

Three Phase (20-100 Amps).

1.0 TECHNICAL SPECIFICATION

Sr. No.	Parameters	Technical Requirements
1.1	Voltage	240 volt (P-N), 415 volt (P-P) +20% to -40% Vref.
1.2	Display	a) LCD (Seven digits) b) Height: 10 mm X 5 mm min. c) Pin Type d) Viewing angle min. 120 degrees
1.3	Display parameters	a) Display parameters: LCD test, date & time, cumulative KWH, cumulative KVAH & RKVAH, MD in KW & KVA, PF, V, I (cumulative KWH continuous and other parameter with pushbutton. All the energies are without decimal.) b) Display order shall be as per Annexure-1
1.4	Power factor range	Zero lag –unity- zero lead
1.5	Power Consumption	Less than 1 Watt & 4VA per phase in voltage circuit, 2 VA in current circuit
1.6	Starting current	0.2 % of I_b
1.7	Current range	Higher current range i.e. I_{max} is acceptable.
1.8	Test Output Device	Flashing LED visible from the front
1.9	Billing data	a) Meter serial number, Date and time, KWH, KVAH, RKVAH, MD in KW and KVA, No. of tamper counts, tamper occurrence with date & time, tamper restoration date & time with snap shots. History of KWH, KVAH, RKVAH & MD for last 6 months along with TOD readings. b) All the above parameters (namely KWH, KVAH, RKVAH, MD in KW and KVA) are meter readings. c) All these data shall be accessible for reading, recording and spot billing by downloading through optical port on MRI or Laptop computers at site.
1.10	MD Registration	a) Meter shall store MD in every 30 min. period along with date & time. b) It should be possible to reset MD automatically at the defined date (or period)
1.11	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.
1.12	TOD metering	Meter shall be capable of doing TOD metering for KWH, KVARH, KVAH and MD in KW and KVA with 6 time zones (programmable on site through CMRI)
1.13	Load survey	30 min integration period, load profile of average voltage and current, KW and KVA for min. 36 days
1.14	Time required for data reading from meter and downloading on desktop PC	Meter data consisting of all parameters and 36 days load survey for 4 parameters shall be read by CMRI and downloaded on desktop PC in minimum possible time and it shall be indicated at the time of finalizing GTP.

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1.15	Diagnostic feature	Self diagnostic for time, calendar, RTC battery all display segments and NVM.
1.16	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, communication write etc
1.17	Software & communication compatibility	<p>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.</p> <p>b) The Supplier shall supply Software required for CMRI & 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 (Windows 98 system). The software should have polling feature with optional selection of parameters to be downloaded for AMR application.</p> <p>c) Necessary provision shall be made in the software for converting all the parameters available for new and old meters if supplied earlier. Copy of operation manual shall be supplied.</p> <p>d) The meter should have capability to store the tamper status in the memory in the form of status word. Any change in the status word (selectable basis) the meter should generate the interrupt to initiate the communication with the AMR module through RS232 port if module connected.</p>
1.18	Memory	Non volatile memory independent of battery backup, memory should be retained up-to 10 year in case of power failure
1.19	Climatic conditions	<p>a) The meter should function satisfactorily in India with temperature ranging from 0 - 60°C and humidity upto 96%.</p> <p>b) Also refer IS: 13779 for climatic conditions.</p>
1.20	Calibration	Meters shall be software calibrated at factory and modification in calibration shall not be possible at site by any means.

2.0 CONSTRUCTIONAL FEATURES

Sr. No.	Parameters	Technical Requirements
2.1	Body of Meter	<p>a) Top transparent and base opaque material polycarbonate of LEXAN 143A/943AA or equivalent grade.</p> <p>b) Front cover & base should be ultrasonically welded and should be provided with the brass sealing screws.</p> <p>c) Top cover should be designed so as the internal components should not be visible.</p>
2.2	Terminal Block	Made of polycarbonate of grade 500 R or equivalent grade and shall form Integral part of the meter base, brass or copper current terminals with flat-head brass screws.
2.3	Terminal cover	Transparent terminal cover with provision of sealing through sealing screw.
2.4	Diagram of	Diagram of external connections to be shown on terminal cover

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	connections	
2.5	Marking on name plates	Meter should have clearly visible, indelible and distinctly name plate marked in accordance with IS & Reliance Energy Ltd specifications.
2.6	Meter Sealing	Supplier shall affix one Buyer seal on side of Meter body as advised and record should be forwarded to Buyer.
2.7	Guarantee / Warranty	5 Years.
2.8	Insulation	A meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
2.9	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.

3.0 TAMPER & ANTI-FRAUD DETECTION/EVIDENCE FEATURES

The meter shall log minimum 225 tamper events, compartment wise division of each event and their persistence time shall be indicated in GTP.

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

- 3.1. **Phase sequence reversal:** The meters shall work accurately irrespective of the phase sequence of the supply.
- 3.2. **Detection of missing potential:** In case someone intentionally takes out a potential lead, the date and time of such occurrence shall be recorded by the Meter. The restoration of normal supply shall also be similarly recorded. The threshold for the voltages should be programmable.
- 3.3. **Reversal of C.C. (Current Coil) Polarity:** Meter shall record the reversal of C.C. polarity with time and date, and also the time of restoration. Meter shall however
- 3.4. register the energy consumed correctly with any one, two or all three phase c.c. reversal.
- 3.5. **C.C. Shorting:** Meter shall record C.C. Terminal shorting with time and date and time of restoration. The threshold of the current should be programmable.
- 3.6. **Power On / Off:** Meter shall detect power OFF (minimum power off period 5 minutes) if any of phase voltages are not present. This event shall be recorded at the time of each power OFF. At the same time power ' ON ' event shall be recorded. This logging shall be available in Tamper details along with cumulative time of failure.
- 3.7. **Recording of Neutral disturbance:** - Meter shall log all events when AC/DC current or voltage is injected in neutral circuit without disturbing the recording of energy.
- 3.8. **Snap-on parameters:** Meter shall log all three phase voltage, current, power factor etc. at the time of tamper attempt for all such occurrence.

- 3.9. **External Magnetic tampers:** Meter should log on the events of attempt of tampering by external magnetic field as mentioned in the CBIP Technical report no. 88 with latest amendments.

The Meter shall record energy at maximum current (I_{max}) under the influence of abnormal external magnetic field irrespective of actual load, energy recorded in such case shall also be available in separate register. 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.

- 3.10. **Influence Quantities:** The Meter shall work satisfactorily with guaranteed accuracy limit under the presence of the following influence quantities as per IS 13779, IEC-1036, and CBIP Technical Report No.88 with latest amendment.

The influence quantities are:

- 3.10.1. External Magnetic field – 0.2 tesla (with log on feature)
- 3.10.2. Electromagnetic field induction,
- 3.10.3. Radio frequency interference,
- 3.10.4. Unbalanced load,
- 3.10.5. Vibration etc,
- 3.10.6. Wave form 10% of 3rd harmonics,
- 3.10.7. Phase sequence,
- 3.10.8. Voltage unbalance,
- 3.10.9. Electro Magnetic H.F. Field, and
- 3.10.10. D.C. Immunity test.

4.0 COMPONENT SPECIFICATIONS

Ser No	Component Function	Requirement	Makes and Origin
4.1	Current Transformers	The Meters should be with the current transformers as measuring elements. The current transformer should withstand for the clauses under 5.9.j	The current transformer should withstand for the clauses under 5.9.j
4.2	Measurement or computing chips	The Measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	<u>USA:</u> Anolog Devices, Cyrus Logic, Atmel, Phillips, Texas Instruments. <u>South Africa:</u> SAMES <u>Japan:</u> NEC
4.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	<u>USA:</u> Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Microchip <u>Japan:</u> Hitachi or Oki
4.4	Display modules	a) The display modules should be well protected from the external UV radiations.	<u>Hongkong:</u> Genda <u>Singapore:</u> Bonafied Technologies <u>Korea:</u> Advantek

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		<p>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).</p> <p>c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type).</p> <p>d) It should be trans-reflective HTN or STN type industrial grade with extended temperature range.</p>	<p><u>China:</u> Sucess <u>Japan:</u> Hitachi, Sony <u>Holland / Korea:</u> Phillips</p>
4.5	Communication modules	Communication modules should be compatible for the two RS 232 ports (one for optical port for communication with Meter reading instruments & the other - for the hardwired RS 232 port to communicate with various modems for AMR)	<p><u>USA:</u> National Semiconductors, HP, Optonica,ST, <u>Holland / Korea:</u> Phillips <u>Japan:</u> Hitachi <u>Taiwan:</u> Ligitek <u>Germany:</u> Siemens</p>
4.6	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.	<p><u>USA:</u> National Semiconductors ,HP <u>Holland / Korea:</u> Phillips <u>Japan:</u> Hitachi, <u>Taiwan:</u> Ligitek</p>
4.7	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.	<p>SMPS Type (It should take care of clause 3.1 and 3.5)</p>
4.8	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.	<p><u>USA:</u> National Semiconductors, Atmel, Phillips, Texas Instruments,ST,Onsemi <u>Japan:</u> Hitachi, Oki, AVX or Ricoh <u>Korea:</u> Samsung</p>
4.9	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc.	

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		b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
4.10	Battery	Lithium with guaranteed life of 10 years	Varta, Tedirun, Sanyo or National
4.11	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	<u>USA</u> : Philips, Dallas Atmel, Motorola, Microchip <u>Japan</u> : NEC or Oki
4.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	

5.0 GENERAL REQUIREMENTS

- 5.1 On the meter name-plate:
- 5.2 meter serial number should be of 7/8 digits
- 5.3 size of the digit of the meter serial number should be minimum 5mm X 3mm.
- 5.4 bar code should be printed next to / below / above the meter serial number
- 5.5 BIS registration mark (ISI mark)
- 5.6 Supplier shall supply software suitable for energy measurement & energy spot billing through CMRI.
- 5.7 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.
- 5.8 The supplier should seal meters on both sides. The Buyer shall approve the method of sealing.
- 5.9 The internal potential links should be in closed position or link less Meters will be preferred and there shall not be any external link.
- 5.10 Terminal cover should be fixed on Meter before dispatch.
- 5.11 Meter Sr. Nos. to be printed in black on the name plate, instead of embossing.
- 5.12 Box number, Meter serial number, type, rating should be mentioned on cases / cartons.
- 5.13 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.

6.0 ANNEXURE 1: DISPLAY SEQUENCE FOR THE PARAMETERS

6.1 Default Display:

1. Cumulative KWH (cumulative KWH to be displayed continuously without decimal)

6.2 On-demand Display:

After using pushbutton the following parameters should be displayed.

1. LCD test
- 2 Date
- 3 Real Time
- 4 Cumulative RKVAH
- 5 Cumulative KVAH
- 6 Current MD in KW
- 7 Current MD in KVA
- 8 Instantaneous Power factor
- 9 Instantaneous voltage R phase
- 10 Instantaneous voltage Y phase
- 11 Instantaneous voltage B phase
- 12 Instantaneous current R phase
- 13 Instantaneous current Y phase
- 14 Instantaneous current B phase
- 15 Last month billing Date
- 16 Last month billing KWH reading
- 17 Last month billing RKVAH reading
- 18 Last month billing KVAH reading
- 19 Last month billing Maximum Demand in KW
- 20 Last month billing Maximum Demand in KW occurrence Date
- 21 Last month billing Maximum Demand in KW occurrence Time
- 22 Last month billing Maximum Demand in KVA
- 23 Last month billing Maximum Demand in KVA occurrence Date
- 24 Last month billing Maximum Demand in KVA occurrence Time

Note: The meter display should return to Default Display mode (mentioned above) if the 'push button' is not operated for more than 6 seconds.