TECHNICAL SPECIFICATION FOR 3 PHASE, 4 WIRE A.C. STATIC (10-60 Amps) DIRECT CURRENT CLASS 1.0 ELECTRONIC ENERGYMETER ALONG WITH PILFER PROOF METER BOX & METER BOX

1. SCOPE:

I) This specification covers the design, manufacture, assembly, inspection, testing at manufacturers works before dispatch, supply and delivery at site/FOR destination anywhere in " U.P state" of Class 1.0 accuracy static whole current electronic meter of current range 10-60 Amps for tariff purpose along with other associated equipment as per requirement given in this specification.
The meter should be 3 phase 4 wire type suitable for connection to LT 3 x 240V, 3 phase 4 wire systems. The meter shall be suitable for balanced as well as unbalanced load at all power factors i.e. Zero lag-Unity –Zero lead. The meter should be capable to record and display kWh, KVAh and maximum demand in kW& KVA for 3 phase 4 wire AC balanced/unbalanced loads for a power factor range of zero (lagging), unity and zero (leading) as per requirement given in this specification.

II) It is not the intent to specify completely herein all the details of the design and construction of material. The material shall, however, conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing for continuous commercial operation in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which in his judgment is not in accordance therewith. The offered materials shall be complete with all accessories, hardware, software and components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

2. STANDARDS APPLICABLE:

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following Indian/International Standards and all related Indian/International standards to be read with upto-date and latest amendments/revisions thereof:

S.No.	Standard No.	Title
1.	IS 13779/ 1999	Specification of AC Static Watt hour meters, class 1.0 & 2.0.
2.	IS : 9000	Basic Environmental Testing Procedures for Electronic & Electrical items.
3.	IS 12346 (1999)	Specification for testing procedure for electrical and electronic items.
4.	IS 11000 (1984)	Fire hazard testing
5.	IEC 62052-11 (2003)	Electricity Requirements (AC) General Requirements Test and Test conditions for

		A.C. Static Watt hour meter for active energy Class 1.0 and 2.0
6.	IEC 62053-21 (2003)	A.C. Static Watt hour meter for active energy Class 1.0 and 2.0
7.	IEC 60068	Environmental testing
8.	CBIP Technical Report no. 111	Specification for Common Meter Reading Instrument.
9.	IEC 61036-1996	Specification for AC static Watt-hour Meters, Class 1 & 2.
10.	CBIP Technical Report No. 304 (revised July 1996) read with amendments issued (April 99-Sep.99)	Specification for AC Static Electrical Energy Meters.
11	CEA Regulation (2006)	Installation and Operation of meters Dtd: 17/03/2006
12	IS:14772/2000:	General requirement for enclosures for accessories for household and similar fixed electrical installation specification.
13	IS 15707(2006):	Testing evaluation installation and maintenance of AC electricity meter code of practice.
14	IS 15959	Para exchange for electricity meter readings, tariff and load center companion specification.

Meter matching with requirements of other national or international standards which ensure equal or better performance than the standards mentioned above shall also be considered. When the equipment offered by the tenderer conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule.

3. CLIMATIC CONDITIONS:

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions. Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

a)	Maximum ambient air temperature in shade.	50 Deg. C
b)	Minimum ambient temperature	(-) 5 Deg. C
c)	Maximum relative humidity	95%
d)	Minimum relative humidity	10%
e)	Height above mean sea level	Up to 1000 meters.
f)	Dust storms likely to occur	March to July.
g)	Average number of thunder storm days per annum	50
h)	Average number of tropical monsoon(conditions)	4 months

	per annum	
i)	Average annual rain fall	10 cms to 100 cms.
k)	Seismic level(Horizontal accn)	0.30g
l)	Isoceraunic level (days per year)	40
m)	Average No. of rainy days per annum	60
n)	Maximum Annual Rainfall	750mm
o)	Rainy Months	June to Oct.
p)	Altitude above MSL not exceeding	300 meters
q)	Wind Pressure	126 kg/sq m

The temperature range and relative humidity for performance of meters shall be as per relevant standards.

4. SUPPLY SYSTEM:

Rated voltage (Vref)	3 x 240 V - Phase to Neutral (3 phase 4 wire system) 3 x 415 V - Phase to Phase
Rated current (Ib) (connected through CT)	Basic current 10A (Ib), Maximum current-60 Amps (Imax.)

5. POWER FACTOR RANGE:

The meter shall be suitable for full power factor range from zero (lagging) through unity to zero (leading).

6. POWER SUPPLY VARIATION:

The meter should be suitable for working with following supply system variations:-

Specified operating range	0.8 to 1.1 V ref.
Limit range of operation	0.6 to 1.2 V ref.
Frequency	47.5 Hz to 52.5 Hz (Reference frequency 50 Hz)

7. ACCURACY:

Class of accuracy of the meter shall be 1.0.

8. POWER CONSUMPTION:

8.1. Voltage Circuit: The active and apparent power consumption in each voltage circuit including the power supply of meter at reference voltage, reference temperature and reference frequency shall not exceed 1Watt per phase and 4 VA per phase respectively.

8.2. Current Circuit: The apparent power taken by each current circuit at basic current, reference frequency and reference temperature shall not exceed 5 VA per phase.

9. STARTING CURRENT:

The meter should start registering the energy at 0.2% of Ib and unity power factor in all the 3 phases.

10. MAXIMUM CURRENT:

The rated maximum current for the meter shall be 60 Amps (600 % Ib) at which the meter purports to meet the accuracy requirement.

11. GENERAL AND CONSTRUCTIONAL REQUIREMENTS:

11.1. Meters shall be designed and constructed in such away so as to avoid causing any danger during use and under normal conditions. However, the following should be ensured.

11.1.1. Personal safety against electric shock
11.1.2. Personal safety against effects of excessive temperature
11.1.3. Protection against spread of fire
11.1.4. Protection against penetration of solid objects, dust and water

11.2. 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.

11.3. The meters shall be designed with the application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components. Power supply and voltage divider circuits may be of PTH technology.

11.4. All insulating material used in the construction of meters shall be non-hygroscopic, non-ageing and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.

11.5. The meter shall have an operation indication device such as a blinking LED. The operation indicator shall be visible from the front window and capable of being monitored conveniently with suitable testing equipment.

11.6. The meter shall conform to the degree of protection IP 51 of IS:12063/IEC:529 for protection against ingress of dust, moisture and vermin.

11.7. The meter shall be supplied with a transparent extended terminal block cover (ETBC) with proper sealing arrangement.

11.8 The meter shall have seamless ultrasonically welded insulated body, along with unidirectional screws and wall mounted projected type to be fitted with the help of screws.

11.9. The meter-base, meter cover, terminal block and ETBC shall be made of unbreakable, high grade, fire resistant, reinforced, non-flammable, polycarbonate or equivalent high grade and good quality engineering plastic.

11.10. **NAME PLATE MARKING:**

Every meter shall be provided with a name-plate which shall be clearly marked/embossed as per clause-7 of IS: 13779/1999. The name plate shall have following markings which shall be indelible, distinct and readable from outside the meter:—

(a) Purchaser name, Purchase order No. and date with inscriptions of "PROPERTY OF PVVNL".
(b) Manufacturers name, Trade mark and place of manufacturer.
(c) Designed of type.
(d) Nature of current and no. of phases and no. of wires for which meter is suitable for.
(e) The manufacturer's serial no., year of manufactures and warrantee period.
(f) Reference voltage
(g) Reference current
(h) Meter constant (if any)
(i) Class of accuracy
(j) Reference temperature
(k) Transformation ratios of instrument transformers (s) of which account is taken for meter constant.

(l) Bar code

Bar code as per 128 C formats shall be provided on the plate inside meter glass. Meter serial number to be written in barcode.

11.11. The terminal block, the ETBC and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic overload of live parts in contact with them.

11.12. The terminal block shall be of high grade non-hygroscopic, fire retardant, low tracking, fire resistant, reinforced poly-carbonate (not Bakelite) or equivalent high grade engineering plastic which should form an extension of the meter case and have terminal holes and shall be of sufficient size to accommodate the insulation of the conductors, meeting the requirement of IS 13779:1993/CBIP technical report- 304 or latest amendment thereof.

11.13. The terminals shall have suitable construction with barriers and cover to provide firm and safe connection of current and voltage leads of stranded copper conductors or copper reducer type terminal ends (thimbles). The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductor and their insulation.

11.14. The manner of fixing the conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.

Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter 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. The internal diameter of the terminal holes shall be 8.5 mm minimum. The clearance and creepage distance shall conform to relevant clause of IS 13779:1993/CBIP technical report no.-88.

11.15. The meter shall be compact in design. The entire design and construction shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation. The meter shall be convenient to transport and immune to shock and vibration during transportation and handling.

11.16 The potential link shall not be provided outside on meter terminal block.

12. SEALING OF THE METER:

Meter cover should be physically joined by ultra sonic welding on both sides in such a way that meter cover cannot be opened without breaking and shall be physically evident as well as it should be protected thorough cover open switch. It shall be displayed and as well as recorded in MRI. Reliable sealing arrangement should be provided to make the meter tamper evidence and avoid fiddling or tampering by unauthorized persons. For this, at least two (2) Nos. seals on meter body, one (1) No. seal on meter terminal cover and one (1) No. seal on optical communication port and scroll push button shall be provided. All the seals should be provided on front side only. Rear side sealing arrangement will not be preferred. The suppliers in their offer should explain the sealing arrangement.

13. CONNECTION DIAGRAM & TERMINAL MARKINGS:

The connection diagram of the meter shall be engraved/embossed on inside portion of the terminal cover. The meter terminals shall also be marked and this marking should appear in the above diagram.

14. SOFTWARE:

Software for reading, down loading data of the meter and TOD programming in the meter, normally resident in the Common Meter Reading Instrument (CMRI), software suitable for MS-DOS 5.0 or higher version.

Windows based Base Computer Software (BCS) for retrieving data from CMRI and downloading instructions from base computer software to CMRI. This BCS should have, amongst other requirements and features and facilities described later in this specification, the facility to convert meter reading data into user definable ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner.

Necessary software for loading application program via CMRI serial port.

The following software shall be made available and installed on CMRI & BCS by the firm whose meters are to interface with CMRI without any extra charges. Any future up gradation in both the software shall also be provided free of cost.

(a) Software to be resident in CMRI for the purpose of reading and programming the specific make(s) of static meters.

(b) Base computer stations (BCS) software for accepting data for CMRI, processing generating reports and down loading instruction from the BCS to CMRI. The firm will also provide ASCII conversion utility along with BCS software for processing of the billing data.

(c) The firm shall install the above software without any extra cost on call from one of the Test Division located in each of the Zones. The purchaser will arrange these software installations in rest of the existing and future Test Divisions for which necessary softcopies with appropriate licences shall be provided by the firm.

(d) It should be possible to re-program the meter at site as per IS 15959 standard for DLMS category –C type or latest category as defined by the IS 15959 amendments.

(e) For efficient and speedy recovery of data read through CMRI, view & analysis, a Base Computer Software (BCS) shall have to be supplied having the following features:

The BCS software shall be windows based user friendly. The data transfer shall be highly reliable and fraud proof. Base Computer software shall give all details adequate for analysis and abnormal event data & load surveys parameters. The software shall have the facility to convert all the consolidated information / data of selectable parameters into ASCII format. EDP department of purchaser can generate its own data base file to download all the required information into it.

(i) Platform:

The BCS shall be executable on updated operating platform or higher operating system.

(ii) Meter Data Display:

The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (Phase diagram with phase angle)

All the information about energy, maximum demand and their respective TOD register reading, billing register readings shall be shown in a manner which user can easily understand.

All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data daily, weekly, and monthly format. The load survey graph will show values where the cursor is placed for the selected or for all parameter.

All the information about abnormality events shall be accompanied with date and time stamping of respective electrical conditions. This information shall be displayed in the sequence in which it happened in cumulative format as well as summary format.

BCS should display the Date and Time for followings - Meter Reading, MRI taken at site and MRI dump in the computer. The software shall be capable of preparing CMRI to read the meter information or time setting of the meter.

(iii) **Support Display:**

There shall be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer will be sorted out and available at one place so that locating any consumer 's past data is easy. It shall be possible to retrieve/locate data on the basis of either one of the following particulars:

a) Site ‘s ID/Numbers.
b) Meter Sr. No.
c) Date of meter reading.
d) Location.

BCS of the bidder should support the supplied meters of it own make

(iv) **The Data Transfer:**

It shall be possible to transfer data to and fro from CMRI through serial interface.

(v) **Configurability :**

It shall be possible to have selective print out of all available data of the meter. Print out shall not include anything and everything available with the BCS. The software shall support "print wizard" whereby user can decide what to print out. The use of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

BCS shall have facility to export data to ASCII or spreadsheet format for integrating with the purchaser's billing system. Here again an "Export wizard" or

similar utility shall be available whereby user can select file format, what data to export, the field width selection etc.

(vi) **Security:**

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protecting by different passwords. The configurable of passwords shall be user definable. The software installed on one PC shall not be capable on another PC.

(vii) **Help :**

The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

Necessary software for loading application program via CMRI through serial port. Also meter reading data downloading facility directly from meter to laptop with 1 cord per 1000 meter shall be provided with desired software.

15. SALIENT FEATURES:

The meters shall have the following additional salient features:-

15.1. Meter shall have provision of Phase indicators to show healthiness of individual voltages.

15.2. The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port.

If any bidder proposes for Internal Battery backup in the meter in case of mains supply failure for meter reading and meter data downloading, no power shall be consumed for this circuit when mains are available to recharge the battery.

In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument) shall be possible though battery internal/ external backup. Rechargeable capacitor back up power shall not be used for display under Power absence condition. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 7 days (168 hrs.) and then meters will be checked by pressing the push button and the CMRI shall be done."

15.3. The meter should work accurately irrespective of phase sequence of the mains supply only in forward direction.

15.4 Any selected parameter shall be displayed for 5 minute and shall go back to auto scroll parameters.

15.5. The meter should remain powered up and functional even when either any two phases or any one phase with neutral is available to the meter.

15.6. The meter should continue to record accurately as per prevailing electrical conditions even if the neutral of potential supply gets disconnected.

15.7 The meter shall remain powered up and functional on all prevailing tamper practices.

16. DISPLAY OF MEASURED VALUES

Parameters	ON Display	ON BCS
KWH (FORWARD)	**7+0**	**7+0**
KVAH (FORWARD)	**7+0**	**7+0**
MAX. DEMAND(KW)	**3+2**	**3+2**
MAX. DEMAND(KVA)	**3+2**	**3+2**
CUMULATIVE MAX. DEMAND	**4+2**	**4+2**

16.1. The measured value(s) shall be displayed on seven segments, minimum seven digit Liquid Crystal Display (LCD) display unit/register with Backlit, having minimum character height of 10 mm.

16.2. The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under un-powered condition. Battery back-up memory will not be considered as NVM.

16.3. It should be possible to easily identify the displayed parameters through symbols/legend on the meter display itself.

16.4. In case of multiple values presented by a single display, it shall be possible to identify each displayed value/parameter through separate symbol/legend to be made available on the display itself.

16.5. The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register should not roll over in between this duration.

17. METER SERIAL NUMBER:

In addition to providing serial number of the meter on the display unit of the meter and display plate, the meter serial number shall also be programmed into meter memory for identification through CMRI/meter reading print out.

18. DISPLAY SEQUENCE:

PUSHBUTTON MODE DISPLAY PARAMETERS

a. LCD segment check
b. Meter serial number
c. Real time
d. Date] or Date and Time
e. KWH Forward
f. KVAH forward
g. Meter reading count
h. Cumulative power-on hours
i. Current Month Max. Demand (kW).
j. Prev. Month Max. Demand (kW).
k. Cumulative max. demand(kw)
l. Current Month Max. Demand.(KVA) during Peak hours
m. Prev. Month Max. Demand.(KVA) during Peak hours
n. Cumulative Max. demand(KVA)
o. MD reset count
p. All Phases Voltage (P-N)
q. All Phases Line Current
r. Inst. Frequency (Hz)
s. Power factor
t. Inst load KW
u. Inst. Load KVA
v. Cumulative power on hours reading of predefined date and time of the last two consumption months (BP POH).
w. Tamper Data:
    1. Present status of tamper:
        a) Missing potential with phase identification
        b) Current polarity reversal with phase identification
        c) Current short & open.
        d) Other tampers(magnet. ND)
    2. Date and time of last tamper occurrence with tamper identification
    3. Date and time of last tamper restoration with tamper identification.
    4. Cumulative tamper count of all types of tampers.

AUTO MODE DISLAY PARAMETERS

a) LCD segment check .
b) Meter serial number
c) Real time
d) Date] or Date and Time
e) KWH Forward
f) KVAH forward
g) Current month max. demand (kw)
h) Prev. Month Max. Demand (kw).

i) Cumulative Max. demand(kw)
j) Current month max. demand(KVA)
k) Previous month max. demand(KVA)
l) Cumulative max. demand(KVA)
m)Inst. Load KW
n) MD reset count
o) Cumulative tamper count of all types of tampers.
p) Existing tamper, if any.

Each parameter shall be on meter display for 10 seconds.

Detailed tamper information as per DLMS should, however, be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

Note: The TOD wise bill point active energy, and maximum demand though not provided on meter-display, should be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

19.0 TIME OF DAY (TOD) TARRIF:

19.1 Meter should be able to store apparent and active energies (forward) consumption along with maximum demand in KVA for at least different 8 time zones.

19.2 Meter shall be able to record and store apparent and active energies, consumption along with maximum demand in KVA during specific peak hours described as following time Zone of register in sequence:—

Meter TOD Zone	
Time Slots	Hours of Day
1	17-18
2	18-22
3	22-23
4	23-05
5	05-06
6	06-08
7	08-11
8	11-17

19.3 The starting of display of TOD zones shall be from 17:00 hrs to 18:00 hrs as first slot and last slot as 11:00 hrs to 17:00 hrs.

19.4 The meter shall have facility for recording and storing of TOD consumption and maximum demand data on minimum Three Tariff Rates, per day basic.

19.5 It should be possible to change the time period for TOD recordings through the portable device or programmable BLOCK installed in the meter itself or manually with proper

security at site. The main control for this change shall be available on the computer located at the Metering Office.

20. OUT PUT DEVICE:

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator, if fitted, must be visible from the front. Test output device shall be provided in the form of LED output device. The relation between test output and the indication on display shall comply with the marking on the name plate (imp per kWh)

21. COMMUNICATION PORT:

"Meter CMRI port should essentially be placed at the front side of meter box."
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 should be possible to configure meter for TOD tariff demand integration period, billing date, real time clock and date etc. through CMRI locally without any extra cost to PVVNL, but the same shall be done by the manufacturer only after taking due approval of MD, PVVNL or his authorized representative. The meters shall have a galvanically isolated optical communication ports as per IEC 1107 so that it can be easily reading instrument for data transfer. The meter shall have additional RJ11 port along with optical port for reading data through CMRI and AMR modem. Communication ports shall not be affected by any type of infection/unauthenticated signals. The baud rate should not be less than 9600 bps and higher baud rate shall be preferred for down loading the data. The complete data shall be downloaded within 5 minutes from meter to CMRI & from CMRI to BCS.

The bidder shall supply software required for local (CMRI) & remote (AMR) connectivity including required training to use the software free of cost. Both the communications port may work simultaneously. Separate communication cords for optical port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box. Also the meter box shall have provision of sealing optical port. **The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS: 15959 Category "C" or latest amended category for consumer metering.** The meter should be complied to DLMS and should have both Optical Port and RS232 Port. Suitable arrangement shall also be made in meter box to take reading from outside. **Separate communication cords for optical port and RJ11 port have to be supplied with each meter free of cost duly fitted with meter box with a provision of reading the data without opening the meter box.** Also the meter box shall have provision at the meter body.

22. SPECIAL REQUIREMENT FOR DISPLAY:

22.1 The meter shall have indication for unsatisfactory/non-functioning of the following:—

a) Time and calendar
b) Real time clock with battery
c) All display segments

d) Non-volatile memory.

22.2 The meter serial number, consumers name and address, and date with time of taking reading shall invariable be available at base computer software.

22.3 The meter shall be factory programmed for each and every month for minimum 20 years at the time of manufacture and correctness of 20 years calendar. In addition following parameters should also be factory programmed:—

a) Integration period

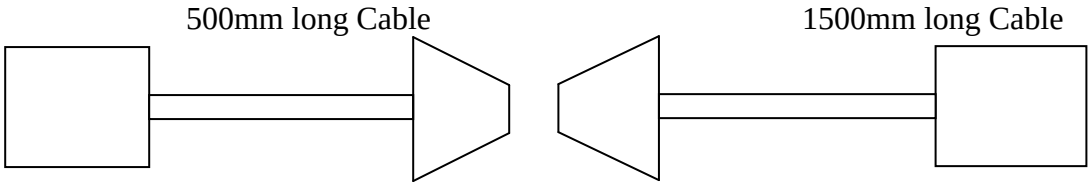
b) Display sequence

22.4 The meter shall have provision of reading in the absence of power through an external source. An inductive coupling arrangement shall be provided so that it should not be possible to damage the circuit of the meter by applying excess voltage directly in the meter. The meter should be powered up using an external battery pack only in absence of power supply to the meter to enable taking of meter readings through display and optical communication port. The supplier has to supply one no. Power Pack unit with each lot of 100 nos. of meters without any extra cost in case of external source of supply. In case of internal battery back up for reading and data downloading through MRI in absence of power supply, the battery must be able for a backup time of minimum 7 days (168 hrs) as per Clause 15.2.

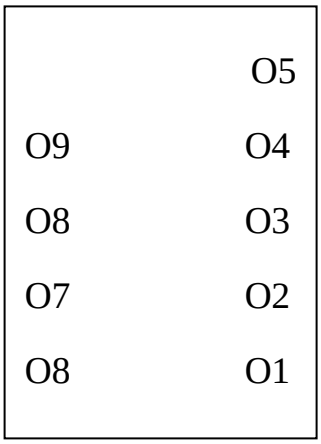
22.5 INTERFACE WITH MS DOS BASED CMRI:

For Physical interface between meter and Common Meter Reading Instruments shall consist of meters optical sensor terminating into a 9 Pin D type male connector with a cable of 500mm + 10mm length with a provision of reading the data without opening the meter box.

ILLUSTRATION NO.1

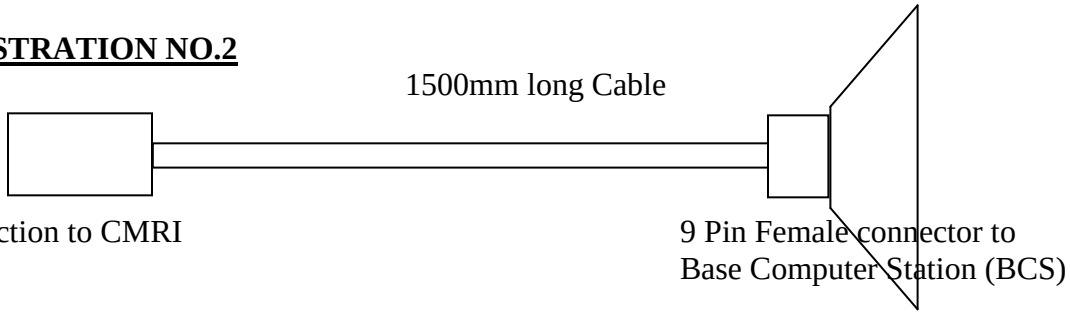


Optical Port for connecting to Meter 9 pin Male 9 pin female Connection to CMRI The configuration of 9 Pin D type male connector shall be as given below:



PIN	SIGNAL NAME
01	NC
02	TRANSMIT DATA (TXD)
03	RECEIVE DATA (RXD)
04	NC
05	SIGNAL GROUND (SG)
06	NC
07	NC
08	NC
09	POWER SUPPLY

ILLUSTRATION NO.2



22.6 Meter shall invariably be provided with LCD display cycling facility for essential parameters, as envisaged under clause No. 7.0 of the technical specification.

22.7 While installing the meter, it shall be possible to check the correctness of the C.T. & P.T. connections to the meter and their polarity with the help of common meter reading instrument.

22.8 The meter and related instruments, when installed, shall be constructed in a way offering full protection against contact voltage, other hazards resulting from/or related to the operating principle and the utilization of the equipment. In particular if any metal part accessible while covers are in place, then the base shall be fitted with protective Earth terminal identified by the Earthing symbol ⊥ and connected to all accessible metal parts.

22.9 The Static Trivector Meter shall have memory capacity to store followings parameters

22.9.1 The static tri vector meter shall measure and retain previous 12 months data (month wise) of the KWH and KVAH reading at 2400 hrs. of the last days of each calendar month, along with monthly consumption in kwh and kvAh for each month including current month consumption. Average power factor and maximum demand with date and time of occurrence of that particular month . These parameters shall also be obtainable through common meter reading instrument whenever required of last 12 months.

22.9.2 The meter shall also have memory capacity to measure & retain tampers evident data of 200 events in compartments as per DLMS (treated occurrence & restoration as separate event). Upto 50 events configured in one compartment which will rollover on FIFO basis(except the non roll over events).

22.9.3 The meter shall record three phase voltage, current, power factor separately with KWh and KVAh energy, at the time of each event (except power ON/OFF.)

22.9.4 Meter shall also store & communicate instantaneous electrical parameters, vector representation as and when meter data downloaded from meter to MRI at BCS end.

22.9.5 The meter shall have sufficient memory capacity to store above parameters with defined duration / frequency / numbers of event with FIFO basis.

22.10 The meter shall be provided with an accurate quartz crystal based real time clock. The maximum drift permissible in the real time clock shall be $\pm$5 minutes per year for class 1.0S Meters.

23. MAXIMUM DEMAND REGISTRATION AND RESETS:

23.1 The meter shall continuously monitor and calculate the average maximum demand for kw and KVA for each interval of time of 30 minutes and maximum of these shall be stored along with date and time when it occurred.

23.2 The meter shall automatically store the 30 minute average demand. At the end of every 30 minutes, the new calculated demand should be compared with previous maximum demand and stored whichever of them is higher. The maximum demand for every calendar month along with the date and time when it occurred should be registered.

23.3 The maximum demand shall automatically reset at 24.00 Hrs. of the last date of each calendar Month for which minimum 20 calendar years shall be programmed by the manufacturer at his work.

23.4 The meter shall be provided with its own real time clock calendar with built in battery backup and time derived from this clock shall be used for maximum demand intervals. The meter shall display the maximum demand reset count.

24. LOAD SURVEY CAPABILITY & BILLING POINT REQUIREMENTS:

Measure & retain minimum Load Survey data of past 2 months to store average KW, KVA, 3 phase voltage and current parameters of 30 min integration period. It shall be possible to select either demand or energy view at the BCS end.

The load survey data can be downloaded & presented in the form of bar charts as well as in spread sheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic form.

25. BILLING PARAMETERS

The predefined date and time for registering the billing parameters of KWh, KVAh , KVA and kW MD as well as Tamper Count and Power-off hours readings shall be 24:00 Hrs of the last day of every month . All current billing parameters shall be transferred to billing registers.
The above billing data, TOD register's data, load survey data, tamper information data shall all be retrievable through the meter's communication port through a common meter reading instrument (CMRI) and shall be transferred (downloaded) to a PC with windows based software to get complete details in numerical and/or graphic form. The necessary base computer software (BCS) for this purpose shall be provided by the supplier with complete details.

26. SELF DIAGNOSTIC FEATURE:

The meter shall be capable of performing complete self diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of date memory location all the time. The meter shall have indication for unsatisfactory/nonfunctioning/malfunctioning of the following:-

a. Time and date and
b. All display segments as per the requirement under G 19 of IS 14697.
c. Real Time Clock (RTC)
d. Non Volatile Memory (NVM)

If possible, the details of malfunctioning should be recorded in the meter memory.

27. TAMPER AND FRAUD PROTECTION

Tamper detection Feature	**Occurrence**			**Restoration**		
	Voltage	**Current**	**Occurrence Time**	**Voltage**	**Current**	**Restoration Time**
Voltage Failure	< 55% Vbasic	Ignored	5Min	> 55% Vbasic	ignored	2Min
Current Open	Ignored	Iph<2%Ib & CT Bypass >15% Ib& No current reversal in any Ph	5Min	Ignored	Iph>2%Ib or CT Bypass <15% Ib	2Min
Current reversal	Vref	Iph> 10% of Ib& Power factor>0.5 in that phase and current flow in reverse direction	5Min	Vref	10% of Ib& Power factor>0.5 in that phase and current flow in forward direction	2Min
Voltage unbalance	V max-Vmin>30% Vref	Ignored	5Min	V max-Vmin< 30% Vref	ignored	2Min
Current Bypass	Ignored	CT Bypass >15% Ib&Iph> 2% Ib(in all phases) & No current reversal in any Ph	5Min	Ignored	CT Bypass < 15% Ib or any Iph< 2%Ib	2Min

Current unbalance	Ignored	I max-Imin>30% Ib	5Min	Ignored	I max-Imin< 30% Ib	2Min
Magnetic logging	Meter shall record at Imax ,**Whenever effected by magnetic field. Ocuurance&resoration within 30 sec**					
Neutral disturbance	Vph>1.5 Vref	Ignored	20 sec	Vph<1.5 Vref	Ignored	20 sec
For any abnormal neutral disturbance signal, meter either remains immune or in case the meter functionality is getting affected, neutral tamper will be logged with date and time as an even and meter to record energy (V ref, actual current and UPF will be taken for metering						
Top Cover open	Event will be logged incase of power failure also, "Cover open" message will be activated on display along with date and time. Once the meter cover open display appears on screen, no other reading kwh, kvAh, demand etc should be on display . However the reading shall be available on push button mode. Event is not resettable. Once occurred the event will be there permanently on display					
Low Voltage	55% Vref<Vph<75% Vref	Ignored	5Min	Vph<55% or Vph>75% Vref	Ignored	2Min
Over Voltage	115% Vref<Vph<150% Vref	Ignored	5Min	115% Vref>Vph>150% Vref	Ignored	2Min
Over Current in any phase	Ignored	Iph>120% In	5Min	Ignored	Iph<120% In	2Min
Power Failure event	When all three phases are switched off for 1 minute and more					

(a) While connecting 3 phase capacitive bank unit to meter, under balance and unbalanced pure capacitive load meter should not log current reversal and should not increment in active energy (at no-load condition)

(b) The meter shall be capable of recording power and remain functional on all prevailing Tampering practice.
In addition to this, meter should log minimum 10 events for meters authenticated transaction i.e time setting, time zones, Integration period change etc.

(c) Meter cannot be put in dead zone (non-functioning zone) either by high voltage discharge(Spark) upto 35KV& by any external high frequency source. Hidden memory fully secured for outer / internal impact compare actual supply parameters & if functionally of meter gets changed/change in parameters, the tamper shall be logged and suitable display on meter LCD shall be given. **35KV Spark test** – The meter (without box) shall be capable to withstand 35KV and should be immune if applied on the terminal, optical port and all sides of meter.

(d) **DC Immunity**: The meter shall not saturate on passage of direct current which can cause the meter either to stop recording/record inaccurately. Measurement by meter shall not get influenced by injection of chopped signal/DC signal /DC pulse of low frequency.

28. TAMPER LOGIC:

Properly designed meter tamper logic should be provided.

There shall be minimum five separate compartments for logging of different types of tampers as per DLMS guidelines.

Bidder under their offer should explain the logging of various tampers in each compartment.

Once one or more compartments have become full, the last tamper event pertaining to the same compartment will be entered and the earliest (first one) tamper event should disappear. Thus, in this manner each succeeding tamper event will replace the earliest recorded event, compartment wise. Events of one compartment/category should overwrite the events of their own compartment/category only.

Bidders may indicate alternate proposals for the above tamper detection and logging scheme.

Tamper count should increase as per occurrence (not restoration) of tamper events. The total number of tamper counts should also be provided on the meter display as well as at the BCS end.

29. ACCURACY REQUIREMENT:

The accuracy of parameters measured by meters shall be tested in accordance with the relevant standards described in clause 2.0 of this specification.

30. ELECTRICAL REQUIREMENT:

The electrical requirement of meters shall be as specified in the relevant standards described in clause 2.0 of this specification.

31. ELECTROMAGNETIC COMPATIBILITY AND INTERFERENCE REQUIREMENT:

The meter shall meet EMI/EMC requirements as specified in the relevant standards described in Clause2.0 of this specification.

32. MECHANICAL REQUIREMENT:

The meter shall meet the mechanical requirements as specified in the relevant standards described in clause 2.0 of this specification.

33. CLIMATIC INFLUENCE REQUIREMENT:

The meter shall meet Dry Heat/Cold/Damp heat cycle test requirement as per the relevant standards described in clause 2.0 of this specification.

34. MINIMUM TESTING FACILITIES:

The tenderer should have the necessary minimum testing facilities for carrying out the following tests:

1. AC voltage test
2. Insulation resistance test
3. Test of limits of errors
4. Test of meter constant
5. Test of starting condition
6. Test of no load condition
7. Repeatability of error test
8. Test of power consumption
9. 35 KV test
10. Tamper conditions - as per this specification

The manufacturer should have duly calibrated RS meter of Class 0.05 accuracy or better. Manufacturer also should possess fully computerized meter test bench system for carrying out the relevant routine/acceptance tests as well as facility to generate test reports for each and every meter tested.

35. Purchaser reserves the right to ask the successful Bidder to carry out complete type testing and an ti-tamper feature test on the sample meter from their delivered lot, from any of the below mentioned test laboratories at their own cost, which shall be reimbursed by purchaser on submission of successful type test reports as per IS : 13779 : 1999 (read with latest revision thereof)/CBIP technical report No. 304.

36. TESTS:

The type test reports/certificates/records for all type tests specified having been successfully performed on the type of meter offered shall be submitted with the tender.
The bidder shall clearly bring out the deviations from this specification clause by clause whether on account of tests or manufacturing process or features incorporated in the

meter. The tender lacking with above information and without supporting test reports for meter meeting the requirement of tests laid in this specification are likely to be rejected.

a) Type Tests:

The Energy meter offered shall be fully type tested at any of the test laboratories mentioned below by the bidder as per relevant standards but test reports shall not be more than five years old from the date of opening of bid. The bidder shall furnish two sets of type test reports along with the bid.

1. NPL, New Delhi
2. ERTL (N), New Delhi
3. ERTL (W), Mumbai
4. ERTL (E), Calcutta
5. ERTL (S), Thiruvananthapuram
6. SAMEER, Madras
7. E.R.D.A., Vadodara
8. C.P.R.I., Banglore

b) Acceptance Test :

All acceptance tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of the purchaser's representative.

37. Routine Tests:

All routine tests as stipulated in the relevant standards shall be carried out and routine test-certificates/reports shall be submitted to the purchaser for approval and also placed inside individual meter packing.

38. **Surge Test**: The offered should be capable to withstand surge immunity test as per IEC 62052-11 2003 and amendments thereof. Bidder shall have to submit type test report along with offer for this test also.

39 Sample Meters:

Three nos. sample meters with Meter box duly signed by permanent marker by firm representative are to be submitted within 3 days from the date of opening of the part-1 & part-2 of the tender which shall be tested at one of the test labs of UPPCL / any Discom/any other lab.

Preliminary testing of samples submitted by the firms shall be arranged in the PVVNL test lab/any other test lab by a team of officers as per technical specifications issued in NIT, in presence of firm's representatives. Date of testing will be informed to all bidders.

Testing team shall submit their clear report as per technical specification given in NIT such as clause no. 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 40 or any other observations desired by the testing team.

Price bid shall be opened of those bidders whose samples are declared in order to technical specifications issued in NIT, by testing team.

40. TECHNICAL SPECIFICATION OF PILFER PROOF METER BOX TO HOUSE THE THREE PHASE WHOLE CURRENT ENERGY METER

The offered meter box is to house one number three-phase four-wire energy meter. The meter box shall comply with IS: 5133/IS14772 (Part-II).

40.1 MATERIAL

The meter box shall be made of high grade Engineering Plastic with following properties

a. UV Stabilized
b. HDT - 120°C±10° C.
c. UL rating – UL94 (Flame Retardant)
d. It shall be capable of withstanding temperatures of boiling water for 5 minutes continuously without distortion or softening.
e. It shall also be capable of withstanding Glow wire test at 650°C as per IS 14772:2000.
f. It shall be environment friendly and easily recyclable.

40.2 CONSTRUCTION:

(i) Meter box shall have a roof tapering down to both sides for easy flow of rainwater.

(ii) The thickness of the box shall be not less than 2.5 mm in the load bearing side (i.e. back side of the box) and other sides, doors and the roof shall not be less than 2.0 mm.

(iii) The overall dimensions of the box shall be such that a minimum side clearance should be maintained in between meter & side wall of meter box. Minimum clearance from both sides 30 mm top side 30 mm, front side 25 mm, back side 10 mm and 75 mm from the terminals of energy meter.

(iv) Box cover shall have minimum 1 nos. snap to fit type arrangement on each side of box. The snap fit arrangement should have adequate barriers)except for cable entry side.)

(v) Self rubber gasket for protection from ingress of dust and water shall be provided on all around the box.

(vii) For sealing the box cover with base minimum 2 nos. sealing hole shall be provided.

(viii) The box shall be made of transparent polycarbonate material conforming to IS 14434 or equivalent.

(ix) Box shall be provided with 4 nos. fixing holes of 6 mm diameter at all four corners of meter box.

(x) Meter box should comply with IP-51.

x. For cable entry , suitable circular holes fitted with engineering plastic/hope glands shall be provided at the bottom of the box for cable inlet and outlet . The internal

diameter of the gland shall be such as to accommodate the 25-27 mm outer diameter cable.

(xi) Purchase order No. date and purchaser's name shall be in such a manner that it shall be permanent in nature. Name of manufacturer shall be embossed on meter box cover.

(xii) Push button shall be provided on the cover of meter box to operate the meter push button without opening the meter box cover.

(xiii) Arrangement for meter reading through meter reading instrument should be provided on meter box cover to read the meter without opening the meter box. Suitable sealing arrangement shall be provided for such meter reading arrangement.

(xiv) Drawing of offered meter box should be enclosed along with bid.

41. TESTS:

41.1 Type Tests:

The type test report at following features of the meter box conducted by any NABL accredited laboratory should be enclosed with the offer as per IS :5.33/IS 14772

i) Test of material identification i.e., (as specified in per Clause No.40.1 of this specification.)
ii) Test for mechanical strength
iii) Test for water absorption.
iv) Test for stability at high temperature.
v) Test for withstanding temperature of boiling water for 5 minutes continuously for non-distortion or softening of material.
vi) Glow wire test at 650°C as per clause 5.2.4 of CBIP Technical Report No.88 read with amendments.

41.2. Acceptance & Routine Tests:

41.3 Acceptance Tests:

The following shall constitute acceptance test for box:

i. Physical verification of dimensions of the box.
ii. Compatibility of the box for housing the meter for ensuring ease of connections and reading the meter.

41.4 Routine Tests:

Following Routine test certificates shall be furnished for approval.

i. Physical verification of the box.

42 Sample Meter Box :

Bidder shall submit 1 Nos.(one) sample meter box along with sample meters & strips of meter box for HDT test as per details in clause no. 39 of tech. specification for verification of requirement of specifications.

GUARANTEED TECHNICAL PARTICULARS OF FOR 3 PHASE, 4 WIRE A.C. STATIC WHOLE CURRENT CLASS 1.0 ELECTRONIC ENERGY

(To be filled in by the tenderer and submitted along with tender Bid Part-1)

Sr. No.	Particulars		As specified by PVVNL	As Furnished by Bidders
1	2		3	4
1	Maker's Name	:		
2	Make	:		
3	Type of Meter/Design designation	:		
4	State the year since the design is in vogue	:		
5	Standard to which meters conforms	:	IS 13779, CBIP-304, IEC 61036	
6	Class of accuracy	:	1.0	
7	Rated Current (Amp)	:	10 Amps	
8	Rated Maximum current as percentage of basic current	:	600% of Basic Current	
9	Rated voltage (volts)	:	3 X 240 V – Phase to Neutral 3 X 415 V – Phase to Phase	

10	Rated frequency (Hz)	:	50 Hz±5%	
11	Specified operating voltage range	:	0.8 to 1.1 V ref.	
12	Limit voltage range of operation	:	0.7 to 1.2 V ref.	
13	Reference temperature	:	27˚C	
14	Temperature range of operation a) Specified operation range b) Limit range of operation c) Limit range for storage and transport	: :	As per the relevant standard	
15	Relative humidity a) Annual mean b) For 30 days these days being spread in a natural manner over the years. c) Occasionally on other days	: : :	As per the relevant standard	
16	Power consumption (a) Power consumption in voltage circuit at rated current a. Active in watts b. Apparent in VA. b) Power consumption in current (in VA) at rated current	: : : :	1 W 4VA 0.5VA	

17	Current that mater is capable of carrying continuously without injury to the meter (Amp.)	:	60 Amp.	
18	Short time over current capability of the meter	:	30 Imax for one half cycles at rated frequency	
19	Percentage minimum current which shall start the meter and continue to run thereafter at rated voltage and unit power factor of basic current (% of basic current)	:	0.2% of basic current	
20	Type of material along with its thickness or dimensions (in mm.) and details of the important components parts of the meter a) Case b) Terminals covers c) Terminals	:	Drawing should be submitted by the bidder	
21	a) Size of terminals holes (in mm.) b) Whether Display Character Height, specify Height in mm.	:	8.5mm 10 mm (minimum)	
22	a) Whether carrying handle is provided. b) Arrangement to read the meter in Power Off mode.	:	Inductive coupling arrangement to power meter in the absence of power or Internal Battery as per clause no. 15.2	
23	Meter constant (if any)	:		

24	Tamper & Fraud Protection details	:	As per Annexure-A	
25	a) Display type b) No. of digits in display	:	LCD with Backlit (minimum 7)	
26	I. Display sequence in Push and Auto Mode II. Specify other parameters/qty. which may be available on display without any extra cost.	:	Are the parameters in sequence as specified in clause no. 18.0	
27	Instantaneous and Billing parameter Display and record in meter memory.	:	Is the meter capable of measuring and storing the data as per DLMS	
28	(a) Specify, tamper data available on the display of the meter (b) Specify tamper data available through CMRI (c) Whether optical port is compatible with different make CMRI or not	:	a) Type of tamper with occurrence and restoration time b) On FIFO Basic c) SANDS/ANALOGIC	
29	Details of internal diagnostic available as per clause 26.0 tech. specification (a) On display, if any (b) On memory	:		
30	Sealing arrangement (specify) Whether sealing at the following has been provided :- (a) Body of the meter (b) Terminal cover of the meter (c) Sealing arrangement to be scroll push button. (d) Optical Port	:		

31	Overall dimensions of the meter (with tolerance) (a) Height (mm) (b) Width (mm) (c) Depth (mm)		Drawing should be submitted by the bidder	
32	Total weight of the meter (kg.) with tolerance	:		
33	State whether – (a) Load survey capabilities of 60 days have been provided as per clause relevant technical specification. (b) Time of day zones have been provided as per clause 19.0 of technical specification	: : : : :	 (a) 2 months to store average KW, KVA, voltage profile and phase current with half an hour slot. (b) TOD time zone in sequence as mention in clause no. 19.0.	
34	Whether hand held unit is able to download data to base computer software at PC end			

GUARNATEED TECHNICAL PARTICULARS OF METER BOX (Suitable for 3 Phase 4Wire 10-60 Amps Direct Current Meter)

Sr. No.	Particulars	As Furnished by Bidders
1.	Manufacture's name	
2.	Material of the meter box body	
3.	Material withstanding temperature	
4.	Dimension of the box (I x w x h)	
5.	Thickness (mm) A At load bearing side B At rest of the wall and door	
6.	Clearance between meter and meter box between the following: **a** Top **b** Both side **c** Bottom side **d** Front side **e** Back side	
7.	Color	
8.	Viewing window **a** Material **b** Dimensions **c** Whether shade arrangement to window provided or not	
9.	No. of Hinges	
10.	Handle provision	
11.	Earthing provision	
12.	Sealing arrangement	

13.	Inlet and outlets for cable	
14.	Gasket **a** Whether gasket is provided for door b. Material of the gasket	
15.	Suitable for outdoor installation	

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