ENERGY METER

1.1 GENERAL

This Chapter describes the common requirement for static energy meter required for HT feeder.

CMRI along with software shall be supplied for each package as per BPS. Necessary software for downloading the data through CMRI and uploading to computer shall be provided.

The seals & sealing specifications are given in Annexure A

1.2 STANDARDS APPLICABLE

Unless otherwise specified elsewhere in this specification, the performance & testing of the meters shall conform to the following Indian/International standards with updated and latest amendments/revisions thereof.

S. No.	Standard No.	Title
1.	IS 14697-1999	AC Static Watthour Meters for active energy Class 0.5 & 0.2
2.	BIS 12063	Specification for degree of protection
3.	IS 5133/1969	Specification for boxes for enclosure of electrical accessories
4.	IEC 60687	Specific for AC static Watt hour meter class 0.5 & 0.2
5.	IS 13779/1999	AC Static Watthour Meters for active energy Class 1.0 & 2.0
6.	IEC 61036/1996	Specific for AC static Watt hour meter class 1.0 & 2.0
7.	CBIP Report No.-88	Specification for AC Static Electrical Energy Meters
8.	CBIP Technical Report No. 111	Specification for common meter reading instrument
9.	IS;9000	Basic environment testing procedure for electric and electronic item

1.3 CLIMATIC CONDITION

The meter should be able to perform satisfactorily in moderately hot and humid climate, conducive to rust and fungus growth as specified in Section-I. The climate conditions are also prone to wide variations in the ambient conditions. The meter shall work satisfactorily even under lightning conditions and also the meter performance and life shall not be affected due to smoke present in the atmosphere.

* The specifications are applicable for meter installation upto an altitude of 2200 meter above mean sea level. For meters to be used for an altitude of above 2200 MSL necessary corrections shall have to be carried out in BIL and one minute power frequency with stand voltage capability as per relevant standard.

1.4 SUPPLY SYSTEM

Type of meter	Input Voltage	Input Current	Burden	Type /Phase	Starting Current	Accuracy
HT Feeder meter	3 x 110 volt ph-ph	1A / 5A	1.5 Watts/phase or 10 VA/phase for voltage circuit and 1 VA phase for each current circuit	3 phase 4 wire	0.1 % of basic	0.5

1.5 POWER FACTOR RANGE

The meter shall be suitable for full power factor range from Zero (lag) to Unity to Zero (lead).

1.6 POWER SUPPLY VARIATION

Energy meter along with its accessories shall withstand following extreme operating conditions.

Voltage	:	70% to 120 % of V ref
Frequency	**:**	**50 ± 5% Hz**

The manufacturer can also offer meters, which can withstand higher variations.

1.7 MAXIMUM CONTINUOUS CURRENT

The maximum continuous current in meters shall be the current at which the meter purports to meet the accuracy requirement of the specification.

1.8 CALLIBERATION

The meter should be only factory calibrated and no modification of calibration should be possible at site to ensure non tampering of meter at site.

1.9 COMMUNICATION CAPABILITY

The Meter shall be provided with a galvanically isolated optical communication port as per IEC-1107/PACT/ANSI, with removable cover and with locking arrangement so that it can be easily connected to a CMRI for data transfer.

The optical communication port shall also have sealing provisions. The manufacturer shall provide the requisite meter software, protocol software or any other software and all facilities required by the owner to use the WINDOWS based hand held CMRI for reading and retrieving the data from the meter and download them in owner's base computer station. The contractor shall demonstrate the data transfer through hand held CMRI and generating the appropriate reports to owner.

1.10 NAME-PLATE MARKING OF THE METER

The marking on every meter shall be in accordance with relevant clauses of standard.

Every meter shall have name plate beneath the meter cover such that the name plate cannot be accessed without opening the meter cover and without breaking the seals of the meter cover and the name plate shall be marked distinctly and indelibly. The basic marking on the meter nameplate shall be as follows:

a) Project(Details to be given later)
b) Manufacturer's name & trade mark
c) Type Designation
d) No. of phases & wires
e) Serial number
f) Month and Year of manufacture
g) Reference Voltage
h) Rated secondary Current of CT, if applicable
i) Reference Standard as applicable
j) Principal unit(s) of measurement
k) Meter Constant

l) Class index of meter
m) "Property of _____"
n) Purchase Order No. & Date
o) Guarantee period

1.11 CALIBRATION AND TEST OUTPUT

The meter should have test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output device shall be provided in the form of one common/separate LED for KWh and KVARh as applicable with provision of selecting the parameter being tested. The test output device should have constant pulse rate in terms of pulse/unit energy.

The meter shall be tested, calibrated and sealed at works before dispatch. Further, no modification or calibration shall be possible at site by any means.

The resolution of the test output shall be sufficient to enable the static current test in less than 10 minutes.

1.12 INSTALLATION AND COMMISSIONING

The Bidder shall be responsible for total installation and commissioning of the meters (along with test blocks, if supplied separately) as per Owner's advice, including unpacking and inspection on receipt at site, mounting the meters, connection of input & output cables to the meters including any required rewiring, functional testing, commissioning and handing over. The Bidder's personnel shall procure/carry the necessary tools, equipment, materials and consumables (including insulated wires, lugs, ferrules, hardware etc.).

As a part of commissioning of CMRI the Bidder shall load the software specified in this specification into the PCs at the Base computer stations, and fully commission the total meter reading scheme. He shall also impart the necessary instructions to Utility engineers.

1.13 GUARANTEE

Manufacturer shall undertake a guarantee to replace the meters upto a period of 12 months from the date of operation. The meters, which are found defective/inoperative at the time of installation, or became inoperative/defective within the guarantee period, these defective/inoperative meters shall be

replaced within one month of receipt of report for such defective/inoperative meters.

1.14 SERVICES

Manufacturer shall also extend services to repair the meters on chargeable basis, up to a period of 108 months from the date when the guarantee period is over i.e. after 12 months of successful operation of the instant meter.

2.0 3 PHASE 4 WIRE 0.5 CLASS ENERGY METER FOR FEEDER

2.1 GENERAL & CONSTRUCTIONAL REQUIREMENTS

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

a) Personal safety against electric shock
b) Personal safety against effects of excessive temperature.
c) Protection against spread of fire
d) Protection against penetration of solid objects, dust & water
e) Detection against fraud
f) Detection against pilferage

2.1.2 The meter shall be designed with application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology). Power supply and voltage divider circuits may be of PTH technology. The meter should be housed in a safe, high grade engineering plastic / polycarbonate casing, which is of projection mounting type and is dust/moisture proof, conforming to IP-51 of BIS 12063 / IEC 529.

2.1.3 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 during operating life by providing suitable protective coating.

2.1.4 The meter shall be supplied with a transparent extended terminal block cover (ETBC). The meter base, meter cover, terminal block and ETBC shall be made of unbreakable high grade fire resistant non-flammable reinforced, polycarbonate (not bakelite) or equivalent high grade engineering plastic, which should form an extension of meter cases and have terminal holes and shall be of sufficient size to accommodate insulation of the conductors, meeting the requirement of CBIP technical report CBIP.88.

2.1.5 The extended terminal block cover should be separately sealable at two places and housed at the bottom of the meters and once sealed should prevent unauthorized tampering.

2.1.6 The terminal block should have sufficient insulating properties, mechanical strength and should have tin plated solid brass terminals with two fixing screws per terminal. The terminals should be designed to withstand high overload.

2.1.7 The meter should not get damaged or substantially influenced by the electromagnetic disturbances and electrostatic discharges caused by harmonics, voltage dips and short interruptions, transients, DC and AC magnetic field.

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

2.1.9 The meter shall conform to the degree of protection IP 51 but without suction in the meter as per IS: 12063/IEC: 529 for protection against ingress of dust, moisture and vermin's.

2.1.10 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.

2.1.11 The meter cover shall have one window. The window shall be of transparent, high grade engineering plastic for easy reading of all the displayed values/parameters, name plate details and observation of operation indicator. The window shall be ultrasonically welded with the meter cover such that it cannot be removed undamaged without breaking the meter cover seals.

2.1.12 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.

2.1.13 The meter shall have tin plated brass terminals. 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).

2.1.14 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 5.0 mm minimum. The clearance and creepage distance shall conform to relevant clause of IS 14697:1999/CBIP technical report No.88.

2.1.15 The meter shall be compact in design. The entire 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.

2.1.16 The meter shall have a design to operate satisfactory for 10 years under normal electrical condition and guaranteed life of 18 months from the date of commissioning against manufacturing and design defects. The meters found

defective with in guaranteed period shall be replaced by supplier free of cost with in one month of intimation.

2.1.17 The meter shall be provided with accurate quartz crystal based real time clock and calendar with the accuracy limit as per relevant standards. Meter shall have provision to synchronise the meter time with standard time through CMRI with proper security system.

2.1.18 The integration period shall be set as 30 minutes and subsequently can be changed on real-time basis.

2.1.19 Vendor will give one copy of all the software's (meter reading software for CMRI, software for uploading data from CMRI to computer).

2.1.20 It should be possible to check the healthiness of phase voltages by displaying all the voltages on the meter display.

2.1.21 The Meter should have appropriate facilities to be read in absence of Power Supply.

2.1.22 The meter should work accurately irrespective of phase sequence of the mains supply.

2.1.23 The meter should remain powered up and functional even when either any two phases are available to the meter

2.1.24 The meter shall record active energy, even if one or more CT"s are reversed. The current vector direction shall always be considered as positive (import) for computation of energy and shall be added in main active energy register.

2.1.25 Data Security: The Meter shall have multilevel password for data protection and security. The meter data retrieval shall be possible through authenticated CMRI. The meter shall support the event of change of TOD register timings / no. of TOD registers, demand integration period and /or setting the meter time through authenticated transaction and shall be logged as an event. The transaction events shall be available for viewing at BCS end.

2.1.26 The meter data shall be retrievable through CMRI and will be downloaded in the Base computer software for viewing, analyzing and printing. The meter data downloaded at BCS end should be in user-friendly formats. The supplier shall supply the required software for base computer system. The base computer software shall have the facility to convert the required data (For billing, Energy Audit, tamper analysis purpose) in to ASCII format. This data should be possible to be used as input data for any other software to generate desired reports as per the utility requirement.

2.1.27 The meter shall have radio interference suppression such that it should not generate noise, which could interfere with the other equipment.

2.1.28 The meter shall have three fixing holes, one at the top and two at the bottom. The top hole shall be provided with a special clip at the back of the meter so that holding screw is not accessible to the consumer after fixing the meters. The lower fixing screws shall be provided under the sealed terminal cover. The requisite fixing screws shall be supplied with each meter.

2.2 SEALING OF METER

Reliable sealing arrangement should be provided to make the meter tamper proof and avoid fiddling or tampering by unauthorized persons. For this, at least two no. of seals on meter body, two no. of seals on meter terminal cover and one no. of seal on each communication port shall be provided. All the seals shall be provided in front side only. Please refer Annexure A for specification for sealing system.

2.3 CONNECTION DIAGRAM & TERMINAL MARKINGS

The terminals shall be marked properly on terminal block for giving external connections. A diagram of connections should be provided inside the cover of terminal block. The terminal cover shall be extended such that when it is placed in position it is not possible to approach the connections or connecting wires. The terminals and the screws shall be suitable to carry upto 150% of Imax safely. The terminals shall have suitable construction with barriers and covers to provide secure and safe connections.

2.4 REMOTE READOUT FACILITY, COMMUNICATION CAPABILITY

The meter also shall have a separate individually sealable RS-485 communication port to communicate with Remote Terminal Unit(RTU) over Modbus protocol in multi-drop mode so that selected analog data can be communicated to central location for SCADA / DMS application. The implementation detail of MOSBUS protocol shall be furnished by the bidder.

2.5 SOFTWARE

Licensed copies of the softwares (meter reading software for CMRI, software for downloading/uploading data from CMRI to computer) shall be made available and shall be installed on each common meter reading instrument (CMRI) and Base computer by the supplier.

Common Meter Reading Instrument (CMRI) would be loaded with user-friendly software (MS-DOS 5.0 or higher version compatible) for reading, downloading meter data and Time of Day (TOD) programming in the meter.

Windows based *user interactive* Software for receiving data from CMRI and downloading instructions from base computer to CMRI. This software should have, amongst other requirements, features and facilities as described later in

this specification, the facility to convert meter reading data into a user definable DBF (Access) or spreadsheet or ASCII format or any other format for integrating with the purchaser's billing system as desired/required by the utility. Here again an "Export wizard" or similar utility shall be available whereby user can select file format, the variable data to export, the field width selection of each variable 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.

The software shall have the flexibility to generate the following sets of reports.

- Load survey reports
- Tamper reports

Necessary software for loading application program into meter via CMRI serial port shall also be provided.

2.5.1 Tamper reports to include for a pre determined duration or month wise, tamper count, tamper duration and tamper history for each of the meters.

2.5.2 Vendor will provide soft copy of all the software in CD form along with the meters supplied.

2.5.3 Vendor to install & demonstrate working of software programmes of other meter manufacturers on the CMRI's to be supplied with this package

The specification of CMRI are presented as *Annexure B*

2.6 DISPLAY

A real time quartz clock shall be used in the meter for maintaining time and calendar date. The maximum drift shall not exceed 5 minutes per year. The uncertainty of setting initial time shall not exceed ± 30 Seconds with respect to Indian standard time (Ref NPL New Delhi).

Facility for adjustment of real time shall be provided through CMRI with proper security.

The meter shall have a minimum 7 digits, 7segment display of liquid crystal display (LCD) or light emission diode display (LED) with another digit for legend. The minimum character height shall be 10 mm. Provision shall be made to read consumption in either whole units or decimal multiples or sub-multiples of one possible to display content of relevant parameters with another digit displaying legend for identification.

The display shall remain on the screen till operator presses button for subsequent display or 10 sec which ever is earlier.

The meter should have non-volatile memory, so that the registered parameters will not be affected by loss of power. A provision shall be made to read the meter parameters such as MD and consumption, etc., through the meter cover without actually opening the meter box cover. The non-volatile memory should have a minimum retention time of 10 years under unpowered condition.

2.7 DISPLAY SEQUENCE

The meter shall display the required parameters in two different modes as follows:

A. Auto Display Mode

Display test (LCD/LED Segment check)

- Real time & date
- Active energy forwarded
- Reactive energy lag
- Reactive energy lead
- Apparent energy forwarded
- Maximum Demand forwarded
- MD occurrence date and time
- Rising demand with elapsed time
- MD reset count
- Cumulative MD forwarded
- Instantaneous average 3 ϕ PF
- Instantaneous frequency
- Phase voltages R,Y,B
- Phase currents R,Y,B
- Cumulative power on hours of current month

B. Push Button Mode

All above & the following

- Tamper and fraud details
- Present CT status
- Last occurrence tamper ID
- Date and time of last tamper occurrence

- Last restoration tamper ID
- Date and time of last tamper restoration
- Cumulative tamper count
- TOD Register [Active forwarded energy (8 Nos)]
- TOD Register [Apparent forwarded energy (8 Nos)]
- TOD Register [Apparent forward MD (8 Nos)]
- Cumulative power on hours

i. Read Out Parameters with CMRI

All above including following

- Energy registers
- Billing registers
- TOD Registers
- Load survey data
- Tamper and fraud (all event details with date and time)
- Self diagnostic details
- Real time calendar clock fail
- Battery bad flag
- History of monthly Energy Flow, Maximum Demand, Average power factor for the last 12 months

2.8 MAXIMUM DEMAND REGISTER

The maximum demand is to be monitored during each demand interval set with 30 minutes integration and the maximum of these in a month shall be stored. Whenever MD is resent the maximum demand value so registered shall be stored along with date and time. Under the current integration period, the rising demand should be displayed continuously along with the elapsed time. The registered demand and the number of times the MD is reset shall also be displayed and the information stored.

2.9 MAXIMUM DEMAND RESET

Facility for auto reset of MD at 00.00 hrs of first of every month shall be provided for which minimum 30 years calendar shall be programmed by the manufacturer.

The meter shall display the maximum demand reset count.

2.10 LOAD SURVEY CAPABILITY

Load survey shall be available for at least 35 days with 30 minutes load survey integration period for following parameters. Vendor shall provide necessary facility to transfer data through CMRI/Public Switch Telephone Network-PSTN/Low Power Radio (LPR)/GSM.

a. kWh forwarded
b. kVAh forwarded
c. kVARh lag
d. Voltage Phase wise
e. Current Phase wise
f. Daily maximum demand active & Apparent.

The load survey data, abnormality event information and instantaneous parameters data shall all be retrievable through the meter's communication port from a common meter reading instrument (CMRI)/ Hand Held Unit and shall be transferred (downloaded) to a PC with user friendly Windows based software to get complete details in numerical and/or graphic form. The necessary feature shall be available in the software used for uploading data from CMRI to computer and shall be provided by the supplier with complete details.

The meter shall have sufficient non-volatile memory for recording history of energy parameters for last twelve billing cycles (Bill date shall be 00 hrs of the 1st date of the calendar month by default – programmable) and information should be made available at the BCS end:

2.11 TIME-OF-DAY (TOD) TARIFF/DEMAND

The meter should have provision of registering the time-of- day energy and maximum demand. It shall be possible to define TOD register for active forwarded, apparent forwarded energy type.

The meter should have in-built capacity to define up to eight (8) time zones through operation of CMRI .The change of the TOD time-period(s) or changing number of TOD zones should be possible through CMRI with special authenticated command from the software used for uploading data from CMRI to computer so that only authorised person(s) can make such changes. The main control of this system along with proper security password/code should be available on one or more computers located at the authorised location(s) as per the directions to be given by the Purchaser

2.12 SELF DIAGNOSTIC FEATURE

2.12.1 The meter shall be capable of performing complete self diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory

location at all times. The meter shall have indications for unsatisfactory/nonfunctioning/malfunctioning of the following:

a) Real Time and Date
b) All display segments as per the requirement
c) Nonvolatile memory (NVM) failure indication at BCS
d) Low battery indication at BCS

2.12.2 While installing the meter, it should be possible to check the correctness of Current and Voltage Transformer connections to the meter and their polarity from the functioning of the meter for different voltage injections with the help of vector/phasor diagrams. For this purpose a suitable software for field diagnosis of meter connections with the help of Meter Reading Instrument should be supplied.

2.13 TAMPER & FRAUD PROTECTION

The meter shall function properly under following common abnormal conditions:

1. Phase sequence reversal	The meter shall keep working accurately irrespective of the phase sequence of the supply.
2. Current reversal/CT polarity reversal	The meter shall log energy in forward direction even if the current is flowing in reverse direction in one or more phases.
3 External magnetic influence	The metering system shall be provided with adequate magnetic shielding so that any external magnetic field (AC Electro Magnet or DC Magnet) as per the values specified in CBIP Technical Report No.88 (with latest amendments) applied on the metering system shall not affect the proper functioning and recording of energy as per error limits prescribed by CBIP.

Beside this the meter should have features to detect the occurrence and restoration of, at least, the following common abnormal events:

i. Missing Potential & Potential imbalance: The meter shall be capable of detecting and recording occurrence and restoration with date and time the cases of Potential failure which could happen due to disconnection of potential leads (one or two), failure of phase line fuse from the Potential Transformer

primary side. Meter shall also detect and log cases of voltage unbalance (from 5% for more than 5 minutes or more (programmable)) of voltages.

ii. Voltage High / Voltage Low: In case the average 3 phase voltage remains less (below 0.75Vref by default) than or above (above 1.15Vref by default) for a predefined period (30 minutes by default), the meter shall log such incidences with date & time. The voltage thresholds & persistence time shall be programmable using the CMRI & BCS. This abnormal condition shall be logged only when all the three-phase voltage is available.

iii. Current imbalance: The meter shall be capable of detecting and recording occurrence and restoration with date and time of Current unbalance (30% or more for more than 15 minutes, or as programmable).

iv. Current Circuit Short: The meter shall be capable of detecting and recording occurrences and restoration of shorting of any one or two phases of current circuit to identify events like CT saturation, CT lead shorting, CT inter turns short etc.

v. Current Circuit Open: The meter shall be capable of detecting and recording occurrences and restoration of opening of any one or two phases of current circuit which can happen due to intentional / accidental disconnection of current circuits. The meter shall be able to log abnormality conditions in current open event like CT leads burns, loose connection, CT winding open etc in the meter memory. No load condition should not be recorded in meter memory as a Current circuit open event.

vi. Power on/off: The meter shall be capable to record power on /off events in the meter memory. All potential failure should be recorded as power off event.

The meter shall record the total duration of the above abnormalities, time and date of their occurrences & restorations with a snap shot of electrical conditions viz. Voltage , current ,PF etc

Logic for calculation of voltage and current imbalance shall be furnished by the tenderer.

The meter shall keep records for the minimum last 250 events (occurrence + restoration) for above of abnormal conditions. It shall be possible to retrieve the abnormal event data along-with all related snap- shots' data through the meter's optical port with the help of a hand held unit (HHU) and download the same to the BCS where it shall be available for viewing. All this information shall be made available in simple and easily understandable format.

2.14 TAMPER LOGIC

Properly designed meter event logic should be provided. There shall be separate compartments for logging of potential related event, current related

event and power on/off event. The bidder should explain the events details in each compartment under their offer.

The logging of various events in each compartment should be as under:

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

A properly defined meter tamper logic should be provided. The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log/record tamper due to source side abnormalities.

There shall be three separate compartments for logging of different types of tampers as follows:

Compartment No. 1:

50 % of the tamper memory space shall be allocated for the following current related tampers

- CT open circuit
- CT short (bypass)

Compartment No. 2:

25 % of the tamper memory space shall be allocated for missing potential tampers.

Compartment No. 3:

25 % of the tamper memory space shall be allocated for current unbalance tampers

2.15 TESTS

Unless specifically waived off all test shall be witnessed by the purchaser.

2.15.1 Type Test

Energy Meters offered shall be fully type tested as per IS 14697 / CBIP Technical Report No. 88 at any of the NABL accredited test laboratories.

In case meters are not type tested in NABL accredited test laboratories the bidder shall arrange to carry out type tests in any of the NABL accredited test laboratories at his own cost.

2.15.2 Acceptance Test

Acceptance test shall be carried out as specified in table 18 of CBIP Technical Report No. 88

2.15.3 Routine Test

All routine tests as specified in table 18 of CBIP Technical Report No. 88 shall be carried out on each individual meter.

2.16 FIXING OF METERS

The meters shall be mounted in the panels.

2.17 OTHER SALIENT FEATURES

2.17.1 It should be possible to check the healthiness of phase voltages by displaying all the voltages on the meter display.

2.17.2 The meter shall have provision of reading through communication port in the absence of power through an external source.

2.17.3 The meter should work accurately irrespective of phase sequence of the mains supply

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

i.

Annexure-A

SPECIFICATION OF POLY CARBONATE SEALS REQUIRED FOR SEALING

OF SINGLE / POLY PHASE METERS

1.01 Seal should be made of polycarbonate with ultra violet additive & should not be affected by boiling water & acid.
1.02 The seal should withstand temperature up to 147 ° C.
1.03 Seal should be available in Clear / Red / Blue / Yellow / Amber / Green / Grey colour and should be transparent.
1.04 Every seal should have 6" long, 20 gauge, twisted strand stainless steel wire.
1.05 Seal should have facility to print mono gram / name of company
1.06 Every Seals should have a unique seven-digit number. Numbers shall be printed on seal including the anchor cap-using laser marking which shall not be erased using any tool or by any chemical reaction. Both the seven digit seal numbers should be visible separately after closing the seal.
1.07 Seals should have tamper proof, internal " anchor " locking mechanism that permanently secures the wire upon closing. The mechanism should be designed in such a way that its original position can't be restored after any effort of tamper or breaking of seals
1.08 Sealing mechanism shall be designed in such a way that it can be sealed without using any pliers or tools.
1.09 Seal should be constructed of two parts, first the main body (female type) & second the anchor (male type) having locking mechanism. Both the part should be designed in such a way that once the seal is closed the two parts can't be separated.
1.010 Seal should be patented. Copy of patent shall be submitted along with offer.
1.011 Packaging: Seals shall be supplied in packet of 100 seals. Each packet shall be labelled for following information

- Client Name
- Purchase order number &date
- Serial number range in the form of bar coding.

1.012 Seals shall be provided with tracking & recording software. The software shall have following features

- Software should have facility of defining the system controller

- Facility to enter serial number of seals with the help of bar code scanner.
- Receiving of seal in the system and with authentication like signature.
- Facility to identify the concern who is responsible for receiving of seals and nominated by system supervisor.
- Provision to define different type of seals for various uses.
- Software should have facility of report generation for inventory & issue records.
- Facility to track for relevant data for individual seal entered in the system.

Annexure-B

TECHNICAL SPECIFICATION FOR

COMMON METER READING INSTRUMENT (CMRI)

This specification covers supply and delivery of Common Meter Reading Instrument (CMRI) for reading (uploading) the data of different make of meters and to have a capability to dump (download) the same to the base computer system. The CMRI shall have memory / space to reside software of reading at least 3 different makes of electronic meters as specified by purchaser.

A. Portable/hand-held Common Meter Reading Instrument (CMRI)

These shall be tailor-made for tapping all data stored in the memory of electronic meters of type, three phase 3wire, three phase 3 wire HT/LT Trivector meters, whole current meters, single phase meter, and faithfully transferring it to the local PC in the BCS. Each device shall be supplied complete with

i) a lead with optical head for coupling it to the meter,

ii) a lead for plugging it to a personal computer;

iii) an internal battery for powering the devices;

iv) a case for safely carrying it about

v) a battery charger

The total arrangement shall be such that one (1) operator can carry out the whole operation himself, in about five (5) minutes per meter.

B. The CMRI shall have a key for starting the data tapping from the coupled meter's memory, a key to start data transfer to the PC, and a lamp, which would light up on completion of data collection, remain 'on' while the data is held in the device and would go 'off' when all data has been transferred to the PC. Data tapping operation shall not erase the data from the meter's memory, or effect the meter operation in any way. The memory of the CMRI shall get automatically cleared when the data has been transferred to the PC only then the CMRI shall accept data from another meter. CMRIs shall also have the necessary provision for meter clock

correction. CMRIs should have adequate memory, to host application software, for enabling downloading of meter data of 3 makes of meters.

C. The Contractor shall provide the necessary software which would enable a local IBM-Compatible PC to (i) accept the data from the CMRI and store it in its memory, (ii) display the collected data on PC's screen, with forward/backward rolling, (iii) print out the data collected from one or more meters, starting from a certain date and time, as per operator's instructions, (iv) transmit the collected data through an appropriate communication link to the central computer, starting from a certain date and time, as per operator's instructions, and (v) store the collected data on a floppy disc.

D. The above software shall further ensure that absolutely no tampering (except total erasures) of the collected metering data is possible during its handling by the PC. The software shall be suitable for the commonly available PCs, and shall be supplied to SEB in a compatible form to enable its easy loading into the PCs available (or to be installed by the SEB) at the various substations/ locations in the circle.

E CMRI should be compatible with Low Power Radio module to be provided by the bidder for receiving the data from the meter to the CMRI/Hand Held UNIT and ultimately transferring to BCS &vice versa for loading required instructions to the meters.

F. CMRI should conform to CBIP Technical Report No. 111with latest amendments with Level (2) IP 67 protection and following climatic condition & standards

1.0 Standards

The CMRI shall confirm in all respects to the following standards.

i) CBIP Technical Report no. 111 – Specification for common Meter reading Instrument.
ii) IEC – 529 – Degree of Protection provided by enclosures
iii) IS : 12063 : 1987 – Classification of Degree of Protection provided by enclosures of electrical items
iv) IS 9000: 1979 – Basic environmental testing procedure for electronic & electronic items.
v) IEC – 1000 – Electromagnetic compatibility
vi) IEC – 1000-4-2 : 1995 – Electrostatic discharge immunity test

vii) IEC – 1000–4-3 : 195 – Radiated, radio – frequency electromagnetic field immunity test, Magnetic immunity test

viii) CISPAR 22 – Limits and method of measurement of radio disturbance characteristics of information technology equipment.

2.0 Climatic Conditions:

The detail climatic condition is specified in Section-I.

3.0 Principal Parameter

For downloading data *from electronic meters of type, single phase,230 V, whole current, three phase 415 V Whole current ,three phase 415 V,CT operated, 33kV,11kV,HT Trivector CT,PT operated meters.* The offered meter reading device *should be* portable, compact and battery powered. It's memory shall be adequate to enabling transfer of data from three makes of meters equipped with suitable communication port and transferring them on to a base computer system such as an IBM compatible PC or an external peripheral & vice-versa.

The offered CMRI should *have capacity* compatible to read minimum 20 meters for billing & tamper data but without load survey and minimum 10 meters for billing and tamper data with load survey.

CMRI shall be able to display phase / vector diagram of phase current, phase voltage with respective phase angles and phase sequence of voltage at *SITE* when these data are read from the meter.

4.0 GENERAL TECHNICAL REQUIREMENT:

Physical Characteristics:

i. Size:

CMRI should be handy, lightweight and small in size for ease of portability.

ii. Enclosure:

CMRI casing shall be of electrical insulating material of high thermal stability and mechanical strength. Its degree of protection confirms to IP 67 LEVEL *(2)* as per IS 12063 / IEC-529.The enclosure should be solvent

resistant and shall be provided with a suitable holding Strap for proper gripping.

iii. Ruggedness: CMRI is able to withstand harsh field environment without physical damage or loss of data.

iv. Display: The display of CMRI is having the following characteristics.

a) Easy readability in varying ambient light conditions.

b) 4 lines and 20 characters per line on the screen

c) The size of the character shall be 4 mm

d) The contrast and intensity control to get a clear display in varying ambient light.

v) Key Board: The keyboard of the CMRI is having the following attributes.

a) Long operation life i.e. minimum 100000 operations (typical).

b) Feed back for key press acknowledgement to user.

c) Legible and non-fading keypad imprints for all alphanumeric characters/symbols.

d) Each English alphabet shall have a separate key.

vi. Input / Output ports (I/O Ports) :

The CMRI shall be having two serial input/output Ports, one port shall be serial port RS 232C compatible. Another optional port can be used for convenience of connecting peripherals such as bar-code reader, printer, battery charger, loader charger etc.

The offered CMRI shall be able to provide power supply for optical sensor used for meter reading applications.

5.0 Physical interface:

i. Interface between meter and CMRI:

The interface between a meter and CMRI shall consist of 2 parts.

a) Meter optical sensor terminating in to a 9 pin D type male connector with a cable of 500 mm +/- 10 mm. Length.

b) The interface between a meter and the offered CMRI shall be with a flexible shielded cable of length 1500mm +/-10mm having 9 pin D-type female connector with electrical circuit. This cable shall be supplied along with CMRI. The two ends of the cable is stress relieved.

Interface between CMRI and Base computer station:

Suitable flexible shielded cable of sufficient length for communication between CMRI and base computer station shall be provided. This communication shall be serial RS232C. On the base computer station end of the cable a 9 pin D-type female connector shall be provided. The two ends of the cable are stress relieved.

This cable shall also be supplied along with the CMRI.

6.0 Hardware and Software requirement:

i. Operating system :

To facilitate use of various meters, specific MRI programs in one CMRI, MS DOS version 5.0 or higher system shall be used. The facility to upgrade the BIOS/OS by a CMRI supplier shall be available without exposing the hardware of the CMRI.

The additional program necessary to transfer application programs with serial port shall be provided.

ii. Memory:

a) The CMRI shall be having a minimum memory capacity of 3 MB Static RAM (SRAM) with battery backup and upgradeable.

b) BIOS/OS on FLASH memory / *EEPROM MEMORY*

iii. Communication:

The CMRI shall be able to communicate for-

a) Down loading / up loading data from / to the meter
b) Uploading / downloading data to / from the Base computer station
c) CMRI shall be capable to read bar code information using a bar code scanner from barcodes of ac static \ electromechanical electricity meters by using appropriate scanner and bar code soft ware.
d) CMRI shall support flexible baud rate ranging from 300 Baud to 19200 (or higher) Baud rates to cater communication needs stated above.

iv. Real time clock :

A real time clock is provided in the CMRI, which have the following features:

Power requirement : The clock shall have a minimum of 15 days battery back up.

Calendar : The clock shall have 20 years calendar.

Time drift : The time drift shall be negligible and shall not exceed 20 seconds per day.

v. Time Setting Facility:

The CMRI shall have the facility to get its time set from Base computer station. Proper security for this is ensured using password

vi. Power supply (Battery) for CMRI:

The CMRI shall have the following features for its power requirements:

a) The CMRI shall be powered by rechargeable battery housed within its enclosure.
b) The average capacity of charged battery shall be sufficient to communicate with meters and base computer station for at least :

i) 6 hours while communicating through optical interface of meters and
ii) 8 hours without powering Input / Output ports for optical interface.

c) To reduce the equipment down time and inventories, there shall be provision to charge the CMRI battery without being removed

from the equipment. A suitable battery charger for charging of CMRI battery shall be provided.

d) There would be a provision for AUTO POWER SAVE, which force the instrument in the power saving mode in case of no activity within 5 minutes.

e) The battery used for data retention in SRAM would have a minimum of 3 years backup capacity.

f) The CMRI would have battery low indication and automatic cutoff to avoid further drain of the battery.

7.0 Communication Protocol and Software

Software:

a) The following software shall be provided in the offered CMRI.

i) Operating system compatible to MS DOS 5.0 or (latest version ver 7.0).

ii) Necessary software for loading application programs via a serial port for uploading and down loading between CMRI and Base computer Station (BCS)

b) i. Provision for loading the software into the CMRI of the specific makes of the meters, for the purpose of reading and programming of the specific make(s) of static meters, such Software shall be provided by respective meter manufacturers.

ii. BCS software accepting data from CMRI, processing generating reports and downloading instruction from BCS to CMRI.

c) Special Requirement:

The offered CMRI shall have provision for storing the third party software and can also be loaded for special applications such as manual meter reading, data entry through keyboard of CMRI, printing, display of balance memory etc.

d) The CMRI shall have facility to draw/display vector diagram of the electrical conditions existing at site to check the healthiness of the connections.

e) The CMRI shall have provision to read the energy registers so that accuracy testing can be done at site with standards calibrating equipments.

f) The CMRI shall have the provision to read the various instantaneous electrical parameters at site like voltages, current, PF, phase angles, power (kW, KVAr, and KVA) frequency etc.

g) The CMRI shall have facility to estimate the memory space available before reading the meter.

8.0 DATA SECURITY

The meter manufacturers are responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithm in the software up to down loading to BCS.

9.0 CMRI shall be type tested as per clause 5 of CBIP Technical Report No. 111.

10.0 Acceptance Tests for CMRI and PC Software

All CMRI after final assembly and before dispatch from Bidder's/Manufacturer's works shall be duly tested to verify that they are suitable for supply to the Purchaser. In particular, each and every CMRI shall be subjected to the following acceptance test:

(i) Functional Checks
(ii) Downloading Meter Data from the Meter(s)
(iii) Compatibility with PC software
(iv) Downloading the meter data on PC
(v) Functioning of advance and retard time commands
(vi) Per meter downloading time verification
(vii) Capacity of CMRI for data storage