

## 1.0 GENERAL TECHNICAL REQUIREMENTS

S.NO.	DESCRIPTION	REQUIREMENT
1.1	Type of the meter	Three phase four wire whole current meter-direct reading type.
1.2	Accuracy Class of the meter	1.0
1.3	Basic Current (I <sub>b</sub> ) & Rated Maximum Current (I <sub>max</sub> )	I <sub>b</sub> = 20A; I <sub>max</sub> = 100 Amps
1.4	Reference Conditions for testing the performance of the meter	V <sub>ref</sub> = 230 V ± 1 % Frequency = 50hz ± 0.3% Temperature= 27 C± 2 °C
1.5	Operating Voltage	Meter shall be operational with required accuracy from 0.6 V <sub>ref</sub> to 1.2 V <sub>ref</sub> .
1.6	Operating Frequency	50 Hz± 5%.
1.7	Power Consumption	Voltage circuit: Maximum 1.5 W and 10 VA Current Circuit :Maximum 1 VA
1.8	Starting Current	40mA (0.2% of I <sub>b</sub> )
1.9	Short time over current	3000 A for 0.01 sec ( 30I <sub>max</sub> for one half cycle at rated frequency)
1.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 45 <sup>0</sup> C.
1.11	Rated Impulse withstand voltage	6KV (Shall be applied ten times with one polarity & then repeated with the other polarity and minimum time between each impulse to be 3 sec.)
1.12	AC withstand voltage for 1 min	4 KV
1.13	Insulation resistance a) Between frame & current ,voltage circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit. :	5 M ohm 50 M ohm.
1.11	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 13779.
1.15	Resistance to heat and fire	The terminal block, terminal cover and Meter case shall ensure safety against spread of fire. They should not be ignited by thermal overload of live parts in contact with them as per clause 6.8 of IS 13779.Fire retardant material shall be used.
1.16	Protection against penetration of dust and water.	Degree of protection :IP 51 as per IS 12063, but without suction in the meter.
1.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 13779.
1.18	Electromagnetic Compatibility (EMC)	Requirements shall be as per CBIP technical report no 88 (latest amendment)
1.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 13779.
1.20	Power factor range	Zero lag to Zero lead.
1.21	Energy measurement	Fundamental energy +Energy due to Harmonics
1.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.

1.23	Self Diagnostic feature	The meter shall have indications for un satisfactory / non-functioning of (i) Time and calendar (ii) Real Time Clock (iii) RTC battery (iv) Non Volatile Memory
1.21	Initial start up of meter	Meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals.
1.25	Internal diameter of the terminal holes	9.5mm ( minimum )
	Depth of the terminal holes	25 mm
1.26	Clearance between adjacent terminals	10 mm ( minimum)
1.27	Lag only configuration	Meter shall be programmed for "Lag only configuration" I.e. lead to be treated as unity PF for kVAh calculation.

### 1.27 Communication capabilities:

**1.27.1** The meter shall have facilities for data transfer locally through CMRI and remotely by GSM, CDMA, PLCC and GPRS modems/devices with proper security via an optically isolated communication port using serial communication. It shall be possible to reconfigure the meters for TOD Tariff, DIP (Demand Integration period), billing date etc through proper authentication process locally through CMRI and remotely through AMR. Optical Communication port shall be available for communication along with additional RJ 11 port .Communication ports shall not be affected by any type of injection /unauthenticated signals. The complete data shall be downloaded within 2 minutes.

### 1.28 Immunity against external influencing signals:

Meter shall record accurate energy in case of any external influencing signals in line with IS 13779:1999 Cl.9.2.1 and variation in limits of error (upto 100% of I<sub>max</sub>) shall be as per the table 17 of IS 13779.

### 1.29 D.C. immunity:

The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection should be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal, DC signal and DC pulse of low frequency. Meter shall log the event into memory as 'DC Injection' with date & time stamp and shall show 'TAMPER 'in the display.

All the tamper events (along with the cumulative count) i.e. Magnet/ HV ESD / DC Injection/ Meter Case open/ Neutral Disturbance shall be logged in the memory of the meter with date and time stamp.

## 2.0 GENERAL CONSTRUCTIONAL REQUIREMENT:

### 2.1 General:

Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water.

All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions.

The meters shall be designed and manufactured using SMT (Surface Mount Technology) components All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.

## **2.2 Meter Body:**

Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II). The minimum thickness of the meter enclosure shall be 2mm. Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent. Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent. Front cover & base shall be Ultrasonically/Chemically welded such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s). Unidirectional screws to be used on meter covers where ever required.

However single case meter body would be highly preferred. I.e. meter top cover and base shall be of single mould, thus nullifying the possibility of opening of meter case.

## **2.3 Terminals and Terminal Block**

Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the test given in ISO 75 for temperature of 135°C and pressure of 1.8 M Pa. The terminal block shall be of opaque with polycarbonate LEXAN500R.

The terminals and connections shall be suitable to carry up to 120 % of I<sub>max</sub> continuously (I<sub>max</sub> is 100A) The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them. The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminals shall be of MS Cage Clamp type as per IS 15707

Internal diameter of the terminal holes shall be minimum 9.5 mm, minimum clearance between adjacent terminals shall be 10 mm. Depth of the terminal holes shall be of 25 mm. Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.

## **2.4 Terminal Cover:**

Terminal cover shall be of short type and shall be transparent with polycarbonate LEXAN 143R/943A. Appropriate space shall be available for incoming /outgoing cables without damaging/stressing terminal cover (terminal cover design shall be got approved from NDPL). After sealing the cover, terminals shall not be accessible without breaking the seals. The connection diagram for the system shall be provided at terminal cover.

## **2.5 Sealing of meter**

Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons as per CEA regulation (2006). For this, one number Polycarbonate seal and one number Hologram seal shall be provided by the NDPL. One no polycarbonate seal and one number hologram seal shall be provided by the bidder. All the seals shall be fixed on meter body by the bidder at his works. One sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per NDPL specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals as per CEA Regulation(2006)

## **2.6 Display of Measured Values:**

The meter shall be capable of measuring Cumulative Energy (KWh) and MD (KW) with time of day (TOD) registers having 4 zones (no. of zones & time slot shall be programmable locally or remotely with adequate security level).

The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65 deg C and minimum temperature withstands 0 deg C during normal operating condition. The LCD display

shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical and magnetic disturbances.

The KWh register shall have minimum 7 digits and size of the digits shall be minimum 10mmx5mm. Cumulative energy (KWh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display for testing)

The MD integration period shall be 30 minutes (integration period-programmable by CMRI at site and also thru AMR with adequate security level). The MD resetting shall be automatic at the 20th of the month i.e. 2400 hours of 20th of the month. Manual MD reset button shall not be available. Last six MD values shall be stored in the memory and four to be displayed in the Auto scroll mode. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points. MD integration shall be of sliding method, not in time block

### 2.6.1 Auto scroll mode:

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (i.e. if MD1 is displayed in Auto scroll mode, Header (as given in ix below) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 10 sec, if push button is not operated.

Following shall be continuously displayed in auto scroll mode in the given order;

<b>S. NO.</b>	<b>Legends</b>	<b>Normal Scroll Mode</b>
i)		LCD segment check.
ii)		Present date and time.
iii)	b 1 KWh	KWh reading on 20th of last month at 00.00 hrs.
iv)	b 2 KWh	KWh reading on 20th of second last month at 00.00 hrs.
v)	b 3 KWh	KWh reading on 20th of third last month at 00.00 hrs.
vi)	b 1 KVA h	KVAh reading on 20th of last month at 00.00 hrs.
vii)	b 2 KVAh	KVAh reading on 20th of second last month at 00.00 hrs.
viii)	b 3 KVA h	KVAh reading on 20th of third last month at 00.00 hrs.
ix)	d 1 1MD KW	MD in KW on 20th of last month at 00.00 hrs.
x)	d 2 1MD KW	MD in KW on 20th of second last month at 00.00 hrs.
xi)	d 3 1MD KW	MD in KW on 20th of third last month at 00.00 hrs.
xii)	d 1 2MD KVA	MD in KVA on 20th of last month at 00.00 hrs.
xiii)	d 2 2MD KVA	MD in KVA on 20th of second last month at 00.00 hrs.
xiv)	d 3 2MD KVA	MD in KVA on 20th of third last month at 00.00 hrs.
xv)	b 1 PF	Average power factor of entire month on 20th of last month at 00.00 hrs.
xvi)	b 2 PF	Average power factor of entire month on 20th of second last month at 00.00 hrs
xvii)	b 3 PF	Average power factor of entire month on 20th of third last month at 00.00 hrs
xviii)	C KWh	Current Cumulative KWh.
xix)	C KVAh	Current Cumulative KVAh.
xx)	C KVARh lag	Current Cumulative KVARh(lag).
xxi)	C KVARh lead	Current Cumulative KVARh(lead).
xxii)r	1 MD KW	Wh Current MD - KW
xxiii)	r1 MD KVA	Current MD - KVA
xxiv)	rc	MD reset count
xxv)	U1 V	A Phase Voltage (Instantaneous value).
xxvi)	U2 V	B Phase Voltage (Instantaneous value).
xxvii)	U3 V	C Phase Voltage (Instantaneous value).
xxviii)	A1 A	A Phase Current (Instantaneous value).
xxix)	A2 A	B Phase Current (Instantaneous value).
xxx)	A3 A	C Phase Current (Instantaneous value).
xxxi)	Pr PF	Instantaneous power factor
xxxii)	Pr KW	Instantaneous load in KW

**Push Button Mode:**

Following parameters shall be displayed in Push button mode in the given order after display of all the tamper events.

i)	C	Kwh	Current Cumulative KWh.
ii)	C	Kvah	Current Cumulative KVah.
iii)	C	Kvarh lag	Current Cumulative KVarh(lag).
iv)	C	Kvarh lead	Current Cumulative KVarh(lead).
v)	r1	MD KW	Current MD - KW.
vi)	r1	MD KVA	Current MD - KVA.
vii)	Pr	KW	Instantaneous load in KW.
viii)	Pr	KVA	Instantaneous load in KVA.
ix)	Pr	PF	Instantaneous power factor.
x)	U1	V	A Phase Voltage.
xi)	U2	V	B Phase Voltage.
xii)	U3	V	C Phase Voltage.
xiii)	A1	A	A Phase Current.
xiv)	A2	A	B Phase Current.
xv)	A3	A	C Phase Current.
xvi)	P1	PF	A Phase Power Factor.
xvii)	P2	PF	B Phase Power Factor.
xviii)	P3	PF	C Phase Power Factor.
xix)	SE	Uryb:Aryb	Phase Sequence.
xx)	A	000	Anamoly.
xxi)	C 1	MD KW	Cumulative MD-KW.
xxii)	C 2	MD KVA	Cumulative MD-KVA.
xxiii)	1	RD KW	Rising Demand in KW with elapsed time.
xxiv)	2	RD KVA	Rising Demand in KVA with elapsed time

All these parameters shall be downloaded locally or remotely and interpreted in PC/Laptop. All the parameters shall be recorded and memorized in its Non volatile Memory (NVM). The corresponding non volatile memory shall have a minimum retention time of 10 years. Last six months history data (KWh reading and MD with data and time) and at least last twenty tamper events shall be available in the non volatile Memory.

**2.7 Output Device**

**2.7.1 Pulse Output:** The meters shall have a suitable test output device. Red color blinking LED (marked as imp/kWh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. The test output device shall have the impulse rate defined as impulse / KWh and impulse / KVAh

**3.0 NAME PLATE AND MARKING:**

Meters shall be provided with name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per IS 13779:1999.

#### 4.0 LIST OF APPROVED VENDORS FOR METERS

S.No	Meter Manufacturer	Dealer name and Address(for consumer Access)	Contact person	Contact details.
1	M/s Larsen & Toubro Ltd	INDRA ELECTRICAL CONTROLS 3E/13, JHANDEWALAN EXTENTION DELHI-110055	Mr. Ashok Sachdeva Mr. Bhanu Sachdeva	9212172667/666 011-23522554 /23533022 9953105464 -Mr. Ramesh
		Surendra Electricala 3865, Behind MCD School Shardhanand Marg Delhi-110006	Mr. Amit Gadia	9811508855 011-23214568 / 23213005 / 23214423 9958444100- Mr. Varun
2	M/s Secure Meters Ltd	RADIANCE ENGG COMPANY 207, Triveni Complex, 2.VeerSavarkar Block, Vikas Marg, delhi-92.	Mr. AJAY SINGH-	9911141022
		INDERSONS, H 10, RAJOURI GARDEN, NEW DELHI-27.	JASDIP SIGH	9810658660
		Adroit Control P Ltd, A-105,DDA Sheds, Okhla – 2, New Delhi – 20	Dayanand Arya	9811171251
3	M/s Genus Power Infrastructure Ltd	Genus Power Infrastructures Ltd,D116 Okhla Industrial Area, Phase I ,Okhla, New Delhi : 110020, Tel NO : 011-41015700-1	Mr. Mr. Rajkumar Shrivastava	093139 40661
4	M/s Elster Metering (P) Ltd	N-149, south city-I, Sector – 40 Gurgoan: 122001	Mr ajay Sharma	
5	M/s Landis +Gyr Ltd	C-48, Sec-57, Noida-201301	Mr. Anand Srivastava	0120-3352148/9818808985 anand.srivastava@landisgyr.com