The detailed meter specification No. : I-10-1A of Single phase Meter.

CONTENTS

1.0 SCOPE

This specification covers the design, manufacture testing, supply and delivery of single phase 2 wire 10-60Amps Static Watt hour meters of class: 1.0 accuracy.

2.0 STANDARDS

IS: 13779, IEC 1036, & CBIP Technical report no.88 and its latest amendments along-with BSES specifications.
The meter shall be ISI marked (vendor shall be BIS certified) and conform to CEA metering regulation.

3.0 FUNCTIONAL SPECIFICATION

Sr. No.	Function /Feature	Technical Requirements
3.1	Voltage	Ref Voltage 240 volt (P-N), +20% to -40% Vref, however the meter should withstand the maximum system voltage.
3.2	Display	a) LCD (Six digits) b) Height: 10 mm X 6 mm min. c) Pin Type d) Viewing angle min. 160 degrees
3.3	Power factor range	Zero lag –unity- zero lead
3.4	Display parameters	a) Display parameters : LCD test, KWH, MD in KW, Date & Time, Voltage, Current, Instantaneous Load. b) Display order shall be as per cl 8.0 of this specification. **NO PUSH BUTTON REQUIRED IN METER.**
3.5	Power Consumption	Less than 1 Watt & 8VA in Voltage circuit and 2 VA for Current circuit
3.6	Starting current	0.2 % of Ib
3.7	Frequency	50 Hz with + / - 5% variation
3.8	Test Output Device	Flashing LED visible from the front
3.9	Billing data	a) Meter serial number, Date and time, KWH, MD in KW, History of KWH, MD with occurance detail for last 6 months along with TOD readings & meter shall log monthly ON/ Off hrs as history. b) All the above parameters (namely KWH, MD in KW) are meter readings. c) All these data shall be accessible for reading, recording and spot billing by downloading through optical port with MRI (Analogic & SANDS) & Laptop computers at site.
3.10	MD Registration (KW)	a) Meter shall store MD in every 30 min. period along with date & time. At the end of every 30 min, new MD shall be computed & compared with previous MD and store whichever is higher and the same shall be displayed.
3.11	Auto Reset of MD	Auto reset date for MD shall be indicated at the time of finalizing GTP and provision shall be made to change MD reset date through MRI even after installation of meter on site. Default resetting date is 00:00 hrs, 1st of every month.

<table>
<tr><th>Sr. No.</th><th>Function /Feature</th><th>Technical Requirements</th></tr>
<tr><td>3.12</td><td>TOD metering</td><td>Meter shall be capable doing TOD metering for KWH, and MD in KW with 6 time zones (programmable on site through CMRI). Following are the default T&D time zone.

<table><tr><td>Tariff</td><td>Timings</td></tr><tr><td>1</td><td>00:00 to 6:00</td></tr><tr><td>2</td><td>06:00 to 09:00</td></tr><tr><td>3</td><td>09:00 to 12:00</td></tr><tr><td>4</td><td>12:00 to 18:00</td></tr><tr><td>5</td><td>18:00 to 22:00</td></tr><tr><td>6</td><td>22:00 to 24:00</td></tr></table></td></tr>
<tr><td>3.13</td><td>Security feature</td><td>Programmable facility to restrict the access to the information recorded at different security level such as read communication, communication write etc</td></tr>
<tr><td>3.14</td><td>Memory</td><td>Non volatile memory independent of battery backup, memory should be retained up to 10 year in case of power failure</td></tr>
<tr><td>3.15</td><td>Software & communication compatibility</td><td>a) Optical port with RS 232 compatible to transfer the data locally through CMRI & remote through PSTN / Optical fiber / GSM / CDMA / RF / any other technology to the main computer.

b) The Supplier shall supply Software required for CMRI (both for Analogic & SANDS make) & for the connectivity to AMR modules. The supplier shall also provide training for the use of software. The software should be compatible to Microsoft Windows systems. The software should have polling feature with optional selection of parameters to be downloaded for AMR application

c) The data transfer (from meter to CMRI / AMR equipment) rate should be minimum 1200 bps.

d) The Supplier shall provide meter reading protocols. Vendor to jointly work with BSES IT team to develop CMRI software for meter downloading and further uploading on computer. The vendor has to give an undertaking in this regards.

e) Communication protocols will be either of following two types.
Same as previous supplied meter to BSES, minimum for 10000 Nos OR
As per IEC 62056/ DLMS protocol. Other protocols shall not be acceptable.</td></tr>
<tr><td>3.16</td><td>Climatic conditions</td><td>a) Refer IS: 13779 for climatic conditions.

b) The meter should function satisfactorily in India with high end temperature as 60ºC and humidity up to 96%.</td></tr>
<tr><td>3.17</td><td>Battery</td><td>In case battery removal or total discharge same should not effect the working & memory of the meter.</td></tr>
<tr><td>3.18</td><td>Calibration</td><td>Modification in calibration shall not be possible at site by any means.</td></tr>
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4.0 CONSTRUCTIONAL SPECIFICATIONS

Sr. No.	Parameters	Technical Requirements
4.1	Body of Meter	a) Top transparent and base opaque material polycarbonate of LEXAN 143A/943AA or equivalent grade having properties of V0 inflammability level and UV stabilized. b) Front cover & base should be ultrasonically welded. c) **Top cover Open** :- The meter shall have top cover opening detection mechanism. The top cover opening event shall be indicated display continuously in auto scroll mode with kWh or through additional LED and shall be logged in memory. The detection and logging mechanism shall work even when meter is not energized. In case of indication of display, meter display shall get reset in 150 days. Logic shall be defined.
4.2	Terminal Block	Made of polycarbonate of grade 500 R or equivalent, brass or copper current terminals with flat-head brass screws.
4.3	Terminal cover	Transparent terminal cover with provision of sealing through sealing screw. It should be extended type, with two cable entry holes suitable for 2X25 Al. armoured cable.
4.4	Diagram of connections	Diagram of external connections to be shown on terminal cover
4.5	Marking on name plates	Meter should have clearly visible, indelible and distinctly name plate marked in accordance with IS & BSES specifications. Prior approval of name plate design to be taken before product supply.
4.6	Meter Sealing	As per IS 13779 and CEA Metering Regulation 2006, Supplier will fix its seal on meter. In addition, supplier shall affix buyer seal(s) on side of Meter body as advised by buyer and record should be forwarded to Buyer.
4.7	Guarantee / Warranty	5 Years.
4.8	Insulation	A meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
4.9	Resistance of 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 the relevant IS 13779.

5.0 TAMPER & ANTI-FRAUD DETECTION/EVIDENCE FEATURES

5.1 Tamper Conditions:

The meter shall not get affected by any remote control device & shall continue recording energy under any one or combinations of the following conditions:

Sr. No.	Tamper condition	Meter behavior
5.1.1	I/C & O/G Interchanged	Meter should record forward energy
5.1.2	Phase & Neutral Interchanged	Meter should record forward energy
5.1.3	I/C Neutral Disconnected,	Meter should record forward energy

	O/G Neutral & Load Connected To Earth.	
5.1.4	I/C Neutral Disconnected, O/G Neutral Connected To Earth Through Resistor & Load Connected To Earth.	Meter should record forward energy
5.1.5	I/C Neutral connected, O/G Neutral Connected To Earth Through Resistor & Load Connected To Earth.	Meter should record forward energy
5.1.6	I/C (Phase & Neutral) Interchanged, Load Connected To Earth.	Meter should record forward energy
5.1.7	I/C & O/G (Phase or Neutral) Disconnected, Load Connected To Earth.	Meter should record forward energy
5.1.8	Under all type of DC/AC magnetic field strength	Meter should be immune or should be logged as an event and should record as per provision of IS 13779.

5.2 Influence Parameters

The meter shall work satisfactorily with guaranteed accuracy limit under the presence of the following influence quantities as per IEC: 1036 and CBIP Technical Report No: 88 with latest amendment:

a) External magnetic field *
b) Electromagnetic field induction,
c) Radio frequency interference,
d) Vibration etc,
e) Waveform 10% of 3rd harmonics,
f) Voltage variation,
g) Electro magnetic H.F. Field,
h) D.C. immunity test,

External magnetic field * Test will be done as per IS for AC abnormal field and at 0.5Tesla for DC magnetic field. BSES reserve the right to formulate any other test method to check magnetic immunity/ logging of meter. Meter with magnetic logging provision will be preferred.

5.3 <u>Tamper logging:-</u>

5.3.1 Low Voltage Logging –Event shall be logged in memory along with Occurrence and restoration event data. Threshold should be below 180Volts.

5.3.2 Protection against HV spark: Meter shall continue to record energy or log the event, incase it is disturbed externally using a spark gun/ ignition coil. Upto 35 KV meter should be immuned.

5.3.3 Recording of Neutral disturbance: - Meter shall log all events when AC/DC/ Pulsating voltage is injected in neutral circuit escpially when same can disturb the recording of energy.

5.4.4 External Magnetic tampers: Meter should log on the events of attempt of tampering by external magnetic field as mentioned in the relevent IS.

The Meter shall record as per actual load once the external abnormal magnetic field is removed. In such conditions the Meter shall log the event for presence of abnormal external magnetic field and its restoration.

Event Logging:- The meter should log all the following events:-

1. Selection of 'Neutral CT' :- 20 events
2. Selection of 'one wire power' :- 20 events
3. Events Top cover opening :- 20 events including 1st occurance
4. Magnetic event :- 20 events

5. Abnormal external field/ ESD :- 20 events
6. Low voltage(Below 180V) :- 20 events

* The events count mentioned is minimum

The vendor will provide s/w to download all these data. The CMRI s/w shall work both on SANDS & Analogic CMRI. The event shall be logged with V.I and cumulative kwh energy register value.

6.0 COMPONENT SPECIFICATIONS

Sr No	Component Function	Requirement	Makes and Origin
6.1	Current Transformers	The Meters should be with the current transformers as measuring elements. The current transformer should withstand for the clauses under 5.2.h	The current transformer should withstand for the clauses under 5.2.h
6.2	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
6.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Japan: Hitachi or Oki
6.4	Display modules	a) The display modules should be well protected from the external UV radiations. b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2.d for Viewing angle). c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). d) It should be trans-reflective HTN or STN type industrial grade with extended temperature range min 70 °C.	Truly semiconductor, Tianma/ Haijing Electronics, China
6.5	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	Everlight, Osram, Agillent, NFC
6.6	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	It should take care of clause 3.1 and 3.5

Sr No	Component Function	Requirement	Makes and Origin
		system appears to the terminals due to faults or due to wrong connections.	
6.7	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. LED	USA: National Semiconductors, Atmel, Phillips, Texas Instruments Japan: Hitachi, Oki, AVX or Ricoh Korea: Samsung EPCOS,Vishay Everlight, Agillent
6.9	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.	
6.10	Battery	Lithium with guaranteed life of 10 years	Texcell, SAFT, Varta
6.11	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip , TEXAS Japan: NEC or Oki
6.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)

Note: 1) The components used by manufacturer shall have “Minimum Life” more than the 10 years.
2) Incase vendor want to use other make components; same shall be approved by BSES before use.
3) Even for existing supplier – fresh approval is needed for all deviations.

7.0 GENERAL REQUIREMENTS

7.1 On the meter name-plate:

a) meter serial number should be of 8 digits
b) Size of the digit of the meter serial number should be minimum 5mm X 3mm.
c) bar code should be printed next to / below / above the meter serial number
d) BIS registration mark (ISI mark)

7.2 Meter Sr. Nos. to be printed in black on the name plate, instead of embossing.

7.3 Buyer’s Serial Number sticker should be fixed on window glass from inside or on Meter front cover of minimum digit size 6 mm X 3 mm.

7.4 Supplier shall supply software suitable for energy measurement & energy spot billing through CMRI.

7.5 The supplier should seal the meter cover. The Buyer shall approve the method of sealing.

7.6 The internal potential links should be in closed position or link less Meters will be preferred. There shall not be any external link.

7.7 Delivarable with Meters.

1. Individual meter accuracy test report.

2. Extended Terminal cover (refer 4.3)
3. Consolidated report of routine test report & seal & initial reading record.

7.8 Box number, Meter serial number, type, rating should be mentioned on cases / cartons.

7.9 Meters shall be suitably packed with environmental friendly material in order to avoid damage or disturbance during transit or handling and to prevent in grace of moisture and dust.

7.10 Meter shall have manufacturing month and year in the memory and should be downloadable.

8.0 DISPLAY SEQUENCE FOR THE PARAMETERS

1	**Cumulative kWh**	30 Sec
2	**Meter Sr. No.(8 digits)**	5 Sec
3	**Date**	5 Sec
4	**Real time**	5 Sec
5	**Current month MD**	5 Sec
6	**Instantaneous Voltage**	5 Sec
7	**Instantaneous Current**	5 Sec
8	**Instantaneous Load KW**	10 Sec

- On occurrence of any abnormality, it should appear on the display like top cover open, battery low or NVM failed.