1 Phase 5-30A meter GTP for TP Odisha Discoms

Clause No.	Description
1	**SCOPE:** This specification covers the technical requirements of design, manufacturing, testing & integration with Network Integration Card (NIC) for communication over 4G for communication network provider, at meter manufacturer's works, packing, forwarding, supply and unloading at store, of Single Phase Two Wire, 230V, 5-30 A static smart energy meters of accuracy class 1.0 (here after referred as meters) complete with all accessories and meter box for efficient and trouble-free operation. It is not the intent to specify completely herein all the details of technical 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 TP(C/N/S/W)ODL, 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. *There exists separate and distinct HES in 4 Utilities of Odisha. Bidder has to integrate in all 4 pre-existing HES at individual Utilities. The Data table & OBIS codes & Discom Specific codes shall be shared during detailed engineering & integration validation.*
2	**APPLICABLE STANDARDS:** The equipment covered by this specification shall conform to the requirements stated in latest editions & amendments of relevant Indian / International Standards and shall conform to the regulations of local statutory authorities.

	a	IS 16444 Part-1 : 2015 (with all amendments)	A.C. Static Direct connected Watt hour Smart meterclass 1.0 and 2.0
	b	IS 13779 : 2020 & amendment thereof	A.C. Static Watt hour meter class 1.0 and 2.0
	c	IS 15884 : 2010	A.C. direct connected static prepayment meters for active energy (class 1 & 2)
	d	IS 15959 Part-1 : 2011	Data exchange for electricity meter reading, tariffand load control
	e	IS 15959 Part 2 : 2016	Data exchange for electricity meter reading, tariffand load control
	f	IEEE 802.15.4 : 2016	Standard for local and metropolitan area networks
	g	IS 9000	Basic Environmental testing procedure for electrical and electronic items.
	h	IEC 62052-11: 2003	Electricity Requirements (AC) General RequirementsTests and Test conditions for A.C. Static Watt hour meter for active energy Class 1.0 and 2.0.
	i	IEC 62053- 21 : 2003	A.C Static Watt hour meter for active energy Class 1.0 and 2.0

	j	IS 15707 : 2006	Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
	k	IEC 60068	Environmental testing.
	l	CBIP – TR No.325	Specification for A.C Static Electrical Energy Meters (Latest amendment).
	m	CEA Regulation : 2006	Installation and operation of meters Dtd:17/03/2006 amendment
	n	IS 12346:1999	Testing Equipment For Ac Electrical Energy Meters
	o	IS11000	Fire Hazard Testing
	p	IS 60529	Degree of protection provided by enclosure
	q	ASTM D648	Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the EdgewisePosition
	r	IS 11731-1	Methods of test for determination of the flammability of solid electrical insulating materialswhen exposed to an igniting source, Part 1: Horizontal specimen method
	s	IS 11731-2	Methods of Test for Determination of Flammability of Solid Electrical Insulating Materials When Exposedto An Igniting Source, Part 2: Vertical Specimen Method
	t	ISO 75 Part 1 & 2	Determination of temperature of deflection under Load

3	**CLIMATE CONDITIONS OF THE INSTALLATION:**
	Max. Ambient Temperature : 70 °C
	Average Ambient Temperature in peak summer months May to July : 40 °C
	Min. Ambient Temperature in winter months : -10 °C
	Relative humidity : up to 100%
	Average Annual Rainfall : 760 mm
	Average rainy days per annum : 60 days
	Max. Altitude above MSL : Not exceeding 300 meters
	Max. wind pressure : 126 kg/sq. m.
	Seismic level (horizontal ground acceleration) : 0.3 g
	Note- Atmosphere is generally laden with mild acid and dust suspended during dry months and 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. Suitable to withstand Lightening surges.

	4	**GENERAL TECHNICAL REQUIREMENTS:**	

SNo	Description	Requirement
4.01	Type of the meter	Single phase two wire, static watt-hour, direct connected type smart meter without application of any Multiplication Constant. It consisting of measuring element(s), time of use of register(s), display, load switch and plug intype bi-directional communication module(NIC) all integral with the meter housing.
4.02	Accuracy Class of the meter	1.0
4.03	Basic Current (lb) & rated Maximum current (Imax)	Ib=5A; Imax=30A (Meter shall be able to continuously carry120% of Imax, meeting the accuracy requirements)
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 requiredaccuracy from 0.6Vref to 1.2 Vref. However meter shall withstand the maximum system Voltage of 440V (forminimum 1 Hour).
4.06	Operating Frequency	50 Hz $\pm$ 5%.
4.07	Power Consumption	Voltage circuit: Maximum 5.0 W and 15VA Current Circuit: Max 5.5VA, As per IS 16444 part-1 latest amendment (The additional power requirement duringdata transmission shall not exceed 7W percommunication module)
4.08	Starting Current	20 mA (0.2% of Ib) (phase or neutralcurrent)
4.09	Short time over Current	900A for 0.01 sec (30 lmax for one half cycle at Rated frequency)
4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambienttemperature at 50° C as per clause 9.4 of IS 13779.
4.11	Rated Impulse withstand voltage	10kV (shall be applied ten times with one polarity and then repeated with the other polarity.)
4.12	AC withstand voltage for 1 min	4 kV
4.13	Minimum Insulation resistance at test voltage 500 +/- 50 V DC Between frame & current, voltage circuits as well as auxiliary circuits connected together	5 Mega ohms

4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 13779
4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safety against the spread of fire. They shall not get ignited by thermal overload of live parts in contact with themas per clause 6.8 of IS 13779.
4.16	Protection against penetration of dust and water	Degree of protection: IP 51 as per IS 12063or 60529, but without suction in the meter, Meter shall comply with clause 6.9 and 12.5 of IS 13779
4.17	Resistance against Climatic influence	Meter shall be in compliance with clause 12.6 of IS 13779
4.18	Electromagnetic Compatibility (EMC)	Meter shall be in compliance with clause 4.5 and 5.5 of IS 15884
4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 13779
4.20	Power factorrange	Zero lag to Zero lead. (For Kva / kVAh, 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 systemshall be provided on terminal cover.
4.23	Self-Diagnostic feature	The meter shall have indications on meter display, for anomaly/ unsatisfactory / non-functioning of (i) Real Time Clock (ii) RTC battery (iii) Non Volatile Memory (iv) NIC Status of NIC (installed / discovered /normal) / Signal Strength
4.24	Initial start-up ofmeter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.
4.25	Alternate mode of supply to the meters	In case of power failure, reading / datashould be retrieved with the help of battery or other power source.
4.26	Sleep Mode	Meter shall not go in sleep mode. Display should not be OFF at any point of time when power up.
4.27	Minimum Internal diameter of the terminal holes Depth of the terminal holes	5.5 mm (minimum)22 +1 mm
4.28	Clearance between adjacent terminals	10 mm (minimum)
4.29	Display	Backlit LCD, Scrolling, min. 10 seconds for each parameter. 6+1 digits LCD display (not for reading)

	4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication,firmware selection from remote.
			Facility for Upgradation / Modification ofFirmware shall be provided
			Following parameters shall be updatedmultiple times during life cycle of meters over the air :
			TOD Update
			Post Paid to Prepaid mode and vice versa
			Import mode to export Mode and viceversa.
			Accordingly Display parameters shall beupdated
			TOU shall be updated in meter.
			Meters should push mid night data on daily basis which should include CKWh, CKVAh, MD KW(Current-Rising), MD KVA(Current-Rising), TOD KWH(both off peakand peak) and TOD KVAh (both off peak and peak)
	4.31	Software and communication compatibility	The bidder shall supply software requiredfor local HHU & Remote (AMI) connectivity including required training touse the software free of cost as required by utility or HES / Communication service provider. If this software can be used in a device readily available in market and can connect to meter through optical port or other communication port without any security checks / or with MRsecurities which OEM will provide; then, OEM can provide only software, else thedevice on which this software will run is also to be provided along with technical specification of this device. BCS, mobile application with all the features including meter reading, connection/disconnection, firmware update, ToD update, etc will be required.
	4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means.There shall be provision for firmware update to change payment mode from Prepaid to Postpaid and vice versa; similarly for metering mode from Import only to Export-Import (NET mode) and viceversa, through proper authentication process remotely over the air (OTA). The change should be recorded as Transaction event. Billing should be done at that time of firmware upgrade so that readings at which this upgrade has happened are logged in meter and system. Display update shall be done accordingly remotely.
	4.33	Communication module of meter for AMI	As per clause no. 1.2 (b) of IS 16444 PART- 1 Meter should have provision of communication module compatible with both the variant mentioned in IS 16444 PART-1. This module should be able to get connected to the WAN network of service provider [4G of TP(C/N/S/W)ODL].Meter should be able to provide required power supply to NIC provided by communication provider, if separately required, recommended / finalized by TP(C/N/S/W)ODL. All the NICs should be same & compatible with all types of meters (single phase/PPWC/LTCT/HT) & should be hot swappable.
	4.34	Communication Layer Protocol	Should be as per clause 9.3 of IS 16444 PART-1
	4.35	Key Management and Security Feature	Should be as per IS 15959 Part-1 & Part-2
	4.36	Usage Application	Indoor usage
	4.37	Chemical Bonding	Meter cover and body should be continuous seamless welded only through chemical bonding.

4.1	**DISCONNECTOR SWITCH**

DISCONNECTOR SWITCH

The meter shall have the facility of disconnecting and re-connecting the load of the meter from the remote and by authenticated command through Laptop (BCS), HHU and mobile app at site by means of a built-in switch / relay. This operation shall be conducted with the help of a third party software which is owned by TP(C/N/S/W)ODL, inover the air mode, on 4G provision Cellular, and in addition, by the manufacturer's own software which canbe given through optical port using above mentioned modes.

Each operation of the switches shall be logged by the meter as an event with date, time stamp and snapshot parameters. This operation should be in line with clause 11 of IS 16444 PART-1, TP(C/N/S/W)ODLwill decide the enabling of disconnection based on statuary guidelines and changes in future.

The cumulative number of ON / OFF operations shall also be made available in meter data and HES. Switchshall be in compliance to IS 15884. Data-sheet of the dis-connector switch shall be submitted by the bidder(s), with the technical bid. 38. i. Meter will check the over load condition for **persistent time (1 minutes)** and disconnect the relay.

ii. After 5 minutes, meter connects the relay and checks the tamper status for 1 minutes. If tamper condition persists, again relay is disconnected.

iii. Meter follows the same process for 3 times.

iv. When disconnected for the fourth time, the relay will stay disconnected for 30 minutes (Lockout period). After expiry of lockout period, the relay will be reconnected.

v. If the condition (i) still persists, the above mentioned steps (i to iv) will be repeated over and over again.

a. Default setting **120%** of Imax

It should also be but programmable

The brief technical particulars of this Disconnector / load switch are furnished below, bidders to comply for the same:-

S.NO	DESCRIPTION	REQUIREMENT
1	Operating Voltage range	130 V to 470 V
2	Operating Current range	20 mA to 45 A
3	Maximum switching power	22 kVA per phase / per IS 15884 Annex G
4	No. of poles	Double pole relay for phase & neutral
5	Operation of switches	Simultaneous
6	Utilization Categories	UC2 or better
7	Min. number of operation	3000 (close, open each)
8	Relay default position	Normally Closed. It should not operate automatically in case of power ON/OFF

4.2	**4.2.1 NIC MODULE DETAILS & INTEGRATION FOR 4G BASED COMMUNICATION**
	4.2.2.1 In case of 4Gbased meter, the NIC shall accommodate SIM card of any service provider and the same should be inter-operable, so that in case there is a change in service provider, NIC needs not to be changed.
	4.2.2.2 The successful bidder of meter shall do the integration of NIC with TP(C/N/S/W)ODL smart meter communication network and ensure end-to-end communication of complete meter data as desired in this specifications. The bidder shall mandatorily submit prototype meters for testing at TP(C/N/S/W)ODL, before mass manufacturing.
	4.2.2.3 The NIC, both deeply integrated, non-removable type and plug-in type shall be allowed in this tender, however,
	a) in case of plug-in type it shall be replaceable at site in hot swappable condition, in event of any failure. It should be integrated in meter body in such way that it should have separate cover & sealing arrangement with screw.
	b) in case of deeply integrated, non-removable type, the provision of SIM replacement shall need to be provided and the failure of NIC shall be treated as failure of the meter itself.
	4.2.2.4 In case of 4G based communication system, the bidder shall inform TP(C/N/S/W)ODL during the technical bidding itself. The associated NIC dimensions and pin configurations should also be defined and got approved from TP(C/N/S/W)ODL for plug-in type.
	In case of 4G based communication system, bidder to mention details of power consumption of associated NIC and same should be in lines with clause 6.10 of IS 16444.
	4.2.2.6 Further, the technical details and pin configuration of NIC shall be shared by the bidders, during detailed engineering.
	4.2.2.7 Energy meter and NIC card Integration (both hardware and software) in a way to get desired data at HES, BCS and HHU/mobile app, shall be the responsibility of bidder jointly with HES service provider and communication network provider.
	4.2.2.8 Necessary support for Meter & NIC (as a unit) integration with TP(C/N/S/W)ODL communication network upto HES, shall be extended by the bidder.
	4.2.2.9 The integration document with associated test plans to be submitted by successful bidder during pre-manufacturing approvals (GTP, drawings & sample) and the same shall also be approved by TP(C/N/S/W)ODL prior to mass manufacturing. Bidder shall arrange for integration testing.
	4.2.2.10 The NIC module placement in meter housing should be such that it is ensured that the NIC can be removed from meter without removing the meter from meter box. This NIC should be online field replaceable.
	4.2.2.11 Meter should be able to identify if NIC has been removed or power failure has occurred. These 2 instances should be separately recorded in meter memory and should be reported back on time to time basis. *(applicable for plug in type)*
	4.2.2.12 Bidders to ensure NIC card compatibility with existing meters as well.

4.3	**a) Communication capabilities and software feasibilities**
	4.3.1 The meter shall have facilities for data transfer locally through Meter Reading Instrument (MRI)/Mobile app/BCS (Using optical port) 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. Utility will facilitate HES support for integration.
	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 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 except RTC. The change shouldbe recorded as upgrade event. Bidder to provide any support on a later stage on the request of TP(C/N/S/W)ODL without anycost implication till the useful life of meter which is considered as 10 years from the date of supply. Training to TP(C/N/S/W)ODL staff on how to use it free of cost to be provided.
	4.3.4 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.
	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 TP(C/N/S/W)ODL along with integrated NIC card. NIC card to be provided with proper sealing arrangement, for plug in type.
	4.3.8 The bidder shall supply software required for local (MRI)/Mobile app/BCS & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol /APIs for communication with meter through local (MRI) /Mobile app/BCS remote (AMI) as and when required by TP(C/N/S/W)ODL free of cost during life time of meter. The bidder should provide DLMS compliance as per conformance test tool 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. It should also indicate the restoration of the same event.
	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 Meter Serial no will be used for tagging of all data of the meters in all database (at HES / MDM/ DCU level etc). However, it will be the responsibility of the Bidder to establish the complete communication solution involving all the meters in the system. Also, the Bidder must ensure that, the mode of communication used for 4G shall be consistent with the Government of India stipulations. Bidder should come out with it requirements for integration of meter with HES and MDMS clearly during tender submission.

4.3.14 The Bidder's supplied meter with third party communication module should have suitable hand-shaking features to allow a third-party MDMS (procured by TP(C/N/S/W)ODL) 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.

4.3.15 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 prepaid mode if required with firmware upgrade. The required firmware and any required support for integration with HES shall be provided free of cost till the useful life of the meter.

4.3.16 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 locking arrangement.

4.3.17 Communication NIC / network should be immune with any external Magnetic field / ESD/ Jammer/ HV voltage influence such that it shall not affect the normal overall functionality.

4.3.18 Meter once powered up with NIC card should be self-detected and its basic name plate details & current readings are transferred to HES.

4.3.19 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 TP(C/N/S/W)ODL after verification of proposedcodes by manufacturer. In future, if BIS adds any OBIS codes then the bidders to provide upgraded firmware with desired changes in consultation and approval of TP(C/N/S/W)ODL competent authority.

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

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

	4.3.20 If any tamper occurs in power off situation, it should be pushed as soon as the meter is powered on.
	4.3.21 Bidder to provide facility for Up-gradation / Modification of Firmware.
	4.3.22 TP(C/N/S/W)ODL reserves the right that if required, TP(C/N/S/W)ODL will hand over the SIM cards to OEM and supply will be accepted with SIM cards already installed and with communication already tested in 100 % meters. For this purpose, TP(C/N/S/W)ODL HES will be used for confirming data availability
	4.3.23 Following parameters may be updated multiple times during life cycle of meters over the air: TOD Update Post Paid to Prepaid mode and vice versa Import mode to export Mode and vice versa. Accordingly Display parameters shall be updated remotely.
	4.3.24 It must be noted that HES of 4 Discoms in Odisha are separate and distinct: therefore, the meters have to be seamlessly integrated with the existing HES available at each utility and there shall be no provision of a new HES being opted for by any bidder. All the integration efforts of meters at the 4 utilities and purposes stated here and elsewhere in the specification must take into account this requirement as a part of exercise.
4.4	**b) IMMUNITY AGAINST EXTERNAL INFLUENCING SIGNALS (to be attained with meter box):** **4.4.1 Magnetic Field:** Meter shall record accurate energy in case of any external influencing signals in line with IS 13779:1999 Cl.11.2 and variation in limits of error (up to 100% Imax) shall be as per the table 17 of IS 13779. Meter shall be immune to magnetic field such that it shall not affect the normal overall functionality However, in case of abnormal magnetic field as defined below meter shall perform as per the following actions: a) Meter shall log the event in its memory as "Magnet" with date and time stamp, the event logging threshold values as per table no. 1 in 4.6. b) The energy recording to shift on I max. Vref. With UPF. **Abnormal Magnetic field is defined as below;** a) Continuous DC magnetic induction: >0.27 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. **4.4.2 Electrostatic Discharge (ESD)** Meter**, inside meter box,** shall be immune up to 50 kV and shall record accurate energy as per IS-13779:1999 / CBIP-325. Meter shall log the event into memory as 'ESD' with date & time stamp for any ESD greater than 35 kV with snap shot the event logging threshold values as per table no. 1 in 4.6.

	4.4.3 The shielding around the meter inside meter box, 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.
	4.4.4 Meter inside meter box should be immune to high / low frequency Jammer devices. Meter shall log the event in its memory as 'JAMMER' with date and time stamp, the threshold values as per table no. 1 in 4.6.
	4.4.5 The meter inside meter box should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves like magnetron etc. the threshold values as per table no. 1 in 4.6.
4.5	**c) NEUTRAL DISTURBANCE & OTHER TAMPERS** 4.5.1 The meter shall log the event in memory on thresholds defined in table 1 in 4.6 4.5.2 The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording / record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of chopped signal / DC signal/ DC pulse upto 330V (both + & - DC) and for any value beyond this of any low frequency and harmonics. Meter shall log the event in to memory as 'Neutral Disturbance' with date & time stamp the thresholds are as per table no. 1 in 4.6 4.5.3 The meter shall record energy proportional to the current and V Ref (230V) when any of the tamper circuits enclosed as per annexure1 are used to tamper energy using any type of diode or a variable resistance or a variable capacitance, energy saving device. Or any DC injection as per 4.5.2. 4.5.4 Defraud Metering is not required if all the connections are intact & supply voltage is low. There is no external interference. **Other tampers:** 4.5.5 **Current mismatch** – Meter should logged current mismatch event as per thresholds in table no. 1. Priority of logging this event in memory of meter is higher than EL. Further, earth indication in LCD shall glow &log event as per its own logic irrespective of this logic.
4.6	**ABNORMAL AND TAMPER CONDITIONS:** 4.6.1 Meter **inside meter box** shall be immune to the influence of Magnet, ESD, Jammer, microwaves as per clause 4.53 during all the tamper conditions of Annexure-I. The meter shall record forward energy under any abnormal conditions as given in the Annexure- I, for all 38 tamper conditions, with above abnormal influencing signals. 4.6.2 All the tamper events mentioned in table no. 1, shall be logged in the memory of the meter with date and time stamp of occurrence (of abnormal event) and restoration (of normal supply) along with instantaneous electrical parameter (Voltage, Current (phase and neutral), energy (kWh &KVAh), PF ,. The event register compartment size shall be as per table no.1 4.6.3 Multiple occurrences of same event, with different time stamps should not be logged without restoration of first occurrence, except for the case of Top Cover Open. Meter should have break to open design and cover open tamper snapshot should be with Kwh and Kvah reading. Meter should have a permanent indication in its display as well as logging of tamper in case of removal of top cover, even in power off condition.

4.6.4 Meter shall latch & store cumulative count of events logged / occurred / stored in memory of meter from the date of energization till life of meter.

4.6.5 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). During abnormal & tamper conditions, the current shall be recorded as active current and line current. Each such event shall be provided with minimum count as per table no.1, to avoid loss of data amidst usual events (like power failure) due to the limitation of FIFO.

4.6.6 Tamper event logging along with snapshot of occurrences & restorations shall be as per table no.1. Persistence time for occurrence and restoration for the events along with their threshold values shall be as per table no. 1 given below

4.6.7 All tamper/event logging thresholds values shall be configurable remotely over the air (OTA).

4.6.8 The Cover Open tamper detection should be through heavy duty, sturdy micro switches such that it should not log false event on vibration or impact during handling or testing.

TABLE NO.1

Persistence Time of Occurrences	Persistence Time for Restoration	Threshold Valuefor Occurrence of Events	Threshold Value	Compartment Size
ESD / JAMMER = immediate (record only 1 event on first application & only one event for next 1min)	ESD / JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last application)	Immunity up to50 KV with NIC and logging of event > 50 KV	Removal of ESD / Jammersignal	25
Magnet = 0 Hr 2 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 > 10mT	<0.5 Tesla forpermanent 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 topcover is opened	NA	05 (Stay put Type)

Neutral Disturbance = 0 Hr 01 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 02 Min 0 sec (ND)	Voltage > 145%of Vref, Current >10% Ib and Frequency <47 Hz OR Frequency > 53Hz OR DC voltage / signal/ pulse/ chopped signalinjection / as per the conditions of clause 4.5.4	Voltage <115% of Vref Current > 10% IbAND Frequency > 47 Hz OR Frequency < 52 Hz	25
Current Mismatch = 0 Hr 10 Min 0sec (CM)	Current Mismatch = 0 Hr 02 Min 0sec (CM)	(In –Ip) ≥ 20 % of Ib AND (In>Ip)	In –Ip< 20 % ofIb	25
Low Voltage Check = 0 Hr30 Min 0 sec(LVC)	Low Voltage Check = 0 Hr02 Min 0sec (LVC)	Voltage < 70%of Vref ANDcurrent >2% Ib	Voltage > 80% ofVref AND current > 2% Ib	25
Power OFF = 0Hr 05 Min 0 sec	Power On = immediate	Actual VoltageOFF	Actual VoltageON	25
Over load 0 Hr 1 Min 0 sec (OL) (If enabled)	Over load = 0 Hr 5 Min 0 sec (OL) (If enabled)	> 120% Imax	< 100% Imax	25
Temperature Rise (TR) = 0 Hr30 Min 0 sec	Temperature Rise (TR) = 0 Hr 02 Min 0 sec	Temperature > 70 ˚C	Temperature < 60 ˚C	25 (Stay put type)
NIC card Removed (Immediate)	NIC Card inserted (Immediate)	On removal of Card	On insertionn of card	20
Earth Leakage (EL) = 0 Hr 30 Min 0 sec	Earth Leakage (EL) = 0 Hr 02 Min 0 sec	Difference between phase and neutral current > 6.25 %of Ib	Difference betwee n phaseand neutral current <6.25%o f Ib	10

4.7	**EVENT COMPARTMENTS**
	4.7.1 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 no. 1.
	4.7.2 Transaction events compartment size shall be minimum 100 events.
4.8	**GENERAL TECHNICAL REQUIREMENTS**
	The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water. 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
	Preferably shunt should be fitted for measuring current in phase element & neutral element may have either CT or shunt or hall-effect sensor with proper isolation. The shunt used in the current circuit must be of high-quality having high thermal stability and temperature co-eff. It should be E-beam / spot welded. In case of hall effect sensor, meter should record energy as per the requirement of this specification in normaland tamper conditions. There should not be any connector or joint in the CT secondary connections from PCB. CT shall be soldered on PCB. The battery cell shall be button/coin type leak-proof.
	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 TP(C/N/S/W)ODL.
	Bidders to put effort to reduce the wired connection to PCB. The components, CT/PT, shunt connections shall be preferably soldiered directly on the PCB.
	The list below is indicative, and bidder is allowed to replace them at their discretion with other branded parts, with necessary approval from Utilities during detailed engineering, ensuring that defect free operations is ensured. (Any deviation in component's make and origin, prior approval to be taken from Utility.)

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, Texas Instruments, ST Microelectronics 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 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 betrans-reflective STN type industrial grad with extended temperature range.	Taiwan: Holtek Singapore: Bonafied Technologies Korea: Advantek China: Xiamen, Trulysemiconductor
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical constructionof the port should be such to facilitate the data transfer easily. It should be magnetic locking type	USA: National Semiconductors Holland / Korea: Phillips Taiwan: MAXIM, Everlight Japan: Hitachi
5.	P.C.B	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	A class vendor
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 15 years	Varta / Tedirun / Vitzrocell / Sanyo/Panasonic/Texcell.
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 micro controller shall be of superior quality from reputed make with long life.	USA: Philips, Dallas, Atmel, Motorola, Texas Instruments, ST Microelectronics Japan: NEC or Oki, Renesas
9.	Temperature sensor (not required for terminal block)	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: The makes of the components are in the preferential order.

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 FVo Fire Retardant, self-extinguishing, UV stabilize, recyclable (first use) 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 (i.e chart of Lexan 500R compared with the alternative material) on prior approval from the TP(C/N/S/W)ODL. (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 TP(C/N/S/W)ODL. (the bidders should submit material data sheet in technical bid)
	5.1.5 Meter cover & base shall be provided with continuous and seamless chemical bonding such that it cannot be opened without breaking the enclosure. Front cover & base shall besuch 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 Unidirectional screws with sealing arrangement through the screw (upside down)to be used on meter covers where ever required.
	5.1.8. 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 Necessary protection and water tight sealing to be provided at terminals and Push buttons etc.
5.2	**TERMINALS, TERMINAL BLOCK**
	5.2.1 Even after any attempts to disengage the terminal block, it should not get disengaged, opened or loosen from any side. Any attempt to disengage the terminal block should certainly damage the meter body with physical evidences. The damage evidences should be visible externally & should be traceable in such a way that attempts can be proved in court of law
	5.2.2 Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account.
	5.2.3 Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the test given in ISO 75 for temperature of 180°C and pressure of 1.8 M Pa. (Clarifications issued dated 25.12.2019 (Sl. No. 12) Accepted as per CBIP 325).Tested as per ISO 75-2/A or ASTM D648.
	5.2.4 The terminal block shall be of opaque with polycarbonate LEXAN 500R or equivalent on prior approval from the TP(C/N/S/W)ODL. (the bidders should submit the relevant material data sheet in technical bid).

	5.2.5 The terminals and connections shall be suitable to carry up to 120 % of Imax continuously. The size, design & material of Bus-bar / Shunt / Terminal shall be with suitable cross sectional area, so that temperature rise at the terminal block will not be more than 35°C above ambient temperature of 45°C at 120% of I max loading for 6 hours continuous. This test shall be repeated at CPRI / ERDA on any meter per every 25000 meters or whenever required, without any cost implications towards TP(C/N/S/W)ODL. It shall also be done on tender sample & on pre- manufacturing sample. The process for the same shall be: The energy meter shall be supplied at reference voltage with actual heating load of 120% of Imax on both phase & neutral circuits. 5.2.6 The Size of the screw shall be 6mm dia. The material and plating details of terminals screw shall be provided. MS screws shall not be accepted. To get the desired temperature rise & avoid hot spots the design of the each terminal screw shall be Allen head screw & shall be operated with Allen key. Nickle plated brass screws to be provided. 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 Minimum two number of terminal screws to be provided per terminal wire. 5.2.9 The preferred arrangement of terminals shall be linear and if any change is offered then suitable arrangement for testing at our testing lab to be provided by bidder free of cost as per requirement. 5.2.10 The Aluminum cable of 2x6 sq.mm shall be used as service line. Hence the terminals shall be provided with Zinc plating or tinning or suitable compatible coating to avoid the bimetallic affect atthe joints with AL core of cable. 5.2.11 Internal diameter of the terminal holes shall be minimum 5.5 mm; minimum clearance between adjacent terminals shall be 10 mm. Depth of the terminal holes shall be of 18 mm and more. 5.2.12 Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.
5.3	**TERMINAL COVER** 5.31 Terminal cover should not have any cuts for incoming and outgoing wires. Terminal cover should work as barrier for direct approach to terminal from gland entry. There should be sufficient space for cable to enter from behind the terminal cover by bending cable. 5.3.2 Terminal cover shall be of short type and shall be transparent with polycarbonate LEXAN 143R / 943A or equivalent on prior approval from the TP(C/N/S/W)ODL (the bidders should submit the relevant material data sheet in technical bid). 5.3.3 The terminal cover shall be short: 25 mm length from bottom of terminal block in line with meter base. 5.3.4 Appropriate space shall be available for incoming /outgoing cables without damaging / stressing terminal cover (terminal cover design shall be as per the TP(C/N/S/W)ODL approval). After sealing the cover, terminals shall not be accessible without breaking the seals. 5.3.5 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)

	5.3.6 The terminal cover should open on the top side, during connection of the cables. The side opening of terminal cover is not acceptable due to additional opening space requirement. 5.3.7 The system connection diagram shall be provided on the terminal cover.
5.2	**SEALING OF METER** 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 two no. Hologram seal (Left and Right of the meter body) shall beprovided by the bidder. 5.4.3. One no polycarbonate seal shall be provided by the TP(C/N/S/W)ODL. 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 One sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the TP(C/N/S/W)ODL 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. 5.4.6 For Plug in type NIC card, cover should have proper sealing arrangement and should be sealed with TP(C/N/S/W)ODL polycarbonate seal. 5.4.7 The bidder shall provide TP(C/N/S/W)ODL (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 5.4.8 Bidder shall provide Routine test report (hard copy A5 size) along with each meter inside the box as well as soft copy.
5.3	**TOD FEATURE:** The meter shall be capable of measuring Cumulative Energy (KWh) 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/BCS / OTA with adequate security level and in one to one / broadcast mode over the air). Time duration of these slots should be available in the meter data, at HES. Current TOD (during tender) to be given is as below, # The bidder to ask TP(C/N/S/W)ODL for latest TOD timing slots defined as per the retail supply tariff before manufacturing of every lot. 8 AM to 4 PM- Solar Hours. After 4 PM to 6 PM – Normal Hours. After 6 PM to 12 Mid Night - Peak hours, after 12 Mid Night before 8 AM Next day - Normal hours
5.4	**MD INTEGRATION:** The MD integration period shall be 30 minutes (integration period-programmable by MRI at site and also through HES with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last twelve 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 three digits before decimal and minimum two digits after decimal points. MD integration shall be Block Type Demand.

5.5	**PARAMETERS IN BCS**
	All these parameters shall be downloaded locally or remotely and interpreted in PC / Laptop. All the parameters shall be recorded and memorized in its Nonvolatile Memory (NVM). The corresponding nonvolatile memory shall have a minimum retention time of 15 years. It is to be ensure that any data which is pushed / pulled from meter must have Meter Sr. No. as one of the Parameters. Time-sync with RTC and over-writes on drift threshold. Clarity on event logged in memory and server time-stamps matching
	Fail to be log in memory in the following conditions in BCS, HES & also in display
	a) RTC fail
	b) NVM memory fail
	c) Battery fail
	NIC fail should be depicted on Meter display and suitable indication should be available at HES

5.6	**LOAD SURVEY (FOR PRE-PAID, POST-PAID & NET METER MODE):**
	Meter shall be delivered in thin prepaid non-ToD configuration, thereby, enabling both prepaid and post paid functionality.
	The other display and associated parameters shall be required when there is an need for upgradation to ToD or net mode on the meter. The utility may ask for such upgraded meters separately when required to be supplied directly from factory. The facility for doing so on installed meter shall be over the air.
	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data.
	The meter shall be capable of recording load profile of 35 days with 30 min integration period for kWh, kVAh, KW, kVA, Voltage, Phase and Neutral current, Metering Current, Power Factor, Temperature (°C) for ON days/time.
	Meter shall be capable of recording daily Energy and Demand 00:00 to 24:00 Hrs kWh and kW, kVAh and kVA in BCS for 35 days.
	Midnight energy value of cumulative KWh, KVAh along with Current (Rising Demand) KW and Current (Rising Demand) KVA along with daily consumption kWh should be available in meter memory for last 35 days.
	Load survey data should be at least with 3 decimal place

5.7	**INSTANTANEOUS PARAMETERS:**
	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for following Instantaneous Parameters in Memory and should be available in BCS.

Meter Sr. No.	
NIC Sr. No.	
Meter Type	1P 2W 5-30A
Meter data & Time	DD MM YYYY HH MM SS
Voltage	000.000V
Phase Current	00.000A
Neutral Current	00.00A
Power factor	0.000
Instantaneous Frequency	00.000Hz
Instantaneous Load	Active
Present Cumulative Energy	Active-kWh
Present Cumulative Energy	Apparent-kVAh

Cumulative Power Off Duration	00000	
Cumulative Power ON Duration	00000	
Cumulative Tamper count	00000	
Billing date	dd:mm:yy	
Terminal Block Temperature (° C)		
No. of disconnector operation (Open)	00000	
No. of disconnector operation (Close)	00000	

5.7.1	**GENERAL INFORMATION:** Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Meter shall be capable for providing below mentioned general parameters in BCS and HES **Meter Serial number** Firmware Version Manufacturer's Name Manufacturing Date (MM/YY) Meter Type Meter Class Meter Constant Meter Voltage Rating Meter Current Rating TOD profile

5.7.2	**BILLING PARAMETERS:**
	Meter serial number and NIC serial number shall be recorded and communicated for all profiles of data. Both Export-Import mode, below mentioned parameters should be for both
	Export and Import.
	1) Maximum Demand (Reset date, Current Month &12 History, time zone register wise)
	
	   a) MD - Abs Active Load/kW
	   b) MD - Abs Apparent
	
	2) Billing Dates (12 History)
	
	3) Cumulative Energy (Reading date Current Month&12 History, time zone register wise)
	kWh and kVAh
	
	4) Consumption (Reading date, Current Month &12 History, time zone register wise)
	kWh and kVAh
	
	5) Average Power factor (12 History)
	
	6) Mode of operation of dis-connector switch
	
	7) Monthly power ON/OFF hours
	
	Last five modes with date & time of switching with cumulative energy parameters of kWh,TOD1 kWh, TOD2 kWh, kVAh, TOD1 kVAh, TOD2 KVAh

5.7.3	**TRANSACTIONS:** All the changes in software of meter to be logged along with date & time stamp and readings. Meter should do billing if any billing related transaction is done.
5.7.4	**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 Pneumatic) construction suitable for maximum temperature withstands 70 C

degree and minimum temperature withstands 0degree C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree.

When **the meter is not energized the electronic display need not be visible**. The display shall not be affected by electrical, magnetic disturbances and ESD.

The display should be readable in direct sunlight. The back lit must be green in color for good visibility of digits in sunlight.

The kWh register shall have minimum 6 digits(without decimal) LCD display and size of the digits shall be minimum 10mmx5mm. Cumulative energy (kWh) shall be displayed without decimal in auto scroll mode. Scroll lock option is required. (However decimal shall be available in push button mode for high resolution display for testing).

5.7.5	**AUTO SCROLL / PUSH BUTTON MODE WITH POST-PAID PAYMENT MODE:**

AUTO SCROLL / PUSH BUTTON MODE WITH POST-PAID PAYMENT MODE:

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be struck for any tamper events. There should not be any decimal point in the energy values.

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

A. Post Paid without TOD

Display	Display 1	Display 2
Scroll Process	**Auto**	**Push**
LCD Check	1	1
Meter Sr. No. (The nine digit Serial no. to be displayed with sequence 3 + 6 /2+7digits at a time, completer no. in single shot is preferred)	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
Current Month MD kW	8	8
Current Month MD kVA	9	9
Last Month (history 1) kWh	10	10
Last Month (history 1) kVAh	11	11
Last Month (history 1) MD kW	12	12
Last Month (history 1) MD kVA	13	13
Phase Current	14	14
Neutral current	15	15
Inst. Voltage Instant Power Factor (Lag/Lead)	16	16
Inst. Phase Power	17	17
Inst. Neutral Power	18	18
Status of Load Switch (connect or disconnect)	19	19
High Resolution kWh	-	20
High Resolution kVAh	-	21
Magnetic Tamper count	-	22
Latest Magnetic tamper occurrence date	-	23
Latest Magnetic tamper occurrence Time	-	24
ESD Tamper count	-	25

Display	Display 1	Display 2
	-	26
Latest ESD tamper occurrence date	-	26
Latest ESD tamper occurrence time	-	27
TC Open tamper count	-	28
TC Open occurrence date of very first event	-	29
TC open occurrence time of very first event	-	30
Count of Connect	-	31
Date & Time of Last Occurrence	-	32, 33
Count of disconnect	-	34
Date & Time of Last Occurrence	-	35, 36

B. Post-Paid with TOD

Display	Display 1	Display 2
Scroll Process	Auto	Push
LCD Check	1	1
Meter Sr. No.	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
TOD Cum. kWh (T1,T2,)	8, 9	8, 9
TOD Cum. kVAh (T1,T2,)	10, 11	10, 11
Current Month MD kW	12	12
Current Month MD kVA	13	13
Last Month (history 1) kWh	14	14
Last Month (history 1) kVAh	15	15
Last Month (history 1) TOD Cum. kWh (T1,T2,)	16, 17	16, 17
Last Month (history 1) TOD Cum. kVAh (T1,T2,)	18, 19	18, 19
Last Month (history 1) MD kW	20	20
Last Month (history 1) MD kVA	21	21
Phase Current	22	22
Neutral current	23	23
Inst. Voltage Instant Power factor(Lag/Lead)	24	24
Inst. Phase Power	25	25
Inst. Neutral Power	26	26
Status of Load Switch (connect or disconnect)	27	27
High Resolution kWh	-	28
High Resolution kVAh	-	29
Magnetic Tamper count	-	30
Latest Magnetic tamper occurrence date	-	31
Latest Magnetic tamper occurrence Time	-	32
ESD Tamper count	-	33
Latest ESD tamper occurrence date	-	34
Latest ESD tamper occurrence time	-	35
TC Open tamper count	-	36
TC Open occurrence date of very first event	-	37
TC open occurrence time of very first event	-	38

Count of Connect	-	39
Date & Time of Last Occurrence	-	40, 41
Count of disconnect	-	42
Date & Time of Last Occurrence	-	43, 44

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 reading and MD and event as above with date and time) shall be available in the Non Volatile Memory.

All meters to be supplied in postpaid, import mode only, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.

5.8	**AUTO SCROLL / PUSH BUTTON MODE WITH PRE PAID PAYMENT MODE**

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. There should not be any decimal point in the energy values.

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

A. Pre-Paid without TOD

Display	Display 1	Display 2
Scroll Process	Auto	Push
LCD Check	1	1
Meter Sr. No.	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
Current Month MD kW	8	8
Current Month MD kVA	9	9
Last Month (history 1) kWh	10	10
Last Month (history 1) kVAh	11	11
Last Month (history 1) MD kW	12	12
Last Month (history 1) MD kVA	13	13
Phase Current	14	14
Neutral current	15	15
Inst. Voltage Instant Power Factor	16	16
Inst. Phase Power	17	17
Inst. Neutral Power	18	18
Status of Load Switch (connect or disconnect)	19	19
Current Balance Amount (Current Balance)	20, 21	20, 21
Current Balance Date & Time	22, 23	22, 23
Total Balance at Last Recharge(Previous Balance)	24, 25	24, 25
Last Recharge Amount	26, 27	26, 27
Last Recharge Date & Time	28, 29	28, 29
High Resolution kWh	-	30
High Resolution kVAh	-	31
Magnetic Tamper count	-	32
Latest Magnetic tamper occurrence date	-	33

Display	-	34
Latest Magnetic tamper occurrence Time	-	34
ESD Tamper count	-	35
Latest ESD tamper occurrence date	-	36
Latest ESD tamper occurrence time	-	37
TC Open tamper count	-	38
TC Open occurrence date of very first event	-	39
TC open occurrence time of very first event	-	40
Count of Connect	-	41
Date & Time of Last Occurrence	-	42, 43
Count of disconnect	-	44
Date & Time of Last Occurrence	-	45, 46

B. Pre-Paid with TOD

Display Scroll Process	Display 1 Auto	Display 2 Push
LCD Check	1	1
Meter Sr. No.	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh	6	6
Cum. kVAh	7	7
TOD Cum. kWh (T1,T2,)	8, 9	8, 9
TOD Cum. kVAh (T1,T2,)	10, 11	10, 11
Current Month MD kW	12	12
Current Month MD kVA	13	13
Last Month (history 1) kWh	14	14
Last Month (history 1) kVAh	15	15
Last Month (history 1) TOD Cum. kWh (T1,T2,)	16, 17	16, 17
Last Month (history 1) TOD Cum. kVAh (T1,T2,)	18, 19	18, 19
Last Month (history 1) MD kW	20	20
Last Month (history 1) MD kVA	21	21
Phase Current	22	22
Neutral current	23	23
Inst. Voltage Instant Power Factor(Lag/Lead)	24	24
Inst. Phase Power	25	25
Inst. Neutral Power	26	26
Status of Load Switch (connect or disconnect)	27	27
Current Balance Amount (Current Balance)	28	28
Current Balance Date & Time	29, 30	29, 30
Total Balance at Last Recharge(Previous Balance)	31	31
Last Recharge Amount	32	32
Last Recharge Date & Time	33, 34	33, 34
High Resolution kWh	-	34
High Resolution kVAh	-	35
Magnetic Tamper count	-	36
Latest Magnetic tamper occurrence date	-	37

Latest Magnetic tamper occurrence Time		-	38
ESD Tamper count		-	39
Latest ESD tamper occurrence date		-	40
Latest ESD tamper occurrence time		-	41
TC Open tamper count		-	42
TC Open occurrence date of very first event		-	43
TC open occurrence time of very first event		-	45
Count of Connect		-	46
Date & Time of Last Occurrence		-	47, 48
Count of disconnect		-	49
Date & Time of Last Occurrence		-	50, 51

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 reading and MD and event as above with date and time) shall be available in the Non Volatile Memory.

All meters to be supplied in postpaid, import mode only, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.

5.8.1	**AUTO SCROLL / PUSH BUTTON MODE WITH EXPORT-IMPORT (NET) MODE**

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated. Display should not be stuck for any tamper events. There should not be any decimal point in the energy values.

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

A. NET mode without TOD Insta Power Factor (lag / lead)

Display	Display 1	Display 2
Scroll Process	Auto	Push
LCD Check	1	1
Meter Sr. No.	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh Import	6	6
Cum. kVAh Import	7	7
Cum. kWh Import	8	8
Cum. kVAh Export	9	9
Current Month MD kW	10	10
Current Month MD kVA	11	11
Last Month (history 1) kWh Import	12	12
Last Month (history 1) kVAh Import	13	13
Last Month (history 1) kWh Export	14	14
Last Month (history 1) kVAh Export	15	15
Last Month (history 1) MD kW	16	16
Last Month (history 1) MD kVA	17	17
Phase Current	18	18
Neutral current	19	19
Inst. Voltage	20	20
Inst. Phase Power	21	21
Inst. Neutral Power	22	22

Status of Load Switch (connect or disconnect)	23	23
High Resolution kWh Import	-	24
High Resolution kWh Export		25
High Resolution kVAh Import	-	26
High Resolution kVAh Export		27
Magnetic Tamper count	-	28
Latest Magnetic tamper occurrence date	-	29
Latest Magnetic tamper occurrence Time	-	30
ESD Tamper count	-	31
Latest ESD tamper occurrence date	-	32
Latest ESD tamper occurrence time	-	33
TC Open tamper count	-	34
TC Open occurrence date of very first event	-	35
TC open occurrence time of very first event	-	36
Count of Connect	-	37
Date & Time of Last Occurrence	-	38, 39
Count of disconnect	-	40
Date & Time of Last Occurrence	-	41, 42
Total Count of all Events	-	43

B. NET mode with TOD

Display	Display 1	Display 2
Scroll Process	Auto	Push
LCD Check	1	1
Meter Sr. No.	2	2
TAMPER*/OK	3	3
Date	4	4
Time	5	5
Cum. kWh Import	6	6
Cum. kVAh Import	7	7
TOD Cum. kWh Import (T1,T2,)	8, 9	8, 9
TOD Cum. kVAh Import (T1,T2,)	10, 11	10, 11
Cum. kWh Export	12	12
Cum. kVAh Export	13	13
TOD Cum. kWh Export (T1,T2,)	14, 15	14, 15
TOD Cum. kVAh Export (T1,T2,)	16, 17	16, 17
Current Month MD kW	18	18
Current Month MD kVA	19	19
Last Month (history 1) kWh Import	20	20
Last Month (history 1) kWh Export	21	21
Last Month (history 1) kVAh Import	22	22
Last Month (history 1) kVAh Export	23	23
Last Month (history 1) MD kW	24	24
Last Month (history 1) MD kVA	25	25
Phase Current	26	26
Neutral current	27	27
Inst. Voltage	28	28
Inst. Phase Power	29	29
Inst. Neutral Power	30	30
Status of Load Switch (connect or disconnect)	31	31

High Resolution kWh Import		-	32
High Resolution kWh Export		-	33
High Resolution kVAh Import			34
High Resolution kVAh Export		-	35
Magnetic Tamper count		-	36
Latest Magnetic tamper occurrence date		-	37
Latest Magnetic tamper occurrence Time		-	38
ESD Tamper count		-	39
Latest ESD tamper occurrence date		-	40
Latest ESD tamper occurrence time		-	41
TC Open tamper count		-	42
TC Open occurrence date of very first event		-	43
TC open occurrence time of very first event		-	44
Count of Connect		-	45
Date & Time of Last Occurrence		-	46, 47
Count of disconnect		-	48
Date & Time of Last Occurrence		-	49, 50
Total Count of all Events		-	51

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 reading and MD and event as above with date and time) shall be available in the Non Volatile Memory.

All meters to be supplied in postpaid, import mode only without TOD Display, until unless specifically intimated. Bidder to provide software to convert meter to any mode over the air by sending command through HES.

5.8.2	**Output Device:** 1. **Pulse rate:** The meters shall have a suitable test output device. Red color blinking LED (marked as imp/kWh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. Meter constant shall be indelibly printed on the name plate as imp / kWh. 2. **EL LCD Indicator-** The meter shall be provided with suitable earth mark indicator for Earth Leakage. The EL Indicator shall glow when there is a difference of 6.25 %Ib between phase and neutral current. This should be recorded as an event in memory and communicated to HES. 3. **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. 4. Load Switch LED indicator-The meter shall be provided with suitable LED indication for condition of load switch (Close / open). LED should show when load switch is open. (Red Colour LED) 5. Phase Indication – Power on indication shall be provided as icon on the LCD.

5.8.3	**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 TP(C/N/S/W) ODL logo)Indelibly and distinctly marked with all essential particulars as per relevant standardsalong 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 plate instead of sticker).
	v. Month and Year of manufacture
	vi. Unit of measurement
	vii. Reference voltage ,frequency
	viii. Ref. temperature if different from 27 deg. C
	ix. Rated basic and maximum Current
	x. Meter constant (imp/kWh)
	xi. 'BIS' Mark
	xii. Class index of meter
	xiii. "Property of TP(C/N/S/W)ODL"
	xiv. Purchase Order No. & date
	xv. Guarantee period.
	xvi. Rated frequency
	xvii. Sign of double square
	xviii. Country of manufacture.
	xix. Symbol of load switch.
	xx. Communication Tech for WAN and NAN(with carrier frequency)
	xxi. Category
	However the following shall be printed in bar code on the meter nameplate.(shall be laser printed on name plate instead of sticker) All data shall be laser printed on meter along with
	Sr. NO and date of manufacturing. No sticker to be used to avoid loss of data in event of fire.
	Content Format for QR code: **Sl No. XXXXXXXXX only**
	(Serial no.) Bidder should ensure that each NIC provided in meter is having laser printed Sr. No., MFGdate, 'Property of TP(C/N/S/W)ODL' marking, PO / RO no.& date (same as that of meter PO / RO)
5.9	**TESTS:**
	All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS / IEC. All routine / acceptance tests shall be witnessed by the purchaser / his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS / IEC.
6.0	**TYPE TEST**
	1) All tests as defined in the latest updated versions of IS 16444 Part-1: 2015, IS 13779:1999, IS15959 Part-1&2: 2016 and IS 15884: 2010.
	2) Test against abnormal magnetic influence as per clause 5.6.2 of CBIP TR 325.
	3) Meter shall have BIS certification as per IS16444 part-1& IS15959 part-2
7.0	**ROUTINE TEST**
	1) AC High Voltage test (Clause no. 12.7.6.3 of IS 13779)
	2) Insulation test (Clause no. 12.7.6of IS 13779)
	3) Test on limits of error due to variation in current (Clause no. 11.1 of IS 13779)
	4) Test of starting current (Clause no. 11.5 of IS 13779)
	5) Test of no load condition (Clause no. 12.13 of IS 13779)
7.1	**ACCEPTANCE TEST:**
	1) AC High Voltage test (Clause no. 12.7.6.3 of IS 13779)
	2) Insulation test (Clause no. 9.5 of IS 13779)

3) Test on limits of error (Clause no. 11.1 of IS 13779) with following loads:

120% I Max (36A)	I max (30A)	Ib (5A)	0.5 Ib (2.5A)	0.1Ib (0.5A)	0.05Ib (0.25A)
UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 Lead and 0.5 lag	UPF

4) Test of meter constant (Clause no. 11.6 of IS 13779)

5) Test of starting current (Clause no. 11.5 of IS 13779)

6) Test of no load condition (Clause no. 12.13 of IS 13779)

7) Test of repeatability of error (Clause no. 11.7 of IS 13779)

8) Test of power consumption (Clause no. 9.1 of IS 13779)

9) Test for Immunity against external influencing signal as per the TP(C/N/S/W)ODL specification

10) Test for Immunity against DC Immunity as per the TP(C/N/S/W)ODL specification

11) Test for Immunity against Tamper conditions as per the TP(C/N/S/W)ODL specification

12) Error measurements with 38 abnormal condition as per annexure I along with magnet, ESD and microwave (if not possible during inspection the meter from lot shall be tested at MTL)

13) Test to Influence of Harmonics (Table no. 17 & 20 of IS 13779)

14) Supply voltage and frequency variation test (as per clause 11.2 of IS 13779)

15) Testing of self-diagnostic features, as per TP(C/N/S/W)ODL specification

16) Tamper count increment and logging with date and time in meter database, as per TP(C/N/S/W)ODL specification

17) All tests as defined in IS15959(Part-2): 2016

18) Functionality of communication module as defined in IS 16444 part1

19) Smart meter communicability as per table no.A28 of IS 15959 (part-2)

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

7.2	**METER BOX** Acceptance Tests Physical verification of dimensions of the box. Compatibility of the box for housing the Meter and ensuring ease of connecting and reading the meter. Test for mechanical strength. Routine Tests : The routine test certificates for the following shall be furnished for approval of the purchaser. Physical verification of dimension of the box. Compatibility of the box for housing the meter ensuring ease of connecting and the reading the meter. Meter box shall be of polycarbonate transparent type (Degree of protection-IP55) Cable entry to meter box should be from side and gland should be such aligned that cable should enter meter box in upward direction to ensure that in case of rain water does not enter meter box by flowing along the cable. Meter Box should have push button compatible with meters push button. Box should have optical port grove in line with meter optical port slot. There should be locking provision available for meter optical cord. The arrangement should be such that meter can be read through optical cord without opening the meters box. Meter Box should be internal type hinge (Not accessible without opening the box). Meter Should be pre-fitted in meter box when supplied. Terminal of the meters should not be accessible through Glands of the meters once the cable is installed. There should be minimum 20 mm spacing between meter and meter box from bottom sides and 10 mm from all other sides. From front it should be minimum 10 mm and behind it should be minimum 5 MM.	
7.3	**SPECIAL TEST:** 1) The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests. Temperature rise test on terminal block will be valid as per clause 5.2.5 of this specification	
7.4	**TYPE TESTS CERTIFICATES:** The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA /UL laboratory or international acclaimed lab or equivalent will also suffice at the discretion of TP(C/N/S/W)ODL. For technical evaluation of the tender, we may consider Type test report as per IS 13779. In such case the Bidder should provide IS16444 compliant test report before starting of supply of meters. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TP(C/N/S/W)ODL.	

7.4	**PRE-DISPATCH INSPECTION:**
	Inspection can be conducted at any stage of manufacture at the discretion of the TP(C/N/S/W)ODL and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection.
	Equipment shall be subject to inspection by a duly authorized representative of the TP(C/N/S/W)ODL. Bidder shall grant free access to the places of manufacture to TP(C/N/S/W)ODL's representatives at alltimes when the work is in progress. Inspection by the TP(C/N/S/W)ODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TP(C/N/S/W)ODL.
	
	Following documents shall be sent along with material
	        a) Pre dispatch Inspection Test reports
	        b) MDCC issued by TP(C/N/S/W)ODL
	        c) Invoice in duplicate
	        d) Packing list
	        e) Drawings & catalogue
	        f) Guarantee / Warrantee card
	        g) Delivery Challan
	        h) Other Documents (as applicable)
	
	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, if deemed necessary, shall be tested for all tampers at TP(C/N/S/W)ODL 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.

8.0	**INSPECTION AFTER RECEIPT AT STORE:** The material received at TP(C/N/S/W)ODL'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.
9.0	**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 TP(C/N/S/W)ODL 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 TP(C/N/S/W)ODL 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.

10.0	**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 IS 15707:206 clauses 9.1 and 9.2. 2. Individual meter should be packed in separate box. Routine test report (with min. tests as defined in 7.2) of the individual meter shall be kept inside each card board carton of the meter. 3. On back side of RTC the bidder shall print a picture of the meter with its small details for consumer to know about meter. 4. The softcopy of the routine test certificate of each meter to be provided with each lot to TP(C/N/S/W)ODL, MMG . Routine test reports of each meter in hard copy are to be provided inside respective meter box. 5. Meter manual is required along with the lot 6. The routine test certificate shall contain results & all tests of clause no. 7.2. 7. QR code containing information of meter Sr. No should be pasted on the outer most box in which single / group of meters are transported. This should be readable through QR scanner without altering the nay physical condition of box.
11.0	**SAMPLE:** **Tendering Stage:** Bidders are required to manufacture 04 numbers of sample meters as per the TP(C/N/S/W)ODL specification (sealed, unsealed and openable base and cover to view/test the inner circuits)and submit the samples (non-returnable) along with bid for approval. The tender sample as per IS 13779 & IS 15959 shallbe acceptable for verification and other checks. Bidder to demonstrate all communication features during sample testing. **Pre-manufacturing approvals:** The successful bidder shall submit four prototype samples of meters at all Meter testing laboratories of TP(C/N/S/W)ODL 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.
12.0	**TRAINING** Suitable training to be arranged for TP(C/N/S/W)ODL representatives, for operation and handling of every software and hardware regarding communication between meter & HHU/mobile app/BCS, meter & HES, without any cost implications towards TP(C/N/S/W)ODL.

13.0	**QUALITY CONTROL**
	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. Quality should be ensured at the following stages:

- At PCB manufacturing stage, each board shall be subjected to computerized bare board testing.
- At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation.

	• Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs). • Prior to final testing and calibration, sample meters shall be subjected to aging test (i.e. meters will be kept in ovens for 24 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily) The TP(C/N/S/W)ODL's engineer or its nominated representative shall have free access to the bidder's / manufacturer's works to carry out inspections any point of time.
14.0	**MINIMUM TESTING FACILITIES** Bidder shall have adequate in house NABL accredited meter testing lab for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.05 accuracy or better.
15.0	**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 plansubmitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order. **GTP Approval shall be mandatory to start manufacturing.**
16.0	**SPARES, ACCESSORIES & TOOLS:** 1. Bidder to be provide free of cost 02 nos. of jig for retrieving data from memory of meter with every new design of meter in which previous jig 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. Optical cable to USB/C type is required (5nos. for 1000 Meter)

17.0	**DRAWINGS AND DOCUMENTS**
	 Following drawings & Documents shall be prepared based on TP(C/N/S/W)ODL specifications and statutory requirements and shall be submitted with the bid:
	     a) Completely filled-in Technical Parameters.
	     b) General arrangement drawing of the meter
	     c) Terminal Block dimensional drawing
	     d) Mounting arrangement drawings.
	     e) General description of the equipment and all components with makes and technical requirement
	     f) Type Test Certificates
	     g) Experience List
	 After the award of the contract, soft copies of following drawings, documents, describing the equipment in detail shall be forwarded for approval:
	 Bidder shall subsequently provide soft copy of all the drawings, GTP, data-sheet of dis-connector switch, data-sheet/ comparative analysis (of material of terminal block, terminal cover, terminal screw, meter body, meter base), Test certificates and integration documents with HES for the final approval of TP(C/N/S/W)ODL, before mass manufacturing. All the documents & drawings shall be in English language.

18.0	**GUARANTEED TECHNICAL PARTICULARS** Clause-wise compliance to this specification.

Annexure 1				
Condition No	LCD Display		Description	Graphical View
1			NORMAL WIRING	
2			NORMAL WIRING, VOLTAGE REVERSED	
3			PHASE & NEUTRAL INTERCHANGED, CURRENT REVERSED	

Annexure 1				
Condition No	LCD Display		Description	Graphical View
4			PHASE & NEUTRAL INTERCHANGED, CURRENT REVERSED, VOLTAGE REVERSED	
5			FULL LOAD EARTH RETURNED	
6			FULL LOAD EARTH RETURNED, VOLTAGE REVERSED	
7			FULL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED	
8			FULL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED, VOLTAGE REVERSED	
9			PARTIAL LOAD EARTH RETURNED	
10			PARTIAL LOAD EARTH RETURNED, VOLTAGE REVERSED	
11			PARTIAL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED	
12			PARTIAL LOAD EARTH RETURNED, VOLTAGE INTERCHANGED & CURRENT REVERSED, VOLTAGE REVERESED	

Annexure 1			

Sr. No.	LCD Display	LCD Description	Graphical View
13		NEUTRAL CURRENT REVERSED	
14		PHASE CURRENT REVERSED, VOLTAGE REVERSED	
15		PHASE CURRENT REVERSED, VOLTAGE INTERCHANGED	
16		NEUTRAL CURRENT REVERSED, VOLTAGE INTERCHANGED & REVERSED	
17		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED	
18		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE REVERSED	
19		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE INTERCHANGED	
20		PARTIAL LOAD EARTH RETURNED & NEUTRAL CURRENT REVERSED, VOLTAGE REVERSED, VOLTAGED INTERCHANGED	

Annexure 1			

Sr. No.	LCD Display	LCD Description	Graphical View
21		CURRENT BYPASSED	
22		NEUTRAL REMOVAL (MISSING)	
23		NEUTRAL REMOVAL (MISSING), VOLTAGE REVERSED	
24		NEUTRAL REMOVAL (MISSING) & CURRENT REVERSED, VOLTAGE INTERCHANGED	
25		NEUTRAL REMOVAL (MISSING) & CURRENT REVERSED, VOLTAGE REVERSED, VOLTAGE INTERCHANGED	
26		DIODE REVERSED IN NEUTRAL	
27		DIODE IN NEUTRAL	
28		DIODE REVERSED IN NEUTRAL, LOAD EARTHED	
29		DIODE IN NEUTRAL, LOAD EARTHED	

Annexure 1				
	CONDITION NO	**LCD DISPLAY**	**Description**	**Graphical View**
	30		REVERSED DIODE EARTHED IN OUPUT NEUTRAL, LOAD EARTHED	
	31		DIODE EARTHED IN OUTPUT NEUTRAL, LOAD EARTHED	
	32		VARIABLE RESISTOR EARTHED IN OUTPUT NEUTRAL, NEUTRAL MISSING, LOAD EARTHED	
	33		VARIABLE CAPACITANCE EARTHED IN OUTPUT NEUTRAL, NEUTRAL MISSING, LOAD EARTHED	
	34		CHOPPER IN NEUTRAL	
	35		CHOPPER IN NEUTRAL, LOAD EARTHED	
	36		CHOPPER EARTHED IN OUTPUT NEUTRAL, NEUTRAL MISSING, LOAD EARTHED	

Annexure 1				
	CONDITION NO	**LCD DISPLAY**	**Description**	**Graphical View**
	37		VARIABLE RESISTOR EARTHED IN NEUTRAL, DIODE IN OUTPUT NEUTRAL, LOAD EARTHED	
	38		TIMER IN OUPUT NEUTRAL, LOAD EARTHED	

Downloadable Parameters: -

1. TP(C/N/S/W)ODL specific OBIS code for self-diagnostic- 1.0.96.5.1.255 IC-1

   Default TOD timing for single phase meter is as per below
   Mentioned as above
   Note:- TOU (Time ZONE) timing can programmed by using activity calendar for times zone (0.0.13.0.0.255)
   Thesame OBIS code shall be used for reading the configured TOU timings
   TOU zones shall be given during detailed Engineering.

2. Single phase default display parameter shall be configured as Post-paid without TOD & shall be programmablethrough HES (OTA) for following combinations.
   a. Pre-paid without TOD
   b. Pre-paid with TOD
   c. Post-paid without TOD
   d. Post-paid with TOD

3. Meter serial number shall be alpha numeric and with 9 digits. Alphabetic part detail shall be shared by TP(C/N/S/W)ODL

4. 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.

5. Billing shall be done at following programming events
   a. Metering mode change
   b. Payment mode change
   c. Communication driven MD reset
   d. Time zone activation
   e. Demand integration period change
   f. Firmware upgrade

6. Following annexures are added in this document
   a. Push data list – Annexure-A
      1) Instant profile four times a day ie. 05:00am, 11:00am, 05:00pm, 11:00pm)
      2) Daily Energy Profile every day at 03:00am
      3) Monthly energy profile (as and when MD reset occurred) at 03:00am
      4) Event flag once daily at 05:00am
   b. Downloadable parameter list- Annexure-B
   c. Display parameter list - Annexure-C
   d. Tamper threshold table- Annexure-D
   e. All data should be in format ddmmyyyy

Push data list:

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

S No.	Periodic Schedule Push Instantaneous 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-2
2	Periodic Push SM (Smart Meter)to HES	0.0.25.9.0.255	IS 15959 part-2
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
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.	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-2
2	Mid Night (daily) push SM to HES	0.6.25.9.0.255	TP(C/N/S/W)ODL Specific
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
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-2
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-2
2	Billing Push SM(Smart Meter) to HES	0.99.25.9.0.255	TP(C/N/S/W)ODL Specific
3	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
4	Billing profile (All billing profile parameters which are mentioned in billing profile – 1.0.98.1.0.255)	1.0.98.1.0.255	IS 15959 part-2
Note- This data shall be pushed to HES only			

Downloadable Parameters List:-

S.No.	Instantaneous Profile	OBIS code	OBIS source
	Instantaneous Profile	1.0.94.91.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Voltage	1.0.12.7.0.255	IS 15959 part-2
3	Phase Current	1.0.11.7.0.255	IS 15959 part-2
4	Neutral Current	1.0.91.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Frequency	1.0.14.7.0.255	IS 15959 part-2
7	Apparent Power – KVA	1.0.9.7.0.255	IS 15959 part-2
8	Signed Active Power - kW (+ Forward; -Reverse)	1.0.1.7.0.255	IS 15959 part-2
9	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
10	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
11	Maximum Demand KW Import/forwarded with date & time	1.0.1.6.0.255	IS 15959 part-2
12	Maximum Demand KVA Import/forwarded with date & time	1.0.9.6.0.255	IS 15959 part-2
13	Cumulative Power ON duration in min	0.0.94.91.14.255	IS 15959 part-2
14	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
15	Cumulative Billing count	0.0.0.1.0.255	IS 15959 part-2
16	Cumulative programming count	0.0.96.2.0.255	IS 15959 part-2
17	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
18	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2
19	Load Limit function status (Connect/disconnect - attribute2 value)	0.0.96.3.10.255	IS 15959 part-2
20	Load Limit in KW	0.0.17.0.0.255	IS 15959 part-2
21	Number of power failures	0.0.96.7.0.255	IS 15959 part-2
22	Billing Date	0.0.0.1.2.255	IS 15959 part-2
23	Temperature	0.0.96.9.128.255	TP(C/N/S/W)ODL
24	Number of load switch (connect/disconnect) operations	0.0.96.50.1.255	TP(C/N/S/W)ODL
25	Cumulative Over voltage Tamper counts	1.0.12.36.0.255	TP(C/N/S/W)ODL
26	Cumulative Low voltage Tamper counts	1.0.12.32.128.255	TP(C/N/S/W)ODL
27	Cumulative Current reverse Tamper counts	1.0.11.128.128.255	TP(C/N/S/W)ODL
28	Cumulative Over current Tamper counts	1.0.11.36.0.255	TP(C/N/S/W)ODL
29	Cumulative Earth Tamper counts	1.0.11.128.131.255	TP(C/N/S/W)ODL
30	Cumulative Magnet Tamper counts	0.0.96.50.0.255	TP(C/N/S/W)ODL
31	Cumulative ND Tamper counts	1.0.96.50.0.255	TP(C/N/S/W)ODL
32	Cumulative Single wire Tamper counts	1.0.96.50.1.255	TP(C/N/S/W)ODL
33	Cumulative Over load Tamper counts	1.0.1.36.0.255	TP(C/N/S/W)ODL
34	Cumulative Comms(NIC) removal Tamper counts	0.0.96.50.3.255	TP(C/N/S/W)ODL
35	Cumulative Case open Tamper counts	0.0.96.20.0.255	TP(C/N/S/W)ODL
36	Cumulative Temperature Rise counts	0.0.96.50.2.255	TP(C/N/S/W)ODL
37	Cumulative Power fail duration	0.0.94.91.8.255	IS 15959 part-2
38	Relay Operation disconnect count	0.0.96.50.6.255	TP(C/N/S/W)ODL
39	Relay Operation Connect count	0.0.96.50.7.255	TP(C/N/S/W)ODL
40	Signal strength (CSQ value)	0.1.96.12.5.255	TP(C/N/S/W)ODL Specific
41	Meter serial number	0.0.96.1.0.255	IS 15959 part-2
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-2
1	Billing Date	0.0.0.1.2.255	IS 15959 part-2
2	Average power factor for billing period	1.0.13.0.0.255	IS 15959 part-2
3	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
4	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-2
5	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-2
6	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-2
7	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-2
8	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	IS 15959 part-2
9	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	IS 15959 part-2
10	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	IS 15959 part-2
11	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	IS 15959 part-2
12	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
13	Cumulative Energy kVAh TZ1 Import/forwarded	1.0.9.8.1.255	IS 15959 part-2
14	Cumulative Energy kVAh TZ2 Import/forwarded	1.0.9.8.2.255	IS 15959 part-2
15	Cumulative Energy kVAh TZ3 Import/forwarded	1.0.9.8.3.255	IS 15959 part-2
16	Cumulative Energy kVAh TZ4 Import/forwarded	1.0.9.8.4.255	IS 15959 part-2
17	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.5.255	IS 15959 part-2
18	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.6.255	IS 15959 part-2
19	Cumulative Energy kVAh TZ7 Import/forwarded	1.0.9.8.7.255	IS 15959 part-2
20	Cumulative Energy kVAh TZ8 Import/forwarded	1.0.9.8.8.255	IS 15959 part-2
21	Maximum Demand KW Import/forwarded with date & time	1.0.1.6.0.255	IS 15959 part-2
22	Maximum Demand KVA Import/forwarded with date & time	1.0.9.6.0.255	IS 15959 part-2
23	Billing Power On duration in Minutes	0.0.94.91.13.255	IS 15959 part-2
24	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
25	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2
26	Maximum Demand KW TZ1 Import/forwarded with date & time	1.0.1.6.1.255	IS 15959 part-2
27	Maximum Demand KW TZ2 Import/forwarded with date & time	1.0.1.6.2.255	IS 15959 part-2
28	Maximum Demand KW TZ3 Import/forwarded with date & time	1.0.1.6.3.255	IS 15959 part-2
29	Maximum Demand KW TZ4 Import/forwarded with date & time	1.0.1.6.4.255	IS 15959 part-2
29	Maximum Demand KW TZ5 Import/forwarded with date & time	1.0.1.6.5.255	IS 15959 part-2
31	Maximum Demand KW TZ6 Import/forwarded with date & time	1.0.1.6.6.255	IS 15959 part-2
32	Maximum Demand KW TZ7 Import/forwarded with date & time	1.0.1.6.7.255	IS 15959 part-2
33	Maximum Demand KW TZ8 Import/forwarded with date & time	1.0.1.6.8.255	IS 15959 part-2
34	Maximum Demand KVA TZ1 Import/forwarded with date & time	1.0.9.6.1.255	IS 15959 part-2
35	Maximum Demand KVA TZ2 Import/forwarded with date & time	1.0.9.6.2.255	IS 15959 part-2
36	Maximum Demand KVA TZ3 Import/forwarded with date & time	1.0.9.6.3.255	IS 15959 part-2
37	Maximum Demand KVA TZ4 Import/forwarded with date & time	1.0.9.6.4.255	IS 15959 part-2
38	Maximum Demand KVA TZ5 Import/forwarded with date & time	1.0.9.6.5.255	IS 15959 part-2
39	Maximum Demand KVA TZ6 Import/forwarded with date & time	1.0.9.6.6.255	IS 15959 part-2
40	Maximum Demand KVA TZ7 Import/forwarded with date & time	1.0.9.6.7.255	IS 15959 part-2
41	Maximum Demand KVA TZ8 Import/forwarded with date & time	1.0.9.6.8.255	IS 15959 part-2
42	Cumulative MD KW Import/forwarded with date & time	1.0.1.2.0.255	TP(C/N/S/W)ODL
43	Cumulative MD KVA Import/forwarded with date & time	1.0.9.2.0.255	TP(C/N/S/W)ODL
44	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
45	Cumulative Billing count	0.0.0.1.0.255	IS 15959 part-2
46	Type of billing	1.0.96.50.2.255	TP(C/N/S/W)ODL
47	Meter serial no	0.0.96.1.0.255	IS 15959 part-2

Note:- 1. Energy consumptions are derived parameters & same shall be available at HES & BCS end	
Note:- 2. Note- This data shall be read through BCS & HES	

S No.	Block Load Profile	OBIS Code	OBIS Source
	Block Load Profile	1.0.99.1.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Average Voltage	1.0.12.27.0.255	IS 15959 part-2
3	Block Energy KWh Import/forwarded	1.0.1.29.0.255	IS 15959 part-2
4	Block Energy KVAh Import/forwarded	1.0.9.29.0.255	IS 15959 part-2
5	Block Energy KWh Export	1.0.2.29.0.255	IS 15959 part-2
6	Block Energy KVAh Export	1.0.10.29.0.255	IS 15959 part-2
7	Average Current	1.0.11.27.0.255	IS 15959 part-2
8	Phase current	1.0.128.27.0.255	TP(C/N/S/W)ODL
9	Neutral Current	1.0.91.129.0.255	TP(C/N/S/W)ODL
10	Temperature	0.0.96.9.129.255	TP(C/N/S/W)ODL
11	Meter Serial number	0.0.96.1.0.255	IS 15959 part-2

Note-1: Block energies data shall be with 3 decimal place

Note-2: Demand KW, KVA & Power factor shall be derived at HES & BCS end

Note-3: Block load profile parameters shall be field programmable by TP(C/N/S/W)ODL specific OBIS code. On changing capture object LS data will be reset

Note-4: This data shall be read through BCS & HES

S No.	Daily Load Profile	OBIS Code	OBIS Source
	Daily Survey Profile	1.0.99.2.0.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Cumulative Energy KWh Export	1.0.2.8.0.255	IS 15959 part-2
3	Cumulative Energy KVAh Export	1.0.10.8.0.255	IS 15959 part-2
4	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
5	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-2
6	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-2
7	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-2
8	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-2
9	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	IS 15959 part-2
10	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	IS 15959 part-2
11	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	IS 15959 part-2
12	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	IS 15959 part-2
13	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
14	Cumulative Energy kVAh TZ1 Import/forwarded	1.0.9.8.1.255	IS 15959 part-2
15	Cumulative Energy kVAh TZ2 Import/forwarded	1.0.9.8.2.255	IS 15959 part-2
16	Cumulative Energy kVAh TZ3 Import/forwarded	1.0.9.8.3.255	IS 15959 part-2
17	Cumulative Energy kVAh TZ4 Import/forwarded	1.0.9.8.4.255	IS 15959 part-2
18	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.5.255	IS 15959 part-2
19	Cumulative Energy kVAh TZ5 Import/forwarded	1.0.9.8.6.255	IS 15959 part-2
20	Cumulative Energy kVAh TZ7 Import/forwarded	1.0.9.8.7.255	IS 15959 part-2
21	Cumulative Energy kVAh TZ8 Import/forwarded	1.0.9.8.8.255	IS 15959 part-2
22	Maximum Demand KW Import/forwarded (With Date & Time)	1.0.1.6.0.255	IS 15959 part-2
23	Maximum Demand KW TZ1 Import/forwarded (With Date & Time)	1.0.1.6.1.255	IS 15959 part-2
24	Maximum Demand KW TZ2 Import/forwarded (With Date & Time)	1.0.1.6.2.255	IS 15959 part-2
25	Maximum Demand KW TZ3 Import/forwarded (With Date & Time)	1.0.1.6.3.255	IS 15959 part-2
26	Maximum Demand KW TZ4 Import/forwarded (With Date & Time)	1.0.1.6.4.255	IS 15959 part-2
27	Maximum Demand KW TZ5 Import/forwarded (With Date & Time)	1.0.1.6.5.255	IS 15959 part-2

28	Maximum Demand KW TZ6 Import/forwarded (With Date & Time)	1.0.1.6.6.255	IS 15959 part-2
29	Maximum Demand KW TZ7 Import/forwarded (With Date & Time)	1.0.1.6.7.255	IS 15959 part-2
30	Maximum Demand KW TZ8 Import/forwarded (With Date & Time)	1.0.1.6.8.255	IS 15959 part-2
31	Maximum Demand KVA Import/forwarded (With Date & Time)	1.0.9.6.0.255	IS 15959 part-2
32	Maximum Demand KVA TZ1 Import/forwarded (With Date & Time)	1.0.9.6.1.255	IS 15959 part-2
33	Maximum Demand KVA TZ2 Import/forwarded (With Date & Time)	1.0.9.6.2.255	IS 15959 part-2
34	Maximum Demand KVA TZ3 Import/forwarded (With Date & Time)	1.0.9.6.3.255	IS 15959 part-2
35	Maximum Demand KVA TZ4 Import/forwarded (With Date & Time)	1.0.9.6.4.255	IS 15959 part-2
36	Maximum Demand KVA TZ5 Import/forwarded (With Date & Time)	1.0.9.6.5.255	IS 15959 part-2
37	Maximum Demand KVA TZ6 Import/forwarded (With Date & Time)	1.0.9.6.6.255	IS 15959 part-2
38	Maximum Demand KVA TZ7 Import/forwarded (With Date & Time)	1.0.9.6.7.255	IS 15959 part-2
39	Maximum Demand KVA TZ8 Import/forwarded (With Date & Time)	1.0.9.6.8.255	IS 15959 part-2
40	Meter serial number	0.0.96.1.0.255	IS 15959 part-2

Note: 1-Daily consumption of energies shall be derived at HES & BCS end
Note:-2-This data shall be read b through BCS & HES

S No.	Name Plate Profile	OBIS Code	OBIS Source
	Name Plate Profile	0.0.94.91.10.255	IS 15959 part-2
1	Meter Serial Number	0.0.96.1.0.255	IS 15959 part-2
2	Device ID	0.0.96.1.2.255	IS 15959 part-2
3	Manufacturer Name	0.0.96.1.1.255	IS 15959 part-2
4	Firmware Version for meter	1.0.0.2.0.255	IS 15959 part-2
5	Meter Type	0.0.94.91.9.255	IS 15959 part-2
6	Category	0.0.94.91.11.255	IS 15959 part-2
7	Current rating	0.0.94.91.12.255	IS 15959 part-2
8	Meter Year of Manufacture	0.0.96.1.4.255	IS 15959 part-2
9	Meter constant	1.0.0.3.0.255	TP(C/N/S/W)ODL
10	Meter voltage rating	0.0.94.91.15.255	TP(C/N/S/W)ODL
11	NIC firmware version number	0.128.96.0.9.255	TP(C/N/S/W)ODL
12	NIC IMEI number (serial number)	0.0.96.1.5.255	TP(C/N/S/W)ODL
13	Sim Sl. No.	**0.0.96.1.9.255**	TP(C/N/S/W)ODL

Note- This data shall be read through BCS & HES.
The SIM sl. no. should be automatically updated in the nameplate profile during installation & replacement.
Details of Metering mode (imp/exp), postpaid/prepaid should be updated in the name plate profile

S No.	Profile for Voltage (e=0),Current(e=1) & other (e=4) events	OBIS Code	OBIS Source
	Tamper event Profile	0.0.99.98.e.255	IS 15959 part-2
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (voltage events)	0.0.96.11.e.255	IS 15959 part-2
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
9	Phase Current	1.0.11.7.0.255	IS 15959 part-2
10	Neutral Current	1.0.91.7.0.255	IS 15959 part-2
11	Meter serial number	0.0.96.1.0.255	IS 15959 part-2

Note- This data shall be read through BCS & HES

S No.	Profile for Power Fail(e=2), Transaction(e=3), Non Rollover (e=5) & Control (e=6) events	OBIS Code	OBIS Source
	Power Fail event profile	0.0.99.98.e.255	IS 15959 part-2

1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (power fail events)	0.0.96.11.2.255	IS 15959 part-2
3	Meter serial number	0.0.96.1.0.255	IS 15959 part-2
Note- - This data shall be read through BCS & HES			

S No.	Profile for TP(C/N/S/W)ODL events compartments (Temperature event profile)	OBIS Code	OBIS Source
	TP(C/N/S/W)ODL**L** events compartments profile	0.0.99.98.128.255	TP(C/N/S/W)ODL
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (TP(C/N/S/W)ODL events compartment	0.0.96.11.128.255	TP(C/N/S/W)ODL
3	Event Snap Current	1.0.94.91.14.255	IS 15959 part-2
4	Voltage	1.0.12.7.0.255	IS 15959 part-2
5	Signed power factor	1.0.13.7.0.255	IS 15959 part-2
6	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
7	Cumulative Tamper count	0.0.94.91.0.255	IS 15959 part-2
8	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS 15959 part-2
9	Phase Current	1.0.11.7.0.255	IS 15959 part-2
10	Neutral Current	1.0.91.7.0.255	IS 15959 part-2
11	Temperature	0.0.96.9.128.255	TP(C/N/S/W)ODL
12	Meter serial number	0.0.96.1.0.255	IS 15959 part-2
Note- This data shall be read through BCS & HES			

S No.	Mode of operation of load switch profile	OBIS Code	OBIS Source
	Mode of operation of load switch profile	0.0.99.98.129.255	TP(C/N/S/W)ODL
1	Real Time Clock – Date and Time	0.0.1.0.0.255	IS 15959 part-2
2	Event Code (Control events)	0.0.96.11.6.255	IS 15959 part-2
3	Reason for Switch operation	0.0.96.50.4.255	TP(C/N/S/W)ODL
4	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS 15959 part-2
5	Cumulative Energy kWh TZ1 Import/forwarded	1.0.1.8.1.255	IS 15959 part-2
6	Cumulative Energy kWh TZ2 Import/forwarded	1.0.1.8.2.255	IS 15959 part-2
7	Cumulative Energy kWh TZ3 Import/forwarded	1.0.1.8.3.255	IS 15959 part-2
8	Cumulative Energy kWh TZ4 Import/forwarded	1.0.1.8.4.255	IS 15959 part-2
9	Cumulative Energy kWh TZ5 Import/forwarded	1.0.1.8.5.255	IS 15959 part-2
10	Cumulative Energy kWh TZ6 Import/forwarded	1.0.1.8.6.255	IS 15959 part-2
11	Cumulative Energy kWh TZ7 Import/forwarded	1.0.1.8.7.255	IS 15959 part-2
12	Cumulative Energy kWh TZ8 Import/forwarded	1.0.1.8.8.255	IS 15959 part-2
13	Cumulative Energy – KVAH Import/forwarded	1.0.1.9.0.255	IS 15959 part-2
14	Cumulative Energy KVAH TZ1 Import/forwarded	1.0.1.9.1.255	IS 15959 part-2
15	Cumulative Energy KVAH TZ2 Import/forwarded	1.0.1.9.2.255	IS 15959 part-2
16	Cumulative Energy KVAH TZ3 Import/forwarded	1.0.1.9.3.255	IS 15959 part-2
17	Cumulative Energy KVAH TZ4 Import/forwarded	1.0.1.9.4.255	IS 15959 part-2
18	Cumulative Energy KVAH TZ5 Import/forwarded	1.0.1.9.5.255	IS 15959 part-2
19	Cumulative Energy KVAH TZ6 Import/forwarded	1.0.1.9.6.255	IS 15959 part-2
20	Cumulative Energy KVAH TZ7 Import/forwarded	1.0.1.9.7.255	IS 15959 part-2
21	Cumulative Energy KVAH TZ8 Import/forwarded	1.0.1.9.8.255	IS 15959 part-2
22	Meter serial number	0.0.96.1.0.255	IS 15959 part-2
Note- This data shall be read through BCS & HES			

S No.	Accuracy Check Data Profile (High Resolution Energy)	OBIS Code	OBIS Source
	Accuracy Check data Profile	1.0.99.128.129.255	TP(C/N/S/W)ODL
1	Cumulative Energy – kWh Import/forwarded	1.0.1.8.0.255	IS15959-Part2
2	Cumulative Energy KWh Export	1.0.2.8.0.255	IS15959-Part2
3	Cumulative Energy – kVAh Import/forwarded	1.0.9.8.0.255	IS15959-Part2

4	Cumulative Energy KVAh Export		1.0.10.8.0.255	IS15959-Part2
5	Meter serial number		0.0.96.1.0.255	IS 15959 part-2
Note- This data shall be read through BCS only				

S. No.	Programmable Parameters	OBIS Code	Event IDs	OBIS Source
1	Real Time clock change	0.0.1.0.0.255	151	IS15959-Part2
2	Demand Integration Period change	1.0.0.8.0.255	152	IS15959-Part2
3	Profile captured period	1.0.0.8.4.255	153	IS15959-Part2
4	single-action schedule for billing dates	0.0.15.0.0.255	154	IS15959-Part2
5	Activity calendar for times zones	0.0.13.0.0.255	155	IS15959-Part2
6	new firmware (image) activated	0.0.44.0.0.255	157	IS15959-Part2
7	Load Limit KW Set	0.0.17.0.0.255	158	IS15959-Part2
8	Connect/Disconnect	0.0.96.3.10.255	159/160	IS15959-Part2
9	Metering Mode	0.0.94.96.19.255	167,(177=Forward,178= Import/Export)	IS15959-Part2
10	Payment mode	0.0.94.96.20.255	211=poastpaid, 212 Pre-paid	IS15959-Part2
11	Last token recharge amount	0.0.94.96.21.255	N/A	IS15959-Part2
12	Last token recharge time	0.0.94.96.22.255	N/A	IS15959-Part2
13	Total Amount at last recharge	0.0.94.96.23.255	N/A	IS15959-Part2
14	Current balance amount	0.0.94.96.24.255	N/A	IS15959-Part2
15	Current balance time	0.0.94.96.25.255	N/A	IS15959-Part2
16	Current Association MR (LLS secret change)	0.0.40.0.2.255	161	IS15959-Part2
17	Current Association US (HLS Key change)	0.0.40.0.3.255	162	IS15959-Part2
18	Current Association FW (HLS Key change)	0.0.40.0.5.255	163	IS15959-Part2
19	Global key change (encryption and authentication)	0.0.43.0.e.255 (e=2,3,4,5)	164	IS15959-Part2
20	Image activation single action schedule	0.0.15.0.2.255	169	IS15959-Part2
21	Event Status Word Filter	0.0.94.91.26.255	165	IS15959-Part2
22	MD Reset	0.0.10.0.1.255	166	IS15959-Part2

30	Display Parameters Auto Scroll	0.0.96.128.0.255	760	TP(C/N/S/W)ODL
31	Display Parameters Push Button	0.0.96.128.1.255	760	TP(C/N/S/W)ODL
32	Display Parameters HR Mode	0.0.96.128.2.255		TP(C/N/S/W)ODL
33	Load Profile capture Objects	1.0.96.128.2.255	761	TP(C/N/S/W)ODL
39	Load control parameters	0.0.96.3.128.255		TP(C/N/S/W)ODL
40	Single Action Schedule for schedule push	0.0.15.0.4.255		TP(C/N/S/W)ODL
41	Single Action Schedule for Daily (midnight) data push	0.6.15.0.4.255	798	TP(C/N/S/W)ODL
42	Single Action Schedule for Billing data push	0.6.15.0.4.255	799	TP(C/N/S/W)ODL
Note: This data can set through BCS & HES				

Annexure-C

Single phase Common Display list for all combinations

Single phase common display list with following Combinations			Push Button
1. Post-paid with TOD 2. Post-paid without TOD **(Default setting)** 3. Pre-paid with TOD 4. Pre-paid without TOD	Auto Scroll	Push Button	
LCD Check	**YES**	**YES**	
Meter Serial number	**YES**	**YES**	
Tamper Status/OK	**YES**	**YES**	
Date (DD:MM:YY)	**YES**	**YES**	
Time(HH:MM:SS)	**YES**	**YES**	
Cumulative kWh(Import/Forwarded)	**YES**	**YES**	
Cumulative kVAh(Import/Forwarded)	**YES**	**YES**	

Cumulative kWh-Export	**YES**	**YES**	Applicable for "net meter" mode
Cumulative kVAh-Export	**YES**	**YES**	
TOD Cum. kWh (T1,T2)	**YES**	**YES**	Applicable only when meter is configured as 'with TOD'
TOD Cum. kVAh (T1,T2)	**YES**	**YES**	Applicable only when meters is configured as 'with TOD'
Current Month MD kW with date & time	**YES**	**YES**	
Current Month MD kVA with date & time	**YES**	**YES**	
Current Month MD – kW(Export) with Date & Time	**YES**	**YES**	Applicable for "net meter" mode
Current Month MD – kVA(Export) with Date & Time	**YES**	**YES**	
Last Month (history 1) kWh	**YES**	**YES**	
Last Month (history 1) kVAh	**YES**	**YES**	
Last Month (history 1) kWh (Export)	**YES**	**YES**	Applicable for "net meter" mode
Last Month (history 1) kVAh (Export)	**YES**	**YES**	
Last Month (history 1) TOD Cumulative kWh (T1,T2)	**YES**	**YES**	Applicable only when meter is configured as 'with TOD'
Last Month (history 1) TOD Cumulative kVAh (T1,T2)	**YES**	**YES**	Applicable only when meter is configured as 'with TOD'
Last Month (history 1) MD kW with date & time	**YES**	**YES**	
Last Month (history 1) MD kVA with date & time	**YES**	**YES**	
Last Month (history 1) MD kW (Export) with Date & Time	**YES**	**YES**	Applicable for "net meter" mode
Last Month (history 1) MD kVA(Export) with Date & Time	**YES**	**YES**	
Phase Current	**YES**	**YES**	
Neutral current	**YES**	**YES**	
Inst. Voltage	**YES**	**YES**	
Inst. Power Factor (Lag/Lead)	**YES**	**YES**	
Inst. Phase Power	**YES**	**YES**	
Inst. Neutral Power	**YES**	**YES**	
Status of Load Switch (connect or disconnect)	**YES**	**YES**	
Current Balance Amount (Current Balance)	**YES**	**YES**	Applicable only when meter is configured as 'Pre-paid'
Current Balance Date & Time	**YES**	**YES**	
Total Balance at Last Recharge(Previous Balance)	**YES**	**YES**	
Last Recharge Amount	**YES**	**YES**	
Last Recharge Date & Time	**YES**	**YES**	
High Resolution kWh (4 Digits after decimal)	--	**YES**	
High Resolution kVAh (4 Digits after decimal)	--	**YES**	
Magnetic Tamper count	--	**YES**	
Latest Magnetic tamper occurrence date	--	**YES**	
Latest Magnetic tamper occurrence Time	--	**YES**	
ESD Tamper count	--	**YES**	
Latest ESD tamper occurrence date	--	**YES**	
Latest ESD tamper occurrence time	--	**YES**	
TC Open tamper count	--	**YES**	
TC Open occurrence date of very first event	--	**YES**	
TC open occurrence time of very first event	--	**YES**	

Relay Count of Connect	--	**YES**	
Date & Time of Last Occurrence	--	**YES**	
Relay Count of disconnect	--	**YES**	
Date & Time of Last Occurrence	--	**YES**	
Meter firmware version number	--	**YES**	
RTC status	--	**YES**	
RTC Battery status	--	**YES**	
NVM memory status	--	**YES**	
Signal strength (CSQ value)	--	**YES**	
NIC card status(12nos. error codes)	--	**YES**	

Annexure-D

Tamper Table

S.No.	Tamper Type	Event ID Code (Occurrence / Restoration)	Occurrence Threshold	Restore Threshold	Persistence time		Compartment Capacity
					Occurrence (Minutes)	Restoration (Minutes)	
Table B1: Voltage Related							25
1	Low Voltage	9, 10	Voltage <70% of Vref, Current > 2% of Ib	Voltage >80% of Vref, Current > 2% of Ib	30	2	
Table A5: Current Related							

#	Event	Codes	Occurrence	Restoration			
2	Current Mismatch	703, 704	(In-Ip) ≥ 20% of Ib, In >Ip	(In-Ip) < 20% of Ib	10	2	35
3	Earth Leakage	69, 70	The difference between phase and neutral current > 6.25% of Ib	The difference between phase and neutral current < 6.25% of Ib	10	2	
Table A6: Power Related							
4	Power Failure	101, 102	Absence of Voltage	Presence of Voltage	5	Immediate	25
Table A8: Others							
5	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	170
6	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 <52 Hz	1	2	
7	Single Wire	207, 208	At a current of >500mA under tamper condition of neutral missing	Voltage > 140V	10	2	
8	Over load	215, 216	Current >120% of Imax	< 100% of Imax	1	5	
9	ESD / JAMMER	801, 802 TP(C/N/S /W)ODL	Meter shall either immune or log the event in case not immune		1	1	
10	Temperature Rise (from microprocessor)	951, 952 TP(C/N/S /W)ODL	> 70ºC	< 60ºC	30	2	

11	NIC Removal	209, 210	On removal of card	On insertion of card	Immediate	Immediate	
12	Microwave (not required)	Meter shall not be able to identify this condition, Jig shall be provided for downloading the data.					
Table A9: Non Rollover							
13	Meter Cover Open	251	If meter top cover is open	NA	Immediate	NA	5 (Stay put type)

Any other tamper event with logic to be shared by the bidder.

Reference Voltage: V_{ref}

Current (Ib): 5A