola Japan: NEC or Oki
		Note- Any Deviations related to above table needs prior Approval			
5.1	**Meter Body**	5.1.1 Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FV0 Fire Retardant, self - extinguishing, UV stabilize, recyclable and Anti oxidation properties. 5.1.2 The minimum thickness of the meter enclosure shall be 2mm. 5.1.3 Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent onprior 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 polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid) **5.1.5 Meter cover & base shall be provided with continuous and seamless chemical welding such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.** 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 seal body should be close to meter body. 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 if liquid is injected from any side of meter body such as meter		

		terminals, push button, display, NIC card casing etc. Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.
5.2	**Terminals, Terminal Block**	5.2.1 **Terminal block should be in single mould with meter body base. (Not separate)** 5.2.2 **After any attempts the terminal block should not be able to disengaged, opened or loosen from any side.Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally& should be traceable in such a way that attempts can be proved in court of law.** 5.2.3 Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. 5.2.4 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 1.8MPa as mentioned in IS 14697. Tested as per ISO 75-2/A or ASTM D648. 5.2.5 The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent on prior approval from the TPXODL. (If different material offered the bidders should submit material data sheet in technical bid) 5.2.6 The terminals and connections shall be suitable to carry up to 100 % of Imax continuously. The size, design & material of Busbar /Shunt/Terminal shall be with suitable cross sectional area so that temperature rise will not be more than20 ˚C above ambient temperature of 45℃ at 100% of I max loading for 06 hrs continuous. This test of temp. rise shall be done on tender samples & will also be done on any samples from any supplied lot. 5.2.7 The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. 5.2.8 The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminal & screw should not be damaged during regular opening and tightening. 5.2.9 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. all terminals and screws should be nickel plated brass material. With (-) heads 5.2.10 Minimum two number of terminal screws to be provided per terminal wire.

		5.2.11Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. 5.2.12 Meter terminal should have 12 pins, zig zag arrangement. Pin Diagram and measurements to be provided by TPCODL 5.2.13Pin configuration shall be R-Cin, R volt, R-Cout, Y-Cin, Y volt, Y-Cout, B-Cin, B-volt, B-Cout, Neutral-in, N, N-out 5.2.14 **The preferred meter size shall be HxWxT= 235x300x120mm. Height is from the base of the terminal block. Further the bidder can check the dimensions and space availability in the existing TPCODL meter boxes at our MMG department for accommodating the smart meters in same boxes and meter body design should be such that it should be fitted with the proper terminal arrangement in existing LTCT boxes of TPCODL.**
5.3	**Terminal Cover**	5.3.1 Terminal cover shall be short type and transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the TPXODL. 5.3.2 Appropriate space shall be available for incoming /out going cables without damaging/stressing terminal cover (terminal cover design shall be as per the TPXODL approval). After sealing the cover, terminals shall not be accessible without breaking the seals. 5.3.3 The terminal cover design should be such that the sealing screw locking provision on cover should have min dimension of 3mmx3mm. (Excluding seal lock hole)
5.4	**Sealing of meter, terminal cover,SIM Card installation and NIC cover**	5.4.1 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. 5.4.3. One polycarbonate seal shall be provided by the TPXODL. This seal shall be fix on right hand side of meter. 5.4.4. All the seals with unique serial numbers shall be fixed on meter body by the bidder at his works before calling for inspection. 5.4.5 Two sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TPXODL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals be as per CEA regulation (2006). Only patented seals to be used as per CEA requirements.

<table>
<tr><td></td><td></td><td>5.4.6 The bidder shall provide TPXODL(MMG store and MTL) the soft record of polycarbonate seal and hologram seal serial number and NIC card serial number used against each meter serial number along with its position (RHS/LHS/Top/ NIC Cover) in tabular form for every lot of meter

5.4.7 Plug in type NIC card cover should have proper sealing arrangement. Sim Cards should be inserted in the meter before dispatched ,details of meter with respective SIM Card should be provided before GRN is done at TPXODL Central Store. One SIM card per meter will be provided by TPXODL. Keys of meter should also be provided at this stage to respective engineer of TPXODL without marking copy of this E-Mail to any other person</td></tr>
<tr><td>5.5</td><td>TOD Feature</td><td>The meter shall be capable of measuring Cumulative Energy (kWh &kVAh), and MD (kW & kVA) with time of day (TOD) registers having 8 zones & 02 seasons (no. of zones& time slot shall be programmable by MRI/ 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,

<table>
<tr><td>Time Slot</td><td>Remarks</td></tr>
<tr><td>0000 to 0800 AM</td><td>Normal Hour</td></tr>
<tr><td>0800AM TO 0400PM</td><td>Solar Hour</td></tr>
<tr><td>0400PM TO 0600PM</td><td>Normal Hour</td></tr>
<tr><td>0600 PM To 1200 Mid Night</td><td>Peak Hour</td></tr>
</table>
The bidder to ask TPXODL for latest TOD timing slots before manufacturing of every lot.</td></tr>
<tr><td>5.6</td><td>MD Integration</td><td>The MD integration period shall be 15 minutes (integration period-programmable by MRI at site and also thru AMR with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last 6 MD values shall be stored in the memory and one to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points.MD integration shall be of sliding Type at an interval of 5 min.</td></tr>
<tr><td>5.7</td><td>ParametersinBCS</td><td>All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop.All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years.Last twelve months history data (kWh &kVAh* (lag only) cumulative & TOD reading and MD(kW & kVA*(lag only) current, history& TOD) with data and time) and at least last 25 tamper events for each tamper shall be available in the non volatile Memory.

Fail’ to be log in memory in the following conditions only in BCS not in display
a) RTC fail
b) NVM memory fail
c) Battery fail
d) NIC card status

‘High THD’ to be log in memory in the following conditions only in BCS not in display</td></tr>
</table>

<table>
<tr><td></td><td></td><td>e) THDV any phase higher than threshold
f) THDI any phase higher than threshold

*Meter shall be programed at default ‘lag only’ configuration i.e. Leading power factor tobe treated as unity for kVA & kVAh calculations.

All the parameters shall be as per actual without multiplying factor.</td></tr>
<tr><td>5.7.1</td><td>Load survey(for pre-paid &postpaid meter mode)</td><td>The meter shall be capable of recording 15 minutes average of the following parameters for at least last 45 days
a) Voltage for each phase
b) Current of each phase
c) Actual Neutral current
d) Average PF
e) Average kWh
f) Average kVAh (lag only)
g) kVArh(Lagging)
h) kVArh(Leading)
i) Demand KW
j) Demand KVA
k) THD Voltage phase wise
l) THD Current phase wise

Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh/kVAh, kW/kVA in BCS for 45 days. Midnight energy value of cumulative kWh/kVAh and daily consumption kWh/kVAh should be available in meter memory for last 45 days. Load survey data should be at least with 3 decimal place.</td></tr>
<tr><td>5.7.2</td><td>Instantaneous Parameters</td><td>Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.

<table>
<tr><td>Meter Sr.No.</td><td></td></tr>
<tr><td>Meter Type</td><td></td></tr>
<tr><td>Meter date & Time</td><td>DD MM YYYY HH MM SS</td></tr>
<tr><td>Voltage –R</td><td>000.000V</td></tr>
<tr><td>Voltage –Y</td><td>000.000V</td></tr>
<tr><td>Voltage –B</td><td>000.000V</td></tr>
<tr><td>Line Current -R</td><td>00.000A</td></tr>
<tr><td>Line Current -Y</td><td>00.000A</td></tr>
<tr><td>Line Current -B</td><td>00.000A</td></tr>
<tr><td>Actual Neutral Current</td><td>00.00A</td></tr>
<tr><td>Active Current –R</td><td>00.000A</td></tr>
<tr><td>Active Current –Y</td><td>00.000A</td></tr>
<tr><td>Active Current –B</td><td>00.000A</td></tr>
<tr><td>Reactive Current-R</td><td>00.000A</td></tr>
<tr><td>Reactive Current-Y</td><td>00.000A</td></tr>
<tr><td>Reactive Current-B</td><td>00.000A</td></tr>
</table>
</td></tr>
</table>

		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 PowerOff Duration	00000	
		Cumulative PowerON Duration	00000	
		Cumulative Tamper count	00000	
		Cumulative Tamper duration	00000	
		Cumulative Billing Count	00000	
		Last Billing date	dd:mm:yy	
		No of Power failure	00000	
		Vector/phasor diagram (also showing neutral current) In case one of the voltage is missing, vector should be madewith2 phase voltage and all currents.		
	General Information	Meter shall be capable for providing below mentioned general parameters in memory **Meter Serial number** Software Name Version Manufacture Name Manufacture Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile showing timing and seasons #NIC Sr.no. NIC make		

		# 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) Cumulative kwh, kVAh (lag only), kVArh lead, lag (all import and export) and TOD1 kWh,TOD2 kWh,,TOD1 kVAh (lag only),TOD2 kVAh (lag only),, For present and last06 Resets (reset date for all resets/history, time zone register wise) 2) Maximum Demand Absolute Active Load and Absolute Apparent load and TOD1 kW,TOD2 kW,TOD3 kW,TOD1 kVA (lag only),TOD2 kVA (lag only), for present and last 06 Resets (reset date for all resets/history, time zone register wise) along with date and time stamp. 3) Billing Dates (6 History) 4) Cumulative Billing count 5) TOD details with day time and season wise. 6) Monthly power On/Off hours Last five modes with date & time of switching with cumulative energy parameters kWh, kVAh (lag only), kVArh lead, lag (all import and export) and TOD1 kWh,TOD2 kWh,TOD1 kVAh (lag only),TOD2 kVAh (lag only), Note : Meter must have provision of 8 time zones. Meter Should push mid night reads with all billing parameters and rising demand for KW and KVA on daily basis all the related data should be pushed at 3 AM on daily basis .
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 billing related 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 specs 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℃ and minimum temperature withstands 0 ℃ 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.

<table>
<tr><td></td><td></td><td>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 reading LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh &kVAh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing).

All the parameters shall be as per actual without multiplying factor.</td></tr>
<tr><td>5.8.1</td><td>Auto Scroll mode</td><td>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. The cumulative energies shall not have any decimal value.

Following shall be continuously displayed in auto scroll and push button mode in the given order;

<table>
<tr><th>Sr. No.</th><th>Auto Scroll Display</th></tr>
<tr><td>1</td><td>LCD CHECK</td></tr>
<tr><td>2</td><td>Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.</td></tr>
<tr><td>3</td><td>dd:mm:yy Date</td></tr>
<tr><td>4</td><td>hh:mm:ss Time</td></tr>
<tr><td>5</td><td>C kWh Current Cumulative kWh</td></tr>
<tr><td>6</td><td>C kVAh (lag only) Current Cumulative kVAh</td></tr>
<tr><td>7</td><td>C kVArh lag Current Cumulative kVArh(lag).</td></tr>
<tr><td>8</td><td>C kVArh lead Current Cumulative KVARh(lead).</td></tr>
<tr><td>9</td><td>Individual cumulative kWh for T1,T2,T3,T4</td></tr>
<tr><td>10</td><td>Individual cumulative kVAh (lag only) for T1,T2,T3,T4</td></tr>
<tr><td>11</td><td>Current MD – kW</td></tr>
<tr><td>12</td><td>Current MD - kVA</td></tr>
<tr><td>13</td><td>H 1 KWh kWh reading on 1st of last month at 00.00 hrs.</td></tr>
<tr><td>14</td><td>H1 Individual cumulative kWh for T1,T2,T3,T4 for last month</td></tr>
<tr><td>15</td><td>H 1 MD in kW on 1st of last month at 00.00 hrs.</td></tr>
<tr><td>16</td><td>H 1 kVAh(lag only) reading on 1st of last month at 00.00 hrs.</td></tr>
<tr><td>17</td><td>H1 Individual cumulative kVAh (lag only) for T1,T2,T3,T4for last month</td></tr>
<tr><td>18</td><td>H 1 MD in kVA reading on 1st of last month at 00.00 hrs</td></tr>
<tr><td>19</td><td>H1 Avg. pf</td></tr>
</table>
</td></tr>
</table>

		20	Cumulative Billing count
		21	R Phase Voltage (Instantaneous value).
		22	Y Phase Voltage (Instantaneous value).
		23	B Phase Voltage (Instantaneous value).
		24	R Phase Current (Instantaneous value).
		25	Y Phase Current (Instantaneous value).
		26	B Phase Current (Instantaneous value).
		27	Instantaneous power factor Phase Wise PF1,PF2,PF3 with sign
		28	Instantaneous load in KW
		29	Instantaneous load in KVA
		30	Voltage Sequence R,Y,B
		31	Current Sequence R,Y,B

5.8.2 **Push Button Scroll mode**

Following parameters shall be displayed in Push button mode in the given order.

Sr. No.	Push Button Display
1	LCD CHECK
2	Meter Sr. No.* > Complete Meter Serial no. should be there in single shot.
3	dd:mm:yy Date
4	hh:mm:ss Time
5	C () kWh Current Cumulative kWh
6	C) kVAh (Lag only) Current Cumulative kVAh
7	C kVArh lag Current Cumulative kVArh(lag).
8	C kVArh lead Current Cumulative kVArh(lead).
9	Individual cumulative kWh for T1,T2,T3,T4
10	Individual cumulative kVAh(Lag only) for T1,T2,T3,T4
11	Current MD – kW
12	Current MD - kVA (lag only)
13	H 1 kWh kWh reading on 1st of last month at 00.00 hrs.
14	H 1 Individual cumulative kWh for T1,T2,T3,T4 for last month
15	H 1 MD in kW on 1st of last month at 00.00 hrs.
16	H 1 kVAh (Lag only) reading on 1st of last month at 00.00 hrs.
17	H 1 Individual cumulative kVAh(Lag only) for T1,T2,T3,T4 for last month
18	H1 MD in KVA on 1st of last month at 00.00 hrs
19	H 1 Avg. pf
20	Cumulative Billing count

21	R Phase Voltage (Instantaneous value).
22	Y Phase Voltage (Instantaneous value).
23	B Phase Voltage (Instantaneous value).
24	R Phase Current (Instantaneous value).
25	Y Phase Current (Instantaneous value).
26	B Phase Current (Instantaneous value).
27	Instantaneous power factor for individual phases R,Y,B
28	Instantaneous load in kW
29	Instantaneous load in kVA
30	Voltage phase sequence R, Y, B
31	Current phase sequence R, Y, B
32	In High resolution Cumulative kWh
33	In High resolution Cumulative kVAh (lag only)
34	In High resolution Cumulative kVArh Lag
35	In High resolution Cumulative kVArh Lead
36	MAG 00 (cumulative count)
36a	Date of last occurrence
36b	Time of last occurrence
37	ESD 00 (cumulative count)
37a	Date of last occurrence
37b	Time of last occurrence
38	TC OPEN 00 (cumulative count)
38a	First occurrence date
38b	First occurrence time
39	Total tamper count 0000

High Resolution Display

Sl No	2+4 Digits after Decimal
1	Cumulative Kwh,
2	Cumulative KvAh
3	Cumulative Kvarh (Lag)
4	Cumulative Kvarh (Lead)

Meter display shou;d be locked in high resolution mode by holding the push button for 10 seconds and meter should come out of high resolution 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 blinking LED (marked as imp/kWh and imp/Kvarh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have constant pulse rate of (preferred value- 400) pulse / kWh & pulse/kVArh**.** Meter constant shall be indelibly printed on the name plate as imp / KWh & imp/kVArh. Meter constant shall be as per actual without multiplying factor. **5.9.2 Communication LCD indicator-** The meter shall be provided with with suitable LCD indication for communication in progress. **5.9.3** Phase indication : Individual phases should be displayed on LCD display of meter

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(as of TPXODL logo)Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. i. Manufacturer's name ii. Type designation iii. Number of phases and wires iv. Serial number (Meter serial number shall be laser printed on name plateinstead on sticker). v. Month and Year of manufacture vi. Unit of measurement vii. Reference voltage ,frequency viii. Ref. temperature if different from 27 deg. C ix. Rated basic and maximum Current x. Meter constant (imp/kWh) xi. Meter constant (imp/kVArh) xii. 'BIS' Mark xiii. Class index of meter xiv. "Property of TPXODL" xv. Purchase Order No. & date xvi. Guarantee period. xvii. Rated frequency xviii. Sign of double square xix. Country of manufacture. xx. Firmware version for meter xxi. Category xxii. Communication Tech for WAN and NAN(with carrier frequency) xxiii. Communication Technology is IHD supported (with carrier frequency). However the following shall be printed in bar code/QR Code 1 on the meter nameplate.(shall be laser printed on name plate instead of any sticker). 1) Manufacturer's Name . 2) Meter Sr. No 3) PO Number Month/Year of manufacture.

		Barcode /QR Code -2 Serial No details Given by TPXODL Barcode/QR Code 3 NIC card Serial No to be provided on NIC Card through QR/Bar Code The PCB Serial number should be printed on PCB instead of sticker. Content Format for bar code: **XXXXXXXXX**(9-digit Serial no.) **Bidder should ensure that 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.
7.1	**TYPE TEST**	1) All tests as defined in IS 16444 part-2 and IS 15959(Part-3):2016 2) Test against abnormal magnetic influence as per CBIP TR 325. 3) Smart meter communicability as per 15959 part-3 4) Meter shall be type tested as per BIS16444 part-2
7.2	**ROUTINE TEST**	1) AC High Voltage test 2) Insulation test 3) Test on limits of error 4) Test of starting current 5) Test of no load condition 6) Communication check of NIC
7.3	**ACCEPTANCE TEST**	1) AC High Voltage test 2) Insulation test Test on limits of error 3) Test of meter constant 4) Test of starting current 5) Test of no load condition 6) Test of repeatability of error. 7) Test of power consumption. 8) Test for Immunity against external influencing signal as per the TPXODL specification 9) Test for Immunity against DC Immunity as per the TPXODL specification 10) Test for Immunity against Tamper conditions as per the TPXODL specification 11) Error measurements with all abnormal condition along with ESD, magnet, jammer 12) Test to Influence of Harmonics 13) Supply voltage and frequency variation test 14) Testing of self diagnostic features 15) Tamper count increment and logging with date and time in meter database 16) All tests as defined in IS 15959(Part-2):2016

		18) Functionality of communication module is 16444 part2 19) smart meter communicability as per provision of 28 IS 15959 (part-3) 20) Meter reading on HES demand, Scheduled meter reading from HES, remote firmware upgrade from HES and all programming request from HES to be simulated and checked during inspections. 21) Physical check of NIC and replaceable ease of the NIC module in meter & logging 22) 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/ UL laboratory 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 TPXODLof 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 offurnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued byTPXODL. Following documents shall be sent along with material a) Pre Dispatch inspection reports b) MDCC issued by TPXODL c) Invoice in duplicate d) Packing list

		e) Drawings & catalogue f) Delivery Challan g) Other Documents (as applicable) h) Guarantee / Warrantee card i) Meter No wise Seal & SIM Card details as per pre approved format j) Routine test report in hard copy to be provided alongwith each meter packed inside the meter box. Soft copy of the same to provided separately 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. Two meters from the offered lot shall be tested for all tampers at TPXODL laboratory for compliance to anti tamper feature before MDCC. The inspectors shall free to take any two meters from offered lot for testing at our Lab. Bidder should check and ensure each meter and reset each meter for any event logged for any tamper.
10.0	**INSPECTION AFTER RECEIPT AT 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 and one copy of the report shall be sent to Plant Engineering department.
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 bidder or 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**	1. Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly. Packing and transportation shall be as per IS15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with manufacturing company logo) of the individual meter shall be kept inside each card board carton of the meter. 3. 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. 4. The softcopy of the routine test certificate of each meter to be provided with each lot to TPXODL, MMG stores. 5. QR Code should be provided in meter cartoon in which meter serial no to be

		provided. These QR code should be readable using QR code scanner without changing the position of meter. 6. Cartoon Box should have suitable strength to stack them indoor store upto height of 6 cartoons.
13.0	**SAMPLE**	Tendering stage: Bidders are required to manufacture 03 numbers of sample meters as per the TPXODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits) and submit the samples (non-returnable) along with bid for approval. The tender sample as per IS 16444 part 2 & IS 15959 shall be acceptable for verification and other checks. The samples shall be retained at TPXODL. Address of Dispatch: Meter Testing Lab.TPXODL Pre-manufacturing approvals: The successful bidder shall submit four prototype samples of meters at Meter Testing Lab, at location informed by TPXODL during submission time, for further testing and compliance as per specifications and get approval before mass manufacturing. Following accessories to be submitted along with sample at both stages: 1) Detailed manual 2) Communication cords 3) Tamper logic sheet 4) Display parameter annunciator 5) BCS 6) Internal connection diagram. All meters shall be supplied with 4G enabled Sim cards. Bidder to demonstrate all communication features and performance SLA on their HES.

14.0	**QUALITY CONTROL**	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. 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 under go computerized testing for conforming to design parameter and orientation. • Complete assembled and soldered PCB should under go 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 or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections.
15.0	**MINIMUM TESTING FACILITIES**	Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.02 accuracy or better. Bidder should have NABL accredited Lab for the acceptance test scope .
16.0	**MANUFACTURING ACTIVITIES**	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

<table>
<tr>
<td>17.0</td>
<td>SPARES, ACCESSORIES AND TOOLS</td>
<td>1. 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.
2. 5 % of NIC Card for maintaining rolling stock for troubleshooting purpose.</td>
</tr>
<tr>
<td>18.0</td>
<td>DRAWINGS AND DOCUMENTS</td>
<td>Following drawings & Documents shall be prepared based on TPXODL specifications and statutory requirements and shall be submitted with the bid:
a)Completely filled-in Technical Parameters.b)General arrangement drawing of the meter
c) Terminal Block dimensional drawing
d) Mounting arrangement drawings.
e) General description of the equipment and all components with makes andtechnical requirement
f) Type Test Certificatesg)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 along with meter samples,

<table>
<tr><th>S. No.</th><th>Description</th><th>For Approval</th><th>For Review Information</th><th>Final Submission</th></tr>
<tr><td>1</td><td>Technical Parameters</td><td></td><td></td><td>√</td></tr>
<tr><td>2</td><td>General Arrangement drawings</td><td></td><td></td><td>√</td></tr>
<tr><td>3</td><td>Terminal block Dimensional drawings</td><td></td><td></td><td>√</td></tr>
<tr><td>4</td><td>Mountingarrangementdrawing.</td><td></td><td></td><td>√</td></tr>
<tr><td>5</td><td>Manual/Catalogues</td><td></td><td></td><td>√</td></tr>
<tr><td>6</td><td>Transport/ Shippingdimension drawing</td><td></td><td></td><td>√</td></tr>
<tr><td>7</td><td>QA &QC Plan</td><td></td><td></td><td>√</td></tr>
<tr><td>8</td><td>Routine, Acceptance andType Test Certificates</td><td></td><td></td><td>√</td></tr>
</table>

Bidder shall subsequently provide Soft copy of all the drawing, GTP, Test certificates shall be submitted for the final approval of TPXODL.

All the documents & drawings shall be in English language.</td>
</tr>
</table>

19.0	**GUARANTEED TECHNICAL PARTICULARS**		**S.No**	**Description**	**Units**	**As Furnished by Bidder**
			1	Type of meter		
			2	Accuracy Class of the meter		
			3	Ib& Imax	A	
			4	Operating Voltage for meter	V	
			5	Operating Frequency	*Hz*	
			6	Power Consumption and Burden		
			7	Starting Current	mA	
			8	Short time over current	A	
			9	Influence of heating		
			10	Rated impulse withstand voltage	KV	
			11	AC withstand Voltage for 1 min	KV	
			12	Insulation resistance a) Between frame &Current, voltage circuits connected together: b) Between each current(or voltage circuit) & eachand every other circuit.	M ohm	
			13	Mechanical requirement as per IS 14697 and IS 16444 part 2		
			14	Resistance to heat and fire (As per specification)		
			15	Degree of protection		
			16	Resistance against climatic influence (as per IS 14697 and IS 16444 part-2)		
			17	Electromagnetic Compatibility (EMC)		
			18	Accuracy requirements (As per IS 14697and IS 16444 part-2		
			19	Power factor range		
			20	Energy measurement		
			21	Connection Diagram for system on terminal cover	Yes/No	
			22	Self diagnostic feature		

			23	Initial start up of meter (meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals)			
			24	Terminal block a) Depth of the Terminal holes b) Internal diameter of terminal holes c) Clearance between adjacent terminals	 Mm Mm Mm		
			25	Communication capabilities as per clause 4.2			
			26	Immunity against abnormal Magnetic influence,as defined in Cl. 4.3			
			27	Immunity against HV ESD as defined inCl. 4.3			
			28	DC Immunity asdefined in Cl. 4.4			
			29	Abnormal and tamper events and logging with snapshot in all conditions as per table no-1 cl. 4.5	Yes/no		
			30	Grade/Name of material for a) Meter base b) Meter cover c) Terminal block d) Terminal cover			
			31	Tamper counters			
			32	Recording forward energy in all conditions.	Yes/No		
			33	Meter sealing as per clause 5.4	Yes/No		
			34	Non Volatile memory (Retention period)			
			35	Measuring elements used in the meter			
			36	Power supply to circuit in case of supply failure			

			37	Display of measured values (As per specification –clause 5.8)	Yes/No		
			38	LCD display (Type and viewing angle)			
			39	Pulse rate	Imp/kWh, Imp/kVArh		
			40	Name plate marking	Yes/No		
			41	Routine test certificates	Yes/No		
			42	Acceptance test Certificates	Yes/No		
			43	Type test certificates	Yes/No		
			44	Guarantee certificates	Yes/No		
			45	Output device(LEDs)As per Cl.5.9	Yes/No		
			46	Terminal Screw dia.			
			47	Ultrasonic welding of cover and base			
			48	Fire retardant categoryof the material a. Meter body b. Terminal block			
			49	Supply of Zig for retrieval of the damaged/burnt meter data at MTL			
			50	The meter should not have any other event logging than desired in specs. All the other logics should be removed or disabled in firmware.			
			51	Meter shall be programed at default ‘lag only’ configuration i.e. Leading power factor to be treated as unity for kVA&kVAh calculations			
			52	Dimensions of the meter HxLxT			
			53	The terminal block arrangement with 12pin zig zag configuration (Samples to be provided by TPCODL)			
			54	The meter design ensures that no MF required for any			

	parameter or energy calculation and Meter constant.		
55	Offered CT ratio's 100/5A, 200/5A		
56	NIC module with cover & sealing arrangement provided.		
57	Harmonics Recording- The recording of harmonics up to 20th harmonic Average THD of all phase for voltage THD and current THD.		
58	Accuracy of harmonics recording		
59	Flag in BCS for high THD in any phase V or I		

B. **Electronics parts**

S No	**Component Function**	**Requirement**	**Makes and Origin**
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	
2.	Memory chips/NVM	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electro static discharges. The life of NVM shall be 15 years.	
3.	Display modules	The display modules should be well protected from the external UV radiations. The display visibility should be sufficient to read the meter mounted between height of 0.5m and 2m. The construction of the modules should be such that the displayed quantity 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.	

			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	
			5	P.C.B.	Glass Epoxy, fire resistance grade with minimum thickness 1.6 mm	
			6.	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	
			7.	Battery	Lithium with guaranteed life of 15 years	
			8.	Micro controller and RTC having separate battery	The accuracy of RTC shall be as per relevant IEC / IS standards and RTC shall be provided with separate battery in its ckt.. The microcontroller shall be of superior quality from Reputed make with long life.	
			9.	Temperature sensor	Temperature sensor shall be internal to the meter and its accuracy shall be as per relevant IEC / IS standards. The OEM test report to be furnished. With good performance till life of meter.	

Three phase LT CT & DT 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 LT CT & DT 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
   b. Downloadable parameter list- Annexure-B
   c. Display parameter list - Annexure-C
   d. Tamper threshold table- Annexure-D

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.

12. Error Codes for NIC Status:

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

Three phase LT CT & DT 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	IS 15959 part-3
2	Periodic Push SM (Smart Meter)to HES	0.0.25.9.0.255	IS 15959 part-3
3	Periodic Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 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	IS 15959 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	IS 15959 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 LT CT & DT meter Downloadable Parameters List: - **Annexure-B**

Three Phase LT CT & DT Meter			
S.		OBIS Code	OBIS Source
	Instantaneous Profile	1.0.94.91.0.255	IS 15959 part-3
1	Real Time Clock - Date and Time	0.0.1.0.0.255	IS 15959 part-3
2	Current – IR	1.0.31.7.0.255	IS 15959 part-3
3	Current – IY	1.0.51.7.0.255	IS 15959 part-3
4	Current – IB	1.0.71.7.0.255	IS 15959 part-3
5	Voltage – VRN	1.0.32.7.0.255	IS 15959 part-3
6	Voltage – VYN	1.0.52.7.0.255	IS 15959 part-3
7	Voltage - VBN	1.0.72.7.0.255	IS 15959 part-3
8	Signed Power Factor - R phase	1.0.33.7.0.255	IS 15959 part-3
9	Signed Power Factor - Y phase	1.0.53.7.0.255	IS 15959 part-3
10	Signed Power Factor - B phase	1.0.73.7.0.255	IS 15959 part-3
11	Signed three Phase Power Factor - PF	1.0.13.7.0.255	IS 15959 part-3
12	Frequency	1.0.14.7.0.255	IS 15959 part-3
13	Apparent Power - KVA	1.0.9.7.0.255	IS 15959 part-3
14	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS 15959 part-3
15	Signed Reactive Power - kVAr (+ Lag; - Lead)	1.0.3.7.0.255	IS 15959 part-3
16	Number of power failures	0.0.96.7.0.255	IS 15959 part-3
17	Cumulative power-failure duration in Min	0.0.94.91.8.255	IS 15959 part-3
18	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-3
19	Cumulative Billing count	0.0.0.1.0.255	IS 15959 part-3
20	Cumulative programming count	0.0.96.2.0.255	IS 15959 Part-3
21	Billing Date	0.0.0.1.2.255	IS 15959 Part-3
22	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS 15959 Part-3
23	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS 15959 Part-3
24	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS 15959 Part-3
25	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS 15959 Part-3
26	MD kW, Import/Forwarded with date & time	1.0.1.6.0.255	IS 15959 Part-3
27	MD kVA, Import/Forwarded with date & time	1.0.9.6.0.255	IS 15959 Part-3
28	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS 15959 Part-3
29	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS 15959 Part-3
30	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS 15959 Part-3
31	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS 15959 Part-3
32	Cumulative power on duration (min)	0.0.94.91.14.255	IS 15959 Part-3
33	Temperature	0.0.96.9.128.255	TPCODL
34	Neutral current	1.0.91.7.0.255	TPCODL
35	R Phase active Current	1.0.31.7.128.255	TPCODL
36	Y Phase active Current	1.0.51.7.128.255	TPCODL
37	B Phase active Current	1.0.71.7.128.255	TPCODL L
38	MD kW, Export with date & time	1.0.2.6.0.255	IS 15959 Part-3
39	MD kVA, Export with date & time	1.0.10.6.0.255	IS 15959 Part-3
40	Angle between R-Y phase voltage	1.0.81.7.10.255	TPCODL
41	Angle between R-B phase voltage	1.0.81.7.20.255	TPCODL
42	Phase Sequence	1.0.128.7.0.255	TPCODL
43	Signal Strength (CSQ value)	0.1.96.12.5.255	TPCODL

44	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	IS 15959 Part-3
1	Billing Date	0.0.0.1.2.255	IS 15959 Part-3
2	System Power Factor For Billing Period for Import /Forwarded	1.0.13.0.0.255	IS 15959 Part-3
3	Cumulative Energy - kWh, Import/Forwarded	1.0.1.8.0.255	IS 15959 Part-3
4	Cumulative Energy kWh TZ1, Import/Forwarded	1.0.1.8.1.255	IS 15959 Part-3
5	Cumulative Energy kWh TZ2, Import/Forwarded	1.0.1.8.2.255	IS 15959 Part-3
6	Cumulative Energy kWh TZ3, Import/Forwarded	1.0.1.8.3.255	IS 15959 Part-3
7	Cumulative Energy kWh TZ4, Import/Forwarded	1.0.1.8.4.255	IS 15959 Part-3
8	Cumulative Energy kWh TZ5, Import/Forwarded	1.0.1.8.5.255	IS 15959 Part-3
9	Cumulative Energy kWh TZ6, Import/Forwarded	1.0.1.8.6.255	IS 15959 Part-3
10	Cumulative Energy kWh TZ7, Import/Forwarded	1.0.1.8.7.255	IS 15959 Part-3
11	Cumulative Energy kWh TZ8, Import/Forwarded	1.0.1.8.8.255	IS 15959 Part-3
12	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS 15959 Part-3
13	Cumulative Energy kVAH TZ1, Import/Forwarded	1.0.9.8.1.255	IS 15959 Part-3
14	Cumulative Energy kVAH TZ2, Import/Forwarded	1.0.9.8.2.255	IS 15959 Part-3
15	Cumulative Energy kVAH TZ3, Import/Forwarded	1.0.9.8.3.255	IS 15959 Part-3
16	Cumulative Energy kVAH TZ4, Import/Forwarded	1.0.9.8.4.255	IS 15959 Part-3
17	Cumulative Energy kVAH TZ5, Import/Forwarded	1.0.9.8.5.255	IS 15959 Part-3
18	Cumulative Energy kVAH TZ6, Import/Forwarded	1.0.9.8.6.255	IS 15959 Part-3
19	Cumulative Energy kVAH TZ7, Import/Forwarded	1.0.9.8.7.255	IS 15959 Part-3
20	Cumulative Energy kVAH TZ8, Import/Forwarded	1.0.9.8.8.255	IS 15959 Part-3
21	MD kW, Import/Forwarded with date & time	1.0.1.6.0.255	IS 15959 Part-3
22	MD kW TZ1, Import/Forwarded with date & time	1.0.1.6.1.255	IS 15959 Part-3
23	MD kW TZ2, Import/Forwarded with date & time	1.0.1.6.2.255	IS 15959 Part-3
24	MD kW TZ3, Import/Forwarded with date & time	1.0.1.6.3.255	IS 15959 Part-3
25	MD kW TZ4, Import/Forwarded with date & time	1.0.1.6.4.255	IS 15959 Part-3
26	MD kW TZ5, Import/Forwarded with date & time	1.0.1.6.5.255	IS 15959 Part-3
27	MD kW TZ6, Import/Forwarded with date & time	1.0.1.6.6.255	IS 15959 Part-3
28	MD kW TZ7, Import/Forwarded with date & time	1.0.1.6.7.255	IS 15959 Part-3
29	MD kW TZ8, Import/Forwarded with date & time	1.0.1.6.8.255	IS 15959 Part-3
30	MD kVA, Import/Forwarded with date & time	1.0.9.6.0.255	IS 15959 Part-3
31	MD kVA TZ1, Import/Forwarded with date & time	1.0.9.6.1.255	IS 15959 Part-3
32	MD kVA TZ2, Import/Forwarded with date & time	1.0.9.6.2.255	IS 15959 Part-3
33	MD kVA TZ3, Import/Forwarded with date & time	1.0.9.6.3.255	IS 15959 Part-3
34	MD kVA TZ4, Import/Forwarded with date & time	1.0.9.6.4.255	IS 15959 Part-3
35	MD kVA TZ5, Import/Forwarded with date & time	1.0.9.6.5.255	IS 15959 Part-3
36	MD kVA TZ6, Import/Forwarded with date & time	1.0.9.6.6.255	IS 15959 Part-3
37	MD kVA TZ7, Import/Forwarded with date & time	1.0.9.6.7.255	IS 15959 Part-3
38	MD kVA TZ8, Import/Forwarded with date & time	1.0.9.6.8.255	IS 15959 Part-3
39	Billing Power ON Duration in Mins	0.0.94.91.13.255	IS 15959 Part-3
40	Cumulative Energy - kWh Export	1.0.2.8.0.255	IS 15959 Part-3

41	Cumulative Energy - kVAh Export	1.0.10.8.0.255	IS 15959 Part-3
42	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS 15959 Part-3
43	Cumulative energy, kVArh(QII)	1.0.6.8.0.255	IS 15959 Part-3
44	Cumulative energy, kVArh(QIII)	1.0.7.8.0.255	IS 15959 Part-3
45	Cumulative energy, kVArh(QIV)	1.0.8.8.0.255	IS 15959 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	IS 15959 Part-3
50	MD kVA, Export with date & time	1.0.10.6.0.255	IS 15959 Part-3
51	Meter serial number	0.0.96.1.0.255	IS 15959 Part-3
Note:- 1. Energy cconsumptions are derived parameters & same shall be available at HES /MDM & BCS end			

S. No.	Block Load Profile (90 days with 30 min IP and 45 days with 15	OBIS Code	OBIS Source
	Block Load Profile	1.0.99.1.0.255	IS 15959 Part-3
1	RTC	0.0.1.0.0.255	IS 15959 Part-3
2	Average Current - IR	1.0.31.27.0.255	IS 15959 Part-3
3	Average Current - IY	1.0.51.27.0.255	IS 15959 Part-3
4	Average Current - IB	1.0.71.27.0.255	IS 15959 Part-3
5	Average Voltage - VRN	1.0.32.27.0.255	IS 15959 Part-3
6	Average Voltage - VYN	1.0.52.27.0.255	IS 15959 Part-3
7	Average Voltage - VBN	1.0.72.27.0.255	IS 15959 Part-3
8	Block Energy – kWh- Import/Forwarded	1.0.1.29.0.255	IS 15959 Part-3
9	Block Energy – kWh-Export	1.0.2.29.0.255	IS 15959 Part-3
10	Block energy. kvarh-Q1/Lag	1.0.5.29.0.255	IS 15959 Part-3
11	Block energy. kvarh-Q2\Lead	1.0.6.29.0.255	IS 15959 Part-3
12	Block energy. kvarh-Q3\Lag	1.0.7.29.0.255	IS 15959 Part-3
13	Block energy. kvarh-Q4/Lead	1.0.8.29.0.255	IS 15959 Part-3
14	Block Energy – kVAh- Import/Forwarded	1.0.9.29.0.255	IS 15959 Part-3
15	Block Energy – kVAh-Export	1.0.10.29.0.255	IS 15959 Part-3
16	Average Neutral current	1.0.91.29.0.255	TPCODL
17	%THDV R- Phase Average	1.0.32.128.124.25	TPCODL
18	%THDV Y- Phase Average	1.0.52.128.124.25	TPCODL
19	%THDV B- Phase Average	1.0.72.128.124.25	TPCODL
20	%THDI R- Phase Average	1.0.31.128.124.25	TPCODL
21	%THDI Y- Phase Average	1.0.51.128.124.25	TPCODL
22	%THDI B- Phase Average	1.0.71.128.124.25	TPCODL
23	Average Temperature	0.0.96.9.129.255	TPCODL
24	Signal strength (CSQ value)	0.1.96.12.5.255	TPCODL
25	Meter Serial number	0.0.96.1.0.255	IS 15959 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
46	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	IS 15959 Part-3
1	Meter Serial number	0.0.96.1.0.255	IS 15959 Part-3
2	Device ID	0.0.96.1.2.255	IS 15959 Part-3
3	Manufacturer Name	0.0.96.1.1.255	IS 15959 Part-3
4	Firmware Version for meter	1.0.0.2.0.255	IS 15959 Part-3
5	Meter Type (1Phase/3P-3W/3P-4W)	0.0.94.91.9.255	IS 15959 Part-3
6	Category	0.0.94.91.11.255	IS 15959 Part-3
7	Current rating	0.0.94.91.12.255	IS 15959 Part-3
8	Meter Year of TPCODL	0.0.96.1.4.255	IS 15959 Part-3
9	Internal CT Ratio	1.0.0.4.2.255	IS 15959 Part-3
10	Internal PT Ratio	1.0.0.4.3.255	IS 15959 Part-3
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	IS 15959 Part-3
15	Load survey integration period	1.0.0.8.4.255	IS 15959 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	IS 15959 Part-3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 Part-3
2	Event Code (voltage events)	0.0.96.11.**e**.255	IS 15959 Part-3
3	Current - IR	1.0.31.7.0.255	IS 15959 Part-3
4	Current - IY	1.0.51.7.0.255	IS 15959 Part-3
5	Current - IB	1.0.71.7.0.255	IS 15959 Part-3
6	Voltage - VRN	1.0.32.7.0.255	IS 15959 Part-3
7	Voltage - VYN	1.0.52.7.0.255	IS 15959 Part-3
8	Voltage - VBN	1.0.72.7.0.255	IS 15959 Part-3
9	Signed R Phase Pf	1.0.33.7.0.255	IS 15959 Part-3
10	Signed Y Phase Pf	1.0.53.7.0.255	IS 15959 Part-3
11	Signed B Phase Pf	1.0.73.7.0.255	IS 15959 Part-3
12	KWH Import/Forwarded	1.0.1.8.0.255	IS 15959 Part-3
13	KWH Export	1.0.2.8.0.255	IS 15959 Part-3
14	Cumulative tamper count	0.0.94.91.0.255	IS 15959 Part-3
15	KVAH Import/Forwarded	1.0.9.8.0.255	IS 15959 Part-3
16	KVAH Export	1.0.10.8.0.255	IS 15959 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	Neutral current	1.0.91.7.0.255	IS 15959 Part-3
21	Total PF	1.0.13.7.0.255	IS 15959 Part-3
22	Meter Serial number	0.0.96.1.0.255	IS 15959 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	IS 15959 Part-3
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 Part-3
2	Event Code (power fail events)	0.0.96.11.e.255	IS 15959 Part-3
3	Meter Serial number	0.0.96.1.0.255	IS 15959 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	IS 15959 Part-3
2	Event Code (Non Standard events)	0.0.96.11.128.255	TPCODL
3	Current – IR	1.0.31.7.0.255	IS 15959 Part-3
4	Current – IY	1.0.51.7.0.255	IS 15959 Part-3
5	Current – IB	1.0.71.7.0.255	IS 15959 Part-3
6	Voltage – VRN	1.0.32.7.0.255	IS 15959 Part-3
7	Voltage – VYN	1.0.52.7.0.255	IS 15959 Part-3
8	Voltage – VBN	1.0.72.7.0.255	IS 15959 Part-3
9	R Phase Pf	1.0.33.7.0.255	IS 15959 Part-3
10	Y Phase Pf	1.0.53.7.0.255	IS 15959 Part-3
11	B Phase Pf	1.0.73.7.0.255	IS 15959 Part-3
12	KWH Import/Forwarded	1.0.1.8.0.255	IS 15959 Part-3
13	KWH Export	1.0.2.8.0.255	IS 15959 Part-3
14	Cumulative tamper count	0.0.94.91.0.255	IS 15959 Part-3 A1
15	KVAH Import/Forwarded	1.0.9.8.0.255	IS 15959 Part-3
16	KVAH Export/Forwarded	1.0.10.8.0.255	IS 15959 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	Neutral current	1.0.91.7.0.255	IS 15959 Part-3
21	Total PF	1.0.13.7.0.255	IS 15959 Part-3
22	Temperature	0.0.96.9.128.255	TPCODL
23	Meter Serial number	0.0.96.1.0.255	IS 15959 Part-3
Note- This data shall be read through BCS & HES			

S. No.	Phasor profile	OBIS Code	OBIS Source
	Phasor Profile	1.0.99.128.128.25	TPCODL
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 Part-3
2	Current – IR	1.0.31.7.0.255	IS 15959 Part-3
3	Current – IY	1.0.51.7.0.255	IS 15959 Part-3
4	Current – IB	1.0.71.7.0.255	IS 15959 Part-3

5	Voltage – VRN	1.0.32.7.0.255	IS 15959 Part-3
6	Voltage – VYN	1.0.52.7.0.255	IS 15959 Part-3
7	Voltage – VBN	1.0.72.7.0.255	IS 15959 Part-3
8	Signed Power Factor –R phase	1.0.33.7.0.255	IS 15959 Part-3
9	Signed Power Factor –Y phase	1.0.53.7.0.255	IS 15959 Part-3
10	Signed Power Factor –B phase	1.0.73.7.0.255	IS 15959 Part-3
11	Signed Three Phase Power Factor – PF	1.0.13.7.0.255	IS 15959 Part-3
12	Frequency	1.0.14.7.0.255	IS 15959 Part-3
13	Apparent Power – KVA	1.0.9.7.0.255	IS 15959 Part-3
14	Signed Active Power – kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS 15959 Part-3
15	Signed Reactive Power – kVAr (+ Lag; - Lead)	1.0.3.7.0.255	IS 15959 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	Neutral current	1.0.91.7.0.255	IS 15959 Part-3
24	Meter Serial number	0.0.96.1.0.255	IS 15959 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	IS 15959 Part-3
2	Cumulative Energy - kWh, Export	1.0.2.8.0.255	IS 15959 Part-3
3	Cumulative energy, kVArh(QI)	1.0.5.8.0.255	IS 15959 Part-3
4	Cumulative energy, kVArh (QII)	1.0.6.8.0.255	IS 15959 Part-3
5	Cumulative energy, kVArh (QIII)	1.0.7.8.0.255	IS 15959 Part-3
6	Cumulative energy, kVArh (QIV)	1.0.8.8.0.255	IS 15959 Part-3
7	Cumulative Energy - kVAh, Import/Forwarded	1.0.9.8.0.255	IS 15959 Part-3
8	Cumulative Energy - kVAh, Export	1.0.10.8.0.255	IS 15959 Part-3
9	Meter Serial number	0.0.96.1.0.255	IS 15959 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	IS 15959 Part-3
2	Demand Integration Period change	1.0.0.8.0.255	152	IS 15959 Part-3
3	Profile captured period	1.0.0.8.4.255	153	IS 15959 Part-3
4	single-action schedule for billing dates	0.0.15.0.0.255	154	IS 15959 Part-3
5	Activity calendar for times zones	0.0.13.0.0.255	155	IS 15959 Part-3

6	new firmware (image) activated	0.0.44.0.0.255	157	IS 15959 Part-3
7	Metering Mode	0.0.94.96.19.255	167,(177=Forward, 178= Import/Export)	IS 15959 Part-3
8	Current Association MR (LLS secret change)	0.0.40.0.2.255	161	IS 15959 Part-3
9	Current Association US (HLS Key change)	0.0.40.0.3.255	162	IS 15959 Part-3
10	Current Association FW (HLS Key change)	0.0.40.0.5.255	163	IS 15959 Part-3
11	Global key change	0.0.43.0.e.255	164	IS 15959 Part-3
12	ESWF	0.0.94.91.26.255	165	IS 15959 Part-3
23	MD Reset	0.0.10.0.1.255	166	IS 15959 Part-3
14	Image activation single action schedule	0.0.15.0.2.255	169	IS 15959 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	1.0.12.129.131.25	758	TPCODL
19	Over Voltage Threshold Configuration	1.0.12.129.129.25	758	TPCODL
20	Low Voltage Threshold Configuration	1.0.12.129.130.25	758	TPCODL
21	Voltage unbalance Threshold Configuration	1.0.12.129.128.25	758	TPCODL
22	Current Reversal Threshold Configuration	1.0.11.129.128.25	758	TPCODL
23	CT Open Threshold Configuration	1.0.11.129.129.25	758	TPCODL
24	Current unbalance Threshold Configuration	1.0.11.129.130.25	758	TPCODL
24	Over Current Threshold Configuration	1.0.11.129.132.25	758	TPCODL
25	CT Bypass Threshold Configuration	1.0.11.129.131.25	758	TPCODL
26	High Neutral current Threshold	1.0.91.129.128.25	758	TPCODL
27	Very Low PF Threshold Configuration	1.0.13.129.128.25	758	TPCODL
28	Temperature rise Threshold Configuration	0.0.96.128.3.255	758	TPCODL
29	Missing potential Persistence time	1.0.12.130.131.25	759	TPCODL
30	Over Voltage Persistence time Configuration	1.0.12.130.129.25	759	TPCODL
31	Low Voltage Persistence time Configuration	1.0.12.130.130.25	759	TPCODL
32	Voltage unbalance Persistence time	1.0.12.130.128.25	759	TPCODL
33	Current Reversal Persistence time	1.0.11.130.128.25	759	TPCODL
34	CT Open Persistence time Configuration	1.0.11.130.129.25	759	TPCODL
35	Current unbalance Persistence time	1.0.11.130.130.25	759	TPCODL
36	Over Current Persistence time Configuration	1.0.11.130.132.25	759	TPCODL
37	CT Bypass Persistence time Configuration	1.0.11.130.131.25	759	TPCODL
38	Power ON-OFF Persistence time	0.0.96.128.4.255	759	TPCODL
39	Magnetic influence Persistence time	0.0.96.128.5.255	759	TPCODL L
40	Neutral Disturbance Persistence time	1.0.96.128.0.255	759	TPCODL
41	Very Low PF Persistence time Configuration	1.0.13.130.128.25	759	TPCODL
42	Over load Persistence time Configuration	1.0.1.130.128.255	759	TPCODL
43	Temperature rise Persistence time	0.0.96.128.6.255	759	TPCODL
44	Load Profile capture Objects	1.0.96.128.2.255	761	TPCODL
45	Single Action Schedule for Daily (midnight)	0.6.15.0.4.255	798	TPCODL

46	Single Action Schedule Billing data push	0.6.15.0.4.255	799	TPCODL
Note:- This Data Can set through BCS & HES				

Three phase LT CT & DT 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	-	YES	
16	Current Month TOD - kW (Import/Forwarded)- TZ2	-	YES	
17	Current Month TOD - kVA (Import/Forwarded)- TZ1	-	YES	
18	Current Month TOD - kVA (Import/Forwarded)- TZ2	-	YES	
19	Current Month MD – kW(Export) with Date & Time	YES	YES	Applicable for “net meter” mode
20	Current Month MD – kVA(Export) with Date & Time	YES	YES	
21	Cumulative TOD KWH -TZ1	YES	YES	
22	Cumulative TOD KWH -TZ2	YES	YES	
23	Cumulative TOD KVAH -TZ1	YES	YES	
24	Cumulative TOD KVAH -TZ2	YES	YES	
25	Last Month (history 1) kWh (Import/Forwarded)	YES	YES	
26	Last Month (history 1) kVAh (Import/Forwarded)	YES	YES	
27	Last Month (history 1) kWh (Export)	YES	YES	Applicable for “net meter” mode
28	Last Month (history 1) kVAh (Export)	YES	YES	
29	Last Month (history 1) Cumulative TOD kWh TZ1	YES	YES	
30	Last Month (history 1) Cumulative TOD kWh TZ2	YES	YES	
31	Last Month (history 1) Cumulative TOD kVAh TZ1	YES	YES	
32	Last Month (history 1) Cumulative TOD kVAh TZ2	YES	YES	
33	Last Month (history 1) MD kW (Import/Forwarded)	YES	YES	
34	Last Month (history 1) MD kVA(Import/Forwarded)	YES	YES	
35	Last Month (history 1) MD kW (Export) with Date &	YES	YES	Applicable for “net meter” mode
36	Last Month (history 1) MD kVA(Export) with Date &	YES	YES	
37	Last Month (history 1) MD kW(Import/Forwarded) TZ1	-	YES	
38	Last Month (history 1) MD kW(Import/Forwarded) TZ2	-	YES	

39	Last Month (history 1) MD kVA(Import/Forwarded) TZ1	-	YES	
40	Last Month (history 1) MD kVA(Import/Forwarded) TZ2	-	YES	
41	Last Month (history 1) Power Factor	YES	YES	
42	R Phase Voltages (Vr)	YES	YES	
43	Y Phase Voltages (Vy)	YES	YES	
44	B Phase Voltages (Vb)	YES	YES	
45	R Phase Current (Ir)	YES	YES	

46	Y Phase Current (Iy)	YES	YES	
47	B Phase Current (Ib)	YES	YES	
48	Signed R phase Power Factor	YES	YES	
49	Signed Y phase Power Factor	YES	YES	
50	Signed B phase Power Factor	YES	YES	
51	Instant Signed Three phase Power Factor	YES	YES	
52	Instant Signed Active Power (kW)	YES	YES	
53	Instant Apparent Power (kVA)	YES	YES	
54	Voltage Sequence (R-Y-B).	YES	YES	
55	Current Sequence (R-Y-B)	YES	YES	
56	High Resolution kWh (Import/Forwarded)	YES	YES	
57	High Resolution kVAh (Import/Forwarded)	YES	YES	
58	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	NIC card status	--	YES	
92	Meter display firmware version number	--	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							100
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	Ir+Iy+Ib+In **≥**10% of Ibasic(Vector sum) and Phase current <1% of Ibasic with all current positive and tampered phase voltage >70% of Vref	Ir+Iy+Ib+In **≤5**% of Ibasic(Vector sum) and Phase current >10% of Ibasic with all current positive and tampered phase voltage >70% of Vref	10	2	
6	Current Unbalance	63, 64	Current difference ≥ **2**0% of Highest current between phases for 100/5A(≥10 for 200/5A) AND Imin > 10% Ib	**Current difference < 1**0% of Highest current between phases for 100/5A(<**5**% for 200/5A) AND	30	2	

				Imin > 5% Ib			
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	Phase sequence Reverse	25, 26	Change of phase sequence	Restoration of phase sequence	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	No Display	Meter shall not be able to identify this condition. Jig shall be provided to download the data from No-display meters					
18	Terminal Cover Open	We shall provide meter cover open in place of terminal cover open.					
Table A23: Non Rollover							
19	Meter Cover Open	251	If meter top cover is open	NA	Immediate	NA	5 (Stay put type)

Reference Voltage: 230V (P-N)

Basic Current (Ib): 5A