Annexure - 1

Technical Specification for Smart Meters

Technical Specification for Single Phase WC Smart Meter

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Record of Revision

Item/Clause No.	Change in Specification	Reason of change	Approved By	Rev



1. Scope of Supply

This specification covers the following for Single Phase 240 V, 10A-60 A Static Watt hour smart meters of accuracy class 1.0 with plug in communication modules (RF mesh only and RF + Cellular technology) and integrated load control switches.

- A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
- B. Any accessories / hardware required for installation and operation for the meter.

2. Codes and Standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

conto	conform to the latest edition/ of following		
SL	Standard Number	Title	
2.1	Indian Electricity Act	IE Act 2003	
2.2	CEA Metering Regulations	With latest amendments	
2.3	CBIP Manual (Pub no325)	Standardization of AC Static Electrical Energy Meters	
2.4	IS- 16444 (Part 1)	AC Static Transformer Operated Watt-hour Smart Meters, Class 1.0 and 2.0 Part 1 Specification	
2.5	IS- 13779	AC Static Watt-hour Meters, Class 1 and 2 – Specification	
2.6	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification	
2.7	IS-15959 (Part 2)	Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2)- Companion Specification for smart meter	
2.8	IS- 11448	Application guide for AC Electricity meters	
2.9	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment	
2.10	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)	
2.11	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols	
2.12	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements	
2.13	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods	
2.14	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S,	



		0,5 S, 1 and 2)
2.15	IEC 60736	Testing Equipment for electrical Energy meter
2.16	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM
2.17	IEC 62056-1- 0:2014	Smart metering standardisation framework
2.18	IEC 62056-3- 1:2013	Use of local area networks on twisted pair with carrier signalling
2.19	IEC 62056-4- 7:2014	DLMS/COSEM transport layer for IP networks
2.20	IEC 62056-5- 3:2017	DLMS/COSEM application layer
2.21	IEC 62056-6- 1:2017	Object Identification System (OBIS)
2.22	IEC 62056-6- 2:2017	COSEM interface classes
2.23	IEC 62056-6- 9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols
2.24	IEC 62056-7- 3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks
2.25	IEC 62056-7- 5:2016	Local data transmission profiles for Local Networks (LN)
2.26	IEC 62056-7- 6:2013	The 3-layer, connection-oriented HDLC based communication profile
2.27	IEC TS 62056-8- 20:2016	Mesh communication profile for neighbourhood networks
2.28	IEC TS 62056-9- 1:2016	Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)
2.29	IEC 62056-9- 7:2013	Communication profile for TCP-UDP/IP networks
2.30	IEC 62056- 21:2002	Direct local data exchange
2.31	DLMS- White Book	Glossary of DLMS/COSEM terms
2.32	DLMS- Blue Book	COSEM meter object model and the object identification system
2.33	DLMS- Green Book	Architecture and protocols to transport the model



2.34	DLMS- Yellow	Conformance testing process	
	Book		
2.35	IEEE 802.15.4	Standard for Local and metropolitan area networks.	
2 36	2.36 IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865	
2.30		MHz to 867 MHz Band in India)	
Order	Order of precedence between different standards shall be as follow:		
i	Indian Standards Issued By BIS		
ii	IEC standard		
Iii	Other standards like CBIP, DLMS etc.		

3. Service Conditions

SN	Item	Description
3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4. Distribution System Data

SN	Item	Description
4.1	Supply	1 Phase AC, 2 wire
4.2	Voltage	240 V ± 6%
4.3	Frequency	$50 \text{ Hz } \pm 5\%$
4.4	System Neutral	Solidly Earthed

5. Electrical and Accuracy Requirement

SN	Item	Description
		Meter Type 1: 1- ø, 2 wire Static Watt-hour Smart Meter
		Meter Type 2: 1- ø, 2 wires Static Watt-hour Smart Meter
5.1	Meter Type	fitted in polycarbonate box.
		Meter Type 1/ Type 2 shall be offered as per purchaser's
		requisition/ BOQ.
5.2	Connection	Direct / whole current
		240V (phase to neutral) with variation of +30% & -40%.
5.3	Rated Voltage	However meter should withstand the maximum system
		voltage.
5.4	Rated Current	Ib -10A and Imax- 60 A
5.5	Starting current	0.2 % of base current



5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	1.0 for Kwh, kVARH and kVAH (IS13779 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 1) Meter with lowest power consumption shall be preferred.
5.9	Meter constant	Imp/ unit (Bidder to specify meter constant)
5.10	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.12	Influence of supply voltage	As per clause 4.4.2 of IS 15884
5.13	Short time over current	As per clause no. 4.4.3 of IS 15884
5.14	Immunity to phase and earth fault	As per clause no. 9.6 of IS 13779
5.15	Influence of Self Heating	As per IS 4.4.4 of IS 15884
5.16	Influence of Heating	As per IS 4.4.5 of IS 15884
5.17	Electromagnetic compatibility	 a. Meter along with (NIC) shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst along-with NIC. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of clause no. 4.5 and 5.5 of IS 15884.



5.18	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 13779/ IEC62053-21/ CBIP325 (most stringent standard to be followed) under and after influence of following: a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% o. Alternating (AC) "abnormal' magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference s. DC immunity test Note: BRPL reserves the right to formulate any other test method to check magnetic immunity/ logging of meter. Meter with logging provision will be preferred.
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6. Construction Feature

SN	Item	Description
6.1	General	Construction of meters shall confirm to the IS 16444 (Part 1)
6.2	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.3	Top Cover	 a. Material – Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level. b. Top cover and base should be



			Ultrasonically/Chemically welded.
		c	Mechanism shall be provided to log event in case of
		0.	top cover is opened. Bidder shall explain its
			mechanism.
			Material - Flame retardant glass filled polycarbonate
		a.	
			of grade 500 R or equivalent.
<i>c</i> 4	T : 151 1	b.	Terminal block shall be capable of passing the tests
6.4	Terminal Block		as per ISO-75 for a temperature of 135 Deg C and
			pressure of 1.8MPa. The terminals shall be designed
			so as to ensure adequate and durable contact such that
			there is no risk of loosening or undue heating.
		a.	Meter Type 1: The terminal cover shall be extended
			type with 2 no's holes of minimum 30 mm in
			diameter for cable entry.
			Meter Type 2: Short terminal cover with U cut
			suitable for entry of 2CX25 Sqmm Cable.
		b.	Material - UV stabilized transparent/Opaque
			polycarbonate cover.
		c.	Provision of sealing through sealing screws.
		d.	The sealing screws shall be held captive in the
			terminal cover.
6.5	Terminal cover	e.	Terminal cover should have provision for cable entry
			from bottom.
		f.	Baffle wall shall be provided above the cable entry
			base wall so that access to the terminals is not
			possible (even with thin metallic wire) without
			breaking the seal.
		ø.	Diagram of external connections should be embossed
		8.	on terminal cover. Sticker is not acceptable.
		h.	
		11.	occurrence and restoration in case of terminal cover
			is opened. Bidder shall explain its mechanism.
		a.	Terminals shall be suitable upto 25 Sqmm aluminium
		a.	stranded cable.
6.6		b.	Two no's flat head screws and washers per terminal
		υ.	
	Tarminals		shall be provided Metarial of tarminals screws and weshers should be
	Terminals	C.	Material of terminals, screws and washers should be
			brass or tinned copper. Terminals shall be tested for
		.1	continuous current of 150 % Imax.
		d.	•
			/ outgoing etc.



		e. Clearances and creep age shall be as per IS 13779.
6.7	Ingress Protection	IP 55 or better, but without suction in the meter.
6.8	Test Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.9	RTC	 a. The meter shall have internal real time crystal clock to set date and time. b. Drift in time of this clock shall not be more than ±5minutes/ year at a reference temperature of 27°C. c. Meter should have capability of Time synchronization. d. Meter RTC shall be corrected automatically by the system in synchronization to the network RTC. e. HES will sync RTC at least once a day.
6.9.1	Time keeping	As per IS 15884
6.10	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thioyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter even in case of single wire power condition.
6.11	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.12	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC. b. Battery. c. Non volatile memory. d. Display e. Communication card status
6.13	Load Control Switch	 a. Smart meter shall be equipped with integrated load control switches to control flow of electricity to the load at the instance of connect/ disconnect commands as per functional need of the system. b. Load switch for connect/ disconnect purpose shall be mounted inside the meter with suitable arrangement. c. Load Switches shall be provided in both phase and neutral d. The rating of switches used shall be in line with



		meter rating.
6.13.1	Performance requirement for load switching	 a. Utilization category of the load switch shall be UC2 as per clause no. 4.6.6.2 of IS 15884. b. All load switches shall operate simultaneously.
6.14	Optical port	Meter shall have an optical port with a rust resistance coated metal ring to hold magnet of downloading probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.
6.15	Communication Module Interface	 a. Meter should have the provision for 01 no's plug in communication module for connectivity. The same interface shall be compatible with both Cellular and RF communication technologies interchangeable in field. b. Interface shall support data transfer between meter and network interface card over UART/ RS232. Bidder shall explain its pin out and standard in detail. c. Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. d. Meter Vendor shall work with BRPL designated RF provider to integrate their module in the meter as per integration requirement mentioned in annexure 'C'. e. Preferred location of communication card module shall be on top of meter.
6.15.1	Communication modules (NIC)	 a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card (NIC) for connectivity of meter to HES from following options as per tender requirement: i. Communication Module/ NIC Type 1: RF based suitable for communication Network of BRPL designated RF canopy provider. ii. Communication Module/ NIC Type 2: RF and cellular communication module (LTE 4G with 3G and 2G fall back as per Indian Telecom Standards). b. Meter shall have separate indications on display/ for remote and local communication. c. Communication module shall held in a casing which can be directly plugged in the meter. Sealing screw shall be provided.



	I	
6.16	Last Gasp	Meter shall have provisions to provide last gasp signals through communication module in case of power failure. Bidder should explain in detail the provisions provided in meter to achieve the requirement.
6.17	Meter Sealing Arrangement	 a. Sealing should be in accordance with IS and CEA metering regulations with latest amendments. b. Sealing arrangement shall be such that sealed parts shall not be opened without breaking the seal or sealed part itself. There should be clear evidence of the breaking in case sealed parts shall be opened without breaking the seal. c. Approval shall be taken from purchaser for location of seals and number of seals.
6.17.1	Manufacturer's Seals	 a. One Polycarbonate seal to be provided on meter cover. b. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.17.2	BRPL Seals	 a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided on top cover. c. Minimum 01 no's polycarbonate seals shall be provided for communication module. d. Seals will be issued to manufacturer free of cost.
6.17.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.18	Name Plate and marking	 a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 1) & clause no. 9.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.19	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 13779.



		As per Annexure 'E' if required in purchaser's requisition.
6.20	Meter Box	Meter shall be factory fitted in meter enclosure by
		unidirectional screws.
	Guarantee	a. 7.5 years from the date of dispatch or 7 year from
		date of commissioning, whichever is earlier
		b. Manufacturer shall undertake a guarantee to replace
6.21		meter up to a period of 7 Year from the date of
6.21		supply. The meters which are found
		defective/inoperative within the guarantee period
		shall be replaced as per meter service level
		agreement.

7. Functional Requirement

SN	Item	Description
7.1	Meter category	Smart meter comply with D1 category of IS 15959 (Part 2).
7.2	Mode of metering	It should be possible to configure meters in following modes of metering: a. Forwarded Only: In this mode any export active energy shall be treated as import energy and shall be recorded in forward only register. Apparent energy calculation shall be as per KVAH calculation mentioned in clause '7.4' b. Bidirectional: Both Import and export energy recording shall be applicable in this mode of metering and relevant registers shall be updated. Any change in metering mode shall be logged in events with date and time stamp. Default mode of metering shall be forwarded only until specified otherwise.
7.3	Payment Mode	It should be possible to configure meter in following modes of payment: a. Post payment mode b. Prepayment Mode Any change in payment mode shall be logged in events with date and time stamp. Prepayment facility shall be achieved by server / HES. Default mode of metering shall be post payment until specified otherwise.



		Lag only: KVAh is computed based on KVArh and
7.4	KVAH Calculation	
/.4	KVAH Calculation	KWH value. If PF=1, or leading, then KVAh = KWH. At no instance KVAh < KWh.
7.5	MD 1 1 d	Block window with default demand integration period of
7.5	MD calculation	1800 s configurable to 900 s as per requirement.
		Extended register shall be used for MD recording.
7.6	TOU Metering	 a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. TOU metering shall be implemented by the activity calendar method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1/ IEC c. Special Day table shall be defined as per DLMS UA-1000-1/ IEC d. Default TOU programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BRPL for the same. e. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal
		R3: Rate Register for Off Peak
		All the parameters mentioned in table 'A1' of IS 15959
7.7	Instantaneous Parameters	(Part 2) along with following additional parameters shall be supported by meter: a. RF/ GSM signal Strength in milli db. b. Displacement PF. c. GPS coordinates. d. Temperature in Deg C. e. kVARH f. kVAH
7.7.1	Association rights	As per clause 11.1.1 of IS 15959 (Part 2).
7.8	Billing data	 a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as per provisions provided in clause no. 14 of IS 15959 (Part 2). b. 6 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access. c. All the parameters mentioned in table 'A4' of IS



		15959 (Part 2) shall be supported by meter.
7.8.1	Association Rights	As per clause 14 of IS 15959 (Part 2).
7.8.2	Selective access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.8.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.8.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).
7.9	Load survey Parameters	 a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table 'A15' of IS 15959 (Part 2) shall be supported by meter.
7.9.1	Association Rights	As per clause no. of IS 15959 (Part 2)
7.9.2	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.9.3	Profile capture period	Default 1800 s programmable to 900 s.
7.10	Daily load profile	Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 35 Power ON days. All the parameters mentioned in table 'A16' of IS 15959 (Part 2) shall be supported by meter as Daily load profile parameters:
7.11	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 16 of IS 15959 (Part 2).
7.11.1	Name Plate Detail	As per Table 'A26' of IS 15959 (Part 2) with following additional parameters. a. Month of manufacturing.
7.11.1.1	Association rights	As per clause 22.1 of IS 15959 (Part 2).
7.11.2	Programmable parameters	 a. These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. b. Programming of any of the parameters shall increment the 'Cumulative programmable count'



		value. c. All the parameters mentioned in table Table 'A27' of IS 15959 (Part 2) shall be supported by meters.
7.11.2.1	Association rights	As per clause 22.2 of IS 15959 (part 2)
7.11.3	Push Services	 a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 2). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e instantaneous, billing, load survey, daily energy and events. Bidder should explain its capability to configure push services. However following push services shall be available by default. i. Load survey profile data at after every 4 hours configurable to any predefined interval. ii. Mid night data at 00:00 hrs of every day. iii. Billing profile data on occurrence of billing.
7.11.3.1	Periodic push (Smart meter to HES)	 a. Meter shall be able to push instantaneous parameters to HES at predefined intervals. Parameters required for push shall be intimated during detailed engineering in the vent of order. b. Other attributes as per IS 15959 (Part 2) i.e. Send Destination, Communication window, Randomization time interval, number of retries and repeat delay shall be decided in the event of manufacturing.



	Г	No. 11 compared to 1
7.11.3.2	Event Push (Smart meter to HES)	 a. Meter is able to report HES, the status change of any of the identified events mapped in to event status word (ESW) of size 128 bits by pushing following objects to HES. i. Device ID ii. Push Setup ID iii. Real time clock- Date and Time iv. Event Status Word 1 (ESW 1). b. Each of the bits in ESW shall reflect the current state of the event and are mapped against each of the identified events. c. An event status word filter (ESWF) of 128 bit
		shall also be provided to configure events for event push. Events which are supported in meter
		shall only be configured for event push. Bit value 1 in ESWF shall indicate that the event is
		supported and value 0 indicates that event is not
		supported for event push. Position of the event
		bit in ESWF shall be same as in ESW.
7.11.3.3	Event status Bit mapping	As Per IS 15959 (Part 2)
		 a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology for a part or complete firmware of meter. b. Firmware upgrade shall use the Image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3. c. Broad cast facility shall be supported in HES for
	Firmware upgrade	simultaneously upgrading the firmware of a group of meters installed in field.
7.12		d. Firmware upgrade feature shall be provided with proper security. The design shall take into account field scenarios such as power failure during F/W upgrade.
		e. Once the firmware is upgraded, meter shall send an acknowledgment to HES. It shall also log it as an event in its memory.
		f. Meter shall support capability to self register the meter with new firmware.
		g. The execution time of the change of the firmware within the meter should be below 1 minute



		Motor shall symmet compostion loss massaging services
		Meter shall support connection less messaging services
		of DLMS to support broadcast messages for a group of
		meters for following actions:
7.13	Support for broadcast	a. Gap reconciliations.
	message	b. Firmware upgrade.
		c. On demand readings.
		d. Meter connection and disconnection.
		e. Updating of Programmable parameters.
		a. The Smart meter shall support disconnection (all
		the switches shall operate simultaneous) on the
		following conditions as per clause 11 of IS
		16444 (Part 1):
		i. Over current (105 % of Imax in any
		element for predefined persistence time.)
		ii. Load control limit (Programmable)
7.14	Disconnection mechanism	iii. Pre-programmed tamper conditions
		(Factory programmed)
		iv. Disconnection signal from Head end
		system.
		v. Pre paid function for prepayment mode.
		b. Meter shall use the disconnection control object
		as defined in clause 10 of IS 15959 (Part 2).
		c. Load limit function shall be disabled by default
		until other specified.
		a. Meter shall be able to reconnect load switches
		locally only for Overload and load control limit
		disconnections.
		b. The meter will try to reconnect the load up to
		predefined time, with predefined interval (Time
		and interval is programmable).
		c. If the consumption is still more than the
7.15	Local reconnection	programmed limits, it will lock out and wait for
7.15	Mechanism	30 minutes.
		d. If the consumption is still above the limit, the
		procedure defined above in 1 and 2 shall be
		repeated.
		e. It shall be possible to remotely
		connect/disconnect the relay via commands from
		HES. The remote reconnect shall not interrupt
		the normal connect/disconnect cycle.
		f. In case of relay malfunction i.e.,



		connect/disconnect action of relay is not taking place due to welding of contacts or any other reason, then it shall be logged as an event in the Non-rollover compartment. Same shall be sent as an alert to HES. g. Remote command shall have priority over local communication.
7.16	Reconnection mechanism	 a. Reconnection shall be done from HES except for over current and load control limit. In case of failure of communication / HES, reconnection shall be possible through Hand Held Device (CMRI) locally via proper security. b. Reconnection in case of prepayment meter shall be as per prepayment profile.
7.17	Status of load switch	 a. Indication of status of relay i.e. connected/disconnected should be available on display as well as through communication to HES. b. Connection and disconnection should be logged as events.
7.18	First breath and last gasp	 a. Status indication of switch i.e. connected/disconnected should be available on display as well as through communication to HES. b. In Last Gasp endpoint shall send the power outage notification with Time Stamp. In case of power failure meter communication module shall not draw power from the backup battery. c. For the purpose of sending the Last Gasp, meter shall have proper power backup (like a super capacitor).
7.19	Security	Advanced security outlined in clause 7.1.2 of IS 15959 (Part 1) shall be provided.
7.19.1	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)
7.19.2	Encryption/ Authentication for data transport	As per clause 7.2 of IS 15959 (Part 2)
7.19.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)



	T		
7.19.4	NIC security	 a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator. 	
7.20	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959.	
7.21	Connection/ Tamper Conditions		
7.22	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be	



		identified by an event ID.	
7.22.1	Association Rights	Each event shall be available to download as per following association rights. i. Public Client: No access ii. Meter Reader: Read only iii. utility Settings: Read only iv. Push Services: Read Only for identified events as per ESWF	
7.22.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events e. Non Roll Over Events f. Transaction related events g. Control Events Occurrence and Restoration of Voltage Related, current related, power related and other events shall be logged in meter memory as per IS 15959 (Part 2). Please refer annexure 'A' for description of events, Event ID, Logics of events and threshold values of events. Threshold values shall be factory programmable. Selective access shall be provided as per clause 11.3 of IS 15959 (Part 1). For each of the events a certain list of parameters shall be captured as per clause 'a' For each occurrence event captured, the cumulative tamper count shall be incremented. Only Real clock (date and time) and event code shall be captured events in compartments mentioned at sl no. 'd', 'f', 'g', 'h'.	
7.22.3	Parameter Snapshot	Captured parameters mentioned above are to be captured when event occurrence and restoration is logged as per IS 15959 (Part 2). a. Date and time of event b. Event code c. Active Current d. Voltage e. Power factor	



		f. Cumulative energy- kWh, kVAh, kVARh
		Captured parameters are to be captured at the time of
		logging of event occurrence and restoration
7.22.4	Event Logging	The meter shall log minimum 100 tamper events
		(ensuring at least 20 events for each tamper).
		Appropriate Indications/Icons for all tampers should
7.22.5	Tamper Indication	appear on the meter display either continuously or in
		auto display mode.

8. Meter Display

SN	Item	Descri	ption		
8.1	LCD Type	STN L	STN Liquid crystal with backlit		
		Minim	Minimum 160 Degree.		
8.2	Viewing angle	The di	splay visibility should b	be sufficient to read the Meter	
		mount	ed at height of 0.5 m as	well as at the height of 2 m.	
8.3	Size of LCD	Minim	um 10 mm X 6 mm		
8.4	LCD Digits	Total 6	6+1 digits		
8.5	LCD language	Englis	h		
		Follow	ring parameters should	be displayed in Auto scroll	
			rogrammable interval		
		Order	Parameter	Display time	
		1	LCD Test	5 Sec	
			Meter Sr. No.(8		
		2	digits)	5 Sec	
		3	Date	5 Sec	
		4	Time	5 Sec	
		5	Cumulative kWh	30 Sec	
8.6	Display mode	6	Current month MD	5 Sec	
0.0	Display mode		Instantaneous		
		7	Voltage	5 Sec	
			Instantaneous		
		8	Current	5 Sec	
		9	Power Factor	5 Sec	
		10	Frequency	5 Sec	
			Instantaneous Load		
		11	KW	5 Sec	
			Signal Strength (RF/		
		12	GSM)	5 Sec	



		13	Temperature	5 Sec
		14	kVARh	5 Sec
		15	kVAH	5 Sec
		Meter	with push button for ma	anual display shall not be
		accepta	able.	
8.7	8.7 Display indications	Appropriate indications/flags for all tampers and self		
0.7	Display indications	diagno	stic features should be 1	provided.

9. Data and Communication Protocol/ HES/ Integrations/ Software

<u>9. D</u>	Data and Communication Protocol/ HES/ Integrations/ Software			
SN	Item	Description		
9.1	Data Exchange protocol	 a. Meter should comply Indian companion of data exchange and tariff control specification IS 15959 (Part 2). b. In case of additional requirement from IS 15959 (part 2), they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/ services/ methods used in meters from IS 15959 (part 2) and its reference to DLMS books/ IEC. d. Prior to manufacturing of meters bidder shall provide a detailed specification explaining all parameters/ services/ methods used in meter in addition to IS 15959 (Part 2). 		
9.2	Integration with HES	 a. Bidder shall work with BRPL IT team/ BRPL designated system integrator to integrate its meter with BRPL HES system as per integration requirements mentioned in annexure 'C'. b. Bidder shall prepare detailed documents as mentioned in above clause and submit it for BRPL approval and integration with HES. 		
9.3	Base computer software	Licensed Software with the following features should be supplied for free to download meter through optical port.		
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.		
9.3.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.		
9.3.3	Database	BCS shall maintain master database according to desired area, location, and region etc.		
9.3.4	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc.b. BCS shall have capability to export data in ASCII, CSV		



		and XML format at desired location so that the same		
		could be integrated with our billing data for processing.		
		c. All the data available in the meter shall be convertible to		
		user defined ASCII, CSV and XML file format.		
9.3.5	Data transfer rate	BCS and communication ports should support data transfer rate		
9.3.3	Data transfer rate	of 9600 bps (minimum).		
		a. The manufacturer has to provide software capable of		
		downloading all the data stored in meter memory through		
		window/ android operating system based handheld units		
		(HHU) through optical port.		
		b. In the event of order, bidder shall work with BRPL IT		
		team/ BRPL designated system integrator to develop		
9.4	Hand Held Unit	HHU software for meter downloading and further		
9.4	Software	uploading on HES.		
		c. HHU software should have option for selection of		
		parameters to be downloaded from meter.		
		d. Meter data consisting of all parameters and complete		
		load survey for all parameters shall be read by HHU and		
		downloaded on HES in minimum possible time (not		
		more than 5 minutes).		
9.5	Tanining	Manufacture shall impart training to BRPL personnel for usage		
9.3	Training	of software and installation.		

10. Name Plate

SN	Description	
10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour.	
10.1	Embossing is not acceptable.	
10.2	Size of the digit shall be minimum 5X3mm	
10.3	Bar code shall be printed along with serial number	
10.4	BIS registration mark (ISI mark)	
10.5	'BRPL' insignia shall be printed above LCD display.	
10.6	BRPL PO No. & date	
10.7	Manufacturers name and country of origin	
10.8	Model type / number of meter	
10.9	Year of manufacturing	
10.10	Reference voltage / current rating	
10.11	The number of phases and the number of wires for which the meter is suitable.	
10.11	Graphical symbol as per IS 12032 can be used.	
10.12	Meter constant	
10.13	Class index of meter	



10.14	Reference frequency		
10.15	Warranty period		
10.16	Symbol of load switch		
Name plate of NIC			
	a. Serial no of NIC along/ IMEI no/MAC address with bar code		
10.17	b. Name of purchaser's		
10.17	c. Communication technology with carrier frequency		
	d. Manufacturing year and month.		
	e. Warranty period.		

11. Component Specification

SN	Item	Description	Make
11.1	Current Transformers	The Meters should be with the current transformers as measuring elements.	The current transformer should withstand for the clauses under 4.18(t)
11.2	Shunt element	Data sheet should be submitted.	Reputed
11.3	Measurement or computing chips	The Measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	Analog Devices, Cyrus Logic, Atmel, Phillips, SAMES,NEC,TEXAS
11.4	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.5	Display modules	a) The display modules should be well protected from the external UV radiations. b) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). c) It should be STN type industrial grade with extended temperature range min 70 °C.	Truly semiconductor, Tianma / Haijing Electronics, China, Hitachi,
11.6	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	Everlight, Osram, Agillent, NFC



11.7	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	
11.8	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. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires. LED	National Semiconductors, Atmel, Phillips, Texas Instruments. Hitachi, Compiled, AVX or Ricoh Samsung, EPCOS, Vishay Everlight, Agillent
11.9	Mechanical parts	 a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods. 	Dverlight, rightene
11.10	Battery	Lithium with guaranteed life of 15 years	Texcell, SAFT, Varta
11.11	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	Philips, Dallas Atmel, Motorola, Microchip, TEXAS, NEC or Compiled
11.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.13	Load Switch	Utilization Category UC2/ UC3 Latching relay Can withstand 120% of Vref and 120% of Imax current. As per IS 15884	Gruner/ KG/ any other reputed make subject to BRPL approval.
11.14	Note	a. The components used by manufacturer shall have	



"Minimum Life" more than the
10 years.
b. Incase vendor want to use other
make components; same shall be
approved by BRPL before use.
c. Even for existing supplier –
fresh approval is needed for all
deviations.
d. Manufacturer should have
complete tracking of material
used in meter. BRPL reserve the
right to carry out audit of
inventory/ manufacturing
process at manufacturer's works
and sub vendor's work.

12. Quality Assurance, Inspection and Testing

SN	Item	Description	
12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.	
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.	
12.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.	
12.4	Type Tests	 a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 1) shall be carried out on sample selected from BRPL lot. 	
12.5	Routine tests	All test marked "R" as per table 20 of IS 13779.	
12.6	Acceptance Tests	a. All tests marked "A" as per table 20 of IS 13779.b. Smart meter functional tests as per IS 16444 Table 1	



	1	
		c. Test of load switch as per clause 10.4 of IS 16444 (Part 1)
		d. Test for data exchange protocol as per clause 10.5 of IS
		16444.
		e. Test for Smart meter communicability as per clause no. 10.6
		of IS 16444 (Part 1).
		f. All the routine and acceptance tests shall be carried out as per relevant standards.
		g. Following tests in addition to IS shall be conducted during
		lot inspection.
		I) Dimensional and drawing verification.
		II) Display parameters/ sequence.
		III) Data Downloading from CMRI and PC.
		IV) Tamper/ fraud detection/logging features as per
		approved
		Documents. Tamper conditions will be simulated at
		varying load up to Imax. Accuracy will also be checked
		during tamper simulation.
		V) Burn in chamber test.
		VI)Component verifications.
		h. Purchaser reserves the right to formulate any other test
		method to verify guaranteed parameters of Meter.
12.7	ESD and Magnetic	ESD and magnetic interference test will be conducted at Samir
12.7	Interference test	lab, Chennai or CPRI.
		a. Purchaser reserves the right to inspect /witness all tests on
		the meters at Seller's works at any time, prior to dispatch, to
		verify compliance with the specification/ standards.
		b. Manufacturer should have all the facilities/ equipments to
12.8	Inspection	conduct all the acceptance tests as per relevant standards/
12.0	шоресноп	this specification and tampers logics as per approved GTP.
		All the equipments including tamper logs kits/ jigs should
		be calibrated.
		c. In-process and / or final inspection call intimation shall be
		given in advance to purchaser.
•		

13. Packing, Marking, Shipping, Handling and Storage

CNI	T ,		.•	-
SN	Item	Descri	ption	



13.1	Packing Packing for	 a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 10 single-phase meters in case of meter type 1 and 5 no's meters with enclosure in case of meter type 2 must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. d. Maximum weight of a group meter box shall not be more than 25 Kg. e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be affected by these disturbances. f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3. g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BRPL in the event of order. h. An impact detector ("Shock-Watch") label shall be attached to the cardboard hood of several pallets in each container/ transport truck, to warn of possible rough handling during shipment, transport and storage.
13.2	accessories and spares	Robust non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required



		both on front (wide side) and top: a. BRPL logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type, rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions	
13.4	Test reports	Routine test report to be provided with each meter	
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.	
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.	

14. Deviations

		a. Deviations from this specification can be acceptable, only
14.1	14.1 Deviations	where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with and which deviations the Buyer has agreed to in writing, before any order is placed.
		b. In the absence of any list of deviations from the Seller, it will be assumed by the Buyer that the Seller complies with the Specification fully.

15. Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre
----	--------------------	-----	----------	-----



				Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
7	Samples of each type and rating offered along with box and RF NIC/ communication module of already integrated RF card as per tender qualifying criteria.	4 no's (2 no's without box and 2 no with box)	2 no's (1 no's without box and 1 no with box)	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required		
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 2).		Required	
16	Program for production and testing (A)		Required	Required
17	Makes of components		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer's works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required



25	Mapping of meter serial no to Communication card.			Required	
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16. Delivery

	<i>J</i>	
	Despatch of Material: Vendor shall despatch the material, only	
16.1	Delivery	after the Routine Tests/Final Acceptance Tests (FAT) of the
10.1	Denvery	material witnessed/waived by the Purchaser, and after receiving
		written Material Despatch Clearance (MDC) from the Purchaser.



Annexure - A: Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification. Bidder shall not change the format of GTP or clause description.

Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	



Annexure – B: Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	



Annexure – C: Integration Requirement of Meters with NIC and HES

Integration requirements with communication provider of BRPL/ any other agency designated by BRPL for other components of AMI.

- a. Bidder(s) must share the meter security keys, all level encryption, and password information along with asset information in a format with the buyer / communication provider of BRPL so that during AMI business flow, the device and data can be authenticated all the time.
- b. Bidder(s) must share the details of meter communication specifically programmed protocols.
- c. Bidder(s) must share the meter configuration source code to the BRPL/ communication provider of BRPL.
- d. Bidder (s) must share the meter interface touch points for external applications/ systems.
- e. Bidder(s) must share the required APIs including but not limited to reading APIs, configuration APIs and Functional APIs with the System Integrator for execution of business flow (Installation, reading, configuration).
- f. Bidder(s) must share the data storage and retrieval details.
- g. Bidder(s) must configure the devices to be upgraded remotely (OTA) and share the required firmware source code (with updates over the project life) with system integrator as and when it is required in case of feature request or fault correction.
- h. Bidder(s) must follow and conduct Utility's sample and periodic test program, including (but not limited to) the selection of a sample population of meters, sharing of sample test results as reported by the meter testing systems with the system Integrator.
- i. Bidder(s) must share the information related to communication module for the authorization purpose at to BRPL/ communication provider of BRPL.

Annexure – D: Tamper and Fraud Detection Events

1. Voltage Related Events:				
Description of event Logic Of Event		Logic Expression/ Threshold values	Persistence Time	
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value. Threshold value is factory programmable.	Occurrence: If Vpn>110% Vref Restoration: If Vpn<=110% Vref	Occurrence: 5 Min Restoration: 5 Min	
Low Voltage (occurrence/ Restoration) 2. Current Description of	Meter should log low voltage event if voltage in any phase is below a threshold value. Threshold value is factory programmable. Related Events: Logic Of Event	Occurrence: If Vpn<75% Vref Restoration: If Vpn>=75% Vref Logic Expression/	Occurrence: 5 Min Restoration: 5 Min Persistence	
Parama	Meter should log the event of	Threshold values Occurrence: If Ip = -ve	Time Occurrence: 5	
Reverse Power/ reverse current	power reverse if meter detect power flow from outgoing to incoming terminals.	direction Restoration: If Ip=+ve direction	Min Restoration: 5 Min	
Over current (occurrence/ restoration)	If the current in any phase exceeds the specified threshold current, meter should log over current event.	Occurrence: If Ip>Imax Restoration: If Ip<=Imax	Occurrence: 5 Min Restoration: 5 Min	
Earth Loading (occurrence/ restoration)	Meter shall able to detect and log of earth loading condition if difference in phase and neutral current found less than a specified % of basic current rating of meter for a specified time threshold value. This event will be restored if this difference remain less than the specified threshold value for a specified restoration	Occurrence: If Ip-In >10% Ib Restoration: if Ip-In <=10% Ib	Occurrence: 5 Min Restoration: 5 Min	
	elated Events.	Logic Evapossion/	Persistence	
Description of event	Logic Of Event	Logic Expression/ Threshold values	Time	
Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.	5 Min	5 Min	



	If meter micro detect power off			
Abnormal	whereas phase voltage is present	Occurrence: If voltage at		
Power Off	than abnormal power will be	meter power supply<10%	NA	
(Occurrence/	recorded. Meter shall continue to	vref and Vpn>20% vref.	NA	
restoration)	record energy as per phase voltage	Restoration:		
	and current.			
4. Other Ev	vents:			
Description of	Logic Of Event	Logic Expression/	Persistence	
event	Logic Of Event	Threshold values	Time	
Abnormal External Magnetic Influence (Occurrence/ Restoration)	 a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS13779/CBIP 325 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed. 	As per IS 13779/ CBIP 325	As per IS 13779/ CBIP 325	
Neutral Disturbance- HF, DC and Alternating (occurrence/ restoration)	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.	Bidder shall define threshold values	Bidder shall define threshold values	
Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value. Event shall restore if PF factor of load remain out of range 0.2 to 0.5 for a load above than % threshold value	Occurrence: 0.2 <pf<=0.5 and Iphase>10%Ib Restoration: (PF<0.2 or PF>0.5) and Iphase>10%Ib</pf<=0.5 	Occurrence: 5 Min Restoration: 5 Min	



Operation (occurrence/ Restoration)	Single Wire			Occurrence: 5
Restoration) Plug in Communication module removal (Occurrence/ Restoration) Configuration change to post- paid mode/ propaid mode/ propaid mode/ removal (Occurrence/ Restoration) Configuration change to post- paid mode payment mode configuration. Configuration change to "Forwarded" only" mode/ "Import and Export" mode Restoration) Overload (Occurrence/ Restoration) Atter should log the change in payment mode configuration. Weter should log the change in payment mode configuration. NA NA NA NA NA NA NA NA NA NA		In case of single wire power is	If Ip or Ip >100 mA and	Min
Restoration) Meter should log the removal of communication module (Occurrence/ Restoration) Meter should log the removal of communication card. Meter should also log insertion of communication card. By NC switch/ sensor Meter should log the change in paid mode payment mode configuration. NA NA Configuration change to post-paid mode payment mode configuration. NA NA Configuration change to "Forwarded" only" mode/ "Import and Export" mode Meter should log the change in matering mode configuration. NA NA HV Spark (Occurrence/ Restoration) of overload in KW 5 min 5 min HV Spark (Occurrence/ should be immune or log the event in the case of application of ESD upto and including 35 KV. 5. Non roll over Events: Description of event Logic Of Event Logic Expression/ Threshold values Immediately (First occurrence shall always remain in meter memory) 6. Detail of Transaction Description of cvent Logic Of Event Logic Expression/ Threshold values Persistence Time Description of cvent Logic Of Event Logic Expression/ Threshold values Persistence Time Description of cvent Logic Of Event Logic Expression/ Threshold values Persistence Time Description of cvent Logic Of Event Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of cvent Logic Expression/ Threshold values Persistence Time Description of	(occurrence/	detected, event shall be logged.	Vpn<10% vref.	Restoration: 5
Communication module communication card. Meter should log the removal of communication card. Meter should (Occurrence) also log insertion of Restoration) communication card. By NC switch/ sensor Configuration change to post-paid mode payment mode configuration. NA	Restoration)			Min
module removal communication card. Meter should also log insertion of communication card. Meter should also log insertion of communication card. Configuration change to post-paid mode/ prepaid mode Configuration change to middle removal of communication card. Meter should log the change in payment mode configuration. NA NA NA NA NA Overload (Occurrence/ should able to log the status Restoration) Meter should able to log the status Restoration of overload in KW Occurrence/ should be immune or log the event in the case of application of ESD upto and including 35 KV. S. Non roll over Events: Description of cover opened Occurrence of cover open Occurrence of cover open Occurrence of cover open Condition of Escape in payment mode configuration. NA NA NA NA NA NA NA NA Immediately NA Immediately (First occurrence shall always remain in meter memory) 6. Detail of Transaction Description of event Real Time Clock- Date and Time Demand Integration of Escape in payment mode configuration. NA NA NA NA Persistence Time Time Logic Expression/ Threshold values Time Logic Impediately Time Time Persistence Time Time Demand Integration Period	Plug in			
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	Demand Integrat	ion Period		



Single Action schedule for billing date		
Activity calendar for time zones		
New firmware activated		
Load Limit (Kw) Set		
Enable Load Limit Function		
Disable load limit function		
LLS secret (MR) change		
HLS key (US) change		
HLS key (FW) change		
Global key change		
ESWF change		
MD reset		
7. Control Events:	•	
Event Description		
Load Switch Status- Disconnected		
Load Switch Status- Connected		

Note:

- 1. Event ID's shall be defined as per BRPL specification/ IS 155959 (part 2). Approval shall be taken from BRPL prior to manufacturing for Event ID's
- 2. Programming of threshold values should be possible from remote via proper authentications.
- 3. Logics of tampers can be changed/upgraded via firmware up gradation from remote via proper authentication.
- 4. All the programming changes/ firmware up gradations shall be logged along-with date and time stamp in meter as well as on HES.

Annexure – E: Meter Enclosure

SL	Clause	Clause Description
		Flush type with Completely transparent top cover and base with
1.0	Meter Box Type	Incoming and Outgoing cable entry and data downloading
		arrangement.
2.0	Design	Meter box shall comply following requirement.
		The meter box shall be designed in such a way that no access to the
2.1	General	meter body, terminals and hardwired port of the meter shall be
2.1	Requirement	possible after installation and sealing of the box without breaking
		the box itself.
		a. Meter box shall be theft proof i.e. meter box cannot be
2.2	Theft Protection	opened without breaking the seals or meter itself.
		b. On breaking of the box, clear evidence of the physical
		tempering shall be visual.
		a. The meter box shall be designed in 02 parts i.e. base and top
		cover.
		b. Meter shall be mounted inside the base on fixed moulded
	Parts of the box	pillars by unidirectional screw.
2.3		c. Meter top cover should be hinge type.
		d. Cable glands and earthing bolt shall be provided at the base as per construction requirement.
		e. Proper stiffeners shall be provided in the body of the base
		and top cover to provide mechanical strength against
		transportation and installation vibrations.
		The meter box shall be completely dust and vermin proof. Ingress
2.4	Ingress protection	protection rating of the box shall be minimum IP55.
		a. A 'U' shaped groove shall be provided in the collar of the
		base body, in which UV stabilized rubber 'O' shall be
		installed. The design of lining shall be such that it provides
	G 11 C1 1	proper sealing between the cover & base of box to avoid
2.5	Collar of base and	penetration of dust and ingress of water.
	cover	b. All around projection provided inside the cover periphery
		which keeps the 'O' ring pressed.
		c. An outside collar shall also be provided, which shall cover
		outer surface of the collar.
		a. Rubber 'O' Ring should be fixed with suitable adhesive so
		that the same does not get removed.
2.6	Fixing of 'O' ring	b. Rubber 'O' ring shall be fixed in a single piece without any
		gap between open ends. Open end of the 'O' ring shall be
	-	provided at the bottom side only.
3.0	Material	The material shall be as follow:



SL	Clause	Clause Description
3.1	Box material	 a. The material of meter box shall be flame retardant with inflammability level V0 having good dielectric and mechanical strength. b. The top Cover and Base of the box shall be made out of transparent polycarbonate with minimum 90% visibility so as to ease installation and monitoring of box against any tampering. The material shall be 'UV' stabilized to ensure that the moulded meter box should not change in colour, shape, size or should not get brittle after exposure to UV rays.
3.2	Hardware	All the metal hardware including hinges, U latches, mounting screws, downloading port ring etc shall be of rust proof stainless steel.
3.3	Cable glands	Polyamide Nylon-66 with flammability class FV0
4.0	Construction	a. Meter box shall be constructed by moulding of polycarbonate material as specified in clause no. 3.1b. Thickness of meter box shall be minimum 2.0 mm.
4.1	Moulding	The box shall be made through Injection moulding or better method.
4.2	Base	Meter shall be factory fitted inside base body using unidirectional screws, on fixed mounting pillars, moulded in to the base of sufficient strength, so that removing of meter shall not possible without breaking the meter box or meter itself.
4.3	Top cover	Hinge type
4.3.1	Hinge type	 a. Minimum 02 no's concealed / internal hinges, not visible or accessible from outside the box without breaking the box itself. b. Minimum 02 no's U latches shall be provided to closed the box with sealing arrangement at each U latch. c. After closing the U latches no play/ gap shall exist between base and top cover.
5.0	Padlocking	The box shall also have padlocking facility.
6.0	Cable entry	 a. 02 no's as incoming and outgoing at the 45 Deg Chamfer bottom corners suitable for 2CX25 Sqmm armoured aluminum cable. b. Cable entry must be at the bottom diagonal ends of the meter box. Appropriate clearance shall be provided between the cable entry and position of meter terminals for proper cable bending and connection. c. Minimum 60 mm vertical space shall be provided from the



SL	Clause	Clause Description	
		terminals of meter to centre of cable gland to provide	
		sufficient bending radius and working space.	
6.1	Cable Gland	a. Two nos. of Elbow shaped glands made out of Polyamide Nylon-66 suitable for 2CX10 / 2CX25 sqmm aluminium armoured cable shall be provided on both cable entries in the box.	
0.1	Cable Gland	b. Glands shall be designed in such a manner that the same cannot be unscrewed / removed from the box from outside. Manufacturer may either supply two nos. of check nuts or any other alternate design to meet this requirement.	
7.0	Earthing bolt	a. Earthing bolt of M6 with nut and washer shall be provided on left side of the body of meter box.b. The arrangement shall be such that one earth point shall be available for customer and external earthing provided by BRPL can be terminated.	
		c. Necessary symbol shall be provided for earth terminal.	
8.0	Mounting	Mounting arrangement shall be as follow	
8.1	Meter mounting pillars	a. Fixed type, moulded in to the base body as per the requirement of meter mounting holes.b. Stiffeners shall be provided at the base of the mater mounting pillars.	
8.2	Meter box mounting	 a. Four (4) nos. fixing holes of 6 to 6.5 mm diameter at the back surface of box shall be provided to fix the same on flat wall. b. Mounting holes shall not be obstructing by Incoming or Outgoing cables. 	
8.3	Box Mounting spacers	04 no's, 25 mm minimum mounting spacer moulded at the mounting holes of back surface of the meter box in order to provide space between meter back surface and wall.	
8.4	Box Mounting accessories	Long pan head self taping SS screws and washers shall be provided by the supplier with every box. 4 no's plastic fixing plugs suitable for self tapping screws shall also be provided.	



SL	Clause	Clause Description
		a. Option 1: i. Slot for optical head with non removable corrosion
		ferromagnetic metal ring.
		ii. Data downloading shall not be affected by scratches on data downloading port or with ageing of box.
		iii. Data downloading shall not be affected by visible light conditions.
		b. Option 2:
	Data Downloading	i. DB9 RS232 connector shall be provided at the top
9.0	arrangement	cover of box to download meter as specified in clause no. 9.1
		ii. Meter shall be downloadable without opening of the
		box/ breaking of seals.
		iii. This arrangement shall not de-rate the IP rating of
		meter box.
		iv. A Top hinges and bottom sealable cover shall be
		provided on the data downloading slot.
		v. Data downloading shall not be affected by visible light conditions.
		Optical reader with 9 pin D-type female connector cable shall be
	O .: 1. D.C.	provided in each meter box. Push fit type protective cover with
9.1	Optical to RS232	sealing arrangement for data downloading port on the cover of the
9.1	cable (If option 2 as per clause no. 9.0	meter box has to be provided. The optical meter reader with 9 pin
		D-type female connector cable of all the meter boxes (100%) shall
		be tested for meter downloading before dispatch.
		Following marking shall be provided on both top cover and base by
		fine quality indelible laser printing/ screen printing or embossed from inside of the box.
		a. BRPL insignia shall be embossed on the base & cover of
10.0	M. 1.	meter box.
10.0	Marking	b. Meter serial no. (Both on base and cover of meter box)
		c. Purchaser's PO no. and date.
		d. Purchaser's Name.
		e. Name or trade mark of seller
		f. Any other detail required at the time of approval.

Technical Specification for Three Phase WC Smart Meter

Document number: BR/18-19/SM/3PH/01 June 2018

Prepared By	Reviewed by	Approved By
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Record of Revision

Item/Clause No.	Change in Specification	Reason of change	Approved By	Rev



1. Scope of Supply

This specification covers the following for Three Phase 240 V, 20A-100A Static Watt hour smart meters of accuracy class 1.0 with plug in communication modules (RF mesh only and RF + Cellular technology) and integrated load control switches.

- A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
- B. Any accessories / hardware required for installation and operation for the meter.

2. Codes and Standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

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S No.	Standard Number	Title	
2.1	Indian Electricity Act	IE Act 2003	
2.2	CEA Metering Regulations	With latest amendments	
2.3	CBIP Manual (Pub no325)	Standardization of AC Static Electrical Energy Meters	
2.4	IS- 16444 (Part 1)	AC Static Transformer Operated Watt-hour Smart Meters, Class 1.0 and 2.0 Part 1 Specification	
2.5	IS- 13779	AC Static Watt-hour Meters, Class 1 and 2 – Specification	
2.6	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification	
2.7	IS-15959 (Part 2)	Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2)- Companion Specification for smart meter	
2.8	IS- 11448	Application guide for AC Electricity meters	
2.9	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment	
2.10	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)	
2.11	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols	
2.12	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements	
2.13	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods	
2.14	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)	



2.15	IEC 60736	Testing Equipment for electrical Energy meter	
2.16	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM	
2.17	IEC 62056-1-0:2014	Smart metering standardisation framework	
2.18	IEC 62056-3-1:2013	Use of local area networks on twisted pair with carrier signalling	
2.19	IEC 62056-4-7:2014	DLMS/COSEM transport layer for IP networks	
2.20	IEC 62056-5-3:2017	DLMS/COSEM application layer	
2.21	IEC 62056-6-1:2017	Object Identification System (OBIS)	
2.22	IEC 62056-6-2:2017	COSEM interface classes	
2.23	IEC 62056-6-9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols	
2.24	IEC 62056-7-3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks	
2.25	IEC 62056-7-5:2016	Local data transmission profiles for Local Networks (LN)	
2.26	IEC 62056-7-6:2013	The 3-layer, connection-oriented HDLC based communication profile	
2.27	IEC TS 62056-8- 20:2016	Mesh communication profile for neighbourhood networks	
2.28	IEC TS 62056-9- 1:2016	Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)	
2.29	IEC 62056-9-7:2013	Communication profile for TCP-UDP/IP networks	
2.30	IEC 62056-21:2002	Direct local data exchange	
2.31	DLMS- White Book	Glossary of DLMS/COSEM terms	
2.32	DLMS- Blue Book	COSEM meter object model and the object identification system	
2.33	DLMS- Green Book	Architecture and protocols to transport the model	
2.34	DLMS- Yellow Book	Conformance testing process	
2.35	IEEE 802.15.4	Standard for Local and metropolitan area networks.	
2.36	IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865 MHz to 867 MHz Band in India)	
Order of precedence between different standards shall be as follow:			
i	Indian Standards Issued By BIS		
ii	IEC standard		
iii	Other standards like CBIP, DLMS etc.		



3. Service Conditions

SN	Item	Description
		Operation range: -10 Deg C to 55 Deg C
3.1	Temperature Range	Limit range of operation: -25 to 60 Deg C
		Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4. Distribution System Data

SN	Item	Description
4.1	Supply	3 Phase AC, 4 wire
4.2	Voltage	415 V ± 6%
4.3	Frequency	$50 \text{ Hz } \pm 5\%$
4.4	System	Solidly Earthed
	Neutral	

5. Electrical and Accuracy Requirement

SN	Item	Description
		Meter Type 1: 3- ø, 4 wire Static Watt-hour Smart Meter
		Meter Type 2: 3- ø, 4 wires Static Watt-hour Smart Meter fitted
5.1	Meter Type	in polycarbonate box.
		Meter Type 1/ Type 2 shall be offered as per purchaser's
		requisition/ BOQ.
5.2	Connection	Direct / whole current
5.3	Data d Malta an	240V (phase to neutral) with variation of +30% & -40%.
5.5	Rated Voltage	However meter should withstand the maximum system voltage.
5.4	Rated Current	Ib -20A and Imax- 100 A
5.5	Starting current	0.2 % of base current
5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	1.0 (IS13779 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 1)
5.9	Meter constant	Imp/ unit (Bidder to specify meter constant)
		Meter shall be software calibrated at factory and modification in
5.10	Calibration	calibration shall not be possible at site by any means or external
		influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test
J.11		at 8 KV
5.12	Influence of supply	As per clause 5.5.2 of IS 15884



	voltage	
5.13	Short time over current	As per clause no. 5.5.3 of IS 15884
5.14	Immunity to phase and earth fault	As per clause no. 9.6 of IS 13779
5.15	Influence of Self Heating	As per IS 5.5.4 of IS 15884
5.16	Influence of Heating	As per IS 5.5.5 of IS 15884
5.17	Electromagnetic compatibility	 a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of clause no. 5.5 and 5.5 of IS 15884
5.18	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 13779/IEC62053-21/ CBIP325 (most stringent standard to be followed) under and after influence of following:- a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit. k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% o. Alternating (AC) "abnormal' magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference



s. DC immunity test
Note: BRPL reserves the right to formulate any other test method
to check magnetic immunity/ logging of meter. Meter with logging provision will be preferred.

6. Construction Feature

SN	Item	Description
6.1	General	Construction of meters shall confirm to the IS 16444 (Part 1)
6.2	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.3	Top Cover	 a. Material: Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level. b. Top cover and base should be Ultrasonically/Chemically welded.
6.4	Terminal Block	 a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.5	Terminal cover	 a. Material - UV stabilized transparent/Opaque polycarbonate cover b. Provision of sealing at two points through sealing screw. c. The sealing screws shall be held captive in the terminal cover. d. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. e. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable. f. Mechanism shall be provided to record an event with occurrence and restoration in case of meter enclosure/terminal cover is opened.



6.6	Terminals	a. Terminals shall be suitable upto 50 Sqmm aluminium cable.b. Two no's flat head screws per terminal shall be
		c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax.
		d. Terminals shall be clearly marked for phase / neutral / outgoing etc.e. Clearances and creep age shall be as per IS 13779.
6.7	Ingress Protection	IP 55 or better, but without suction in the meter.
6.8	Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.9	RTC	 a. The meter shall have internal real time crystal clock to set date and time. b. Drift in time of this clock shall not be more than ±5minutes/ year at a reference temperature of 27°C. c. Meter RTC shall be corrected automatically by the system in synchronization to the network RTC. d. HES will sync RTC at least once a day.
6.9.1	Time keeping	As per IS 15884
6.10	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thioyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter even in case of single wire power condition.
6.11	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.12	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC. b. Battery. c. Non volatile memory. d. Display e. Communication Card Status



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6.13	Load Control Switch	 a. Smart meter shall be equipped with integrated load control switches to control flow of electricity to the load at the instance of connect/ disconnect commands as per functional need of the system. b. Load switch for connect/ disconnect purpose shall be mounted inside the meter with suitable arrangement. c. Load Switches shall be provided for all phases and neutral d. The rating of switches used shall be in line with meter rating. e. All the switches shall operate simultaneously.
	Performance requirement	a. Utilization category of the load switch shall be UC3
6.13.1	for load switching	as per clause no. 5.6.6.2 of IS 15885.
	101 loud Switching	b. All load switches shall operate simultaneously.
6.14	Optical port	Meter shall have an optical port with a metal ring to hold magnet of probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.
6.15	Communication Module Interface	 a. Meter should have the provision for 01 no's plug in communication module for connectivity. The same interface shall be compatible with both Cellular and RF communication technologies interchangeable in field. b. Interface shall support data transfer between meter and network interface card over UART/ RS232. Bidder shall explain its pin out and standard in detail. c. Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. d. Meter Vendor shall work with BRPL designated RF provider to integrate their module in the meter as per integration requirement mentioned in annexure 'C'. e. Preferred location of communication card module shall be on top of meter.
6.15.1	Communication modules	a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card (NIC) for connectivity of meter to HES from following options as per tender requirement: i. Communication Module/ NIC Type 1: RF based suitable for communication Network of BRPL designated RF canopy provider. ii. Communication Module/ NIC Type 2: RF and Cellular communication module (LTE 4G



		with 3G and 2G fall back as per Indian telecom Standards). b. Meter shall have separate indications on display/ for remote and local communication. c. Communication module shall held in a casing which can be directly plugged in the meter. Sealing screw shall be provided.
6.16	Last Gasp	Meter shall have provisions to provides last gasp signals through communication module in case of power failure. Bidder should explain in detail the provisions provided in meter to achieve the requirement.
6.17	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken from purchaser for location of seals.
6.17.1	Manufacturer's Seals	 a. One Polycarbonate seal to be provided on meter cover. b. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.17.2	BRPL Seals	 a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided on top cover. c. Seals will be issued to manufacturer free of cost. d. 02 no's polycarbonate seals shall be provided for communication module.
6.17.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.18	Name Plate and marking	 a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 1) & clause no. 9.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.19	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 13779.



6.20	Meter Box	As per Annexure 'E' if required in purchaser's requisition.
		Meter shall be factory fitted in meter enclosure by
		unidirectional screws.
	Guarantee	a. 7.5 years from the date of dispatch or 7 year from
		date of commissioning, whichever is earlier
		b. Manufacturer shall undertake a guarantee to replace
6.21		meter up to a period of 7 Year from the date of
6.21		supply. The meters which are found
		defective/inoperative within the guarantee period,
		these defective/inoperative meters shall be replaced
		as per meter service level agreement.

7. Functional Requirement

SN	Item	Description
7.1	Meter category	Smart meter shall comply D2 category of IS 15959 (Part 2).
	Mode of metering	It should be possible to configure meters in following modes of metering: a. Forwarded Only: In this mode any export active
7.2		energy shall be treated as import energy and shall be recorded in forward only register. Apparent energy calculation in this mode shall be as per clause no. 6.5. b. Bidirectional: Both Import and export energy recording shall be applicable in this mode of metering and relevant registers shall be updated. Any change in metering mode shall be logged in events with date and time stamp. Default mode of metering shall be forwarded only untill
7.3	Payment Mode	specified in tender requirement otherwise. It should be possible to configure meter in following modes of payment: a. Post payment mode b. Prepayment Mode Any change in payment mode shall be logged in events with date and time stamp. Prepayment facility shall be achieved by server / HES. Default mode of metering shall be post payment untill specified in tender requirement otherwise.
7.4	KVAH Calculation	Lag only: KVAh is computed based on KVArh and KWH value. If PF=1, or leading, then KVAh = KWH.



		At no instance KVAh < KWh.
7.5	MD calculation	Block / sliding window with default demand integration period of 1800 s configurable to 900 s as per requirement. Meter should be configurable for block/ sliding window at the time of manufacturing. This change should not be possible in the field. Extended register shall be used for MD recording.
7.6	TOU Metering	 a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. TOU metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 c. Special Day table shall be defined as per DLMS UA-1000-1 d. Default TOU programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BRPL for the same. e. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak
7.7	Instantaneous Parameters	All the parameters mentioned in table 'A1' of IS 15959 along with following additional parameters shall be supported by meter. a. RF/ GSM signal Strength in milli db. b. % TDH in R phase Voltage c. % THD in Y Phase Voltage d. % THD in B Phase Voltage e. % THD in R phase Current f. % THD in Y Phase Current g. % THD in B Phase Current h. Displacement PF i. GPS Coordinates j. Temperature Method of Harmonic Measurement shall confirm to the IEEE 519 2015.
7.7.1	Association Rights	As per Clause 11.1.1 of IS 15959 (Part 2).



7.8	Billing data	 a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as per provisions provided in clause no. 14 of IS 15959 (Part 2). b. 6 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective
		access. c. All the parameters mentioned in table 'A4' of IS 15959 (Part 2) shall be supported by meter.
7.8.1	Association Rights	As per clause 14 of IS 15959 (Part 2).
7.8.2	Selective access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.8.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.8.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).
7.9	Load survey Data	 a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table 'A15' of IS 15959 (Part 2) along with following additional parameters shall be supported by meter: % THD in R phase Voltage % THD in Y Phase Voltage % THD in B Phase Voltage % THD in R phase Current % THD in Y Phase Current % THD in B Phase Current
7.9.1	Association Rights	As per clause 18 of IS 15959 (Part 2)
7.9.2	Profile capture period	Default 1800 s programmable to 900 s.
7.9.3	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).



		Daily load profile parameters shall be measured and
7.10	Daily load profile	recorded at each midnight i.e. 00:00 hrs for last 35 Power On days. All the parameters mentioned in table 'A16' of IS 15959 (Part 2) shall be supported by meter as Daily load profile parameters.
7.10.1	Association rights	As per clause no 19 of IS 15959 (Part 2).
7.11	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 16 of IS 15959 (Part 2).
7.11.1	Name Plate Detail	As per Table 'A26' of IS 15959 (Part 2) with following additional parameters. a. Month of manufacturing.
7.11.2	Association rights	As per clause 22.1 of IS 15959 (Part 2).
7.11.2	Programmable parameters	These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. Programming of any of the parameters shall increment the 'Cumulative programmable count' value. All the parameters mentioned in table Table 'A27' of IS 15959 (Part 2) shall be supported by meters with following additional parameters. a. Time trigger value for stamp event.
7.11.2.1	Association rights	As per clause 22.2 of IS 15959 (part 2)
7.11.3	Push Services	 a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 2). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e instantaneous, billing, load survey, daily energy and events. Bidder



		should explain its capability to configure push
		services. However following push services shall
		be available by default.
		i. Load survey profile data at after every 4
		hours configurable to any predefined
		interval.
		ii. Mid night data at 00:00 hrs of every day.
		iii. Billing profile data on occurrence of
		billing.
		oming.
		a. Meter shall be able to push instantaneous
		parameters to HES at predefined intervals.
		Parameters required for push shall be intimated
	Periodic push (Smart meter to	during detailed engineering in the vent of order.
7.11.3.1	HES)	b. Other attributes as per IS 15959 (Part 2) i.e.
	11123)	Send Destination, Communication window,
		Randomization time interval, number of retries
		and repeat delay shall be decided in the event of
		manufacturing.
		a. Meter is able to report HES, the status change of
		any of the identified events mapped in to event
		status word (ESW) of size 128 bits by pushing
		following objects to HES.
	Event Push (Smart meter to HES)	i. Device ID
		ii. Push Setup ID
		iii. Real time clock- Date and Time
		iv. Event Status Word 1 (ESW 1).
		b. Each of the bits in ESW shall reflect the current
7.11.3.2		state of the event and are mapped against each
		of the identified events.
		c. An event status word filter (ESWF) of 128 bit
		shall also be provided to configure events for
		event push. Events which are supported in meter
		shall only be configured for event push. Bit
		value 1 in ESWF shall indicate that the event is
		supported and value 0 indicates that event is not
		supported for event push. Position of the event
		bit in ESWF shall be same as in ESW.
7.11.3.3	Event status Bit mapping	As Per IS 15959 (Part 2)



		a. Smart meter shall support remote firmware
		a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss
		of any data and metrology for a part or complete firmware of meter.
		b. Firmware upgrade shall use the Image transfer
		classes and mechanisms specified in IEC62056-
		6-2 and IEC62056-5-3.
		c. Broad cast facility shall be supported in HES for
		simultaneously upgrading the firmware of a
		group of meters installed in field.
7.12	Firmware upgrade	d. Firmware upgrade feature shall be provided
7.12	i iiiiiware apgrade	with proper security. The design shall take into
		account field scenarios such as power failure
		during F/W upgrade.
		e. Once the firmware is upgraded, meter shall send
		an acknowledgment to HES. It shall also log it
		as an event in its memory.
		f. Meter shall support capability to self register the
		meter with new firmware.
		g. The execution time of the change of the
		firmware within the meter should be below 1
		minute
	Support for broadcast message	Meter shall support connection less messaging services
		of DLMS to support broadcast messages for a group of
		meters for following actions:
7.13		a. Gap reconciliations.
7.13		b. Firmware upgrade.
		c. On demand readings.
		d. Meter connection and disconnection.
		e. Updating of Programmable parameters.
		a. The Smart meter shall support disconnection (all
		the switches shall operate simultaneous) on the
		following conditions as per clause 11 of IS
		16444 (Part 1):
		i. Over current (105 % of Imax in any
7.14	Disconnection machanisms	element for predefined persistence time.)
	Disconnection mechanism	ii. Load control limit (Programmable)
		iii. Pre-programmed tamper conditions
		(Factory programmed)
		iv. Disconnection signal from Head end
		system.
		v. Pre paid function for prepayment mode.



		b. Meter shall use the disconnection control object
		as defined in clause 10 of IS 15959 (Part 2).
		c. Load limit function shall be disabled by default
		until other specified.
		a. Meter shall be able to reconnect load switches locally only for Overload and load control limit disconnections.
		b. The meter will try to reconnect the load up to
		predefined time, with predefined interval (Time and interval is programmable).
		c. If the consumption is still more than the
		programmed limits, it will lock out and wait for 30 minutes.
		d. If the consumption is still above the limit, the
	Local reconnection	procedure defined above in 1 and 2 shall be repeated.
7.15	mechanism	e. It shall be possible to remotely
		connect/disconnect the relay via commands
		from HES. The remote reconnect shall not
		interrupt the normal connect/disconnect cycle.
		f. In case of relay malfunction i.e.,
		connect/disconnect action of relay is not taking
		place due to welding of contacts or any other
		reason, then it shall be logged as an event in the Non-rollover compartment. Same shall be sent
		as an alert to HES.
		g. Remote command shall have priority over local
		communication.
		a. Reconnection shall be done from HES except
		for over current and load control limit. In case
		of failure of communication / HES,
7.16	Reconnection mechanism	reconnection shall be possible through Hand
		Held Device (CMRI) locally via proper security.
		b. Reconnection in case of prepayment meter shall
7.17		be as per prepayment profile. Indication of status of relay i.e. connected/
		disconnected should be available on display as well as
	Status of load switch	through communication to HES.
		Connection and disconnection should be logged as
		events.



7.18	First breath and last gasp	 a. Indication of status of relay i.e. connected/disconnected should be available on display as well as through communication to HES. b. Connection and disconnection should be logged as events.
7.19	Security	Advanced security outlined in clause 7.1.2 of IS 15959 (Part 1) shall be provided.
7.19.1	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)
7.19.2	Encryption/ Authentication for data transport	As per clause 7.2 of IS 15959 (Part 2)
7.19.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)
7.19.4	NIC Security	 a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator.
7.20	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959.
7.20	Consumer display unit (Optional)	Provision of consumer interface unit (CIU) to access meter from consumer premises. Wireless IHD powered by battery.
7.21	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.



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7.21.1	Association Rights	Each event shall be available to download as per following association rights. a. Public Client: No access b. Meter Reader: Read only c. utility Settings: Read only d. Push Services: Read Only for identified events as per ESWF
7.21.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events e. Non Roll Over Events f. Transaction related events g. Control Events Occurrence and Restoration of Voltage Related, current related, power related and other events shall be logged in meter memory as per IS 15959 (Part 2). Please refer annexure 'A' for description of events, Event ID, Logics of events and threshold values of events. Threshold values shall be factory programmable. Selective access shall be provided as per clause 11.3 of IS 15959 (Part 1). For each of the events a certain list of parameters shall be captured as per clause 'a' For each occurrence event captured, the cumulative tamper count shall be incremented. Only Real clock (date and time) and event code shall be captured events in compartments mentioned at sl no. 'd', 'f', 'g', 'h'.
7.21.3	Parameter Snapshot	Following parameters mentioned above are to be captured when event occurrence and restoration is logged as per IS 15959 (Part 2). a. Date and time of event b. Event code c. R Phase Current d. Y Phase Current e. Y Phase Current f. Neutral Current g. R Phase Voltage h. Y Phase Voltage



		i. B Phase Voltagej. Three Phase Power factork. Cumulative energy- kWh
7.21.4	Event Logging	The meter shall log minimum 100 tamper events (ensuring at least 20 events for each tamper).
7.21.5	Tamper Indication	Appropriate Indications/Icons for all tampers should appear on the meter display either continuously or in auto display mode.
7.22	Phasor Representation	Meter shall support parameters required to develop phasors of current and voltage at HES.

8. Meter Display

SN	Item	Description
8.1	LCD Type	STN Liquid crystal with backlit
8.2	Viewing angle	a. Minimum 120 Degree.b. The display visibility should be sufficient to read the Meter mounted at height of 0.5 m as well as at the height of 2 m.
8.3	Size of LCD	Minimum 10X5mm
8.4	LCD Digits	Total 6+1 digits
8.5	LCD language	English
8.6	Display modes	 a. Auto Mode b. Manual Mode c. Sub active mode Display list shall be finalized during detailed engineering in the event of order.
8.7	Display indications	Appropriate indications/flags for all tampers and self diagnostic features should be provided.

9. Data and Communication Protocol/ HES/ Integration/ Software

SN	Item	Description
9.1	Data Exchange protocol	 a. Meter should comply Indian companion of data exchange and tariff control specification IS 15959 (Part 2). b. In case of additional requirement from IS 15959 (part 2), they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/ services/ methods used in meters from IS 15959 (part 2)



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		and its reference to DLMS books/ IEC.
		d. Prior to manufacturing of meters bidder shall provide a
		detailed specification explaining all parameters/ services/
		methods used in meter in addition to IS 15959 (Part 2).
		a. Bidder shall work with BRPL IT team/ BRPL designated
		system integrator to integrate its meter with BRPL HES
9.2	Integration with HES	system.
9.2	integration with thes	b. Bidder shall prepare detailed documents as mentioned in
		above clause and submit it for BRPL approval and
		integration with HES.
0.2	Base computer	Licensed Software with the following features should be
9.3	software	supplied for free to download meter through optical port.
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.
		System shall be password protected where user can login only if
0.2.2	G :	login ID is provided by administrator. BCS shall have rights
9.3.2	Security	management system so that access rights can be provided as per
		requirement to maintain security.
0.2.2	D . 1	BCS shall maintain master database according to desired area,
9.3.3	Database	location, and region etc.
		a. BCS shall have option of user defined report generation
		in format of Excel, Word and CSV, XML, PDF etc.
		b. BCS shall have capability to export data in ASCII, CSV
9.3.4	Reporting	and XML format at desired location so that the same
		could be integrated with our billing data for processing.
		c. All the data available in the meter shall be convertible to
		user defined ASCII, CSV and XML file format.
0.2.5	D	BCS and communication ports should support data transfer rate
9.3.5	Data transfer rate	of 9600 bps (minimum).
		a. The manufacturer has to provide software capable of
		downloading all the data stored in meter memory through
		window/ android operating system based handheld units
		(HHU) through optical port.
		b. In the event of order, bidder shall work with BRPL IT
		team/ BRPL designated system integrator to develop
	Hand Held Unit	HHU software for meter downloading and further
9.4	Software	uploading on HES.
	Soloware	c. HHU software should have option for selection of
		parameters to be downloaded from meter.
		d. Meter data consisting of all parameters and complete
		load survey for all parameters shall be read by HHU and
		downloaded on HES in minimum possible time (not
		more than 5 minutes).
		more man 5 minutes).



9.5	Training	Manufacture shall impart training to BRPL personnel for usage
		of software

10. Name Plate

SN	Description		
101	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour.		
10.1	Embossing is not acceptable.		
10.2	Size of the digit shall be minimum 5X3 mm		
10.3	Bar code shall be printed along with serial number		
10.4	BIS registration mark (ISI mark)		
10.5	'BRPL' insignia shall be printed above LCD display.		
10.6	BRPL PO No. & date		
10.7	Manufacturers name and country of origin		
10.8	Model type / number of meter		
10.9	Month and Year of manufacturing		
10.10	Reference voltage / current rating		
10.11	The number of phases and the number of wires for which the meter is suitable.		
10.11	Graphical symbol as per IS 12032 can be used.		
10.12	Meter constant		
10.13	Class index of meter		
10.14	Reference frequency		
10.15	Warranty period		
10.16	Symbol of load switch		
	Name plate of NIC		
10.17	a. Serial no of NIC along/ IMEI no/MAC address with bar code		
	b. Name of purchaser's		
	c. Communication technology with carrier frequency		
	d. Manufacturing year and month.		
	e. Warranty period.		

11. Component Specification

SN	Item	Description	Make
11.1		The Meters should be with the	
11.1	Current Transformers	current transformers as measuring	should withstand for the
		elements.	clauses under 5.18(t)
11.2	Shunt element	Data sheet should be submitted.	Reputed
11.3	Measurement or	The Measurement or computing	Analog Devices, Cyrus
	computing chips	chips used in the Meter should be	Logic, Atmel, Phillips,



		with the Surface mount type along	SAMES ,NEC,TEXAS
11.4	Memory chips	with the ASICs. The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.5	Display modules	 a) The display modules should be well protected from the external UV radiations. b) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). c) It should be STN type industrial grade with extended temperature range min 70 °C. 	Truly semiconductor, Tianma / Haijing Electronics, China, Hitachi,
11.6	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	Everlight, Osram, Agillent, NFC
11.7	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	
11.8	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. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires. LED	National Semiconductors, Atmel, Phillips, Texas Instruments. Hitachi, Compiled, AVX or Ricoh Samsung, EPCOS, Vishay Everlight, Agillent
11.9	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc.	Z. Cingit, rigitoti



		b) The other mechanical components	
		should be protected from rust,	
		corrosion etc. by suitable	
		plating/painting methods.	
11.10	Battery	Lithium with guaranteed life of 15 years	Texcell, SAFT, Varta
11.11	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	Philips, Dallas Atmel, Motorola, Microchip, TEXAS, NEC or Compiled
11.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.13	Load Switch	Utilization Category UC2/ UC3 Latching relay Can withstand 120% of Vref and 120% of Imax current. As per IS 15884	Gruner/ KG/ any other reputed make subject to BRPL approval.
11.14	Note	 a. The components used by manufacturer shall have "Minimum Life" more than the 10 years. b. Incase vendor want to use other make components; same shall be approved by BRPL before use. c. Even for existing supplier – fresh approval is needed for all deviations. d. Manufacturer should have complete tracking of material used in meter. BRPL reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work. 	

12. Quality Assurance, Inspection and Testing

SN	Item	Description
12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be



12.3 Inspection Points a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 1) shall be carried out on sample selected from BRPL lot. 12.5 Routine tests All test marked "R" as per table 20 of IS 13779. a. All tests marked "A" as per table 20 of IS 13779. b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16445. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test			taken for the same.
specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 1) shall be carried out on sample selected from BRPL lot. 12.5 Routine tests All test marked "R" as per table 20 of IS 13779. b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16445. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. 1) Dimensional and drawing verification. 1) Display parameters/ sequence. 111) Data Downloading from CMR1 and PC. 11V) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test	12.3	_	To be mutually identified, agreed and approved in Quality Plan.
a. All tests marked "A" as per table 20 of IS 13779. b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16445. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. l) Dimensional and drawing verification. li) Display parameters/ sequence. lii) Data Downloading from CMRI and PC. lV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test	12.4	Type Tests	 specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 1) shall be carried
b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16445. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test	12.5	Routine tests	All test marked "R" as per table 20 of IS 13779.
	12.6		 b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16445. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter.
ESD and Magnetic ESD and magnetic interference test will be conducted at Samir lab, Chennai or CPRI.	12.7	_	_
Interference test lab, Chennai or CPRI. 12.8 Inspection a. Purchaser reserves the right to inspect /witness all tests on	12.8		



the meters at Seller's works at any time, prior to dispatch, to
verify compliance with the specification/ standards.
b. Manufacturer should have all the facilities/ equipments to
conduct all the acceptance tests as per clause 15.3 relevant
standards and tampers logics as per approved GTP. All the
equipments including tamper logs kits/ jigs should be
calibrated.
c. In-process and / or final inspection call intimation shall be
given in advance to purchaser.

13. Packing, Marking, Shipping, Handling and Storage

SN	Item	Description
		a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives.
		b. Up to 4 to 5 three-phase meters must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives.
		c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm.
		d. Maximum weight of a group meter box shall not be more than 25 Kg.
13.1	Packing	e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be affected by these disturbances.
		f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3.



		 g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BRPL in the event of order. h. An impact detector ("Shock-Watch") label shall be attached to the cardboard hood of several pallets in each container/ transport truck, to warn of possible rough handling during shipment, transport and storage.
13.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required both on front (wide side) and top: a. BRPL logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type, rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions
13.4	Test reports	Routine test report to be provided with each meter
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

14. Deviations

		a. Deviations from this specification can be acceptable, only
		where the Seller has listed in his quotation the requirements
14.1	Deviations	he cannot, or does not, wish to comply with and which
		deviations the Buyer has agreed to in writing, before any
		order is placed.



b. In the absence of any list of deviations from the Seller, it
will be assumed by the Buyer that the Seller complies with
the Specification fully.

15. Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre
SL	Detail of Document	Diu	Approvar	Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
		4 no's (2	2 no's (01	
	Samples of each type and rating offered along with box and RF NIC/ communication module of already integrated RF card as per tender qualifying criteria.	nos with	no with	
7		box and	box and	
,		2 nos	01 no	
		without	without	
		box)	box)	
8	Any software and accessories required for	Required	Required	
	installation/ operation of meter	required	required	
9	Manufacturer's quality assurance plan and	Required		
	certification for quality standards			
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
	Specification documents containing all parameters,			
15	Services, Methods in addition to companion		Required	
	specification of IS 15959 (part 2).			
16	Program for production and testing (A)		Required	Required
17	Makes of components		Required	Required
18	Detailed installation and commissioning		Required	Required



	instructions		
19	As Built Drawing	Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals	Required	Required
21	Inspection and test reports, carried out in manufacturer's works		Required
22	Routine Test certificates		Required
23	Test certificates of all bought out items		Required
24	Meter Seal data		Required
25	Mapping of meter serial no to Communication card.		Required

16. Delivery

16.1	Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser
		written Material Despatch Clearance (MDC) from the Purchaser.



Annexure – A: Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification. Bidder shall not change the format of GTP or clause description.

Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	



Annexure – B: Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	
3			



Annexure – C: Integration Requirement of Meters with NIC and HES

Integration requirements with communication provider of BRPL/ any other agency designated by BRPL for other components of AMI.

- a. Bidder(s) must share the meter security keys, all level encryption, and password information along with asset information in a format with the buyer / communication provider of BRPL so that during AMI business flow, the device and data can be authenticated all the time.
- b. Bidder(s) must share the details of meter communication specifically programmed protocols.
- c. Bidder(s) must share the meter configuration source code to the BRPL/ communication provider of BRPL.
- d. Bidder (s) must share the meter interface touch points for external applications/ systems.
- e. Bidder(s) must share the required APIs including but not limited to reading APIs, configuration APIs and Functional APIs with the System Integrator for execution of business flow (Installation, reading, configuration).
- f. Bidder(s) must share the data storage and retrieval details.
- g. Bidder(s) must configure the devices to be upgraded remotely (OTA) and share the required firmware source code (with updates over the project life) with system integrator as and when it is required in case of feature request or fault correction.
- h. Bidder(s) must follow and conduct Utility's sample and periodic test program, including (but not limited to) the selection of a sample population of meters, sharing of sample test results as reported by the meter testing systems with the system Integrator.
- i. Bidder(s) must share the information related to communication module for the authorization purpose at to BRPL/ communication provider of BRPL.

Annexure – D: Tamper and Fraud Detection Events

1. Voltage Related Events:			
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
R Phase Voltage Missing (Occurrence/ Restoration) Y Phase Voltage Missing (Occurrence/ Restoration) B Phase Voltage Missing (Occurrence/ Restoration)	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end	Occurrence: If Vpn<10% Vref and Ip>10% Ib Restoration: If Vpn>=10% Vref and Ip>10% Ib	Occurrence: 5 Min Restoration: 5 Min
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value.	Occurrence: If Vpn>10% Vref Restoration: If Vpn<=10% Vref	Occurrence: 5 Min Restoration: 5 Min
Low Voltage (occurrence/ Restoration)	Meter should log low voltage event if voltage in any phase is below a thershold value. Thershold value if factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min
Voltage Unbalance (Occurrence/ Restoration)	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a thershold value. Thershold value if factory programmable.	Occurrence: If Vmax- Vmin>30% Vref Occurrence: If Vmax- Vmin<=30% Vref	Occurrence: 5 Min Restoration: 5 Min
R Phase voltage Harmonics	Meter should log occurrence of high voltage	Occurrence: If % THD in	
Y Phase Voltage Harmonics B Phase Voltage	harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value	I_P >5% of fundamental. Restoration: If % THD in I_P <5% of fundamental.	Occurrence: 5 Min Restoration: 5 Min
Harmonics	should be factory		
2. Current Relat	ed Events:		
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time



Cumont Downs / D	I	I	
Current Reverse/ R	Meter should log the event		
Phase Current	of reversal of C.C polarity.		
Reverse (occurrence/	Meter should register	0	
Restoration)	energy consumed correctly with any one, two or all three current coils reversed.	Occurrence: If Ip = -ve direction	Occurrence: 5 Min Restoration: 5 Min
Y Phase Current			
Reverse (occurrence/		Restoration: If Ip=+ve	
Restoration)	This event shal not be valid	direction	
B Phase Current	in bidirectional mode of		
Reverse (occurrence/	metering.		
Restoration)			
R Phase Current			
Open (Occurrence/		Vector	
Restoration)	Meter should log the event	$Sum(I_R+I_Y+I_B+I_N)>20\%$	
Y Phase Current	of current coil open.	<i>Ib and I<10% Ib</i>	Occurrence: 5 Min
Open (Occurrence/	Threshold value of current	Vector	Restoration: 5 Min
Restoration)	should be programmable at	$Sum(I_R+I_Y+I_B+I_N)>20\%$	
B Phase Current	factory end.	Ib	
Open (Occurrence/			
Restoration)			
Current Unbalance			
(Occurrence/			
Restoration)			
Current Bypass (Occurrence/ Restoration	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.	Vector $Sum(I_R+I_Y+I_B+I_N)>20\%$ $Ib \ and \ I \ (any \ Phase)>5\%$ Ib Vector $Sum(I_R+I_Y+I_B+I_N)>10\%$ Ib	
Over current (occurrence/ restoration)	If the current in any phase exceeds the specified threshold current, meter should log over current event.	Occurrence: If Ip>Imax Restoration: If Ip<=Imax	Occurrence: 5 Min Restoration: 5 Min
R Phase high Current	Meter should log		
Harmonics	occurrence of high current	Occurrence: If % THD in	
R Phase high Current	harmonic event when %	$I_P > 5\%$ of fundamental.	Occurrence: 5 Min
Harmonics	THD in current of phase	Restoration: If % THD in	Restoration: 5 Min
R Phase high Current Harmonics	will be more than threshold value. Threshold value should be factory	Restoration. If $\%$ THD in $I_P < 5\%$ of fundamental.	Restoration. 3 Will
3. Power Related Events:			



Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.		
Abnormal Power Off (Occurrence/ restoration)	If meter micro detect power off whereas phase voltage is present than abnormal power will be recorded. Meter sall continue to record energy as per phase voltage and current.	Occurrence: If voltage at meter power supply<10% vref and Vp>20% vref. Restoration:	NA
4. Other Events: Description of		Logic Expression/	
event	Logic Of Event	Threshold values	Persistence Time
Abnormal External Magnetic Influence (Occurrence/ Restoration)	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS13779/ CBIP 325 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.	As per IS 13779/ CBIP 325	As per IS 13779
Neutral Disturbance- HF, DC and Alternating	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral	As per manufacturing standard.	Bidder shall define threshold values



(occurrence/	circuit.		
restoration)			
Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found between 0.2 to 0.5 for a load above than a % thershold value for a thershould time value. Event shall restore if PF factor of load remain out of range 0.2 to 0.5 for a load ablove than % thershould value for		
Plug in	Meter should log the		
Communication	removal of communication		
module removal	card. Meter should also log		
(Occurrence/	insertion of communication		
Restoration)	card.	By NC switch/ sensor	
Configuration			
change to post-paid	Meter should log the change		
mode/ pre-paid	in payment mode		
mode	configuration.		
Configuration			
change to			
"Forwarded" only"	Meter should log the change		
mode/ "Import and	in metering mode		
Export" mode	configuration.		
Overload			
(Occurrence/	Meter should able to log the		
Restoration)	status of overload in KW		
	Meter with communication		
HV Spark	card should be immune or		
(Occurrence/	log the event in the case of	Immediately	NA
restoration)/ Jammer	application of ESD upto and including 35 KV.		
High neutral Current	Meter should log event of high neutral current if measured neutral current should be more than predefined threshold value.	Occurrence: If $I_N > 50\%$ of average phase current Restoration: If $I_N < 50\%$ of average phase current	Occurrence: 5 Min Restoration: 5 Min
Distorted PF	Meter shall log the event if		Occurrence: 5 Min



	1		1
	difference between		Restoration: 5 Min
	displacement PF and actual		
	PF is more than a		
	predefined value		
	Meter shall log voltage,		
Time Based Event	current, PF and energy	As man mundafined time	NA
Stamp	consumption on a	As per predefined time	INA
	predefined time		
5. Non Roll over	events:		
Event Description			
Occurrence of cover o	pen		
6. Transaction F	Related Events:		
Detail of Transaction	1		
Real Time Clock- Dat	e and Time		
Demand Integration P	eriod		
Profile Capture Period	1		
Single Action schedul			
Activity calander for t			
New firmware activate	ed		
Load Limit (Kw) Set			
Enable Load Limit Fu	nction		
Disable load limit fund	ction		
LLS secret (MR) chan	ige		
HLS key (US) change			
HLS key (FW) change	2		
Global key change			
ESWF change			
MD reset			
7. Control Even	ts		
Event Description			
Load Switch Status- D	Disconnected		
Load Switch Status- C	Connected		

Note:

- 1. Event ID's shall be defined as per BRPL specification/ IS 155959 (part 2). Approval shall be taken from BRPL prior to manufacturing for Event ID's
- 2. Programming of threshold values should be possible from remote via proper authentications.
- 3. Logics of tampers can be changed/ upgraded via firmware up gradation from remote via proper authentication.
- 4. All the programming changes/ firmware up gradations shall be logged along-with date and time stamp in meter as well as on HES.

Annexure – E: Meter Enclosure

SL	Clause	Clause Description	
		Flush type with Completely transparent top cover and base with	
1.0	Meter Box Type	Incoming and Outgoing cable entry and data downloading	
		arrangement.	
2.0	Design	Meter box shall comply following requirement.	
		The meter box shall be designed in such a way that no access to the	
2.1	General	meter body, terminals and hardwired port of the meter shall be	
2.1	Requirement	possible after installation and sealing of the box without breaking	
		the box itself.	
		a. Meter box shall be theft proof i.e. meter box cannot be	
2.2	Theft Protection	opened without breaking the seals or meter itself.	
2.2	Then Tolection	b. On breaking of the box, clear evidence of the physical	
		tempering shall be visual.	
		a. The meter box shall be designed in 02 parts i.e. base and top	
		cover.	
		b. Meter shall be mounted inside the base on fixed moulded	
		pillars by unidirectional screw.	
2.3	Parts of the box	c. Meter top cover should be hinge type.	
2.3	Tarts of the box	d. Cable glands and earthing bolt shall be provided at the base	
		as per construction requirement.	
		e. Proper stiffeners shall be provided in the body of the base	
		and top cover to provide mechanical strength against	
		transportation and installation vibrations.	
2.4	Ingress protection	The meter box shall be completely dust and vermin proof. Ingress	
2.4	ingress protection	protection rating of the box shall be minimum IP55.	
		a. A 'U' shaped groove shall be provided in the collar of the	
		base body, in which UV stabilized rubber 'O' shall be	
		installed. The design of lining shall be such that it provides	
	Collar of base and	proper sealing between the cover & base of box to avoid	
2.5	cover	penetration of dust and ingress of water.	
	COVCI	b. All around projection provided inside the cover periphery	
		which keeps the 'O' ring pressed.	
		c. An outside collar shall also be provided, which shall cover	
		outer surface of the collar.	
		a. Rubber 'O' Ring should be fixed with suitable adhesive so	
		that the same does not get removed.	
2.6	Fixing of 'O' ring	b. Rubber 'O' ring shall be fixed in a single piece without any	
		gap between open ends. Open end of the 'O' ring shall be	
		provided at the bottom side only.	
3.0	Material	The material shall be as follow:	



SL	Clause	Clause Description	
3.1	Box material	 a. The material of meter box shall be flame retardant with inflammability level V0 having good dielectric and mechanical strength. b. The top Cover and Base of the box shall be made out of transparent polycarbonate with minimum 90% visibility so as to ease installation and monitoring of box against any tampering. The material shall be 'UV' stabilized to ensure that the moulded meter box should not change in colour, shape, size or should not get brittle after exposure to UV rays. 	
3.2	Hardware	All the metal hardware including hinges, U latches, mounting screws, downloading port ring etc shall be of rust proof stainless steel.	
3.3	Cable glands	Polyamide Nylon-66 with flammability class FV0	
4.0	Construction	 a. Meter box shall be constructed by moulding of polycarbonate material as specified in clause no. 3.1 b. Thickness of meter box shall be minimum 2.0 mm. 	
4.1	Moulding	The box shall be made through Injection Moulding or better method.	
4.2	Base	Meter shall be factory fitted inside base body using unidirectional screws, on fixed mounting pillars, moulded in to the base of sufficient strength, so that removing of meter shall not possible without breaking the meter box or meter itself.	
4.3	Top cover	Hinge type	
4.3.1	Hinge type	 a. Minimum 02 no's concealed / internal hinges, not visible or accessible from outside the box without breaking the box itself. b. Minimum 02 no's U latches shall be provided to closed the box with sealing arrangement at each U latch. c. After closing the U latches no play/ gap shall exist between base and top cover. 	
5.0	Padlocking	The box shall also have padlocking facility.	
6.0	Cable entry	 a. 02 no's as incoming and outgoing at the 45 Deg Chamfer bottom corners suitable for 4CX50 Sqmm armoured aluminum cable. b. Cable entry must be at the bottom diagonal ends of the meter box. Appropriate clearance shall be provided between the cable entry and position of meter terminals for proper cable bending and connection. c. Minimum 60 mm vertical space shall be provided from the terminals of meter to centre of cable gland to provide 	



SL	Clause	Clause Description	
		sufficient bending radius and working space.	
6.1	Cable Gland	 a. Two nos. of Elbow shaped glands made out of Polyamide Nylon-66 suitable for 4CX25 / 2CX50 sqmm aluminium armoured cable shall be provided on both cable entries in the box. b. Glands shall be designed in such a manner that the same cannot be unscrewed / removed from the box from outside. Manufacturer may either supply two nos. of check nuts or any other alternate design to meet this requirement. 	
7.0	Earthing bolt	 a. Earthing bolt of M6 with nut and washer shall be provided on left side of the body of meter box. b. The arrangement shall be such that one earth point shall be available for customer and external earthing provided by BRPL can be terminated. c. Necessary symbol shall be provided for earth terminal. 	
8.0	Mounting	Mounting arrangement shall be as follow	
8.1	Meter mounting pillars	a. Fixed type, moulded in to the base body as per the requirement of meter mounting holes.b. Stiffeners shall be provided at the base of the mater mounting pillars.	
8.2	Meter box mounting	 a. Four (4) nos. fixing holes of 6 to 6.5 mm diameter at the back surface of box shall be provided to fix the same on flat wall. b. Mounting holes shall not be obstructing by Incoming or Outgoing cables. 	
8.3	Box Mounting spacers	04 no's, 25 mm minimum mounting spacer moulded at the mounting holes of back surface of the meter box in order to provide space between meter back surface and wall.	
8.4	Box Mounting accessories	Long pan head self taping SS screws and washers shall be provided by the supplier with every box. 4 no's plastic fixing plugs suitable for self tapping screws shall also be provided.	
9.0	Data Downloading arrangement	 a. Option 1: a. Slot for optical head with non removable corrosion ferromagnetic metal ring. b. Data downloading shall not be affected by scratches on data downloading port or with ageing of box. c. Data downloading shall not be affected by visible light conditions. b. Option 2: a. DB9 RS232 connector shall be provided at the top cover of box to download meter as specified in 	



SL	Clause	Clause Description
		clause no. 9.1
		b. Meter shall be downloadable without opening of the
		box/ breaking of seals.
		c. This arrangement shall not de-rate the IP rating of meter box.
		d. A Top hinges and bottom sealable cover shall be
		provided on the data downloading slot.
		e. Data downloading shall not be affected by visible
		light conditions.
		Optical reader with 9 pin D-type female connector cable shall be
	Optical to RS232	provided in each meter box. Push fit type protective cover with
9.1	cable (If option 2 as per clause no. 9.0	sealing arrangement for data downloading port on the cover of the
9.1		meter box has to be provided. The optical meter reader with 9 pin
		D-type female connector cable of all the meter boxes (100%) shall
		be tested for meter downloading before dispatch.
		Following marking shall be provided on both top cover and base by
		fine quality indelible laser printing/ screen printing or embossed
		from inside of the box.
10.0		a. BRPL insignia shall be embossed on the base & cover of
	Marking	meter box.
	Marking	b. Meter serial no. (Both on base and cover of meter box)
		c. Purchaser's PO no. and date.
		d. Purchaser's Name.
		e. Name or trade mark of seller
		f. Any other detail required at the time of approval.

Technical Specification for LT-CT Smart Meter

Document number: BR/18-19/SM/LTCT/01 June 2018

Prepared By	Reviewed by	Approved By
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Std. Appler Auser 5.6.18	200 /2/00/	81/40/20
Md. Akhtar Ansari	Rishi Goyal	Sheshadri Krishnapura



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Record of Revision

Item/Clause No.	Change in Specification	Reason of Change	Approved By	Rev



1. Scope of Supply

This specification covers the following for Three Phase 240 V, 5A-10A AC Static transformer operated Watt hour and Var Hour smart meters of accuracy class 0.5s with plug in communication module (RF mesh only and RF + Cellular technology).

- A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
- **B.** Any accessories / hardware required for installation and operation for the meter.

2. Codes and Standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

2.5 IS- 14697 2.6 IS-15959 (Part 1) Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification 2.7 IS-15959 (Part 2) Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2) - Companion Specification for smart meter 2.8 IS-15959 (Part 2) Data Exchange For Electricity Meter Reading, Tariff And Load Control-Companion Specification Part 3 Smart Meter (Transformer Operated Kwh And KVARh Class 0.2 S, 0.5 S And 1.0 S 2.9 IS- 11448 Application guide for AC Electricity meters 2.10 IEC- 62052-11 Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment 2.11 IEC- 62053-21 Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)	confo	conform to the latest edition/ of following		
Number			Title	
Electricity Act Electricity Act Electricity Act	No.			
2.2 CEA Metering Regulations 2.3 CBIP Manual (Pub no325) IS- 16444 (Part 2) 2.4 IS- 16444 (Part 2) IS- 14697 2.5 IS- 14697 2.6 IS-15959 (Part 1) 2.7 IS-15959 (Part 2) 2.8 IS-15959 (Part 2) 2.8 IS-15959 (Part 2) 2.9 IS-1448 Application Specification Part 3 Smart Meter (Transformer Operated Kwh And KVARh Class 0.2 S, 0.5 S And 1.0 S 2.9 IS-11448 Application guide for AC Electricity meters Electricity metering equipment (AC) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2) Electricity metering equipment (AC) - Particular requirements - Part 52: Static meters for active energy (classes 1 and 2)	2.1		IE Act 2003	
2.3 Regulations CBIP Manual (Pub no325) IS- 16444 (Part 2) IS- 16444 (Part 2) IS- 16497 2.6 IS-15959 (Part 1) IS-15959 (Part 2) IS-15959				
2.3 CBIP Manual (Pub no325) Standardization of AC Static Electrical Energy Meters 2.4 IS- 16444 (Part 2) IS- 16444 (Part 2) AC Static Transformer Operated Watt-hour And Var-hour Smart Meters, Class 0.2 S, 0.5 S And 1.0 S Part 2 Specification Transformer Operated Smart Meters 2.5 IS- 14697 2.6 IS-15959 (Part 1) 2.7 IS-15959 (Part 2) IS-15959 (P	2.2		With latest amendments	
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	2 12	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52:	
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2.13 IEC 62053-61 Power consumption and voltage requirements	2.13	1EC 02033-01	Power consumption and voltage requirements	



2.14	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11:	
2.11	120 02030 11	General acceptance inspection methods	
2.15	Electricity metering equipment (AC) - Acceptance inspection - Part 31 Particular requirements for static meters for active energy (classes 0,2 S 0,5 S, 1 and 2)		
2.16	IEC 60736	Testing Equipment for electrical Energy meter	
2.17	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM	
2.18	IEC 62056-1- 0:2014	Smart metering standardisation framework	
2.19	IEC 62056-3- 1:2013	Use of local area networks on twisted pair with carrier signalling	
2.20	IEC 62056-4- 7:2014	DLMS/COSEM transport layer for IP networks	
2.21	IEC 62056-5- 3:2017	DLMS/COSEM application layer	
2.22	IEC 62056-6- 1:2017	Object Identification System (OBIS)	
2.23	IEC 62056-6- 2:2017	COSEM interface classes	
2.24	IEC 62056-6- 9:2016	\perp (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and	
2.25	IEC 62056-7- 3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks	
2.26	IEC 62056-7- 5:2016	Local data transmission profiles for Local Networks (LN)	
2.27	IEC 62056-7- 6:2013	The 3-layer, connection-oriented HDLC based communication profile	
2.28	IEC TS 62056- 8-20:2016	Mesh communication profile for neighbourhood networks	
2.29	IEC TS 62056- 9-1:2016		
2.30	IEC 62056-9- 7:2013	Communication profile for TCP-UDP/IP networks	
2.31	IEC 62056- 21:2002	LDirect local data exchange	
2.32	DLMS- White Book	Glossary of DLMS/COSEM terms	
2.33	DLMS- Blue	COSEM meter object model and the object identification system	



	Book		
2.34	DLMS- Green	Architecture and protocols to transport the model	
2.34	Book	Architecture and protocols to transport the model	
2.35	DLMS- Yellow	Conformance testing process	
2.33	Book	Comormance testing process	
2.36	IEEE 802.15.4 Standard for Local and metropolitan area networks.		
2.37	IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865 MHz	
2.37		to 867 MHz Band in India)	
Order of precedence between different standards shall be as follow:			
i	Indian Standards Issued By BIS		
ii	IEC standard		
Iii	Other standards like CBIP, DLMS etc.		

3. Service Conditions

SN	Item	Description
		Operation range: -10 Deg C to 55 Deg C
3.1	Temperature Range	Limit range of operation: -25 to 60 Deg C
		Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4. Distribution System Data

SN	Item	Description
4.1	Supply	3 Phase AC, 4 wire
4.2	Voltage	415 V ± 6%
4.3	Frequency	50 Hz ± 5%
4.4	System	Solidly Earthed
	Neutral	

5. Electrical and Accuracy Requirement

J.	Electrical and Accuracy Reguliement	
SN	Item	Description
	Meter Type	a. 3- ø, 4 wire static Transformer Operated Smart Meter
5 1		without LTCT box.
5.1		b. 3- ø, 4 wire static Transformer Operated Smart Meter
		with LTCT box as per annexure 'E'
5.2	Connection	Current Transformer Operated
5.3	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%.
		However meter should withstand the maximum system



		voltage.
5.4	Rated Current	Ib -5A and Imax- 10 A
5.5	Starting current	0.1 % of base current
5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	0.5s (IS14697 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 2)
5.9	Meter constant	Meter with lowest power consumption shall be preferred. Imp/ unit (Bidder to specify meter constant)
3.9	Weter constant	Meter shall be software calibrated at factory and
5.10	Calibration	modification in calibration shall not be possible at site by any means or external influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.12	Influence of supply voltage	As per IS 14697
5.13	Short time over current	As per IS 14697
5.14	Immunity to phase and earth fault	As per IS 14697
5.15	Influence of Self Heating	As per IS 14697
5.16	Influence of Heating	As per IS 14697
5.17	Electromagnetic compatibility	 a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of IS 14697



5.18	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 14697/ IEC62053-21/ CBIP325 (most stringent standard to be followed) under and after influence of following:- a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray" magnetic induction of 0.5mT+/-5% o. Alternating (AC) "abnormal" magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference s. DC immunity test Note: BRPL reserves the right to formulate any other test method to check magnetic immunity/ logging of meter. Meter with logging provision will be preferred.
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6. Construction Feature

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SN	Item	Description
6.1	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.2	Top Cover	a. Material: Transparent/Opaque and UV stabilized
		polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
		b. Top cover and base should be Ultrasonically/Chemically welded.



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6.3	Terminal Block	 a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of
		loosening or undue heating.
6.4	Terminal cover	 a. Material - UV stabilized transparent/Opaque polycarbonate cover. b. Provision of sealing at two points through sealing screw. c. The sealing screws shall be held captive in the terminal cover. d. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. e. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable. f. Mechanism shall be provided to record an event with occurrence and restoration in case of meter enclosure/terminal cover is opened.
6.5	Terminals	 a. Terminals shall be suitable for 6 Sqmm copper wire. b. Two no's flat head screws per terminal shall be provided c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase / neutral / outgoing etc. e. Clearances and creepage shall be as per IS 14697.
6.6	Meter Enclosure	a. Polycarbonate meter enclosure and LTCT's as per annexure 'E' shall be provided with meter.b. Mechanism shall be provided to record an event with occurrence and restoration in case of meter enclosure is opened.
6.7	Ingress Protection	IP 55 or better, but without suction in the meter.
6.8	Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less



		than 10 minutes.
6.9	RTC	 a. The meter shall have internal real time crystal clock to set date and time. b. Drift in time of this clock shall not be more than ±5minutes/ year at a reference temperature of 27°C. c. Meter RTC shall be corrected automatically by the system in synchronization to the network RTC. d. HES will sync RTC at least once a day.
6.10	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thioyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter.
6.11	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.12	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC. b. Battery. c. Non volatile memory. d. Display e. Status of Communication card Meter shall have an optical port with a metal ring to hold
6.13	Optical port	magnet of probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.
6.14	Communication Module Interface	 a. Meter should have the provision for 01 no's plug in communication module for connectivity. The same interface shall be compatible with both Cellular and RF communication technologies interchangeable according to the site. b. Interface shall support data transfer between meter and network interface card over UART/ RS232. c. Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. d. Meter Vendor shall work with BRPL designated RF provider to integrate their module in their meter. e. Preferred location of communication card module shall be on top of meter



		a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card
		(NIC) for connectivity of meter to HES from
		following options as per tender requirement:
		i. Communication Module/ NIC Type 1: RF based suitable for communication Network of
		BRPL designated RF canopy provider.
		ii. Communication Module/ NIC Type 2: RF and
6.14.1	Communication modules	Cellular communication module (LTE 4G
		with 3G and 2G fall back as per Indian
		telecom Standards).
		b. Meter shall have separate indications on display/ for
		remote and local communication.
		c. Communication module shall held in a casing which
		can be directly plugged in the meter. Sealing screw
		shall be provided.
	Last Gasp	Meter shall have provisions to provide last gasp signals
6.15		through communication module in case of power failure.
		Bidder should explain in detail the provisions provided in
		meter to achieve the requirement. Sealing should be in accordance with IS and CEA metering
6.16	Meter Sealing Arrangement	regulations with latest amendments. Approval shall be taken
0.10		from purchaser for location of seals.
		a. One Polycarbonate seal to be provided on meter
	Manufacturer's Seals	cover.
6.16.1		b. Minimum one seal as Hologram type, numbered with
0.10.1		hologram transfer on tamper proof paper seal. Seal
		should not be just Hologram sticker (100%
		hologram).
		a. Minimum one seal as Hologram type, numbered with
		hologram transfer on tamper proof paper seal. Seal
		should not be just Hologram sticker (100%
	BRPL Seals	hologram). Meter sides should not have sharp edges to avoid damage to hologram seals.
6.16.2		b. Minimum one Polycarbonate seal should be provided
		on top cover.
		c. Seals will be issued to manufacturer free of cost.
		d. 02 no's polycarbonate seals shall be provided for
		communication module.
6.16.3	Seal record	Record of all seals shall be forwarded to purchaser with each
0.10.3	Scal record	lot.



6.17	Name Plate and marking	 a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 2) & clause no. 10.0 of this specification. b. All markings and details shall be printed by laser
		only. c. Paper stickers are not allowed for name plate.
6.18	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 14697.
6.19	Guarantee	 a. 7.5 years from the date of dispatch or 7 year from date of commissioning, whichever is earlier b. Manufacturer shall undertake a guarantee to replace meter up to a period of 7 Year from the date of supply. The meters which are found defective/inoperative within the guarantee period shall be replaced as per meter service level agreement.

7. Functional Requirement

SN	Item	Description
7.1	Meter category	Smart meter comply with D3 category of IS 15959
7.1		(Part 3).
		It should be possible to configure meters in following
		modes of metering:
		a. Forwarded Only: In this mode any export active
		energy shall be treated as import energy and
		shall be recorded in forward only register.
	Mode of metering	Apparent energy calculation in this mode shall
7.2		be as per clause no. 6.4.
1.2		b. Bidirectional: Both Import and export energy
		recording shall be applicable in this mode of
		metering and relevant registers shall be updated.
		Any change in metering mode shall be logged in events
		with date and time stamp.
		Default mode of metering shall be forwarded only untill
		specified in tender requirement otherwise.
		Lag only: KVAh is computed based on KVArh and
7.3	KVAH Calculation	KWH value. If PF=1, or leading, then KVAh = KWH.
		At no instance KVAh < KWh.



7.4	MD calculation	Block / sliding window with default demand integration period of 1800 s configurable to 900 s as per requirement. Meter should be configurable for block/sliding window at the time of manufacturing. This change should not be possible in the field. Extended register shall be used for MD recording.
7.5	TOU Metering	 a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. TOU metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 c. Special Day table shall be defined as per IEC/DLMS UA-1000-1 d. Default TOU programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BRPL for the same. e. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak
7.6	Instantaneous Parameters	All the parameters mentioned in table '1' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter. a. Neutral Current (<i>I_N</i>) b. % TDH in R phase Voltage c. % THD in Y Phase Voltage d. % THD in B Phase Voltage e. % THD in R phase Current f. % THD in Y Phase Current g. % THD in B Phase Current h. Displacement PF i. temperature j. RF/ GSM signal Strength in milli db. k. GPS Coordinates. Method of Measurement for harmonic parameters at sl no. 'b' to 'g' shall confirm to the IEEE 519, 2014.
7.6.1	Association Rights	As per Clause 1.1.1 of IS 15959 (Part 3).
7.7	Billing data	a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as



7.7.1	Association Rights	per provisions provided in clause no. 14 of IS 15959 (Part 3). b. 6 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access. c. All the parameters mentioned in table '4' of IS 15959 (Part 3) shall be supported by meter. As per clause 14 of IS 15959 (Part 3). Support for selective access shall be provided for
7.7.2	Selective access	billing parameters as per clause no 11.3 of IS 15959
		(part 1).
7.7.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.7.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.7.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).
7.8	Load survey Data	 a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table '15' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter: % THD in R phase Voltage % THD in B Phase Voltage % THD in R phase Current % THD in Y Phase Current % THD in B Phase Current
7.8.1	Profile capture period	Default 1800 s programmable to 900 s.
7.8.2	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3`	Association Rights	As per clause no.18 of IS 15959 (Part 3)
7.9	Daily load profile	Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 35 Power ON days. All the parameters mentioned in table '3' of IS 15959 (Part 3) shall be supported by meter as Daily load



		profile parameters.
7.9.1	Association Rights	As per clause no. 13 of IS 15959 (Part 3)
7.10	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 16 of IS 15959 (Part 3).
7.10.1	Name Plate Detail	As per Table '12' of IS 15959 (Part 3) with following additional parameters. a. Month of manufacturing.
7.10.2	Association Rights	As per clause no. 16.1 of IS 15959 (Part 3)
7.10.3	Programmable parameters	These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. Programming of any of the parameters shall increment the 'Cumulative programmable count' value. All the parameters mentioned in table '13' of IS 15959 (Part 3) shall be supported by meters with following additional parameters.
7.10.4	Association rights	As per Clause no. 16.2 of IS 15959 (Part 3).
7.11	Push Services	 a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 2). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e instantaneous, billing, load survey, daily energy and events. Bidder should explain its capability to configure push services. However following push services shall be available by default. i. Load survey profile data at after every 4



		hours configurable to any predefined interval. ii. Mid night data at 00:00 hrs of every day. iii. Billing profile data on occurrence of billing.	
7.11.1	Periodic push (Smart meter to HES)	 a. Meter shall be able to push instantaneous parameters to HES at predefined intervals. Parameters required for push shall be intimated during detailed engineering in the vent of order. b. Other attributes as per IS 15959 (Part 3) i.e. Send Destination, Communication window, Randomization time interval, number of retries and repeat delay shall be decided in the event of manufacturing. 	
7.11.2	Event Push (Smart meter to HES)	 a. Meter is able to report HES, the status change of any of the identified events mapped in to event status word (ESW) of size 128 bits by pushing following objects to HES. Device ID Push Setup ID Real time clock- Date and Time iv. Event Status Word 1 (ESW 1). b. Each of the bits in ESW shall reflect the current state of the event and are mapped against each of the identified events. c. An event status word filter (ESWF) of 128 bit shall also be provided to configure events for event push. Events which are supported in meter shall only be configured for event push. Bit value 1 in ESWF shall indicate that the event is supported and value 0 indicates that event is not supported for event push. Position of the event bit in ESWF shall be same as in ESW. 	
7.11.3	Event status Bit mapping	As Per IS 15959 (Part 3)	
7.12	Firmware upgrade	 a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology for a part or complete firmware of meter. b. Firmware upgrade shall use the Image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3. 	



		c. Broad cast facility shall be supported in HES for simultaneously upgrading the firmware of a	
		group of meters installed in field.	
		d. Firmware upgrade feature shall be provided	
		with proper security. The design shall take into account field scenarios such as power failure during F/W upgrade.	
		e. Once the firmware is upgraded, meter shall send an acknowledgment to HES. It shall also log it as an event in its memory.	
		f. Meter shall support capability to self register the meter with new firmware.	
		g. The execution time of the change of the	
		firmware within the meter should be below 1	
		minute	
		Meter shall support connection less messaging services	
		of DLMS to support broadcast messages for a group of	
		meters for following actions:	
7.13	Support for broadcast	a. Gap reconciliations.	
	message	b. Firmware upgrade.	
		c. On demand readings	
		d. Meter connection and disconnection.	
		e. Updating of Programmable parameters	
		a. In Last Gasp endpoint shall send the power outage notification with Time Stamp. In case of	
7 1 4	First breath and last gasp	power failure meter communication module	
7.14		shall not draw power from the backup battery.	
		b. For the purpose of sending the Last Gasp,	
		communication module shall have proper power	
		backup (like a super capacitor).	
1 / 13 Security		Advanced security outlined in clause 7.1.2 of IS 15959	
	Enamention for data	(Part 1) shall be provided.	
7.151	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)	
	Encryption/ Authentication		
7.15.2	for data transport	As per clause 7.2 of IS 15959 (Part 2)	
7.15.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)	



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7.15.4	NIC Security	 a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator. 	
7.16	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959 (Part 3).	
7.17	Consumer display unit (Optional)	Provision of consumer interface unit (CIU) to access meter from consumer premises. Wireless IHD powered by battery.	
7.18	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.	
7.18.1	Association Rights	Each event shall be available to download as per following association rights. a. Public Client: No access b. Meter Reader: Read only c. Utility Settings: Read only d. Push Services: Read Only for identified events as per ESWF	
7.18.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events e. Non Roll Over Events	



		f. Transaction related events		
		g. Control Events		
		a. Occurrence and Restoration of Voltage Rela		
		current related, power related and other events		
		shall be logged in meter memory as per IS		
		15959 (Part 3). Please refer annexure 'A' for		
		description of events, Event ID, Logics of		
		events and threshold values of events.		
		b. Threshold values shall be factory		
		programmable.		
		c. Selective access shall be provided as per clause 11.3 of IS 15959 (Part 1). d. For each of the events a certain list of		
		parameters shall be captured as per clause 'a'		
		e. For each occurrence event captured, the		
		cumulative tamper count shall be incremented.		
		Meter shall capture all the parameters mentioned in		
7.18.3	Parameter Snapshot	table '24' of IS 15959 (part 3) when event occurrence		
		and restoration is logged		
7.18.4	Event Logging	The meter shall log minimum 100 tamper events		
7.10.4	Event Logging	(ensuring at least 20 events for each tamper).		
	Appropriate Indications/Icons for all tar			
7.18.5	Tamper Indication	appear on the meter display either continuously or in		
		auto display mode.		
7.19	Dhagar Danragantation	Meter shall support parameters required to develop		
/.19	Phasor Representation	phasors of current and voltage at HES.		

8. Meter Display

0.	Wieter Dispilay		
SN	Item	Description	
8.1	LCD Type	STN Liquid crystal with backlit	
		a. Minimum 120 Degree.	
		b. The display visibility should be sufficient to read	
		the Meter mounted at height of 0.5 m as well as at	
8.2	Viewing angle	the height of 2 m.	
8.3	Size of LCD	Minimum 10X5mm	
8.4	LCD Digits	Total 6+1 digits	
8.5	LCD language	English	
		a. Auto Mode	
8.6	Display modes	b. Manual Mode	
		c. Sub active mode	



		Display list shall be finalized during detailed engineering in the event of order.	
		Appropriate indications/flags for all tampers and self	
8.7	Display indications	diagnostic features should be provided.	

9. Data and Communication Protocol/ HES/ Integrations/ Software

	Data and Communication Protocol/ HES/ Integrations/ Software			
SN	Item	Description		
		a. Meter should comply Indian companion of data exchange		
		and tariff control specification IS 15959 (Part 2).		
		b. In case of additional requirement from IS 15959 (part 2),		
		they shall be as per DLMS standards/ IEC DLMS		
	Data Exchange	protocols suite (62056).		
9.1	protocol	c. Bidder shall explain in detail the additional parameters/		
	protocor	services/ methods used in meters from IS 15959 (part 2)		
		and its reference to DLMS books/ IEC.		
		d. Prior to manufacturing of meters bidder shall provide a		
		detailed specification explaining all parameters/ services/		
		methods used in meter in addition to IS 15959 (Part 3).		
		a. Bidder shall work with BRPL IT team/ BRPL designated		
		system integrator to integrate its meter with BRPL HES		
9.2	Integration with HES	system.		
7.4		b. Bidder shall prepare detailed documents as mentioned in		
		above clause and submit it for BRPL approval and		
		integration with HES.		
9.3	Base computer	Licensed Software with the following features should be		
9.3	software	supplied for free to download meter through optical port.		
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.		
	Security	System shall be password protected where user can login only if		
9.3.2		login ID is provided by administrator. BCS shall have rights		
9.3.2		management system so that access rights can be provided as per		
		requirement to maintain security.		
9.3.3	Database	BCS shall maintain master database according to desired area,		
7.5.5	Database	location, and region etc.		
		a. BCS shall have option of user defined report generation		
9.3.4	Reporting	in format of Excel, Word and CSV, XML, PDF etc.		
		b. BCS shall have capability to export data in ASCII, CSV		
		and XML format at desired location so that the same		
		could be integrated with our billing data for processing.		
		c. All the data available in the meter shall be convertible to		



		user defined ASCII, CSV and XML file format.			
9.3.5	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).			
9.4	Hand Held Unit Software	 a. The manufacturer has to provide software capable of downloading all the data stored in meter memory through window/ android operating system based handheld units (HHU) through optical port. b. In the event of order, bidder shall work with BRPL IT team/ BRPL designated system integrator to develop HHU software for meter downloading and further uploading on HES. c. HHU software should have option for selection of parameters to be downloaded from meter. d. Meter data consisting of all parameters and complete load survey for all parameters shall be read by HHU and downloaded on HES in minimum possible time (not more than 5 minutes). 			
9.5	Training	Manufacture shall impart training to BRPL personnel for usage of software			

10. Name Plate

SN	Description	
10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour.	
10.1	Embossing is not acceptable.	
10.2	Size of the digit shall be minimum 5X3mm	
10.3	Bar code shall be printed along with serial number	
10.4	BIS registration mark (ISI mark)	
10.5	'BRPL' insignia shall be printed above LCD display.	
10.6	BRPL PO No. & date	
10.7	Manufacturers name and country of origin	
10.8	Model type / number of meter	
10.9	Month and Year of manufacturing	
10.10	Reference voltage / current rating	
10.11	The number of phases and the number of wires for which the meter is suitable.	
Graphical symbol as per IS 12032 can be used.		
10.12	Meter constant	
10.13	Class index of meter	
10.14	Reference frequency	



10.15	Warranty period	
	Name plate of NIC	
	a. Serial no of NIC along/ IMEI no/MAC address with bar code	
10.16	b. Name of purchaser's	
10.10	c. Communication technology with carrier frequency	
	d. Manufacturing year and month.	
	e. Warranty period.	

11. Component Specification

SN	Item	Description	Make
11.1	Current Transformers	The Meters should be with the current transformers as measuring elements.	To meet accuracy requirement
11.2	Measurement or computing chips	The Measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	Analog Devices, Cyrus Logic, Atmel, Phillips, SAMES, NEC, TEXAS
11.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.4	Display modules	 a. The display modules should be well protected from the external UV radiations. b. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). c. It should be STN type industrial grade with extended temperature range min 70 °C. 	Hongkong: Genda Singapore: Bonafied technologies Korea: Advantek China: Success Japan: Hitachi, Sony
11.5	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	USA: National Semiconductors, HP Holland/ Korea: Phillips Japan: Hitachi, Ligitek
11.6	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of	SMPS Type



		the motor should not be affect 1.		
		the meter should not be affected in case the maximum voltage of the		
		system appears to the terminals due		
		to faults or due to wrong		
		connections.		
		The active & passive components		
		should be of the surface mount type	USA: National	
		& are to be handled & soldered by	Semiconductors, Atmel,	
	F1 4 '	the state of art assembly processes.	Phillips, Texas	
11.7	Electronic	The PTH components should be	Instruments.	
	components	positioned such a way that the leads	Japan: Hitachi, Oki,	
		of components should not be under	AVX or Ricoh	
		stress and not touching the internal	Korea: Samsung	
		wires.		
		LED	Everlight, Agillent	
		a) The internal electrical		
		components should be of electrolytic		
		copper & should be protected from		
11.8	Mechanical parts	corrosion, rust etc.		
11.0		b) The other mechanical components		
		should be protected from rust,		
		corrosion etc. by suitable		
		plating/painting methods.		
11.9	Dottomy	Lithium with guaranteed life of 15	Texcell, SAFT, Varta,	
11.9	Battery	years	Tedirun, Sanyo	
			USA: Philips, Dallas	
11.10	RTC & Micro	The accuracy of RTC shall be as per	Atmel, Motorola,	
11.10	controller	relevant IEC / IS standards	Microchip, TEXAS,	
			Japan: NEC, Oki	
		Glass Epoxy, fire resistance grade		
11.11	P.C.B.	FR4, with minimum thickness 1.6	(BBT test is must)	
		mm	,	
		a. The components used by		
		manufacturer shall have		
		"Minimum Life" more than the		
	Note	10 years.		
11.12		b. Incase vendor want to use other		
		make components; same shall be		
		approved by BRPL before use.		
		c. Even for existing supplier –		
		fresh approval is needed for all		
		media approvar is necuca for an		



deviations.	
d. Manufacturer should have	
complete tracking of material	
used in meter. BRPL reserve the	
right to carry out audit of	
inventory/ manufacturing	
process at manufacturer's works	
and sub vendor's work.	

12. Quality Assurance, Inspection and Testing

SN	Item	Description Description	
12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.	
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.	
12.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.	
12.4	Type Tests	 a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 2) shall be carried out on sample selected from BRPL lot. 	
12.5	Routine tests	All test marked "R" as per table 20 of IS 14697.	
12.6	Acceptance Tests	 a. All tests marked "A" as per IS 14697. b. Smart meter functional tests as per IS 16444 (Part 2). c. Test for data exchange protocol as per IS 16444 (part 2). d. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 2). e. All the routine and acceptance tests shall be carried out as per relevant standards. f. Following tests in addition to IS shall be conducted during lot inspection. 	



		Dimensional and drawing verification.		
		II) Display parameters/ sequence.		
		III) Data Downloading from CMRI and PC.		
		IV)Tamper/ fraud detection/logging features as per		
		approved documents. Tamper conditions will be		
		simulated at varying load up to Imax. Accuracy will also		
		be checked during tamper simulation.		
		V) Burn in chamber test.		
		VI) Component verifications.		
		g. Purchaser reserves the right to formulate any other test		
		method to verify guaranteed parameters of Meter.		
12.7	ESD and Magnetic	ESD and magnetic interference test will be conducted at Samir		
12.7	Interference test	lab, Chennai or CPRI.		
		a. Purchaser reserves the right to inspect /witness all tests on		
		the meters at Seller's works at any time, prior to dispatch, to		
		verify compliance with the specification/ standards.		
		b. Manufacturer should have all the facilities/ equipments to		
12.0	T	conduct all the acceptance tests as per clause 14.3 relevant		
12.8	Inspection	standards and tampers logics as per approved GTP. All the		
		equipments including tamper logs kits/ jigs should be		
		calibrated.		
		c. In-process and / or final inspection call intimation shall be		
		given in advance to purchaser.		
		Br m mar amor to baremager.		

13. Pa	. Packing, Marking, Shipping, Handling and Storage			
13. Pa	Packing	 a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 4 to 5 three-phase meters must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. 		
		d. Maximum weight of a group meter box shall not be		
		more than 25 Kg.		
		e. The packaging will protect the meters against shock and		



		vibration, preventing damage due to the road conditions		
		during transport and distribution in the field. The		
		electrical and mechanical properties shall not be affected by these disturbances.		
		f. For shipping the boxed meters will be close packed by		
		stockpiles of suitable quantities on pallets. The meters		
		numbers sequence (without partition) shall be kept in		
		each pallet. A pallet will be protected against moisture		
		by a polyethylene hood, covered with a cardboard cover		
		(hood), and fixed onto the pallet by parallel		
		polypropylene bands, using protection angle bars at the		
		corners. The hood shall be marked – on the front (wide		
		side), on the narrow side and on the top as per clause 13.3.		
		g. Each pallet should contain between 70 and 300 meters.		
		The actual number of meters on each pallet will be		
		agreed with the BRPL in the event of order.		
		h. An impact detector ("Shock-Watch") label shall be		
		attached to the cardboard hood of several pallets in each		
		container/ transport truck, to warn of possible rough		
	D 1: C	handling during shipment, transport and storage.		
13.2	Packing for accessories and	Robust wooden non returnable packing case with all the above		
13.2	spares	protection & identification Label.		
		On each group box and pallet, following details are required		
		both on front (wide side) and top:		
		a. BRPL logo.		
		b. Meter serial number range along with bar code.		
		c. Unique number of box/ pallet.		
		d. Purchaser's name		
		e. PO number (along with SAP item code, if any) & date		
13.3	Marking	with bar code f. Equipment Tag no. (if any)		
13.3	Marking	g. Destination		
		h. Manufacturer / Supplier's name		
		i. Address of Manufacturer / Supplier / it's agent		
		j. Type, rating and other description of equipment		
		k. Country of origin		
		1. Month & year of Manufacturing		
		m. Case measurements		
		n. Gross and net weights in kilograms		



		o. All necessary slinging and stacking instructions	
13.4	Test reports	Routine test report to be provided with each meter	
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.	
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.	

14. Deviations

		a. Deviations from this specification can be acceptable, only
	14.1 Deviations	where the Seller has listed in his quotation the requirements
		he cannot, or does not, wish to comply with and which
1.4.1		deviations the Buyer has agreed to in writing, before any
14.1		order is placed.
		b. In the absence of any list of deviations from the Seller, i
		will be assumed by the Buyer that the Seller complies with
		the Specification fully.

15. Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
7	Samples of each type and rating offered along with box (Highest rating offered) and RF NIC/ communication module of already integrated RF card as per tender qualifying criteria.	2 no's	1 no's	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and	Required		



	certification for quality standards			
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 2).		Required	
16	Program for production and testing (A)		Required	Required
17	Makes of components		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer's works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required
25	Mapping of meter serial no to Communication card.			Required

16. Delivery

		Despatch of Material: Vendor shall despatch the material, only
16.1	6.1 Delivery	after the Routine Tests/Final Acceptance Tests (FAT) of the
10.1		material witnessed/waived by the Purchaser, and after receiving
		written Material Despatch Clearance (MDC) from the Purchaser.



Annexure - A: Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification.

Bidder shall not change the format of GTP or clause description.

Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	



Annexure – B: Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	
3			



Annexure – C: Integration Requirement of Meters with NIC and HES

Integration requirements with communication provider of BRPL/ any other agency designated by BRPL for other components of AMI.

- a. Bidder(s) must share the meter security keys, all level encryption, and password information along with asset information in a format with the buyer / communication provider of BRPL so that during AMI business flow, the device and data can be authenticated all the time.
- b. Bidder(s) must share the details of meter communication specifically programmed protocols.
- c. Bidder(s) must share the meter configuration source code to the BRPL/ communication provider of BRPL.
- d. Bidder (s) must share the meter interface touch points for external applications/ systems.
- e. Bidder(s) must share the required APIs including but not limited to reading APIs, configuration APIs and Functional APIs with the System Integrator for execution of business flow (Installation, reading, configuration).
- f. Bidder(s) must share the data storage and retrieval details.
- g. Bidder(s) must configure the devices to be upgraded remotely (OTA) and share the required firmware source code (with updates over the project life) with system integrator as and when it is required in case of feature request or fault correction.
- h. Bidder(s) must follow and conduct Utility's sample and periodic test program, including (but not limited to) the selection of a sample population of meters, sharing of sample test results as reported by the meter testing systems with the system Integrator.
- i. Bidder(s) must share the information related to communication module for the authorization purpose at to BRPL/ communication provider of BRPL.

Annexure – D: Tamper and Fraud Detection/ Events

1. Voltage Related Events:			
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
R Phase Voltage Missing (Occurrence/ Restoration) Y Phase Voltage Missing (Occurrence/ Restoration) B Phase Voltage Missing (Occurrence/ Restoration)	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end	Occurrence: If Vpn<10% Vref and Ip>10% Ib Restoration: If Vpn>=10% Vref and Ip>10% Ib	Occurrence: 5 Min Restoration: 5 Min
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value.	Occurrence: If Vpn>10% Vref Restoration: If Vpn<=10% Vref	Occurrence: 5 Min Restoration: 5 Min
Low Voltage (occurrence/ Restoration)	Meter should log low voltage event if voltage in any phase is below a threshold value. Threshold value if factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min
Voltage Unbalance (Occurrence/ Restoration)	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a threshold value. Threshold value should be factory programmable.	Occurrence: If Vmax- Vmin>30% Vref Restoration: If Vmax- Vmin<=30% Vref	Occurrence: 5 Min Restoration: 5 Min
R Phase high Voltage Harmonics Y Phase high Voltage Harmonics B Phase high Voltage Harmonics 2. Current I	Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value should be factory programmable. Related Events:	Occurrence: If % THD in Vpn>5% of fundamental. Restoration: If % THD in Vpn<5% of fundamental.	Occurrence: 5 Min Restoration: 5 Min



Description of	Logic Of Event	Logic Expression/	Persistence
event	Logic Of Livene	Threshold values	Time
Current			
Reverse/ R			
Phase Current			
Reverse	Meter should log the event of		
(occurrence/	reversal of C.C polarity.		
Restoration)	Meter should register energy	Occurrence: If $Ip = -ve$	Occurrence:
Y Phase Current	consumed correctly with any	direction	5 Min
Reverse	one, two or all three current	Restoration: If Ip=+ve	Restoration:
(occurrence/	coils reversed. This event shall	direction	5 Min
Restoration)	not be valid in bidirectional		
B Phase Current	mode of metering.		
Reverse			
(occurrence/			
Restoration)			
R Phase Current			
Open			
(Occurrence/			
Restoration)		XI	
Y Phase Current	Meter should log the event of	Vector	Occurrence:
Open	current coil open. Threshold	Sum($I_R+I_Y+I_B+I_N$)>20% Ib and I<10% Ib	5 Min
(Occurrence/	value of current should be		Restoration:
Restoration)	programmable at factory end.	Vector	5 Min
B Phase Current		$Sum(I_R+I_Y+I_B+I_N)>20\% Ib$	
Open			
(Occurrence/			
Restoration)			
Current			
Unbalance			
(Occurrence/			
Restoration)			
,	Meter should log the event of	Vector	
Current Bypass	current coil shorting/bypass.	$Sum(I_R+I_Y+I_B+I_N)>20\% Ib$	
(Occurrence/	Threshold value of current	and I (any Phase) >5% Ib	
Restoration	should be programmable at	Vector	
	factory end.	$Sum(I_R+I_Y+I_B+I_N)>10\%$ Ib	
	If the current in any phase	1 2 11/	Occurrence:
Over current	exceeds the specified threshold	Occurrence: If Ip>Imax	5 Min
(occurrence/	current, meter should log over	Restoration: If Ip<=Imax	Restoration:
restoration)	current event.		5 Min



_	1		1
R Phase high			
Current	Meter should log occurrence of		
Harmonics	high voltage harmonic event	Occurrence: If % THD in	Occurrence:
R Phase high			5 Min
Current	when % THD in voltage of	$I_P > 5\%$ of fundamental.	Restoration:
Harmonics	phase will be more than threshold value. Threshold	Restoration: If % THD in I_P <5% of fundamental.	5 Min
R Phase high		<5% of fundamental.	3 Min
Current	value should be factory		
Harmonics			
3. Power Re	elated Events:		•
Description of	1 . 000	Logic Expression/	Persistence
event	Logic Of Event	Threshold values	Time
	Meter shall detect power OFF if		
	all phase voltages are absent.		
Power OFF	This event shall be recorded at		
(occurrence/	the time of each power OFF. At		
restoration)	the same time power ON event		
	shall be recorded.		
	If meter micro detect power off		
Abnormal	whereas phase voltage is	Occurrence: If voltages at	
Power Off	present than abnormal power	meter power supply<10%	
(Occurrence/	will be recorded. Meter sall	Vref and Vp>20% vref.	NA
restoration)	continue to record energy as per	Restoration:	
restoration)	phase voltage and current.	Restoration.	
4. Other Ev			
Description of		Logic Expression/	Persistence
event	Logic Of Event	Threshold values	Time
CVCIIC	a. Meter should either be	Tineshold values	Time
	immune or should log the		
	events of attempt of tampering		
	by external magnetic		
Abnormal			
External	field as per relevant IS14697/ CBIP 325 with latest		
			A ~ ~ TC
Magnetic	amendments.	As per IS 14697/ CBIP 325	As per IS
Influence	b. If the working of meter gets		14697
(Occurrence/	affected under the		
Restoration)	influence of external magnetic		
	field, meter should		
	record energy at Imax. Meter		
	should not compute		
	MD during this period. The		



	meter shall record energy as per actual load once the magnetic field is removed.		
Neutral Disturbance- HF, DC and Alternating (occurrence/ restoration)	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.	As per manufacturing standard.	Bidder shall define threshold values
Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found in between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value. Event shall restore if PF factor of load remain out of range 0.2 to 0.5 for a load above than % threshold value for		10% of I basic
Plug in			
Communication	Meter should log the removal of		
module removal (Occurrence/	communication card. Meter should also log insertion of		
Restoration)	communication card.	By NC switch/ sensor	
Configuration			
change to post-			
paid mode/ pre-	Meter should log the change in		
paid mode	payment mode configuration.		
Configuration			
change to			
"Forwarded"			
only" mode/	Matar should los the shores in		
"Import and Export" mode	Meter should log the change in metering mode configuration.		
Overload	metering mode configuration.		
(Occurrence/	Meter should able to log the		
Restoration)	status of overload in KW		
HV Spark	Meter with communication card		
(Occurrence/	should be immune or log the	Immediately	NA
restoration)/	event in the case of application		



Jammer	ammer of ESD upto and including 35				
	KV.				
	Meter should log event of high	Occurrence: If $I_N > 50\%$ of	Occurrence:		
High neutral	neutral current if measured	average phase current	5 Min		
Current	neutral current should be more	Restoration: If $I_N < 50\%$ of	Restoration:		
	than predefined threshold value.	average phase current	5 Min		
	Meter shall log the event if		Occurrence:		
Distorted PF	difference between		5 Min		
Distorted FT	displacement PF and actual PF		Restoration:		
	is more than a predefined value		5 Min		
Time Based	Meter shall log voltage, current,				
Event Stamp	PF and energy consumption on	As per predefined time	NA		
Event Stamp	a predefined time				
5. Non Roll	over events:				
Event Description	on				
Occurrence of co	-				
6. Transacti	ion Related Events:				
Detail of Transa	ction				
Real Time Clock-	- Date and Time				
Demand Integrati	on Period				
Profile Capture P					
Single Action sch	edule for billing date				
Activity calendar	for time zones				
New firmware ac	tivated				
Load Limit (Kw)	Load Limit (Kw) Set				
Enable Load Lim	it Function				
Disable load limit function					
LLS secret (MR) change					
HLS key (US) change					
HLS key (FW) change					
Global key change					
ESWF change					
MD reset	MD reset				

Note:

- 1. Event ID's shall be defined as per BRPL specification/ IS 155959 (part 2). Approval shall be taken from BRPL prior to manufacturing for Event ID's
- 2. Programming of threshold values should be possible from remote via proper authentications.
- 3. Logics of tampers can be changed/ upgraded via firmware up gradation from remote via proper authentication.



4. All the programming changes/ firmware up gradations shall be logged along-with date and time stamp in meter as well as on HES.

Annexure – E: Technical Specification of LTCT Box

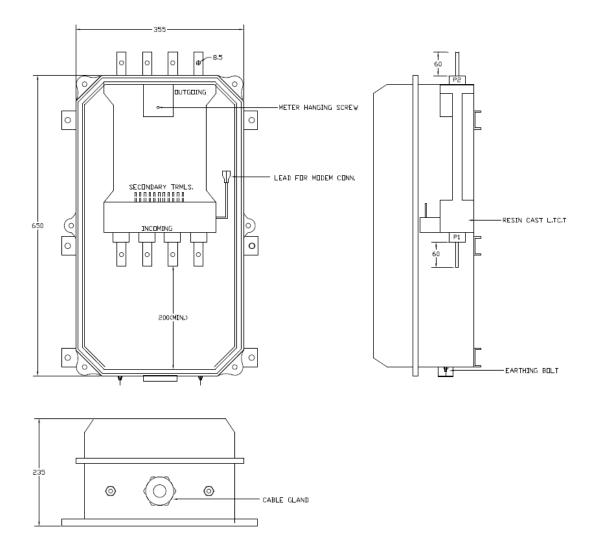
1.0 GUARANTEED TECHNICAL PARTICULARS FOR LTCT BOX

S No.	Parameters	Requirement	Data by Supplier
1	Manufacturer name		
2	Nominal/Highest system voltage	415V/660V	
3	Box details		
3.1	Material	Polycarbonate	
3.2	Base	Opaque, dark grey	
3.3	Top cover	Transparent	
3.4	Overall dimensions	As per Annexure - C	
3.5	Marking of terminations	To be provided	
3.6	Suitable Arrangement for modem installation	To be provided	
3.7	Rating Plate	Two nos. (one each on box and CT block)	
3.8	Connection diagram	To be provided on rating plate mounted on CT block	
3.9	Protection Class	IP55	
3.10	Sealing arrangement	To be provided on all corners	
3.11	Nuts & Bolts	For I/C & O/G connections	
3.12	Mounting channel	MS (HDG)	
3.13	Fasteners for Installation	4 nos.	
3.14	Gland Plate	200 x 100mm, MS (HDG)	
3.15	Cable Gland	To be provided	
4	CT Details		
4.1	Reference standard	IS 2705	
4.2	Type of CT	Resin cast	
4.3	Class of accuracy	0.5	
4.4	ISF	<=10	
4.5	Burden	5 VA	
4.6	Transformation Ratio	400/5 A /200/5 A/100/5 A as per purchaser's requisition	
4.7	Frequency	50 Hz	
4.8	Insulation level	660V / 3KV	
4.9	Insulation class	Е	
4.10	Short time current rating for 1 sec.	20 times the rated current	
4.11	Primary winding type	Bar	
4.11.1	Material of conductor	Aluminium	
4.11.2	Size of conductor	1A/Sqmm	
4.12	Secondary winding	Wound	



4.12.1	Material of conductor	Copper	
4.12.2	Size of conductor		

2.0 LTCT Box layout and CT Detail



NOTE:-

-ALL DIMENSIONS ARE IN MM.

Technical Specification for HT-CT Smart Meter

Document number: BR/18-19/SM/HT/01

June 2018

Prepared By	Reviewed by	Approved By
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Record of Revision

Item/Clause No.	Change in Specification	Reason of Change	Approved By	Rev



1. Scope of Supply

This specification covers the following for Three Phase 63.5 V, AC Static transformer operated Watt hour and Var Hour smart meters of accuracy class 0.5s/ 0.2s with plug in communication module (RF mesh only and RF + Cellular technology).

- **A.** Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
- **B.** Any accessories / hardware required for installation and operation for the meter.

2. Codes and Standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

S	Standard	
No.	Number	Title
2.1	Indian Electricity Act	IE Act 2003
2.2	CEA Metering Regulations	With latest amendments
2.3	CBIP Manual (Pub no325)	Standardization of AC Static Electrical Energy Meters
2.4	IS- 16444 (Part 2)	AC Static Transformer Operated Watt-hour And Var-hour Smart Meters, Class 0.2 S, 0.5 S And 1.0 S Part 2 Specification Transformer Operated Smart Meters
2.5	IS- 14697	ac Static Transformer Operated Watt-hour and Var-hour Meters, Class 0.2 S and 0.5 S
2.6	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification
2.7	IS-15959 (Part 2)	Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2)- Companion Specification for smart meter
2.8	IS-15959 (Part 2)	Data Exchange For Electricity Meter Reading, Tariff And Load Control-Companion Specification Part 3 Smart Meter (Transformer Operated Kwh And KVARh Class 0.2 S, 0.5 S And 1.0 S
2.9	IS- 11448	Application guide for AC Electricity meters
2.10	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
2.11	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
2.12	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols
2.13	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements



	1		
2.14	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods	
2.15	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)	
2.16	IEC 60736	Testing Equipment for electrical Energy meter	
2.17	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM	
2.18	IEC 62056-1- 0:2014	Smart metering standardisation framework	
2.19	IEC 62056-3- 1:2013	Use of local area networks on twisted pair with carrier signalling	
2.20	IEC 62056-4- 7:2014	DLMS/COSEM transport layer for IP networks	
2.21	IEC 62056-5- 3:2017	DLMS/COSEM application layer	
2.22	IEC 62056-6- 1:2017	Object Identification System (OBIS)	
2.23	IEC 62056-6- 2:2017	COSEM interface classes	
2.24	IEC 62056-6- 9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols	
2.25	IEC 62056-7- 3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks	
2.26	IEC 62056-7- 5:2016	Local data transmission profiles for Local Networks (LN)	
2.27	IEC 62056-7- 6:2013	The 3-layer, connection-oriented HDLC based communication profile	
2.28	IEC TS 62056- 8-20:2016	Mesh communication profile for neighbourhood networks	
2.29	IEC TS 62056- 9-1:2016	Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)	
2.30	IEC 62056-9- 7:2013	Communication profile for TCP-UDP/IP networks	
2.31	IEC 62056- 21:2002	Direct local data exchange	
2.32	DLMS- White Book	Glossary of DLMS/COSEM terms	
2.33	DLMS- Blue	COSEM meter object model and the object identification system	



	Book		
2.34	DLMS- Green	Architecture and protocols to transport the model	
2.34	Book	Architecture and protocols to transport the model	
2.35	DLMS- Yellow	Conformance testing process	
2.33	Book	Comormance testing process	
2.36	IEEE 802.15.4	Standard for Local and metropolitan area networks.	
2.37	IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865 MHz	
2.37	1EEE 802.13.4u	to 867 MHz Band in India)	
Order	Order of precedence between different standards shall be as follow:		
i	Indian Standards Issued By BIS		
ii	IEC standard		
iii	Other standards like CBIP, DLMS etc.		

3. Service Conditions

SN	Item	Description
		Operation range: -10 Deg C to 55 Deg C
3.1	Temperature Range	Limit range of operation: -25 to 60 Deg C
		Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4. Distribution System Data

SN	Item	Description
4.1	Supply	3 Phase AC, 4 wire
4.2	Voltage	415 V ± 6%
4.3	Frequency	$50 \text{ Hz } \pm 5\%$
4.4	System	Solidly Earthed
	Neutral	

5. Electrical and Accuracy Requirement

SN	Item	Description
5.1	Meter Type	3- ø, 4 wire static Transformer Operated Smart Meter
5.2	Connection	Transformer Operated
5.3	Rated Voltage	63.5 V (phase to neutral) with variation of +30% & -40%. However meter should withstand the maximum system voltage.
5.4	Rated Current	a. Ib -5A and Imax- 10 Ab. Ib- 1A and Imax- 2 A as per purchaser's requisition/ BOQ



5.5	Starting current	0.1 % of base current
5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	0.5s/ 0.2s as per purchaser's requisition (IS14697 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 2)
5.9	Meter constant	Imp/ unit (Bidder to specify meter constant)
5.10	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.12	Influence of supply voltage	As per IS 14697
5.13	Short time over current	As per IS 14697
5.14	Immunity to phase and earth fault	As per IS 14697
5.15	Influence of Self Heating	As per IS 14697
5.16	Influence of Heating	As per IS 14697
5.17	Electromagnetic compatibility	 a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of IS 14697



5.18	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 14697/ IEC62053-21/ CBIP325 (most stringent standard to be followed) under and after influence of following: a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% o. Alternating (AC) "abnormal' magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference s. DC immunity test Note: BRPL reserves the right to formulate any other test method to check magnetic immunity/ logging of meter.
		Meter with logging provision will be preferred.

6. Construction Feature

SN	Item	Description
6.1	General	Construction should be in accordance with IS 16444 (Part 2)
	Base Body	Material - Opaque and UV stabilized polycarbonate of grade
6.2		LEXAN 143/ 943 or Equivalent with V0 inflammability
		level.
		a. Material: Transparent/Opaque and UV stabilized
6.3	Top Cover	polycarbonate of grade LEXAN 143/ 943 or Equivalent
		with V0 inflammability level.
		b. Top cover and base should be Ultrasonically/Chemically



		welded.
6.4	Terminal Block	 a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.5	Terminal cover	 a. Material - UV stabilized transparent/Opaque polycarbonate cover b. Provision of sealing at two points through sealing screw. c. The sealing screws shall be held captive in the terminal cover. d. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. e. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable. f. Mechanism shall be provided to record an event with occurrence and restoration in case of terminal cover is opened.
6.6	Terminals	 a. Terminals shall be suitable for 6 Sqmm copper wire. b. Two no's flat head screws per terminal shall be provided c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase / neutral / outgoing etc. e. Clearances and creep age shall be as per IS 14697.
6.7	Ingress Protection	IP 55 or better, but without suction in the meter.
6.8	Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.



		a. The meter shall have internal real time crystal clock
		to set date and time.
6.9	RTC	b. Meter RTC shall be corrected automatically by the
0.9	RIC	system in synchronization to the network RTC.
		1
		c. HES will sync RTC at least once a day.
		Lithium ion battery with guaranteed shelf life of 10 years
6.10	Battery	and capacity life of 15 years. Lithium thioyl Chloride battery
		will be preferred. In case battery removal or total discharge
		same should not affect the working & memory of the meter.
6.11	26	Non volatile memory independent of battery backup,
6.11	Memory	memory should be retained up to 10 year without any
		auxiliary power.
		Meter shall have self diagnostic for the following
		a. Date and RTC.
6.12	Self Diagnostic feature	b. Battery.
		c. Non volatile memory.
		d. Display
		e. Communication Card Status
		Meter shall have an optical port with a metal ring to hold
6.13	Optical port	magnet of probe. Optical port shall comply with hardware
		specifications provided in IEC-62056-21.
		a. Meter should have the provision for 01 no's plug in
		communication module for connectivity. The same
		interface shall be compatible with both Cellular and
		RF communication technologies interchangeable
		according to the site.
		b. Interface shall support data transfer between meter
6.14	Communication Module	and network interface card over UART/ RS232.
	Interface	c. Meter shall have mechanism to log communication
		module removal as an event in its memory with date
		and time stamp.
		d. Meter Vendor shall work with BRPL designated RF
		provider to integrate their module in their meter.
		e. Preferred location of communication card module
		shall be on top of meter



		0 1 11 1 01
6.14.1	Communication modules	 a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card (NIC) for connectivity of meter to HES from following options as per tender requirement: i. Communication Module/ NIC Type 1: RF based suitable for communication Network of BRPL designated RF canopy provider. ii. Communication Module/ NIC Type 2: RF and Cellular communication module (LTE 4G with 3G and 2G fall back as per Indian Telecom Standards). b. Meter shall have separate indications on display/ for remote and local communication. c. Communication module shall held in a casing which can be directly plugged in the meter. Sealing screw shall be provided.
		Meter shall have provisions to provide last gasp signals
6.15	Last Gasp	through communication module in case of power failure. Bidder should explain in detail the provisions provided in meter to achieve the requirement.
6.16	Meter Sealing Arrangement	 a. Sealing should be in accordance with IS and CEA metering regulations with latest amendments. b. Sealing arrangement shall be such that sealed parts shall not be opened without breaking the seal or sealed part itself. There should be clear evidence of the breaking in case sealed parts shall be opened without breaking the seal. c. Approval shall be taken from purchaser for location of seals and number of seals.
6.16.1	Manufacturer's Seals	 a. One Polycarbonate seal to be provided on meter cover. b. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.16.2	BRPL Seals	 a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided



		on top cover. c. Seals will be issued to manufacturer free of cost. d. 02 no's polycarbonate seals shall be provided for communication module.
6.16.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.17	Name Plate and marking	 a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 2) & clause no. 10.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.18	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 14697.
6.19	Guarantee/ Warranty	 a. 7.5 years from the date of dispatch or 7 year from date of commissioning, whichever is earlier b. Manufacturer shall undertake a guarantee to replace meter up to a period of 7 Year from the date of supply. The meters which are found defective/inoperative within the guarantee period shall be replaced as per meter service level agreement.

7. Functional Requirement

SN	Item	Description
7.1	Meter category	Smart meter comply with D3 category of IS 15959
/.1		(Part 3).
	Mode of metering	a. It should be possible to configure meters in
		following modes of metering:
		i. Forwarded Only: In this mode any export
		active energy shall be treated as import
		energy and shall be recorded in forward only
7.2		register. Apparent energy calculation in this
1.2		mode shall be as per clause no. 7.4.
		ii. Bidirectional: Both Import and export
		energy recording shall be applicable in this
		mode of metering and relevant registers
		shall be updated.
		b. Any change in metering mode shall be logged in



		4 24 1 4 1 2
		events with date and time stamp.
		c. Default mode of metering shall be forwarded only
		until specified otherwise.
7.3		Lag only: KVAh is computed based on KVArh and
	KVAH Calculation	KWH value. If $PF=1$, or leading, then $KVAh = KWH$.
		At no instance KVAh < KWh.
		Block / sliding window with default demand integration
		period of 1800 s configurable to 900 s as per
7.4	MD coloulation	requirement. Meter should be configurable for block/
/ . 4	WID calculation	sliding window at the time of manufacturing. This
		change should not be possible in the field. Extended
		register shall be used for MD recording.
		a. Meter shall be capable of doing TOD metering
		in minimum 4 tariff rate registers programmable
		for minimum 8 time zones and 4 seasonal
		profiles.
		_
7.5	TOU Metering	
		<u> </u>
		1
	Instantaneous Parameters	<u> </u>
7.6		
		vi. % THD in Y Phase Current
		vii. % THD in B Phase Current
		1
7.4	TOU Metering Instantaneous Parameters	requirement. Meter should be configurable for block/sliding window at the time of manufacturing. This change should not be possible in the field. Extended register shall be used for MD recording. a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. TOU metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 c. Special Day table shall be defined as per IEC/DLMS UA-1000-1 d. Default TOU programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BRPL for the same. e. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Off Peak a. All the parameters mentioned in table '1' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter. i. Neutral Current (I _N) ii. % TDH in R phase Voltage iii. % THD in B Phase Voltage v. % THD in B Phase Current vi. % THD in R phase Current vi. % THD in B Phase Current vii. % THD in B Phase Current



		b. Method of Measurement for harmonic parameters at sl no. 'ii' to 'vii' shall confirm to the IEEE 519, 2014.
7.6.1	Association Rights	As per Clause 1.1.1 of IS 15959 (Part 3).
7.7	Billing data	 a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as per provisions provided in clause no. 14 of IS 15959 (Part 3). b. 6 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access. c. All the parameters mentioned in table '4' of IS 15959 (Part 3) shall be supported by meter.
7.7.1	Association Rights	As per clause 14 of IS 15959 (Part 3).
7.7.2	Selective access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.7.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.7.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.7.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).
7.8	Load survey Data	 a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table '15' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter: i. % THD in R phase Voltage ii. % THD in Y Phase Voltage iii. % THD in B Phase Voltage iv. % THD in R phase Current v. % THD in Y Phase Current vi. % THD in B Phase Current vii. W THD in B Phase Current viii. Displacement PF
7.8.1	Profile capture period	Default 1800 s programmable to 900 s.
7.8.2	Selective Access	Support for selective access shall be provided for



		billing parameters as per clause no 11.3 of IS 15959
		(part 1).
7.8.3`	Association Rights	As per clause no.18 of IS 15959 (Part 3)
7.9	Daily load profile	 a. Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 35 power ON days. b. All the parameters mentioned in table '3' of IS 15959 (Part 3) shall be supported by meter as Daily load profile parameters.
7.9.1	Association Rights	As per clause no. 13 of IS 15959 (Part 3)
7.10	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 16 of IS 15959 (Part 3).
7.10.1	Name Plate Detail	As per Table '12' of IS 15959 (Part 3) with following additional parameters. i. Month of manufacturing.
7.10.2	Association Rights	As per clause no. 16.1 of IS 15959 (Part 3)
7.10.3	Programmable parameters	 a. These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. b. Programming of any of the parameters shall increment the 'Cumulative programmable count' value. c. All the parameters mentioned in table '13' of IS 15959 (Part 3) shall be supported by meters with following additional parameters: i. GPS coordinates.
7.10.4	Association rights	As per Clause no. 16.2 of IS 15959 (Part 3).



7.11	Push Services	 a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 3). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e. instantaneous, billing, load survey, daily energy and events. Bidder should explain its capability to configure push services. However following push services shall be available by default. i. Load survey profile data at after every 4 hours configurable to any predefined interval. ii. Mid night data at 00:00 hrs of every day. iii. Billing profile data on occurrence of billing.
7.11.1	Periodic push (Smart meter to HES)	 a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology for a part or complete firmware of meter. b. Firmware upgrade shall use the Image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3. c. Broad cast facility shall be supported in HES for simultaneously upgrading the firmware of a group of meters installed in field. d. Firmware upgrade feature shall be provided with proper security. The design shall take into account field scenarios such as power failure during F/W upgrade. e. Once the firmware is upgraded, meter shall send an acknowledgment to HES. It shall also log it



		as an event in its memory.
		f. Meter shall support capability to self register the meter with new firmware.
		g. The execution time of the change of the firmware within the meter should be below 1 minute.
7.11.2	Event Push (Smart meter to HES)	 a. Meter is able to report HES, the status change of any of the identified events mapped in to event status word (ESW) of size 128 bits by pushing following objects to HES. Device ID Push Setup ID Real time clock- Date and Time iv. Event Status Word 1 (ESW 1). b. Each of the bits in ESW shall reflect the current state of the event and are mapped against each of the identified events. c. An event status word filter (ESWF) of 128 bit shall also be provided to configure events for event push. Events which are supported in meter shall only be configured for event push. Bit value 1 in ESWF shall indicate that the event is supported and value 0 indicates that event is not supported for event push. Position of the event bit in ESWF shall be same as in ESW.
7.11.3	Event status Bit mapping	As per IS 15959 (part 3)
7.12	Firmware upgrade	 a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology for a part or complete firmware of meter. b. Firmware upgrade shall use the Image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3. c. Broad cast facility shall be supported in HES for simultaneously upgrading the firmware of a group of meters installed in field. d. Firmware upgrade feature shall be provided with proper security. The design shall take into account field scenarios such as power failure during F/W upgrade.



		 e. Once the firmware is upgraded, meter shall send an acknowledgment to HES. It shall also log it as an event in its memory. f. Meter shall support capability to self register the meter with new firmware. g. The execution time of the change of the firmware within the meter should be below 1 minute
7.13	Support for broadcast message	Meter shall support connection less messaging services of DLMS to support broadcast messages for a group of meters for following actions: a. Gap reconciliations. b. Firmware upgrade. c. On demand readings. d. Meter connection and disconnection. e. Updating of Programmable parameters.
7.14	First breath and last gasp	 a. In Last Gasp endpoint shall send the power outage notification with Time Stamp. In case of power failure meter communication module shall not draw power from the backup battery. b. For the purpose of sending the Last Gasp, communication module shall have proper power backup (like a super capacitor).
7.15	Security	Advanced security outlined in clause 7.1.2 of IS 15959 (Part 1) shall be provided.
7.151	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)
7.15.2	Encryption/ Authentication for data transport	As per clause 7.2 of IS 15959 (Part 2)
7.15.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)
7.15.4	NIC Security	 a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and



		alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator.
7.16	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959 (Part 3).
7.17	Consumer display unit (optional)	Provision of consumer interface unit (CIU) to access meter from consumer premises. Wireless IHD powered by battery.
7.18	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.
7.18.1	Association Rights	Each event shall be available to download as per following association rights. a. Public Client: No access b. Meter Reader: Read only c. Utility Settings: Read only d. Push Services: Read Only for identified events as per ESWF
7.18.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events e. Non Roll Over Events f. Transaction related events g. Control Events a. Occurrence and Restoration of Voltage Related, current related, power related and other events shall be logged in meter memory as per IS 15959 (Part 3). Please refer annexure 'A' for description of events, Event ID, Logics of events and threshold values of events. b. Threshold values shall be factory programmable. c. Selective access shall be provided as per clause



		 11.3 of IS 15959 (Part 1). d. For each of the events a certain list of parameters shall be captured as per clause 'a' e. For each occurrence event captured, the cumulative tamper count shall be incremented.
7.18.3	Parameter Snapshot Meter shall capture all the parameters mentioned in table '24' of IS 15959 (part 3) when event occurrence and restoration is logged	
7.18.4	Event Logging The meter shall log minimum 100 tamper events (ensuring at least 20 events for each tamper).	
7.18.5	Tamper Indication	Appropriate Indications/Icons for all tampers should appear on the meter display either continuously or in auto display mode.
7.19	Phasor Representation	Meter shall support parameters required to develop phasors of current and voltage at HES.

8. Meter Display

SN	Item	Description	
8.1	LCD Type	STN Liquid crystal with backlit	
		a. Minimum 120 Degree.	
		b. The display visibility should be sufficient to read	
		the Meter mounted at height of 0.5 m as well as at	
8.2	Viewing angle	the height of 2 m.	
8.3	Size of LCD	Minimum 10 X 6mm	
8.4	LCD Digits	Total 6+1 digits	
8.5	LCD language	English	
		a. Auto Mode	
		b. Manual Mode	
	Display modes	c. Sub active mode	
		Display list shall be finalized during detailed engineering	
8.6		in the event of order.	
		Appropriate indications/flags for all tampers and self	
8.7	Display indications	diagnostic features should be provided.	

9. Data and Communication Protocol/ HES/ Integration/ Software

SN	Item	Description	
0.4	Data Exchange	a. Meter should comply Indian companion of data exchange	
9.1	protocol	and tariff control specification IS 15959 (Part 3).	
		b. In case of additional requirement from IS 15959 (part 3),	



		they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/		
		services/ methods used in meters from IS 15959 (part 3		
		and its reference to DLMS books/ IEC.		
		d. Prior to manufacturing of meters bidder shall provide a		
		detailed specification explaining all parameters/ services/ methods used in meter in addition to IS 15959 (Part 3).		
		a. Bidder shall work with BRPL IT team/ BRPL designated		
		system integrator to integrate its meter with BRPL HES		
		system as per integration requirements mentioned in		
9.2	Integration with HES	annexure 'C'.		
		b. Bidder shall prepare detailed documents as mentioned in		
		above clause and submit it for BRPL approval and		
	7	integration with HES.		
9.3	Base computer	Licensed Software with the following features should be		
0.2.1	software	supplied for free to download meter through optical port.		
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.		
	Security	System shall be password protected where user can login only if		
9.3.2		login ID is provided by administrator. BCS shall have rights		
		management system so that access rights can be provided as per		
		requirement to maintain security.		
9.3.3	Database	BCS shall maintain master database according to desired area, location, and region etc.		
		a. BCS shall have option of user defined report generation		
	Reporting	in format of Excel, Word and CSV, XML, PDF etc.		
		b. BCS shall have capability to export data in ASCII, CSV		
9.3.4		and XML format at desired location so that the same		
		could be integrated with our billing data for processing.		
		c. All the data available in the meter shall be convertible to		
		user defined ASCII, CSV and XML file format.		
0.2.5	Data to a C	BCS and communication ports should support data transfer rate		
9.3.5	Data transfer rate	of 9600 bps (minimum).		
		a. The manufacturer has to provide software capable of		
		downloading all the data stored in meter memory through		
	Hand Held Unit Software	window/ android operating system based handheld units		
9.4		(HHU) through optical port.		
J. 1		b. In the event of order, bidder shall work with BRPL IT		
		team/ BRPL designated system integrator to develop		
		HHU software for meter downloading and further		
		uploading on HES.		



		c. HHU software should have option for selection of
		parameters to be downloaded from meter.
		d. Meter data consisting of all parameters and complete
		load survey for all parameters shall be read by HHU and
		downloaded on HES in minimum possible time (not
		more than 5 minutes).
0.5	Tasining	Manufacture shall impart training to BRPL personnel for usage
9.5	Training	of software

10. Name Plate

SN	Description			
10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour.			
10.1	Embossing is not acceptable.			
10.2	Size of the digit shall be minimum 5X3mm			
10.3	Bar code shall be printed along with serial number			
10.4	BIS registration mark (ISI mark)			
10.5	'BRPL' insignia shall be printed above LCD display.			
10.6	BRPL PO No. & date			
10.7	Manufacturers name and country of origin			
10.8	Model type / number of meter			
10.9	Year of manufacturing			
10.10	Reference voltage / current rating			
10.11	The number of phases and the number of wires for which the meter is suitable.			
10.11	Graphical symbol as per IS 12032 can be used.			
10.12	Meter constant			
10.13	Class index of meter			
10.14	Reference frequency			
10.15	Warranty period			
	Name plate of NIC			
	a. Serial no of NIC along/ IMEI no/MAC address with bar code			
10.16	b. Name of purchaser's			
10.10	c. Communication technology with carrier frequency			
	d. Manufacturing year and month.			
	e. Warranty period.			

11. Component Specification

SN	Item	Description	Make
11.1	Current Transformers	The Meters should be with the	To meet accuracy
11.1	Current Transformers	current transformers as measuring	requirement



		elements.	
11.2	Measurement or computing chips	The Measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	Analog Devices, Cyrus Logic, Atmel, Phillips, SAMES,NEC,TEXAS
11.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.4	Display modules	 a. The display modules should be well protected from the external UV radiations. b. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). c. It should be STN type industrial grade with extended temperature range min 70 °C. 	Hongkong: Genda Singapore: Bonafied technologies Korea: Advantek China: Success Japan: Hitachi, Sony
11.5	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	USA: National Semiconductors, HP Holland/ Korea: Phillips Japan: Hitachi, Ligitek
11.6	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	SMPS Type
11.7	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. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal	USA: National Semiconductors, Atmel, Phillips, Texas Instruments. Japan: Hitachi, Oki, AVX or Ricoh Korea: Samsung



		wires.	
		LED	Everlight, Agillent
11.8	Mechanical parts	 a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods. 	
11.9	Battery	Lithium with guaranteed life of 15 years	Texcell, SAFT, Varta, Tedirun, Sanyo
11.10	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip, TEXAS, Japan: NEC, Oki
11.11	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.12	Note	 a. The components used by manufacturer shall have "Minimum Life" more than the 10 years. b. Incase vendor want to use other make components; same shall be approved by BRPL before use. c. Even for existing supplier – fresh approval is needed for all deviations. d. Manufacturer should have complete tracking of material used in meter. BRPL reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work. 	

12. Quality Assurance, Inspection and Testing

SN	Item		Description
12.1	Vendor's	Quality	To be submitted for Purchaser's approval.



	Plan (QP)		
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.	
12.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.	
12.4	Type Tests	 a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 3) shall be carried out on sample selected from BRPL lot. 	
12.5	Routine tests	All test marked "R" as per table 20 of IS 13779.	
12.6	Acceptance Tests	 a. All tests marked "A" as per table 20 of IS 13779. b. Smart meter functional tests as per IS 16444 Part 2 c. Test of load switch as per clause 10.4 of IS 16444 (Part 2) d. Test for data exchange protocol as per clause 10.5 of IS 16444. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 2). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter. 	



12.7	ESD and Magnetic	ESD and magnetic interference test will be conducted at Samir
12.7	Interference test	lab, Chennai or CPRI.
12.8	Inspection	 a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per clause 14.3 relevant standards and tampers logics as per approved GTP. All the equipments including tamper logs kits/ jigs should be calibrated. c. In-process and / or final inspection call intimation shall be given in advance to purchaser.

13. Packing, Marking, Shipping, Handling and Storage

13. Pa	Packing, Marking, Shipping, Handling and Storage		
SN	Item	Description	
13.1	Packing	 a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 4 to 5 three-phase meters must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. d. Maximum weight of a group meter box shall not be more than 25 Kg. e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be affected by these disturbances. f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel 	



		polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3. g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BRPL in the event of order. h. An impact detector ("Shock-Watch") label shall be attached to the cardboard hood of several pallets in each container/ transport truck, to warn of possible rough handling during shipment, transport and storage.
13.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required both on front (wide side) and top: a. BRPL logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type, rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions
13.4	Test reports	Routine test report to be provided with each meter
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.



14. Deviations

14.1	Deviations	a. Deviations from this specification can be acceptable, only where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with and which deviations the Buyer has agreed to in writing, before any
1111	Beviations	order is placed.b. In the absence of any list of deviations from the Seller, it will be assumed by the Buyer that the Seller complies with the Specification fully.

15. Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
7	Samples of each type and rating offered and RF NIC/ communication module of already integrated RF card as per tender qualifying criteria.	2 no's	1 no's	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required		
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 2).		Required	
16	Program for production and testing (A)		Required	Required



17	Makes of components	F	Required	Required
18	Detailed installation and commissioning	I.	Required	Required
10	instructions	1	xequired	required
19	As Built Drawing	F	Required	Required
20	Operation and maintenance Instruction as well as	Т	Required Required	Required
20	trouble shooting charts/ manuals	ı	Required Requi	
21	Inspection and test reports, carried out in		Require	
21	manufacturer's works			
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required
25	Mapping of meter serial no to Communication card.			Required

16. Delivery

16.1	16.1 Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the
10.1		material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.



Annexure – A: Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification. Bidder shall not change the format of GTP or clause description.

Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	



Annexure – B: Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	
3			



Annexure – C: Integration Requirement of Meters with NIC and HES

Integration requirements with communication provider of BRPL/ any other agency designated by BRPL for other components of AMI.

- a. Bidder(s) must share the meter security keys, all level encryption, and password information along with asset information in a format with the buyer / communication provider of BRPL so that during AMI business flow, the device and data can be authenticated all the time.
- b. Bidder(s) must share the details of meter communication specifically programmed protocols.
- c. Bidder(s) must share the meter configuration source code to the BRPL/communication provider of BRPL.
- d. Bidder (s) must share the meter interface touch points for external applications/ systems.
- e. Bidder(s) must share the required APIs including but not limited to reading APIs, configuration APIs and Functional APIs with the System Integrator for execution of business flow (Installation, reading, configuration).
- f. Bidder(s) must share the data storage and retrieval details.
- g. Bidder(s) must configure the devices to be upgraded remotely (OTA) and share the required firmware source code (with updates over the project life) with system integrator as and when it is required in case of feature request or fault correction.
- h. Bidder(s) must follow and conduct Utility's sample and periodic test program, including (but not limited to) the selection of a sample population of meters, sharing of sample test results as reported by the meter testing systems with the system Integrator.
- i. Bidder(s) must share the information related to communication module for the authorization purpose at to BRPL/ communication provider of BRPL.

Annexure – D: Tamper and Fraud Detection/Events

1. Voltage Related Events:

Description of	Logic Of Event	Logic Expression/ Threshold	Persistence
event		values	Time
R Phase Voltage Missing (Occurrence/ Restoration) Y Phase Voltage Missing (Occurrence/ Restoration) B Phase Voltage Missing (Occurrence/ Restoration) COCCURRENCE/ Restoration)	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end.	Occurrence: If Vpn<10% Vref and Ip>10% Ib Restoration: If Vpn>=10% Vref and Ip>10% Ib	Occurrence: 5 Min Restoration: 5 Min
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value. Threshold value if factory programmable.	Occurrence: If Vpn>10% Vref Restoration: If Vpn<=10% Vref	Occurrence: 5 Min Restoration: 5 Min
Low Voltage (occurrence/Restoration)	Meter should log low voltage event if voltage in any phase is below a threshold value. Thershold value if factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min
Voltage Unbalance (Occurrence/ Restoration)	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a threshold value. Threshold value should be factory programmable.	Occurrence: If Vmax- Vmin>30% Vref Occurrence: If Vmax- Vmin<=30% Vref	Occurrence: 5 Min Restoration: 5 Min
High harmonic in R Phase Voltage High harmonic in Y Phase Voltage High harmonic in in B Phase Voltage	Meter should occurrence of high harmonic in voltage if % THD in voltage of any phase shall be more than a threshold value.	Occurrence: If %THD in Voltage>=5% Restoration: If %THD in Voltage<5%	Occurrence: 5 Min Restoration: 5 Min



2. Current Related Events:

Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
Current Reverse/ R Phase Current Reverse (occurrence/ Restoration) Y Phase Current Reverse (occurrence/ Restoration) B Phase Current Reverse (occurrence/ Reverse (occurrence/	Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one, two or all three current coils reversed. This event shall not be valid in bidirectional mode of metering.	Occurrence: If Ip = -ve direction Restoration: If Ip=+ve direction	Occurrence: 5 Min Restoration: 5 Min
Restoration) R Phase Current Open (Occurrence/ Restoration) Y Phase Current Open (Occurrence/ Restoration) B Phase Current Open (Occurrence/ Restoration)	Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.	Vector Sum($I_R+I_Y+I_B+I_N$)>20% Ib and $I<10\%$ Ib Vector Sum($I_R+I_Y+I_B+I_N$)>20% Ib	Occurrence: 5 Min Restoration: 5 Min
Current Unbalance (Occurrence/ Restoration) Current Bypass (Occurrence/ Restoration	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.	Vector Sum($I_R+I_Y+I_B+I_N$)>20% Ib and I (any Phase) >5% Ib Vector Sum($I_R+I_Y+I_B+I_N$)>10% Ib	Occurrence: 5 Min Restoration: 5 Min
Over current	If the current in any phase	Occurrence: If Ip>Imax	Occurrence: 5



(occurrence/	exceeds the specified threshold	Restoration: If Ip<=Imax	Min
restoration)	current, meter should log over		Restoration: 5
	current event.		Min
High current in R	Meter should occurrence of		
Phase	high harmonic in current if %	Occurrence: If %THD in	Occurrence: 5
High current in Y	THD in current of any phase	Current>=5%	Min
Phase	shall be more than a threshold	Restoration: If %THD in	Restoration: 5
High current in B	value.	Current<5%	Min
Phase	varue.		
	Meter should log occurrence of	Occurrence: If $I_N > 50\%$ of	Occurrence: 5
High Neutral	high neutral current if neutral	average phase current	Min
Current	current shall be more than a	Restoration: If $I_N < 50\%$ of	Restoration: 5
	threshold value.	average phase current	Min

3. Power Related Events:

Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.		
Abnormal Power Off (Occurrence/ restoration)	If meter micro detect power off whereas phase voltage is present than abnormal power will be recorded. Meter sall continue to record energy as per phase voltage and current.	Occurrence: If voltage at meter power supply<10% vref and Vpn>20% vref. Restoration:	NA

4. Other Events:

Description of	Logic Of Event	Logic Expression/Threshold	Persistence
event		values	Time



	76. 1 11.11	T	
	a. Meter should either be		
	immune or should log		
	the events of attempt		
	of tampering by		
	external magnetic		
	field as per relevant		
	IS14697/ CBIP 325		
	with latest		
A1 1E / 1	amendments.		
Abnormal External	b. If the working of		
Magnetic	meter gets affected	A 10.14607/GDID 225	As per IS
Influence	under the influence of	As per IS 14697/ CBIP 325	14697
(Occurrence/	external magnetic		
Restoration)	field, meter should		
	record energy at Imax.		
	Meter should not		
	compute		
	c. MD during this period.		
	The meter shall record		
	energy as per actual		
	load once the		
	magnetic field is		
N 1	removed.		
Neutral Disturbance- HF,	Mater should log the event		Bidder shall
DC and	Meter should log the event when AC/DC/ Pulsating		define
Alternating	voltage is injected in neutral	As per manufacturing standard.	threshold
	circuit.		values
(occurrence/ restoration)	circuit.		values
restoration)	Meter shall able to detect and		
	log the low PF event if power		
	factor of the load found		
	between 0.2 to 0.5 for a load		
	above than a % threshold		
Low Power Factor	value for a threshold time		10% of I basic
Low Tower Facior	value. Event shall restore if		10/0 Of 1 Dasic
	PF factor of load remain out		
	of range 0.2 to 0.5 for a load		
	above than % threshold value		
	for		
Single Wire			100 ma



Operation			
(occurrence/			
Restoration)			
Plug in			
Communication	Meter should log the removal		
module removal	of communication card. Meter		
(Occurrence/	should also log insertion of		
Restoration)	communication card.	By NC switch/ sensor	
Configuration			
change to post-	Meter should log the change		
paid mode/ pre-	in payment mode		
paid mode	configuration.		
Configuration			
change to			
"Forwarded" only"	Meter should log the change		
mode/ "Import and	in metering mode		
Export" mode	configuration.		
Overload			
(Occurrence/	Meter should able to log the		
Restoration)	status of overload in KW		
HV Spark			
(Occurrence/		On detection of HV spark	
restoration)			
Terminal Cover	Meter should log the		
Open	occurrence and restoration of	By NC switch/ sensor	
орен	terminal cover.		
	Meter should log the event if		Occurrence: 5
	difference between		Min
Distorted PF	displacement PF and actual		Restoration: 5
	PF is more than a threshold		Min
	value		
m: 1 1	Meter should log voltage,		
Time based event	current, PF and energy	As per predefined time	NA
stamp	consumption on a predefined		
	time		

5. Non Roll over events:

Event Description	
Occurrence of cover open	



6. Transaction Related Events:

Detail of Transaction
Real Time Clock- Date and Time
Demand Integration Period
Profile Capture Period
Single Action schedule for billing date
Activity calendar for time zones
New firmware activated
Load Limit (Kw) Set
Enable Load Limit Function
Disable load limit function
LLS secret (MR) change
HLS key (US) change
HLS key (FW) change
Global key change
ESWF change
MD reset

Note:

- 1. Event ID's shall be defined as per BRPL specification/ IS 155959 (part 2). Approval shall be taken from BRPL prior to manufacturing for Event ID's
- 2. Programming of threshold values should be possible from remote via proper authentications.
- 3. Logics of tampers can be changed/upgraded via firmware up gradation from remote via proper authentication.
- 4. All the programming changes/ firmware up gradations shall be logged along-with date and time stamp in meter as well as on HES.

Technical Specification for DT Smart Meter

Document number: BR/18-19/SM/DT/01 June 2018

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Record of Revision

Item/Clause No.	Change in Specification	Reason of Change	Approved By	Rev



1. Scope of Supply

This specification covers the following for Three Phase 240 V, 5A-10A AC Static transformer operated Watt hour and Var Hour smart meters of accuracy class 0.5s with plug in communication module (RF mesh only and RF + Cellular technology).

- A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
- **B.** Any accessories / hardware required for installation and operation for the meter.

2. Codes and Standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

S	Standard	T:41.	
No.	Number	Title	
2.1	Indian Electricity Act	IE Act 2003	
2.2	CEA Metering Regulations	With latest amendments	
2.3	CBIP Manual (Pub no325)	Standardization of AC Static Electrical Energy Meters	
2.4	IS- 16444 (Part 2)	AC Static Transformer Operated Watt-hour And Var-hour Smart Meters, Class 0.2 S, 0.5 S And 1.0 S Part 2 Specification Transformer Operated Smart Meters	
2.5	IS- 14697	ac Static Transformer Operated Watt-hour and Var-hour Meters, Class 0.2 S and 0.5 S	
2.6	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification	
2.7	IS-15959 (Part 2)	Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2)- Companion Specification for smart meter	
2.8	IS-15959 (Part 2)	Data Exchange For Electricity Meter Reading, Tariff And Load Control-Companion Specification Part 3 Smart Meter (Transformer Operated Kwh And KVARh Class 0.2 S, 0.5 S And 1.0 S	
2.9	IS- 11448	Application guide for AC Electricity meters	
2.10	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment	
2.11	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)	
2.12	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols	
2.13	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements	



2.14	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods	
2.15	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)	
2.16	IEC 60736	Testing Equipment for electrical Energy meter	
2.17	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM	
2.18	IEC 62056-1- 0:2014	Smart metering standardisation framework	
2.19	IEC 62056-3- 1:2013	Use of local area networks on twisted pair with carrier signalling	
2.20	IEC 62056-4- 7:2014	DLMS/COSEM transport layer for IP networks	
2.21	IEC 62056-5- 3:2017	DLMS/COSEM application layer	
2.22	IEC 62056-6- 1:2017	Object Identification System (OBIS)	
2.23	IEC 62056-6- 2:2017	COSEM interface classes	
2.24	IEC 62056-6- 9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols	
2.25	IEC 62056-7- 3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks	
2.26	IEC 62056-7- 5:2016	Local data transmission profiles for Local Networks (LN)	
2.27	IEC 62056-7- 6:2013	The 3-layer, connection-oriented HDLC based communication profile	
2.28	IEC TS 62056- 8-20:2016	Mesh communication profile for neighbourhood networks	
2.29	IEC TS 62056- 9-1:2016	Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)	
2.30	IEC 62056-9- 7:2013	Communication profile for TCP-UDP/IP networks	
2.31	IEC 62056- 21:2002	Direct local data exchange	
2.32	DLMS- White Book	Glossary of DLMS/COSEM terms	
2.33	DLMS- Blue Book	COSEM meter object model and the object identification system	



2.34	DLMS- Green	A mahita atuwa and must a sala to tuangon out the model	
2.34	Book	Architecture and protocols to transport the model	
2.35	DLMS- Yellow	Conformance testing process	
2.33	Book	Conformance testing process	
2.36	IEEE 802.15.4	Standard for Local and metropolitan area networks.	
2.37	IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865 MHz	
2.37		to 867 MHz Band in India)	
Order	Order of precedence between different standards shall be as follow:		
i	Indian Standards Issued By BIS		
ii	IEC standard		
iii	Other standards like CBIP, DLMS etc.		

3. Service Conditions

SN	Item	Description
3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C
		Limit range of operation: -25 to 60 Deg C
		Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4. Distribution System Data

1. Distribution System Data		ystem Data
SN	Item	Description
4.1	Supply	3 Phase AC, 4 wire
4.2	Voltage	$415 \text{ V} \pm 6\%$
4.3	Frequency	50 Hz ± 5%
4.4	System	Solidly Earthed
	Neutral	

5. Electrical and Accuracy Requirement

SN	Item	Description
5.1	Meter Type	3- ø, 4 wire static Transformer Operated Smart Meter
5.2	Connection	Direct / whole current
	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%.
5.3		However meter should withstand the maximum system
		voltage.
5.4	Rated Current	Ib -5A and Imax- 10 A
5.5	Starting current	0.1 % of base current
5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	0.5s (IS14697 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 2)



		Meter with lowest power consumption shall be preferred.
5.9	Meter constant	Imp/ unit (Bidder to specify meter constant)
5.10	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.12	Influence of supply voltage	As per IS 14697
5.13	Short time over current	As per IS 14697
5.14	Immunity to phase and earth fault	As per IS 14697
5.15	Influence of Self Heating	As per IS 14697
5.16	Influence of Heating	As per IS 14697
5.17	Electromagnetic compatibility	 a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of IS 14697
5.18	Limits of error due to influence quantities	 Meter shall work within guaranteed accuracy as per IS 14697/ IEC62053-21/ CBIP325 (most stringent standard to be followed) under and after influence of following: a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray' magnetic induction of



	0.5mT+/-5%
	o. Alternating (AC) "abnormal' magnetic induction of
	10mT.
	p. External magnetic field 0.5 T
	q. Electromagnetic HF fields
	r. Radio frequency interference
	s. DC immunity test
	Note: BRPL reserves the right to formulate any other test
	method to check magnetic immunity/ logging of meter.
	Meter with logging provision will be preferred.

6. Construction Feature

SN	Item	Description
6.1	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.2	Top Cover	 a. Material: Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level. b. Top cover and base should be Ultrasonically/Chemically welded.
6.3	Terminal Block	 a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.4	Terminal cover	 a. Material - UV stabilized transparent/Opaque polycarbonate cover b. Provision of sealing at two points through sealing screw. c. The sealing screws shall be held captive in the terminal cover. d. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. e. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable.



		f. Mechanism shall be provided to record an event with occurrence and restoration in case of meter enclosure/ terminal cover is opened.
6.5	Terminals	 a. Terminals shall be suitable for 6 Sqmm copper wire. b. Two no's flat head screws per terminal shall be provided c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase / neutral / outgoing etc. e. Clearances and creep age shall be as per IS 14697.
6.6	Ingress Protection	IP 55 or better, but without suction in the meter.
6.7	Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.8	RTC	 a. The meter shall have internal real time crystal clock to set date and time. b. Meter should have capability of Time synchronization through optical port/ remote communication. c. Meter RTC shall be corrected automatically by the system in synchronization to the network RTC. d. No separate battery required for RTC. e. HES will sync RTC at least once a day.
6.9	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thioyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter.
6.10	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.11	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC. b. Battery. c. Non volatile memory. d. Display
6.12	Status Signals	Meter shall have following digital and analog inputs and outputs: 1. 4 no's Digital Inputs



		2. 4 no's Digital outputs
		3. 2 no's analog inputs.
		5. 2 no 5 anaiog mpass.
6.13	Optical port	Meter shall have an optical port with a metal ring to hold magnet of probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.
6.14	Communication Module Interface	 a. Meter should have the provision for 01 no's plug in communication module for connectivity. The same interface shall be compatible with both Cellular and RF communication technologies interchangeable according to the site. b. Interface shall support data transfer between meter and network interface card over UART/ RS232. c. Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. d. Meter Vendor shall work with BRPL designated RF provider to integrate their module in their meter. e. Preferred location of communication card module shall be on top of meter
6.14.1	Communication modules	 a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card (NIC) for connectivity of meter to HES from following options as per tender requirement: i. Communication Module/ NIC Type 1: RF based suitable for communication Network of BRPL designated RF canopy provider. ii. Communication Module/ NIC Type 2: RF and Cellular communication module (LTE 4G with 3G and 2G fall back as per Indian telecom Standards). b. Meter shall have separate indications on display/ for remote and local communication. c. Communication module shall held in a casing which can be directly plugged in the meter. Sealing screw shall be provided.
6.15	Last Gasp	Meter shall have provisions to provide last gasp signals through communication module in case of power failure. Bidder should explain in detail the provisions provided in meter to achieve the requirement.
6.16	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken



		from purchaser for location of seals.
6.16.1	Manufacturer's Seals	 a. One Polycarbonate seal to be provided on meter cover. b. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.16.2	BRPL Seals	 a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided on top cover. c. Seals will be issued to manufacturer free of cost. d. 02 no's polycarbonate seals shall be provided for communication module.
6.16.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.17	Name Plate and marking	 a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 2) & clause no. 9.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.18	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 14697.
6.19	Meter Box	 a. Polycarbonate meter box for outdoor use with IP55 rating shall be provided. b. Meter box shall be hinged type with suitable sealing arrangements. c. Material used should have flammability level FV0. d. All the metal hardware should be stainless steel or galvanized. e. Optical to RS 232 (DB9) cable shall be provided for meter downloading.



6.20	Guarantee	a. 7.5 years from the date of dispatch or 7 year from
		date of commissioning, whichever is earlier
		b. Manufacturer shall undertake a guarantee to replace
		meter up to a period of 7 Year from the date of
		supply. The meters which are found
		defective/inoperative within the guarantee period
		shall be replaced as per meter service level
		agreement.

7. Functional Requirement

SN F	Item	Description
7.1	Meter category	Smart meter comply with D4 category of IS 15959 (Part 3).
7.2	Mode of metering	Mode of metering shall be bidirectional i.e. both import and export recording shall be done. No change in metering mode shall be possible either by remote or local.
7.3	KVAH Calculation	Lag+Lead
7.4	MD calculation	Block / sliding window with default demand integration period of 1800 s configurable to 900 s as per requirement. Meter should be configurable for block/sliding window at the time of manufacturing. This change should not be possible in the field. Extended register shall be used for MD recording.
7.5	TOU Metering	 a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. TOU metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 c. Special Day table shall be defined as per IEC/DLMS UA-1000-1 d. Default TOU programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BRPL for the same. e. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak



		All the parameters mentioned in table '14' of IS 15959
		(Part 3) along with following additional parameters
		shall be supported by meter.
		a. Neutral Current (I_N)
		b. Earth voltage with respect to neutral voltage
		$(V_{\rm EN})$
		c. Y phase voltage angle with respect to R Phase
		Voltage
		d. B phase Voltage angle with respect to R phase
7.6	Instantaneous Parameters	Voltage
7.0	Instantaneous Parameters	e. % TDH in R phase Voltage
		f. % THD in Y Phase Voltage
		g. % THD in B Phase Voltage
		h. % THD in R phase Current
		i. % THD in Y Phase Current
		j. % THD in B Phase Current
		k. Displacement PF
		1. RF/ GSM signal Strength in milli db.
		m. GPS Coordinates.
		Method of Measurement for harmonic parameters at sl
7.6.1	A '.' D'.1.	no. 'b' to 'g' shall confirm to the IEEE 519, 2014.
7.6.1	Association Rights	As per Clause 17.1 of IS 15959 (Part 3).
		a. Billing parameters shall be generated at the end
		of each billing cycle and stored in memory as
		per provisions provided in clause no. 20 of IS
	Billing data	15959 (Part 3).
7.7		b. 6 no's billing cycle parameters shall be remain
7.7		in meter memory along with current cycle
		parameters and shall be available for reading as
		well as profile and or 'by entry' for selective
		access.
	A CONTROLL	c. All the parameters mentioned in table '17' of IS
771		15959 (Part 3) shall be supported by meter.
7.7.1	Association Rights	As per clause 20 of IS 15959 (Part 3).
772	Salaatiya agaasa	Support for selective access shall be provided for
7.7.2	Selective access	billing parameters as per clause no 11.3 of IS 15959
772	Dilling maried reget/MD reget	(part 1).
7.7.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.7.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
	mechanish	Cumulativa hilling popied country since installation and
7.7.5	Billing period counter	Cumulative billing period counter since installation and
	01	available billing periods shall be provided as per clause



		11.2 of IS 15959 (Part 1).
7.8	Load survey Data	 a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table '15' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter: "THD in R phase Voltage THD in Y Phase Voltage THD in B Phase Voltage THD in R phase Current THD in Y Phase Current THD in B Phase Current THD in B Phase Current
7.8.1	Profile capture period	Default 1800 s programmable to 900 s.
7.8.2	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3`	Association Rights	As per clause no.18 of IS 15959 (Part 3)
7.9	Daily load profile	Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 35 Power ON days. All the parameters mentioned in table '16' of IS 15959 (Part 3) shall be supported by meter as Daily load profile parameters.
7.9.1	Association Rights	As per clause no. 19 of IS 15959 (Part 3)
7.10	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 26 of IS 15959 (Part 3).
7.10.1	Name Plate Detail	As per Table '25' of IS 15959 (Part 3) with following additional parameters. a. Month of manufacturing.
7.10.1.1	Association Rights	As per clause no. 26.1 of IS 15959 (Part 3)
7.10.2	Programmable parameters	These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. Programming of any of the parameters shall increment the 'Cumulative programmable count' value. All the parameters mentioned in table '26' of IS 15959 (Part 3) shall be supported by meters with following additional parameters:



		a. GPS coordinates.
7.10.2.1	Association rights	As per Clause no. 26.2 of IS 15959 (Part 3).
7.10.3	Push Services	 a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 2). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e instantaneous, billing, load survey, daily energy and events. Bidder should explain its capability to configure push services. However following push services shall be available by default. i. Load survey profile data at after every 4 hours configurable to any predefined interval. ii. Mid night data at 00:00 hrs of every day. iii. Billing profile data on occurrence of billing.
7.10.3.1	Periodic push (Smart meter to HES)	 a. Meter shall be able to push instantaneous parameters to HES at predefined intervals. Parameters required for push shall be intimated during detailed engineering in the vent of order. b. Other attributes as per IS 15959 (Part 3) i.e. Send Destination, Communication window, Randomization time interval, number of retries and repeat delay shall be decided in the event of manufacturing.



		a. Meter is able to report HES, the status change of
		any of the identified events mapped in to event
		status word (ESW) of size 128 bits by pushing
	Event Push (Smart meter to HES)	following objects to HES.
		i. Device ID
		ii. Push Setup ID
		iii. Real time clock- Date and Time
		iv. Event Status Word 1 (ESW 1).
		b. Each of the bits in ESW shall reflect the current
7.10.3.2		state of the event and are mapped against each
7.10.3.2		of the identified events.
		c. An event status word filter (ESWF) of 128 bit
		shall also be provided to configure events for
		event push. Events which are supported in meter
		shall only be configured for event push. Bit
		value 1 in ESWF shall indicate that the event is
		supported and value 0 indicates that event is not
		supported for event push. Position of the event
		bit in ESWF shall be same as in ESW.
		a. Smart meter shall support remote firmware
		upgrade feature for meter firmware without loss
		of any data and metrology for a part or complete
		firmware of meter.
		b. Firmware upgrade shall use the Image transfer
		classes and mechanisms specified in IEC62056-
		6-2 and IEC62056-5-3.
	Event status Bit mapping	c. Broad cast facility shall be supported in HES for
		simultaneously upgrading the firmware of a
		group of meters installed in field.
7.10.3.3		d. Firmware upgrade feature shall be provided
7.10.3.3		with proper security. The design shall take into
		account field scenarios such as power failure
		during F/W upgrade.
		e. Once the firmware is upgraded, meter shall send
		an acknowledgment to HES. It shall also log it
		as an event in its memory.
		f. Meter shall support capability to self register the
		meter with new firmware.
		g. The execution time of the change of the
		firmware within the meter should be below 1
		minute
		mmuc



		h. Smart meter shall support remote firmware	
		upgrade feature for meter firmware without loss	
	Firmware upgrade	of any data and metrology for a part or complete	
		firmware of meter.	
		i. Firmware upgrade shall use the Image transfer	
		classes and mechanisms specified in IEC62056-	
		6-2 and IEC62056-5-3.	
		j. Broad cast facility shall be supported in HES for	
		simultaneously upgrading the firmware of a	
		group of meters installed in field.	
7.11		k. Firmware upgrade feature shall be provided	
		with proper security. The design shall take into	
		account field scenarios such as power failure	
		during F/W upgrade.1. Once the firmware is upgraded, meter shall send	
		an acknowledgment to HES. It shall also log it	
		as an event in its memory.	
		m. Meter shall support capability to self register the	
		meter with new firmware.	
		a. The execution time of the change of the	
		firmware within the meter should be below 1	
		minute	
	Support for broadcast message	Meter shall support connection less messaging services	
		of DLMS to support broadcast messages for a group of	
		meters for following actions:	
7.12		a. Gap reconciliations.	
		b. Firmware upgrade.c. On demand readings	
		d. Meter connection and disconnection.	
		e. Updating of Programmable parameters	
	First breath and last gasp	a. In Last Gasp endpoint shall send the power	
		outage notification with Time Stamp. In case of	
7.13		power failure meter communication module	
		shall not draw power from the backup battery.	
		b. For the purpose of sending the Last Gasp,	
		communication module shall have proper power	
		backup (like a super capacitor).	
7.14	Security	Advanced security outlined in clause 7.1.2 of IS 15959	
	Engraption for data	(Part 1) shall be provided.	
7.14.1	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)	
7.14.2	Encryption/ Authentication	As per clause 7.2 of IS 15959 (Part 2)	
/.17.4	Energytion Audientication	115 per elause 1.2 of 15 15/5/ (1 alt 2)	



	for data transport		
7.14.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)	
7.14.4	NIC Security	 a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator. 	
7.15	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959 (Part 3).	
7.16	Consumer display unit (Optional)	Provision of consumer interface unit (CIU) to access meter from consumer premises. Wireless IHD powered by battery.	
7.17	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.	
7.17.1	Association Rights	Each event shall be available to download as per following association rights. a. Public Client: No access b. Meter Reader: Read only c. Utility Settings: Read only d. Push Services: Read Only for identified events as per ESWF	
7.17.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events	



		e. Non Roll Over Events
		f. Transaction related events
		g. Control Events
		Ü
		a. Occurrence and Restoration of Voltage Related,
		current related, power related and other events
		shall be logged in meter memory as per IS
		15959 (Part 3). Please refer annexure 'A' for
		description of events, Event ID, Logics of
		events and threshold values of events.
		b. Threshold values shall be factory
		programmable.
		c. Selective access shall be provided as per clause
		11.3 of IS 15959 (Part 1).
		d. For each of the events a certain list of
		parameters shall be captured as per clause 'a'
		e. For each occurrence event captured, the
		cumulative tamper count shall be incremented.
		Meter shall capture all the parameters mentioned in
7.17.3	Parameter Snapshot	table '24' of IS 15959 (part 3) when event occurrence
		and restoration is logged
7 17 4	F 41 :	The meter shall log minimum 100 tamper events
7.17.4	Event Logging	(ensuring at least 20 events for each tamper).
		Appropriate Indications/Icons for all tampers should
7.17.5	Tamper Indication	appear on the meter display either continuously or in
	_	auto display mode.
7.10	DI D	Meter shall support parameters required to develop
7.18	Phasor Representation	phasors of current and voltage at HES.

8. Meter Display

SN	Item	Description	
8.1	LCD Type	STN Liquid crystal with backlit	
		a. Minimum 120 Degree.	
	Viewing angle	b. The display visibility should be sufficient to read	
	the Meter mounted at height of 0.5 m as well		
8.2		the height of 2 m.	
8.3	Size of LCD	Minimum 10X5mm	
8.4	LCD Digits	Total 6+1 digits	
8.5	LCD language	English	
		A . M. 1	
	Display modes	a. Auto Mode	
8.6		b. Manual Mode	



			c. Sub active mode
			Display list shall be finalized during detailed engineering
			in the event of order.
		Display indications	Appropriate indications/flags for all tampers and self
8.	.7	Display indications	diagnostic features should be provided.

9. Data and Communication Protocol/ HES/ Integrations/ Software

<u>9.</u> D	Data and Communication Protocol/ HES/ Integrations/ Software		
SN	Item	Description	
9.1	Data Exchange protocol	 a. Meter should comply Indian companion of data exchange and tariff control specification IS 15959 (Part 2). b. In case of additional requirement from IS 15959 (part 2), they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/ services/ methods used in meters from IS 15959 (part 2) and its reference to DLMS books/ IEC. d. Prior to manufacturing of meters bidder shall provide a detailed specification explaining all parameters/ services/ methods used in meter in addition to IS 15959 (Part 3). 	
9.2	Integration with HES	 a. Bidder shall work with BRPL IT team/ BRPL designated system integrator to integrate its meter with BRPL HES system. b. Bidder shall prepare detailed documents as mentioned in above clause and submit it for BRPL approval and integration with HES. 	
9.3	Base computer software	Licensed Software with the following features should be supplied for free to download meter through optical port.	
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.	
9.3.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.	
9.3.3	Database	BCS shall maintain master database according to desired area, location, and region etc.	
9.3.4	Reporting	 a. BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc. b. BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing. c. All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format. 	



9.3.5	Data transfer rate	BCS and communication ports should support data transfer rate	
9.3.3	of 9600 bps (minimum).		
9.4	Hand Held Unit Software	 a. The manufacturer has to provide software capable of downloading all the data stored in meter memory through window/ android operating system based handheld units (HHU) through optical port. b. In the event of order, bidder shall work with BRPL IT team/ BRPL designated system integrator to develop HHU software for meter downloading and further uploading on HES. c. HHU software should have option for selection of parameters to be downloaded from meter. d. Meter data consisting of all parameters and complete load survey for all parameters shall be read by HHU and downloaded on HES in minimum possible time (not more than 5 minutes). 	
9.5	Training	Manufacture shall impart training to BRPL personnel for usage of software	

10. Name Plate

10.	ame i late	
SN	Description	
10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour.	
10.1	Embossing is not acceptable.	
10.2	Size of the digit shall be minimum 5X3mm	
10.3	Bar code shall be printed along with serial number	
10.4	BIS registration mark (ISI mark)	
10.5	'BRPL' insignia shall be printed above LCD display.	
10.6	BRPL PO No. & date	
10.7	Manufacturers name and country of origin	
10.8	Model type / number of meter	
10.9	Month and Year of manufacturing	
10.10	Reference voltage / current rating	
10.11	The number of phases and the number of wires for which the meter is suitable.	
10.11	Graphical symbol as per IS 12032 can be used.	
10.12	Meter constant	
10.13	Class index of meter	
10.14	Reference frequency	
10.15	Warranty period	
10.16	Communication technology with carrier frequency	
10.17	Name plate of NIC	
10.17	a. Serial no of NIC along/ IMEI no/MAC address with bar code	



- b. Name of purchaser's
- c. Communication technology with carrier frequency
- d. Manufacturing year and month.
- e. Warranty period.

11. Component Specification

SN	Item	Description	Make
11.1	Current Transformers	The Meters should be with the current transformers as measuring elements.	To meet accuracy requirement
11.2	Measurement or computing chips	The Measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	Analog Devices, Cyrus Logic, Atmel, Phillips, SAMES,NEC,TEXAS
11.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.4	Display modules	 a. The display modules should be well protected from the external UV radiations. b. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). c. It should be STN type industrial grade with extended temperature range min 70 °C. 	Hongkong: Genda Singapore: Bonafied technologies Korea: Advantek China: Success Japan: Hitachi, Sony
11.5	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	USA: National Semiconductors, HP Holland/ Korea: Phillips Japan: Hitachi, Ligitek
11.6	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong	SMPS Type



		connections.	
11.7	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. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires. LED	USA: National Semiconductors, Atmel, Phillips, Texas Instruments. Japan: Hitachi, Oki, AVX or Ricoh Korea: Samsung Everlight, Agillent
11.8	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
11.9	Battery	Lithium with guaranteed life of 15 years	Texcell, SAFT, Varta, Tedirun, Sanyo
11.10	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip, TEXAS, Japan: NEC, Oki
11.11	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.12	Note	 a. The components used by manufacturer shall have "Minimum Life" more than the 10 years. b. Incase vendor want to use other make components; same shall be approved by BRPL before use. c. Even for existing supplier – fresh approval is needed for all deviations. d. Manufacturer should have complete tracking of material used in meter. BRPL reserve the 	



right to carry out audit of inventory/ manufacturing
process at manufacturer's works and sub vendor's work.

12. Quality Assurance, Inspection and Testing

12. Q	Quality Assurance, Inspection and Testing		
SN	Item	Description	
12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.	
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.	
12.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.	
12.4	Type Tests	 a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 2) shall be carried out on sample selected from BRPL lot. 	
12.5	Routine tests	All test marked "R" as per table 20 of IS 14697.	
12.6	Acceptance Tests	 a. All tests marked "A" as per table 20 of IS 14697. b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16444. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. 	



		IV) Tamper/ fraud detection/logging features as per	
		approved documents. Tamper conditions will be	
		simulated at varying load up to Imax. Accuracy will	
		also be checked during tamper simulation.	
		V) Burn in chamber test.	
		VI)Component verifications.	
		h. Purchaser reserves the right to formulate any other test	
		method to verify guaranteed parameters of Meter.	
12.7	ESD and Magnetic	ESD and magnetic interference test will be conducted at Samir	
12.7	Interference test	lab, Chennai or CPRI.	
12.8	Inspection	 a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per clause 14.3 relevant standards and tampers logics as per approved GTP. All the equipments including tamper logs kits/ jigs should be calibrated. c. In-process and / or final inspection call intimation shall be given in advance to purchaser. 	

13. Packing, Marking, Shipping, Handling and Storage

15. 10	3. Packing, Marking, Snipping, Handling and Storage					
SN	Item	Description				
13.1	Packing	 a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 4 to 5 three-phase meters must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. d. Maximum weight of a group meter box shall not be more than 25 Kg. e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be 				



		offeeted by these disturbances
		affected by these disturbances. f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3. g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BRPL in the event of order. h. An impact detector ("Shock-Watch") label shall be attached to the cardboard hood of several pallets in each container/ transport truck, to warn of possible rough handling during shipment, transport and storage.
13.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required both on front (wide side) and top: a. BRPL logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type, rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions
13.4	Test reports	Routine test report to be provided with each meter
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.



Handling and	Handling and	Manufacturer instruction shall be followed. Detail handling &			
		storage instruction sheet /manual to be furnished before			
	Storage	commencement of supply.			

14. Deviations

SN	Item	Description
14.1	Deviations	 a. Deviations from this specification can be acceptable, only where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with and which deviations the Buyer has agreed to in writing, before any order is placed. b. In the absence of any list of deviations from the Seller, it will be assumed by the Buyer that the Seller complies with the Specification fully.

15. Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispotab
1	Guaranteed Technical particulars (GTP)	Required	Required	Dispatch
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
7	Samples of each type and rating offered along with box and RF NIC/ communication module of already integrated RF card as per tender qualifying criteria.	2 no's	1 no's	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required		
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		



13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 2).		Required	
16	Program for production and testing (A)		Required	Required
17	Makes of components		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer's works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required
25	Mapping of meter serial no to Communication card.			Required

16. Delivery

16.1	16.1 Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the
16.1		material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.



Annexure – A: Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification. Bidder shall not change the format of GTP or clause description.

Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature -----

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	



Annexure – B: Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	
3			



Annexure – C: Integration Requirement of Meters with NIC and HES

Integration requirements with communication provider of BRPL/ any other agency designated by BRPL for other components of AMI.

- a. Bidder(s) must share the meter security keys, all level encryption, and password information along with asset information in a format with the buyer / communication provider of BRPL so that during AMI business flow, the device and data can be authenticated all the time.
- b. Bidder(s) must share the details of meter communication specifically programmed protocols.
- c. Bidder(s) must share the meter configuration source code to the BRPL/communication provider of BRPL.
- d. Bidder (s) must share the meter interface touch points for external applications/ systems.
- e. Bidder(s) must share the required APIs including but not limited to reading APIs, configuration APIs and Functional APIs with the System Integrator for execution of business flow (Installation, reading, configuration).
- f. Bidder(s) must share the data storage and retrieval details.
- g. Bidder(s) must configure the devices to be upgraded remotely (OTA) and share the required firmware source code (with updates over the project life) with system integrator as and when it is required in case of feature request or fault correction.
- h. Bidder(s) must follow and conduct Utility's sample and periodic test program, including (but not limited to) the selection of a sample population of meters, sharing of sample test results as reported by the meter testing systems with the system Integrator.
- i. Bidder(s) must share the information related to communication module for the authorization purpose at to BRPL/ communication provider of BRPL.

Annexure – D: Tamper and Fraud Detection/ Events

1. Voltage Related Events:						
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time			
R Phase Voltage Missing (Occurrence/ Restoration) Y Phase Voltage Missing (Occurrence/ Restoration) B Phase Voltage Missing (Occurrence/ Restoration)	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end	Occurrence: If Vpn<10% Vref and Ip>10% Ib Restoration: If Vpn>=10% Vref and Ip>10% Ib	Occurrence: 5 Min Restoration: 5 Min			
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value.	Occurrence: If Vpn>10% Vref Restoration: If Vpn<=10% Vref	Occurrence: 5 Min Restoration: 5 Min			
Low Voltage (occurrence/ Restoration)	Meter should log low voltage event if voltage in any phase is below a threshold value. Threshold value if factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min			
Voltage Unbalance (Occurrence/ Restoration)	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a threshold value. Threshold value should be factory programmable.	Occurrence: If Vmax- Vmin>30% Vref Restoration: If Vmax- Vmin<=30% Vref	Occurrence: 5 Min Restoration: 5 Min			
R Phase high Voltage Harmonics Y Phase high Voltage Harmonics	Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value should be	Occurrence: If % THD in Vpn>5% of fundamental. Restoration: If % THD in Vpn<5% of fundamental.	Occurrence: 5 Min Restoration: 5 Min			



B Phase high	factory programmable.						
Voltage							
Harmonics							
2. Current Related Events:							
Description of	Logic Of Event	Logic Expression/	Persistence				
event	- B	Threshold values	Time				
Current							
Reverse/ R							
Phase Current							
Reverse	Meter should log the event of						
(occurrence/	reversal of C.C polarity.						
Restoration)	Meter should register energy						
Y Phase	consumed correctly with any	Occurrence: If $Ip = -ve$	Occurrence: 5				
Current	one, two or all three current	direction	Min				
Reverse	coils reversed. This event	Restoration: If Ip=+ve	Restoration: 5				
(occurrence/	shall not be valid in	direction	Min				
Restoration)	bidirectional mode of						
B Phase							
Current	metering.						
Reverse							
(occurrence/							
Restoration)							
R Phase							
Current Open							
(Occurrence/							
Restoration)		Vector					
Y Phase	Meter should log the event of		Occurrence: 5				
Current Open	current coil open. Threshold	Sum($I_R+I_Y+I_B+I_N$)>20% Ib and I<10% Ib	Min				
(Occurrence/	value of current should be	Vector	Restoration: 5				
Restoration)	programmable at factory end.		Min				
B Phase		$Sum(I_R+I_Y+I_B+I_N)>20\% Ib$					
Current Open							
(Occurrence/							
Restoration)							
Current							
Unbalance							
(Occurrence/							
Restoration)							
Current Bypass (Occurrence/ Restoration	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at	Vector $Sum(I_R+I_Y+I_B+I_N)>20\%$ Ib and I (any Phase) >5% Ib Vector					



	factory end.	$Sum(I_R+I_Y+I_B+I_N)>10\% Ib$			
Over current (occurrence/ restoration)	If the current in any phase exceeds the specified threshold current, meter should log over current event.	Occurrence: If Ip>Imax Restoration: If Ip<=Imax	Occurrence: 5 Min Restoration: 5 Min		
R Phase high Current Harmonics R Phase high Current Harmonics R Phase high Current Harmonics R Phase high	Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value should be factory	Occurrence: If % THD in $I_P > 5\%$ of fundamental. Restoration: If % THD in $I_P < 5\%$ of fundamental.	Occurrence: 5 Min Restoration: 5 Min		
High neutral Current	Meter should log event of high neutral current if measured neutral current should be more than predefined threshold value.	Occurrence: If $I_N > 50\%$ of average phase current Restoration: If $I_N < 50\%$ of average phase current	Occurrence: 5 Min Restoration: 5 Min		
Difference between actual and calculated neutral Current	Meter shall log the event if measured neutral current has been found differ from calculated neutral current from a predefined value	Occurrence: If $ I_{N(calculated)} $ $I_{N(measured)}/>10\%$ of Ib . Restoration: If $ I_{N(calculated)} $ $I_{N(measured)}/<=10\%$ of Ib .	Occurrence: 5 Min Restoration: 5 Min		
3. Power Related Events:					
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time		
Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.				
Abnormal Power Off (Occurrence/ restoration)	If meter micro detect power off whereas phase voltage is present than abnormal power will be recorded. Meter sall continue to record energy as	Occurrence: If voltages at meter power supply<10% Vref and Vp>20% vref. Restoration:	NA		



	per phase voltage and current.						
Sudden load Change	Meter shall log event if there is sudden change in load e.g. 40% of last measured value.						
4. Other E	4. Other Events:						
Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time				
Abnormal External Magnetic Influence (Occurrence/ Restoration)	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS14697/CBIP 325 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.	As per IS 14697/ CBIP 325	As per IS 14697				
Neutral Disturbance- HF, DC and Alternating (occurrence/ restoration)	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.	As per manufacturing standard.	Bidder shall define threshold values				
Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found in between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value. Event shall restore if PF factor of		10% of I basic				



	load remain out of range 0.2 to 0.5 for a load above than				
	% threshold value for				
Plug in Communication	Meter should log the removal				
module	of communication card.				
removal	Meter should also log				
(Occurrence/	insertion of communication				
Restoration)	card.	By NC switch/ sensor			
Configuration	N. 1 111 1 1				
change to post-	Meter should log the change				
paid mode/ pre-	in payment mode				
paid mode Configuration	configuration.				
Configuration change to					
"Forwarded"					
only" mode/	Meter should log the change				
"Import and	in metering mode				
Export" mode	configuration.				
Overload					
(Occurrence/	Meter should able to log the				
Restoration)	status of overload in KW				
UV Sport	Meter with communication				
HV Spark (Occurrence/	card should be immune or				
restoration)/	log the event in the case of	Immediately	NA		
Jammer	application of ESD upto and				
Jammer	including 35 KV.				
DO alarms	Meter shall log DO alarms as configured by user	NA	NA		
Distorted PF	Meter shall log the event if				
	difference between		Occurrence: 5		
	displacement PF and actual		Min		
	PF is more than a predefined		Restoration: 5		
	value		Min		
	Meter shall log voltage,				
Time Based	current, PF and energy	As per predefined time	NA		
Event Stamp	consumption on a predefined	113 per predefined unic	IVA		
	time				
5. Non Roll over events:					
Event Description	on				



Occurrence of cover open		
6. Transaction Related Events:		
Detail of Transaction		
Real Time Clock- Date and Time		
Demand Integration Period		
Profile Capture Period		
Single Action schedule for billing date		
Activity calendar for time zones		
New firmware activated		
Load Limit (KW) Set		
Enable Load Limit Function		
Disable load limit function		
LLS secret (MR) change		
HLS key (US) change		
HLS key (FW) change		
Global key change		
ESWF change		
MD reset		