GUARANTEED TECHNICAL PARTICULAR OF LT SINGLE PHASE WHOLE CURRENT STATICENERGY METERS (SMART METER)

SINGLE PHASE 2 WIRES, 240 Volts 10-60 AMP, SMART ENERGY METER

Sl.No.	Particular	Purchasers Requirement	Offered
1.	Name of manufacturer	To be mentioned	
2.	Type, name & number (Model)	To be mentioned	
3.	Standard Applicable	IS 16444 with its latest amendment as on date.	
4.	Rating		
(i)	Accuracy Class	Class-1.0 as per IS 16444 for Active Energy	
(ii)	Rated Voltage	240V (+ 20% -40%)	
(iii)	Rated current	Ib-10 Amp. Imax 60 Amp, Variation 120 % of Imax	
(iv)	Rated frequency	50 Hz ± 5%	
(v)	Power factor	0 lag - Unity – 0 lead	
(vi)	Shall work within accuracy up to max. loading	120 % of Imax	
5.(i)	Continuous current rating (Amp.)	60 Amps.	
(ii)	Running with no load and 115 % of rated voltage	No creeping	
6.	Short time over current for one half cycle at rated frequency.	60 Imax	
7.	Starting current at which meter shall run & continue to run	Starting current at which meter shall run & continue to run - 0.4%of Ib at rated voltage and unity power factor & continue to run at 60 A	
8.	Power loss at rated frequency & reference temperature		
(a)	Current circuit at rated current	As per IS 16444	
(b)	Voltage circuit at rated current	As per Is 16444	
9.	Type of material used		
(a)	Base Material and thickness	Transparent, High Impact strength, non-hygroscopic, flame retardant, Engineering plastic of min. 2.0 mm thick	
(b)	Meter cover material	---As above ---	
(c)	Terminal Block material	High Impact strength non hygroscopic, flame retardant material. Barrier of adequate size shall be provided between neighboring terminals.	
(d)	Colour	Meter cover shall be fully transparent.	
(e)	Screw		
(i)	Material	Nickle Plated - Brass	
(ii)	Size	5-6 mm dia	
10.	Internal diameter of Terminal	As per CBIP report 325	

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
	Hole		
	Note	**Meter Cover should be ultrasonically welded.** **The meter shall be encapsulated designed or ultrasonically welded base and top cover separated but chemical welded in case of encapsulated design**	
11.	Centre to Centre clearances between adjacent terminals	More than 13 mm	
12.	Transducers		
(i)	Input	CT/Shunt or combination and potential divider (PT less)	
(ii)	Output	Digital	
13.	Type of display	LCD with Backlit	
(i)	Operation suitability	LCD suitable for operation up to 80°C	
(ii)	No. of Digits	6 including decimal digit (5+1)	
(iii)	Size of Numerals	SIZE OF NUMERALS 8.5 x 5 mm MIN	
14.	Display Sequence (display should be self explanatory)		
14.1	Auto Scroll Mode		
(i)	Cumulative active energy	KWh	
(ii)	Maximum demand of month	KW	
14.2	Push button mode	(As per specification)	
15	Type of push button arrangement	Spring loaded push button to be provided on top cover of meter box to activate the push button of meter to read parameters Spring loaded push button/ Capacitive Touch Keypad can be accepted.	
16.(i)	Reading during power-off condition	Meter shall be able to display the reading trough any push button mode in power off condition.	
(ii)	Type of arrangement made to display in power off condition	To be explained	
(iii)	During power outage if reading button pressed continuously for more than 1 minute	Display shall be inoperative and it will get operative with change of date / resumption of power.	
17.	Whether meter is provided with optical port for data downloading	To be indicated	
18.	Battery Backup	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years from date of installation of meters.	
19.	Fixing/sealing arrangement		

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
(i)	Fixing of meter	Min. 2 fixing holes (one at top & one at bottom under terminal block). The top fixing screw shall not be accessible after meter is fixed to meter box base.	
(ii)	Sealing of meter cover to Base	(a) At least 2 nos. polycarbonate irreplaceable tamper evident seals with serial no. matching with that of meter also marked with discom name and firm's logo.	
		(b) seal shall be provided on front side only.	
		(c) Meter cover shall be permanently and solidly welded with Base so that it could not be opened without breaking. In case of encapsulated design chemical welding is Accepted	
20.	Performance of meter in tamper conditions		
(i.)	Phase-neutral interchanged	Should work within specified accuracy	
(ii)	Main & load wire are interchanged	----do----	
(iii)	(a) Load is not terminated back to meter & current is drawn through local earth fully or partially even when phase and neutral connection are reversed.	---do----	
	(b) Incoming neutral disconnected, outgoing neutral connected to earth through resistance and load is connected to earth.	LED start blinking when incoming voltage is below 200V and Energy register shall advance for low voltage up to 120V for single phase meter. LCD icon shall also be accepted	
(iv)	Neutral disconnected from both incoming & outgoing and load drawn through local earth	Provision should be there to not exceeding threshold current of 20% of I_b and start recording energy.	
(v)	Indication in above tamper condition (LED or ICON)	¯Reverse‖ indication for (i) & (ii), ¯Earthed‖ indication for (iii) above & (iv)	
(vi)	Injection of abnormal frequency and voltage of the order of 35 KV with help of external device. Meter should also be immune for tamper by application of remote induction device (Jammer) when meter with	Should work normal	

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
	communication module is placed inside of meter box and when meter without communication module is placed outside of meter box.		
21.	Suitability of meter to sustain over voltage i.e. phase to phase voltage injected between phase & neutral	Should sustain	
22.	Size of calibration LED and other LED/Icon	Size of calibration LED and other LED/Icon: Low Power 3mm or 5mm. Calibration LED of Red colour is essential.	
23.	Electromagnetic compatibility (EMC/ EMI severity level)	Should withstand severity level 4	
24.	Effect on accuracy of external electromagnetic interference of electrical discharge, external magnetic field & DC current in AC supply or in neutral	Should work within accuracy Complying with standards with its latest amendment as on date.	
		The meter shall not get influenced by any external magnetic fields (AC Electromagnet or DC Magnet) as per value(s) specified in CBIP technical reports no 325 for AC magnetic field. • Under the influence of abnormal magnetic field (above prescribed limits) the meter shall record power value not exceeding the product of rated voltage and maximum current (I_{max}). • Meter shall have provision to record the tamper of abnormal magnetic induction with date and time of occurrence and restoration.	
25.	Effect of accuracy in tamper conditions	Should work within accuracy specified in IS:16444 with latest amendment	
26.	Cut off voltage (at which meter stop working)	Cut off voltage (at which meter stop working) shall be below 40% of the rated voltage (Vref)	
27.	Ref. Temperature	27°C	
28.	Temperature range of operation	-10°C to 60°C	
29.	Drift in accuracy of measurement with time	No Drift in accuracy in measurement with time	
30.	Fixing arrangement of name plate	Plastic nameplate fixed in side the meter. It should contain all the details as per ISS	
31.	Type of body	Projection type	
32.	Calibration	Software calibrated at factory.	
33.	Manufacturing activity		

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
(i)	Mounting of components on PCB shall be SMT type	SMT type and ASIC technology	
(ii)	Compliance to quality assurance	To be complied	
34.	Testing facility		
(i)	Fully automatic meter bench with print out facility shall be available.	Must be available	
(ii)	Make and S.No. of Test bench	To be indicated	
(iii)	Accuracy of ESS duly calibrated	---do---	
(v)	Following in house testing facility shall be available;		
a)	Insulation resistance	Must be available	
b)	Running on no load	--do--	
c)	Starting current	--do--	
d)	Limits of error	--do--	
e)	Power loss in voltage and current circuit.	--do--	
f)	Repeatability of error	--do--	
g)	Transportation test	--do--	
h)	Low load run test	--do--	
I)	Heating test	--do--	
35. (i)	Whether offered meter are Type Tested as per IS:16444 at NABL accredited Lab	To be indicated	
(ii)	Name of the Lab	To be indicated	
36.	Guarantee period of meter printed on name plate.	As per TS	
37	Parameters (In case of net-meter both export & import parameters to be measured)	Instantaneous: As per IS 15959 (Part 2): 2016 Billing parameters: As per IS 15959 (Part 2): 2016 Daily Load Profile: As per IS 15959 (Part 2): 2016 . The billing parameters shall be retained in the meter for 12 months and should automatically rollover. With additional parameters of export TODs, Profile parameters for meters (including Import - export parameters) shall be in line with IS16444 part1 requirements and import/export parameters shall be in line with the requirements of IS16444 part1 and IS15959 part2.	
38	Maximum Demand	Should have Maximum Demand registers kW and kVA with integration period 15 minutes. It should be programmable for 30/15	

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
		minutes. Resets should be auto-monthly as well as through HES. MD Recording should be based on sliding window principal with default MD integration Period 15 Min	
39	Load Survey/Interval Data	As per IS applicable shall be IS:16444 Part-II & IS:15959 Part-III with latest amendment for category „D3' LT CT operated meter for consumer metering. Block load profile parameters as per IS 15959 (Part 3): 2017 shall be recorded for 45 (Power ON) days data to be recorded with 15 minutes integration period. In addition, Daily load profile parameters as per IS 15959 (Part 3): 2017 shall also be recorded for 45 (Power ON) days. The register shall automatically rollover the data after 45 days based on first in first out (FIFO) basis. Survey block integration period shall be configurable for 15 min & 30 min, by defaults it should be provided in 15 minutes block for 45 days. By default, LS parameters shall be with 15 Min. integration period.	
40	Time of Use	As per IS 15959 (Part 2): 2016	
41	LCD Indicators	As per IS 16444:2015	
42	Tamper/Event recording	As per IS 15959 (Part-2):2016. 200 events shall be stored in local memory of Smart Meters (100 occurrence and 100 restoration)	
43	Alarm switch / contactor	As per IS 15884	
44	Measuring Elements	Meter should have two measuring elements – one in phase and other in neutral path.	
45	Anti-Tamper features	As per TS	
46	Disconnection/Reconnection Mechanism	As per IS 16444.	
47	Connect/Disconnect Indication	As per IS 16444	
48	Programmability	It should be possible to program the parameters limits / values remotely through adequate security mechanisms. Once programmed it will be possible for the programmed	

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
		parameters to come into effect from a certain date & time. Metrology under such condition must remain intact and shall not be upgradable from remote & Meter shall be as per IS 15959 part 2	
49	Communication and Communication Protocol	As per IS 16444	
50	RTC & time synchronization	Meter shall have RTC with 20 years calendar programmed in the memory and provision for time synchronization, the maximum drift shall not exceed +/- 300 Seconds per year. The clock day/date setting and synchronization shall only be possible through password/Key code command from remote server through communication network. Contractor shall submit the methodology for the synchronization of RTC.	
50	Data display facility (manual/Auto)	Data Display shall have following features: Data display facility (manual/Auto) Minimum 7-digit LCD display having minimum 8.5x5 mm min for all digits Display of data as per TS. The Push button for manual scrolling in addition to auto scrolling with a persistence time of 10 seconds for each parameter shall be provided. High resolution (shall display energy value with resolution of 2 digits before decimal and 5 digits after decimal. KWh total and fundamental kWh are essential. In case of Net Metering Import, Export and Net will be available at Meter Display and at HES also In case of prepaid meter Display parameters should be available as per IS 15959 and latest amendment and same shall be available at HES also. With additional parameters of export TODs, the requirement shall	

CONFIDENTIAL

Sl.No.	Particular	Purchasers Requirement	Offered
		be in line with IS16444 part 2 for import - export meter parameters.	
51	Guarantee	Manufacturer Shall undertake a guarantee to replace meter with NIC up to Contract Period (Execution + AMC). However meterwith NIC is supplied after executionperiod then Guarantee period shall be 5 and half year from date of supply.	
52	Remote Firmware Upgrade	As per IS 15959 (Part 2): 2016	
53	Testing of Smart Meter	As per TS	
54	Other parameters/features notcovered in the above GTP	Conform to specification of IS 16444 (with its latest amendment).	

REMARKS:

(1) All the information/parameters indicated above shall exist in the meter offered & shall withstand all the tests specified above within the variation of current/voltage frequency and climatic conditions specified therein.

Even though if any features or parameters are not specifically covered in this GTP, but are essential for the satisfactory performance of the meter as per the specification, are deemed to have been covered in the GTP.

CONFIDENTIAL

Meter Data Display Requirements

A. Single Phase Meters Display Data

1. DISPLAY SEQUENCE:

The Liquid Crystal Display register for single and three phase LT meter should display the measured value(s). The height of the display character should be minimum 8.5 mm. In addition display of the required parameters should be in two different modes as stated hereunder:-

1.1 Auto scroll Display Mode:

The LT meters shall have following parameters in auto scroll display

i) Date: DD: MM: YY Real Time: HH:MM

ii) Cumulative Active Energy KWH total and fundamental KWH; Kwh total and fundamentalkwh are essential to follow Regulatory norms.

iii) Instantaneous load in KW in three decimal.

iv) Current Power factor

v) Voltage

1.2 Display parameter (Push Button) Mode:

The display of the following parameters shall be scrolling one after the other through push button. The display shall have ‗ON' time of minimum 10 seconds of each measured value, except LCD segment check. The LCD segment check shall be on meter display for minimum 2 seconds. Display parameters shall move forward if button is pressed prior to the programmed time for display of each parameter.

(a) LCD segment check
(b) Meter serial number
(c) Real date and time (Date DD-MM-YY, Time HH-MM)
(d) Cumulative active energy (KWH) register.
(e) Cumulative apparent energy (KVAH) register.
(f) Maximum demand of the month should be in KW and kVA by default up to two decimal (since last auto reset) with date & time with 15 minutes integration on sliding windowprinciple with sub integration period of not greater than 5 minutes. Cumulative active energy KWH for each calendar month for previous two months withprogrammed billing date.
(g) Cumulative apparent energy KVAH for each calendar month for previous two months.

(h) Maximum Demand in KW and KVA by default up to two decimal, each calendar month for previous six months with date and time of such demand, Maximum demand of the month shall be in KW and KVA by default & up to two decimal digits
(i) Average PF to be provided for previous 6 months.
(j) Tamper information- this shall be displayed when tampered with following.

Date of last tamper last tampe ltamper occurrence.

(b)Time of last Tamper occurrence

CONFIDENTIAL

(c)Number of time meter tampered.

(k) Instantaneous Phase voltage
(l) Instantaneous Phase current
(m) Instantaneous Neutral current
(n) Instantaneous p.f. (With sign of lead/lag)
(o) Instantaneous load in KW and KVA in three decimal
(p) High resolution Energy value (resolution will be sufficient to enable conduction of the startingcurrent and accuracy test in less time).

Since meters are required duly fitted with Hinge type meter box, hence for reading purpose, an arrangement should be made on top cover of Hinge type meter box with its mechanical connection to the meter's body as described in the Specification of meter box to activate the display push button of meter.

The display with push button shall be auto off type after completion of the display cycle it should revert back to normal auto scroll mode approximately after 10 seconds. Fresh button press will be required after resumption of auto scroll cycle to display the above parameters again.

CONFIDENTIAL

Communication Protocol:-

1. Communication Protocol As per IS 15959/DLMS-COSEM (RF **/RF MESH, NBIoT, WBIoT/GPRS**)
2. Remote Firmware Upgrade As per IS 15959 Part 3
3. Should be able to Integrate with JIO HES and a integration confirmation is required from JIO

DCU and its capabilities as minimum requirement as below:
DCU shall push events such as tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
The equipment shall be weatherproof, dustproof and constructed for outdoor installation on poles (minimum rating: IP65).
A suitable mounting provision shall be made for the equipment.
Enclosure: Provision for security sealing shall be provided and in case the gasket of the cover is used for protection against moisture, dust and insects, the gasket shall be made of weather and aging resistant material.

DCU Communication:

Min Requirement: The communication architecture shall be any, as defined under IS 16444.
The DCU shall ensure the appropriate backhaul for secure transfer of data to HES either via cellular or Fiber Optic communication. In case of cellular backhaul, it shall support SIM card with dynamic/static IP from any service provider.
It shall have Wide Area Network (WAN) connectivity to the HES through suitable means.
DCU shall be able to communicate with meters either on RF / RF mesh (Unlicensed or Licensed frequency band as permitted by WPC/Statutory Bodies in country of deployment as applicable) or PLCC.
DCU shall periodically monitor meter reads/downstream commands and shall retry and reconnect in case of failed events/reads. It shall push events such as tamper, power off etc. to HES immediately on occurrence/receipt from field devices/meters.
DCU shall be able to acquire and send data to HES for full capacity (as per designed for no. of meters/field devices) to ensure the performance level. Full capacity of DCU is required to be indicated in the offer

Min Requirement: After Power Interruption, on restoration of power supply, DCU shall establish communication with underlying devices as well as upstream application automatically.

DCU shall be able to communicate with the nearest meters depending on topographical features. For further communication among the meters, distance of the other meters with the DCU shall not be a constraint as communication of the nearest meters shall be established with other meters through appropriate mesh formation / other formation.

Remote Firmware Upgrade: The DCU shall support remote firmware upgrades as well as remote configuration from the network operation cum monitoring center. Configuration of programmable parameters of Smart Meters shall be done through HES.

All meters falling under one DCU shall be commissioned and checked for proper communication in presence of Utility incharge.

DCU shall keep the records of minimum of the following events:

- No of packet failures
- Retry attempts
- Missed periodic readings
- Failure to connect
- Tamper events
- First Breath and Last Gasp on Power Restore and Failure occurance

Smart Metering Rating and Compliances

Sl. No	Material Description (Short text)	Additional Description	BIS COMPLIANCE	Warranty and Life	Remark
1	1 PH SMART METER Current - 10-60 Amp Voltage - 240 Volt Class : 1 Freq : 50 Hz Single Phase 2 Wire IS:16444 Part-1	SINGLE PHASE SMART METER 10-60A, 240V, Cl -1, 50 HZ WITH IN BUILT COMMUNICATION (COMMUNICATION MODULE WITH NBIOT /GPRS/RF), IS: 16444 COMPLIANCE, REMOTE CONNECT / DISCONNECTION SUITABLE FOR ONLINE PRE PAYMENT FUNCTIONALITY, ONLINE CREDIT RECHARGE WITH PAYMENT GATEWAY AND NBIOT SIM OF RELIANCE JIO / AIRTEL ALONG WITH METER.	IS:16444 Part-I & IS:15959 Part-II with latest amendment for Project	10.5 Years	with backlit LCD display and communication port for data downloading, Two Way communication, NIC card plug and play, TOD Energy recording etc