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**Technical Specifications for High Precision HT Static Trivector Meters with DLMS Protocol & Suitability for Remote Metering with GPRS Modem.**

**1. SCOPE:**

This specification covers high precision tri vectors static energy meters of accuracy class 0.2s for 66KV and above Voltage Level & 0.5s for 11kv to 33KV Voltage Level meters with **DLMS Protocol & Suitability for Remote Metering with GPRS Modem**, capable of performing functions of energy audit/ load survey and metering for tariff purposes. The meters shall be three phase four wire type for HT applications. The meter with 0.5s for 11kV to 33kV Voltage Level has 5Amp Secondary rating. The meter with 0.2s for 66kV and above Voltage Level has 1 Amp Secondary rating.

It is not the intent to specify completely herein all the details of the design and construction of meter. The meter 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 the meter which is not in accordance therewith. The offered meter 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.

The original manufacturer of HT AC Static Energy Meters who is registered vendor shall only quote against this tender. It is mandatory that in case of Indian manufacturer, the offered meter shall be ISI marked and bidder shall have to furnish valid BIS certification along with the offer and in case of foreign bidder the meter shall comply either BIS standard or standard of International Electro technical Commission, i.e. relevant IEC, shall be marked with the same and bidder must furnish valid BIS or IEC certification along with the offer, however the meter must comply this specification.

**2. STANDARD APPLICABLE:**

While drafting these specifications, reference has been made to following Indian and International Standard Specifications. In case, certain details are not covered in these specifications, the relevant latest Indian/International Standard shall be applicable.

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IEC 62052-11	Electricity metering equipment (AC) -General requirements, Tests and test conditions -Part 11: Metering equipment
IEC 62053-22	Electricity metering equipment (a.c.) -Particular requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
IS 14697:1999(2004)	ac STATIC TRANSFORMER OPERATED WATI HOUR AND VAR-HOUR METERS, CLASS 0.2 S, 0.5 S and 1.0 S - SPECIFICATION
IS-15707	Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice
IS 15959:2011	Data Exchange For Electricity Meter Reading, Tariff & Load Control - Companion Specification
IS 9000 -	Environmental testing Procedures for Electronics and Electrical Items
IS 8161	Guide for Equipment Reliability Testing
IS 12346 -	testing equipment for AC Electrical energy meters.
IS 6842	Limits of electromagnetic interference
CBIP Research Publication No. 325	CBIP Guide on Static Energy Meter - Specifications and Testing
CEA Notification Dtd: 17/03/2006	Installation and Operation of meters
IEEE 519	For Harmonics Distortion

### 3. SUPPLY SYSTEM:

- 3.1 Solid neutral grounded H.V. and E.H.V. 3 phase, 4 wire 50 Hz. systems with CTPT ( Instrument transformers) connected.
- 3.2 Primary voltages : 11,22,33,66, 132 and 220KV  
For 5 Amp it should programmed for 11 Kv & for 1 Amp it should programmed for 66 Kv
- 3.3 Secondary voltages: 110V or 3 x 110V/ $\sqrt{3}$ . PTs are normally Y-Y (star-star) connected having a secondary Y (star) point brought out and with or without earthed.

CTs are 1-phase, 3 nos. with 6 wire connections to measure balanced and Unbalanced (either Delta or Star connected with floating star point or star point neutral grounded) loads from installation charging (i.e. No load) to 200 % of declared rated loads at all power factors.

### 4. SYSTEM VARIATIONS:

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The electrical quantities are required to be measured with a fine degree of precision, monitor, display and store in non-volatile memory of high precision static demand and energy Tri-vector meters of 0.2S/ 0.5S class accuracy for energy audit, load survey and tariff metering purposes at the installation of HT consumers, conforming to latest standard applicable. These meters are required to function accurately within the specified limits of errors under the following conditions of voltage, frequency, current, temperature & climatic condition.

**A. Electrical Quantities:**

**I Voltage**

a)	Phase to phase with star connection (but Neutral either solidly grounded or floated)	110 volts + 20%- 30%
b)	Phase to star point having neutral point either solidly grounded or floated.	110/√3 volts + 20% -30%

II Currents:- 1 or 5 ampere normal (In and 0.1% In to 200% In working

III Frequency: - 50 Hz. (+) 5% to (-) 5%

IV Power factor: - 0.0 Lag-Unity-0.0 Lead

**B. Climatic Conditions:**

Sr. No.	Particulars	Specified Requirements
1	Locations	At various HT Connections in the state of Gujarat
2	MAX. Ambient Air Temperature	55 Deg. Centigrade
3	MAX. Ambient Air Temperature in closed Box	UP TO 65 Deg. Centigrade
4	Minimum Air Temperature	0 Deg. Centigrade
5	Average Daily Ambient Temperature	25 TO 35 Deg. Centigrade
6	MAX. Relative Humidity	100 %
7	MAX. Altitude above mean sea level	1000 METERS
8	Average Annual rain fall	700 TO 900 MM
9	MAX. Wind Pressure	200 /Sq. MM

**5 GENERAL REQUIREMENT:**

5.1 The meter should be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized, virgin Polycarbonate casing of projection mounting type. The meter cover should be transparent, for easy reading of displayed parameters, and observation of operation indicators. The meter base shall not be transparent. The

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- meter casing should not change shape color, size, and dimensions when subjected to 200 hrs on UV test as per ASTM D 53.
- 5.2 Meter shall have in built power supply unit & it should be micro control type instead of control transformer type to avoid magnetic influence.
  - 5.3 RTC battery & the battery for display (in case of power failure) should be separate.
  - 5.4 Diagnostic Features: Suitable Indication for status of RTC, RTC Battery, Non Volatile Memory (NVM).
  - 5.5 Meter shall be capable of withstanding switching and transient surges of highest level so as to protect the internal meter circuit.
  - 5.6 The facility for reading the meter in absence of power supply shall be provided. This facility shall be powering from a separate internal battery having minimum life of 10 years.
  - 5.7 The registered parameters shall not be affected by loss of power. The display shall not be affected by electrical and magnetic disturbances. The meter shall make use of non-volatile memory capable of storing and retaining all the data required to be stores, without the help of any power source or battery backup and shall have a minimum retention time of 10- years under un-powered condition.
  - 5.8 Meters should have internal Real Time Clock with backup life of minimum Ten (10) years for operation of time clock. The Real Time Clock shall be independent of line frequency variations. The maximum drift per annum permissible in the real time clock shall be less than 2 minutes.
  - 5.9 The working of Meter under different magnetic influence condition is as under for Active energy.
    - (a) Meter must be immune to the continuous D.C. stray magnetic field of  $67\text{mT} \pm 5\%$ . Method for the testing & obtaining magnetic field should be as per CBIP 325 clause No 5.6.2.1, Table : 17 & its notes.
    - (b) Meter must be immune to the A.C. stray magnetic field of  $0.5\text{mT} \pm 5\%$ . Method for the testing & obtaining magnetic field should be as per CBIP 325 clause No 5.6.2.3, Table : 17 & its notes.
    - (c) Meter should be immune to the continuous D.C. abnormal magnetic of  $0.2\text{ Tesla} \pm 5\%$ . In case of if it is not immune than Meter should switch over to 100%  $I_{\text{max}}$ , UPF. Method for the testing & obtaining magnetic field should be as per CBIP 325 clause No 5.6.2.2, Table: 17 & its notes.
    - (d) Meter should be immune to the A.C. abnormal magnetic of  $10\text{mT}$ . In case of if it is not immune than Meter should switch over to 100%  $I_{\text{max}}$ , UPF. Method for the testing & obtaining magnetic field should be as per CBIP 325 clause No 5.6.2.4, Table: 17 & its notes.
    - (e) Meter should be immune to the A.C. abnormal magnetic of  $0.2\text{ Tesla} \pm 5\%$ . In case of if it is not immune than Meter should switch over to 100%  $I_{\text{max}}$ , UPF. Method of testing & obtaining magnetic field shall be as under.

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The abnormal A.C. magnetic induction emanating from a circular air cored coil (O.D. 200 mm, I.D. 38 mm, Depth 50 mm, 14 SWG, 20000 ampere-turns) producing 0.2 Tesla $\pm$  5% in the central region of its either surface shall be applied successively to all the surfaces of the meter and under the most unfavourable conditions of phase and direction to determine any abnormality under its influence.

- (f) Meter should be immune to permanent magnet of 0.5 T of minimum size 70 x70 x 50 mm. In case of if it is not immune than Meter should switch over to 100% I<sub>max</sub> at UPF.

**Tests at above sr. no. (e) & (f) are special requirement of DISCOM and for testing below mentioned test conditions are applicable.**

In the event of logging of presence of abnormal magnetic induction with date and time, the positive variation of error may be beyond the limit of 4% but not exceeding a value (e) as given in Note 3.2 under Table 17 of CBIP 325, corresponding to nominal registration of the meter at reference voltage, 100% maximum current and  $\cos\Phi=1$ .

During the test(s) no abnormality like movement of digits, flickering/ switching on- off of display abnormal heating and perceptible change of error should occur. After the test(s) there should not be any permanent change of error exceeding half the accuracy class index at I<sub>max</sub> at  $\cos\Phi = 1$  and 0.5 inductive & at 5% I<sub>b</sub> at  $\cos\Phi = 1$ ,

**6. CONSTRUCTIONAL REQUIREMENT:**

- 6.1 Meter 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 shall 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 and water
- 6.2 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's.
- 6.3 The meter shall be designed and manufactured using SMT (Surface Mount Technology).
- 6.4 Meter's Top Cover, Meter Base and Terminal Cover material should be polycarbonate and it should be fire, heat and ultra violet radiation resistant.
- 6.5 All parts of the meter should be resisted against mechanical stroke and shake during the transportation
- 6.6 Meter base and terminal block should be injection molded and should not be transparent.

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- 6.7 Meter top cover and terminal cover should be injection molded in transparent natural color.
- 6.8 The top cover should be ultrasonically welded or break to open type arrangement
- 6.9 The meter cover and base shall be suitably shielded with metallic material so as to protect the meter from adverse effect of AC/DC, Permanent Abnormal external magnetic field. The meter shall meet the requirements of CBIP-325 with its latest amendment and PGVCL requirement as per cl. no. 5.9 for immunity against continuous magnetic induction.
- 6.10 The terminal cover shall be extended type & shall enclose terminal compartment except for the provision of conductor entry at the bottom for incoming & outgoing leads. The terminal block, the ETBC meter cover & meter base shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermic overload of live parts in contact with them. The terminal block shall be of high grade non-hygroscopic, fire retardant, low tracking fire resistant, reinforced polycarbonate or equivalent high grade engineering plastic which shall form an extension of the meter case and shall have terminal holes and shall be of sufficient size to accommodate the insulated conductors & meeting the requirement.
- 6.11 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 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.
- 6.12 The terminal screws shall be of Nickle plated brass metal. The screws shall not have pointed end of threads.
- 6.13 Meter should not be prone to produce audible noise while in use.
- 6.14 The meter base shall be manufactured from high quality Polycarbonate material.
- 6.15 The thickness of casing, base & terminal cover shall be 2.0 mm +/-0.2mm.
- 6.16 Creepage and clearance shall be as per relevant standard.
- 6.17 All connection screws and washers should be tinned/nickel plated brass. The terminal screws shall not have pointed end at the bottom. All terminals will have two screws. The terminals shall be properly bound in the insulation.
- 6.18 The embossing/engraving/printing shall be provided on meter base, meter cover, terminal cover and terminal block as 'UV STABILIZED', 'PGVCL' and manufacturer's logo/ trade name.
- 6.19 Meter shall have three fixing holes, one at top & two at bottom. The top screw hole shall be provided on back of the meter so that screw head are not accessible after the meter is fixed. Lower holes shall be provided inside the terminal

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compartment so as to make them inaccessible to an unauthorized person after terminal cover is fixed.

- 6.20 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.
- 6.21 The polycarbonate material of only following manufacturers shall be used:-

- |    |               |  |
|----|---------------|--|
| A) | GE PLASTICS   | LEXAN 943A FOR COVER AND TERMINAL COVER/<br>LEXAN 503R FOR BASE & TERMINAL BLOCK |
| B) | BAYER         | GRADE CORRESPONDING TO ABOVE   |
| C) | DDW CHEMICALS | -DO-   |
| D) | MITSUBISHI    | -DO-   |
| E) | TEJIN         | -DO-   |
| F) | DUPONT        | -DO-   |

The meter base shall be manufactured from high quality industrial grade material viz. Polycarbonate with 10 % glass filled which shall meet following properties to ensure higher reliability and long life of the meter base.

- 1) Meter base & cover and 2) terminal cover shall conform to the following :-

Sr. No	Test	10% Glass filled non-transparent material for meter base & terminal block	Transparent material for meter cover & terminal cover
1	UV ageing for 200 Hrs. as per ASTM : G53(CL No. 9.3)	4 Hours UV at 60° C, 4 Hours condensation at 50° C	4 Hours UV at 60° C, 4 Hours condensation at 50° C
2	Boiling water test(10 MIN)	No softening & whitening & No change in colour, shape, size & dimensions	No softening & whitening & No change in colour, shape, size & dimensions
3	Ball pressure test as per IEC--60695-10-2	125° C +/- 2° C	125° C +/- 2° C
4	Flammability Test (a) As per UL 94 or (b) As per IS 11731(Part-2) 1986	VO FVO	VO FVO
5	Glow wire test IS:11000(part 2/SEC-1) 1984 OR IEC PUB,60695-2- 12	960 ±15° C (For terminal block)	650 ±10° C (For Terminal cover and meter case)

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6	Heat deflection Temp.(HDT) HDT/Ae, 1.8MPa edge (100mm) As per ISO 75/Ae	132° C	125° C
7	Free Fall Test from 2 mtr height without assembly	No crack	No crack

6.22 PCB of meter should be of Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm. The latest technology such as hybrid microcircuit or application specific integrating circuit (ASIC) shall be used to ensure reliable performance. The mounting of components on the PCB shall be SMT (Surface Mounted Technology) Type. The electronic components used in the meter shall be of high quality from world renowned manufacturers and there shall be no drift in accuracy of the meter for at least up to 10 years in operation.

**6.23 DISPLAY MODULE:**

- A) The Display should be 7 Digit LCD display with minimum character height of 10 mm.
- B) The display shall be permanently green backlit LCD during power on condition.
- C) The LCD shall be of STN (super twisted nematic type) constructing suitably for temperature withstand of 80°C (storage) & 65°C (operation).
- D) The LCD display should have a wide viewing angle of 120 degree and up to one meter distance, for clear visibility of the display of the meter reading at distance. Large viewing area with large display icons is preferred.
- E) When the meter is placed over at a constant temperature of 65 degree C for a period of 30 minutes, the character of LCD should not deform.
- F) After keeping the meter at a constant temperature of 80 degree C for a period of 30 minutes and when restores at normal temperature, LCD display should work satisfactorily.
- G) Dot- Matrix type LCD display is not acceptable.

**7. CONNECTION DIAGRAM & TERMINAL MARKING:**

The connection diagram of the meter shall be clearly shown in inside portion of the terminal cover & shall be of permanent nature. Meter terminals shall also be marked & these markings should appear in above diagram.

**8. SEALING OF METER:**

- 8.1 The construction of the meter shall be such as to be sealed independently and prevent unauthorized tampering. Meter should be sealed in such way to prevent unauthorized access. Any attempt for opening the meter's main cover should not be possible unless by breaking the meter's case.
- 8.2 All the seals shall be provided on front side only. Rear side sealing arrangement shall not be accepted. The diameter of the sealing screw hole shall accommodate

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two seals, one by supplier and other by utility or separate holes shall be provided for both sealing. Bidder in their offer shall explain the sealing arrangement.

- 8.3 At least two sealing screws of Nickel plated steel shall be provided for proper fixing of meter cover.
- 8.4 Appropriate sealing facility required on Meter terminal Cover, MD Reset Button & communication ports.
- 8.5 The supplier has to provide two polycarbonate seal having supplier's Logo and PGVCL's Logo and Serial No. both on Male and Female part on meter body.
- 8.6 The supplier has to provide two security seals on meter body. The security seals shall be as per ANNEXURE: A
- 8.7 The supplier must kept records of sealing done at their works.

**9. MARKING OF METER & NAME PLATE OF THE METER**

The meter terminal marking and mounting arrangement shall be as per Indian Standard/IEC.

The marking on every meter shall be in accordance with IS 14697/1999.

The 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 indelibly. The name plate marking shall not fade with lapse of time.

The basic marking on the meter nameplate shall be as under:

- Manufacturer's name and trade mark
- Type designation
- Number of phases and wires
- Serial number
- Month and Year of manufacture
- Reference voltage & PT ratio
- Rated Current & CT ratio
- Maximum rated Current
- Principal unit(s) of measurement
- Meter constant (Imp/kWh & kVarh)
- 'BIS' Mark (Applicable for Indian meter manufacturers only)
- Accuracy Class of meter for Active energy & Reactive energy
- "Property of PGVCL."
- Purchase Order No. & date
- Guarantee period-5 ½ years.
- Bar coding of Serial Number, month & year of manufacture, Meter Make
- Clear indication on Push Buttons i.e. for MD reset, Up /Down Scrolling, Battery Mode

Serial no which is provided by the PGVCL shall only be provided on name plate. Unique procedure of Meter Sr. no. having Alfa-numeric character will be decided by PGVCL and will be given at the time of placing Order so that 8 digit numeric

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part will appear on meter display and Alfa-numeric part will appear in BCS (MRI data) as well as on name plate.

#### 10. Output Devices:

The meter shall have a 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 homogenous and be provided in the form of LED output device for kWh and kVarh measurement.

The relation between test output shall comply with the marking on the name plate i.e. pulse per kWh/kVarh

#### 11. BROUGHT OUT ITEMS

A detailed list of bought out items, which are used in manufacturing of the meter shall be furnished indicating the name of firms from whom these items are procured.

The bidder shall also give the details of quality assurance procedures followed by them in respect of the bought out items. However, at the time of offering the lot, the list of bought out items should be submitted, components of the make mentioned in the list shall be preferable and due weightage shall be given. PGVCL reserves right to select any of the meters from any of the lot offered and give it to approved laboratory for conforming the same and if it is differing, the lot /order will be rejected/cancelled as decided by the PGVCL.

The meter manufacturer has to submit test certificate for materials used from reputed Lab/original supplier's lab for every lot offered for inspection.

The materials used should be same for order quantity. It may be verified by PGVCL. The list is as per following:

Sr No	Component function	Requirement	Makes and Origin
1	Current Transformers	If the Meter is with current transformers as measuring elements.	Any Make of Origin Conforming to IS-2705 OR Relevant Standard.
2	Measurement or computing chips	The measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	USA: Analog Devices, Cyrus Logic, Atmel, Philips South Africa :SAMES Japan: NEC

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3	Quartz Crystal		AVX, Vanlong, Advanced Crystaletc
4	Memory chips	The memory chips should not be affected by external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: Atmel, National Semiconductors, Texas Instruments, Philips, ST, Japan : Hitachi
5	Display modules	<p>a) The display modules should be well protected from the external UV radiations.</p> <p>b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2 d for Viewing angle).</p> <p>c) The construction of the modules should be such that the displayed quantity should not be disturbed with the life of display (PIN Type).</p> <p>D) It should be trans-reflective HTN or STN type industrial grade with extended temperature range.</p>	<p>Display TEK/KCE/RCL Display /Suzhou heng Xiamen instruments/ Veritronics/ Bona- fide/ JebonVIZ.</p> <p>Hongkong : Genda</p> <p>Singapore: Bonafied Technologies.</p> <p>Korea: Advantech</p> <p>China: Success</p> <p>Japan: Hitachi, Sony.</p> <p>TIANMA,Haijing, Holtek,</p>
6	Communication Modules	Communication modules should be compatible for the optical port & RS232 port for communication with meter reading instruments ,computer and through remote metering	<p>USA: National, Semiconductors HP, Optonica.</p> <p>Holland/ Korea: Phillips</p> <p>Japan: Hitachi</p> <p>Taiwan: Ligitek</p>

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7	Optical port	<p>Optical port should be used to transfer the meter data to meter reading instrument.</p> <p>The mechanical construction of the port should be such to facilitate the data transfer easily. The Optical Port should not be adversely affected by influence of electromagnetic field , Static discharge.</p>	<p>USA: National Semiconductors HP Agilent Holland/Koread: Phillips Japan: Hitachi Taiwan: Ligitek</p>
8	Power supply	<p>The power supply should be with the Capabilities as per the relevant standards. It should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections</p>	<p>SMPS Type or better</p>
9	Electronic components	<p>The active&amp; passive components should be of the surface mount type &amp; are to be handled &amp; soldered by the state of art assembly processes.</p>	<p>USA: National Semiconductors, Atmel, Philips, Texas Instruments, SiemensWELWYN, VISHAY DRALORIC, YAGEO, KOA, R OHM, PHYCOMP, FAIRCHI LD, PHILIPS, VISHAY SEMICOND, TEXAS INSTRUMENT, EPCOS, OSRAM, INFINION, NATIONAL SEMICOND etc. Japan: Toshiba , Hitachi, Oki, AVZ or Ricon Korea; Samsung</p>
10	Mechanical parts	<p>a) The internal electrical components should be of electrolytic copper &amp; should be protected from corrosion, rust etc. b) The other mechanical</p>	

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		components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
11	Battery	Chargeable maintenance free guaranteed life of 10 years.	Varta, Tedirun, Sanyo or National, Panasonic, Renata
12	RTC& Micro controller.	The accuracy of RTC shall be as per relevant IEC/ IS standards.	USA: Philips, Dallas, ST, Xicor Atmel, Motorola, Microchip Japan: NEC or Oki.
13	PCB	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.	A class vendor

**Note:** The makes of components mentioned in tender specifications are only indicative. The bidder can utilize better or equivalent make of components and they have to submit make of above mentioned components in Schedule:B of technical bid. It is mandatory. The list of components shall be provided by the supplier at the time of Proto as well as Lot inspection.

The physical verification of make of components of meter shall be carried out at discretion of PGVCL at any stage (sample,proto,lot).

## 12 QUANTITIES TO BE MEASURED, DERIVED, MONITORED AND MEMORISED:

- 12.1 Sampling Rate & Derivation of Basic Measurable Quantity: The actual supply wave of related voltages and currents should be sampled out at the rate of minimum 3000 samples per second and should provide integrated values of each actual voltage and current cycle and angle between them. while deriving actual basic Active ( cosine part measurable component ) and Reactive ( sine part measurable component ) energies ( with respect to relevant voltage wave and current wave ) to assess actual contents of energies persisting / traversing, to have up to-date information for total energy even when highest order of Harmonics is present in supply wave.
- 12.2 Voltage for all three phase
- 12.3 Current for all three phase
- 12.4 Power Factor for all three phase
- 12.5 Frequency
- 12.6 TOD TIMINGS: The meter should have eight time zones, however it should be configured for following three zones.

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- 1 - 07:00 to 11:00 Hrs + 18:00 to 22:00 Hrs - Peak Hr
- 2 - 22:00 to 06:00 Hrs - Night Hr.
- 3 - 11:00 to 18:00 Hrs + 06:00 to 07:00 Hrs. - Rest Hr.

- 12.7 Date and Time
- 12.8 Total Active Energy: Total forwarded active energy (Fundamental + Harmonics) i.e, with highest order of harmonics for current billing period & last twelve billing period including TOD. Forwarded means  $|I1|+|I2|+|I3|$
- 12.9 Reactive energy: Reactive energy (Lag) for current billing period & last twelve billing period
- 12.10 Apparent Energy: Vectorial summation of Total Active Energy (Fundamental + Harmonics) and Reactive Energy (Lag) with Lead PF treated as Unity Power Factor for current billing period & last twelve billing period including TOD
- 12.11 Maximum Demand in (KW) & ( KVA) for 15/30 minutes integration period for current billing period & last twelve billing period including TOD & it should be programmable.
- 12.12 Average Power factor: Derived from division of Total forwarded active Energy to Apparent Energy for current billing period & last twelve billing period
- 12.13 Load survey data for following parameters for 45 power on days with integration of 15 (e.g. 09:30 to 09:45) minute for 0.2s Meters and 62 power on days with integration of 30 Minutes ( e.g. 09:30 to 10:00 ) for 0.5s Meters is required to be stored and shall be available in BCS & in Meter memory
  - Date and Time
  - Average Voltage - Phase Wise (Power On time only)
  - Average Current - Phase wise (Power On time only)
  - Total Active Energy (KWH) (Power On time only)
  - Total Reactive Energy (KVarh lag) (Power On time only)
  - Total Apparent Energy (KVAH) (Power On time only)

Load Survey should be as per IS 15959 (2011).

BCS should have facility for generate load survey for average max. demand (KW & KVA) from load survey of Total Active Energy (KWH) & Total Apparent Energy (KVAH) (Power On time only)

**12.14 Configuration Details:**

The following Configuration Details is required to be stored and shall be available in BCS

RTC  
TOD  
MD INTEGRATION PERIOD  
AUTO MD RESET DATE  
PROGRAMMING ATTEMPT

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**Note: Meter shall have facility to change above parameter through authenticated password. No hardware lock should be provided.**

**12.15 Self Diagnostics:**

The following Self Diagnostics is required to be stored and shall be available in BCS

Real Time Clock (RTC) status  
Nonvolatile Memory (NVM) status  
Battery status on display

**12.16 Parameters / information: - Must be kept recorded permanently**

- I Meter - make and Sr. No.
- II Prevailing integration period
- III Automatic re setting date and time
- IV Tariff time Zone.
- V Meter CT and PT ratio.

**12.17** The meter shall keep all recorded and memorized in its Non Volatile memory chip forever, so that in event of failure/damage of the meter the all recorded & memorized data should not be lost.

**13. DISPLAY PARAMETERS:**

The meter should have legible LCD with green backlit minimum 7 digit and automatic in cyclic order display. In case a single display is being used to display the values of various parameters in rotation, it should be possible to display contents of relevant memories continuously in a specified cyclic order.

Each of the physical quantities shall remain on the display screen for a time interval of Ten (10) seconds.

While displaying the memories, proper and adequate legible and understandable text identification of each of the quantities being displayed shall be made. Sequence of the display parameter must be as per ANNEXURE B. Scrolling should be continuously without any interval between two cycle.

**14 Maximum Demand Register:**

The meter should monitor demand during pre-specified integration period (15 /30 Minutes) and record/display the maximum registered value. The rising demand under the current integration period should be displayed along with elapsed time. The integration period shall be programmable (as may be required by the provisions of tariff schedule). The integration period option shall be available and

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it should be possible to select the period of integration by the user after duly authenticated through base computer service center/HES/CMRI only.

**15 Maximum Demand Reset:**

The meter should have the following maximum demand resetting arrangements:

- Automatic resetting at the specified date and time of every month which is 00.00 hours on 15th day or as specify by Discom. However, this should be programmable through BCS /CMRI with due authentication of protected password.
- Provision for Manual Resetting of the monthly Max Demand with adequate sealing arrangement shall be available
- After every reset (Auto & Manual both) MD reset count & cumulative maximum demand must be increased

**16 Accuracy & VA Burden of various Circuits**

- 1 **Accuracy:** Meters should be of **0.2s (1A) &0.5S (5A)** Class of accuracy. Energy measurements by meter shall be tested in accordance with relevant clause of IEC 62053-22 and IS-14697 (1999). The tests and reference conditions under which tests shall be carried out shall be in accordance with respective clause no. of IEC-62053-22 and IS-14697 (1999), along with tests and test conditions as envisaged under respective clause no of IEC 62053-22 and IS-14697 (1999). It is imperative that bidder shall indicate minimum acceptance tests to be conducted along with accuracy of test set up with brief sequential write up for relevant acceptance tests. It is further emphasized here that any acceptance tests to be carried out in any test house or by bidder's shop laboratory must conform to relevant conditions of IEC 62053-22 and IS-14697 (1999). Measuring instrument must bear laboratory grade accuracy and with valid calibration from NABL accredited laboratory. Any deviation felt necessary should be brought out clearly.
- 2 **VA Burdens of various circuits :** VA burden of voltage and current circuits shall not more than limit specified in IS 14697/ IEC 62053-22 .

**17 TAMPER FEATURES & TAMPER LOGIC**

The meter shall work satisfactorily under presence of various influencing conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Vibrations, Harmonic Distortion, Voltage/Frequency Fluctuations, and Electromagnetic High Frequency Fields etc. The meter shall be immune to abnormal voltage/frequency generating devices and shall record the occurrence and restoration of all tampers and related snapshots mentioned in Annexure-C as per IS 15959:2011

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A	phase sequence	:	Meter should measure/monitor phase rotation of voltage & current and store all variable electrical quantities (active and reactive both) irrespective of potential phase sequence (i.e. either clockwise or anti-clockwise) accurately within the specified limits of errors.
B	Potentials/line voltage	:	As per Annexure C for tamper logics
C	Line currents	:	As per Annexure C for tamper logics Note: Meter shall record correct energy in case of current reversal of one or more phase. Also, meter shall record energy corresponding to such reversal of current in separate Register & it should available on meter display.
D	Others	:	1) Influence of Permanent Magnet or AC/ DC Electromagnet As per CBIP 325, PGVCL requirement as per cl. no. 5.9 & Annexure C for tamper logics
E	Top cover open	:	Meter shall registered "Top cover Open" event immediately. At occurrence of Top Cover Open tamper, meter display shall show "Cover Open" permanently in auto mode during power ON and OFF both conditions. No display parameter should scroll in auto mode. However meter shall continue to record energy and display parameter shall available in push button mode. Snap shot value for occurrence and restoration of event should be available together in the MRI report.
F	Indication for wrong connection	:	Meter should indicate wrong connections if made to Association respective phase pressure Coils and current coils (i.e. perfect current and potential phase association should be achieved).
G	Meter recording	:	Meter should be immune by application of remote induction device i.e. radiated spark through jammer circuit.

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H	Power failure	:	Occurrence and Restoration of Power failure event should be recorded As per IS 15959:2011
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The meter shall be able to check wiring and shall flash message for correct wiring as well as Wrong wiring. The meter Phasor Diagram through PC and MRI should also be possible.

Note:

- I The meter must kept recorded all tamper/events distinctly with type, identification and duration period in a roll over/rotational (i.e. FIFO) method and in NO case these tamper data shall be able to set "Zero".
- II Also the bidder must clearly specify in the technical offer, the capability of meter to store nos. of tamper/ events with duration.
- III All tamper data shall not be to reset to ZERO. Minimum 400 events are required. i.e. 200 Occurrence +200Restoration (i.e. FIFO or in rotational/roll over method).
- IV The Occurrence and Restoration of the tamper must be together with snap values.
- V Tamper data shall be available in compartments as under.
  - 1) Voltage related : 75 nos
  - 2) Current related : 75 nos
  - 3) Others : 50 nos
- VI The total time in minutes to be taken by meter to dump all above data to MRI/BCS shall have to be clearly indicated in offer.
- VII In addition of above minimum 20 nos power supply failure events should be separately available in BCS.

## 18 COMMUNICATION CAPABILITIES AND COMMUNICATION PORTS:

- The Tender Item i.e. 3 phase meter HT static Meter for DLMS Protocol, meter should comply as per IS 15959:2011 for category 'C1'. The bidder will have to submit the certificate of CPRI/ERDA conforming above IS 15959:2011 along with the bid. If the certificate/ relevant documents are not submitted, the bid will not be considered for further evaluation.
- The meter should be capable to communicate with any make of CMRI, LAPTOP & Remotely i.e. through GPRS Modem on DLMS protocol.
- Meter should have communication facility for galvanically isolated optical port and RS 232 port. The RS 232 pin configuration for this ports shall be as per Annexure-PIN.
- The communication baud rate of the meter should be 9600 bps or more.
- Meter shall be capable of receiving the instructions/information from the Base Computer Service Centre, HES directly and through Common Meter Reading Instrument-CMRI, only after due authentication through protected password and shall be able to store in its non-volatile memory and shall obey / carry out instructions.

## 19 GPRS Base Software:

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The supplier has to provide licensed BCS for each PGVCL Laboratory indicating the current version number of software. The BCS has the facility for reading and displaying following parameters. The BCS has user login and password for these. The BCS has facility to create multiple user ids with appropriate authority. The BCS has provision for user defined ASCII file generation. All the report should be exported to PDF, EXCEL etc. The BCS should be capable to communicate with meter through any make of GPRS Modem on DLMS protocol.

The supplier has to provide licensed GPRS based Head End Software free of cost with HT TV Meters indicating the current version number of software. It should have the facility for reading and displaying following parameters and user login with password. Software shall have facility to create multiple user ids with appropriate authority. It should also have provision for user defined ASCII file generation. All the report should be exported to PDF, EXCEL etc. It should be capable to communicate with meter through any make of GPRS Modem on DLMS protocol

The **GPRS Base Software** should have following facilities:

**19.1 Instantaneous Data:**

The following Instantaneous data for Real Time is required to be stored and display whenever required:

Instantaneous AC Voltage (Phase to Neutral) -Phase wise  
Instantaneous AC Current - Phase wise  
Instantaneous Power Factor Phase wise  
Instantaneous Three Phase Power Factor  
Instantaneous Total Three Phase Active Power  
Real Date and Time  
Current Reading for Cumulative Total Active, Reactive (Lag) & Apparent Energy

All the display parameters as per the Annexure B preferably.

**19.2 Billing Data or Energy:**

The following Billing data for last 12 reset with TOD Zones is required to be stored and display whenever required:

Current Total Active Energy (KWH) Reading with date and time (Total Cumulative as well as TOD Zone Wise).

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Total Active Energy (KWH) Reading with date and time for last twelve resets cumulative (Total Cumulative as well as TOD Zone Wise).

Current cumulative Reactive Energy (Kvarh lag) Reading with date and time.

Cumulative Reactive Energy (Kvarh Lag) Reading with date and time for twelve last resets .

Current cumulative Apparent Energy (Kvah) Reading with date and time (Cumulative as well as TOD Zone Wise).

Cumulative Apparent Energy (Kvah) Reading with date and time for last twelve resets . (Cumulative as well as TOD Zone Wise)

Current Maximum Demand in KW with date and time

Maximum Demand in KW with date and time for last twelve resets (Cumulative as well as TOD Zone Wise)

Current Maximum Demand in KVA with date and time

Maximum Demand in KVA with date and time for last twelve resets . (Cumulative as well as TOD Zone Wise)

Average Power factor Since Last reset.

Average Power factor for Last twelve reset.

Note: TOD Zone wise Reactive Energy (Kvarh-Lag) shall be available at on Meter Display Mode-2

### 19.3 Load Survey Data:

The following load survey parameters data for 45 days (power on days only)with 15(e.g. 09:30 to 09:45) minute for 0.2s Meters and 62 days (power on days only) 30 Minutes integration for 0.5s Meters ( e.g. 09:30 to 10:00 ) is required to be stored and displayed whenever required: The load survey should be in numeric tabular format and graphical format (Bar & Line graph). The software should show the parameters as per daily. However, in addition to daily view, weekly & monthly view is also preferable.

- Date and Time
- Average Voltage - Phase Wise (Power On time only)
- Average Current - Phase wise (Power On time only)
- Total Active Energy (KWH) (Power On time only)
- Total Reactive Energy (KVarh lag) (Power On time only)

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- Total Apparent Energy (KVAH) (Power On time only)  
Load Survey should be as per IS 15959 (2011).  
BCS should have facility for generate load survey for average max. demand (KW & KVA) from load survey of Total Active Energy (KWH) & Total Apparent Energy (KVAH) (Power On time only)

**19.4 Tamper Information:**

The Tamper Information data for all type of tampers (Clause-17) is required to be stored and displayed whenever required

The meter should record 400 such events (200 occurrence+ 200 Restoration. The tamper events shall be recorded in FIFO/Roll Over basis.

Snap Shots (numerical values) of voltage, current, power factor and energy (kWh) readings as well as the date and time of the occurrence and restoration of tamper events.

**19.5 Configuration Details:**

The following Configuration Details is required to be stored and displayed whenever required.

RTC  
TOD  
MD INTEGRATION PERIOD  
AUTO MD RESET DATE  
PROGRAMMING ATTEMPT

**19.6 Self Diagnostics:**

The following Self Diagnostics is required to be stored and displayed whenever required.

Real Time Clock (RTC) status  
Nonvolatile Memory (NVM) status  
Battery status on display

**19.7 All Data:**

The above all data 19.1 to 19.6 is required to be stored and displayed whenever required with single selection.

**19.8 BCS must have data collection scheduling configuration facility for data**

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Collections of multiple meters on particular day

**20 MRI (METER READING INSTRUMENT): AS PER ANNEXURE D**

**21 PROGRAMMING:**

**21.1** Meter shall have capability to change the date and time (RTC), TOD Timings, and MD integration period (15/30minutes), Maximum Demand auto reset date and time, load survey parameter and interval timing.

**21.2** The programming should be done through CMRI, LAPTOP and Remotely through Modem with authenticated passwords.

**21.3** The meter shall be software calibrated at factory end and shall be supplied with certificate along with dispatch. However modification of calibration should not be possible at site. The meter should not have any form of mechanical adjustments such as trip pots potentiometer etc. for calibration. The meter shall be tested, calibrated and sealed at manufacturer's works before dispatch. Further, no modification of calibration shall be possible at site by any means what so ever.

**22 DEMONSTRATION:**

The purchaser reserves the right to ask for the demonstration of the meters offered at the purchaser's place prior to qualifying the offer or placement of order.

**23 SUBMISSION OF SAMPLES AND TEST CERTIFICATE:**

**23.1** The Bidder shall have to submit 2 (Two) samples of meter and BCS Software to read the meters along with bid documents. Please note that the samples submitted shall be tested at Govt. Approved lab. At ERDA, Vadodara or any other Govt. approved /NABL accredited laboratory decided by the company for the tests listed in Annexure E as per relevant standards and as per PGVCL specification. Further, if required the same samples may be further tested for type tests as per IS 14697:99/ IEC 62053:22, PGVCL specifications & CBIP technical report no 325. If the sample found failed in any of the test carried out, the offer of that bidder shall be considered disqualified. However, the decision of the PGVCL for placement of order shall be final and binding to all the bidders.

**23.2 The meters must be compliant to IS 15959 for category C1:**

"The suppliers shall have to submit necessary documents and certification in this regard along with their technical offer. The samples to be submitted along with the tender should also be conforming and compliant to the above protocol. The offers, not complying to above, shall be rejected without any further correspondence.

**24 TYPE TEST CERTIFICATE:**

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The supplier shall have to submit all type test certificates from the Govt. approved laboratory viz: CPRI, NPL, ERTL, ETDC & ERDA. For Indian bidder and for foreign bidder the certificate should be from recognized Govt. approved lab. of that respective country, as per IS No.14697 /1999 or IEC 62053:22 as the case may be along with bid.

After opening of Technical Bid, no type test certificates shall be accepted. Type test should not be older than 7 years. Also the type test certificate of AC/DC magnetic influence test as per CBIP-325 & PGVCL requirement mentioned in cl. no. 5.9 and total energy test harmonics test as per IEC 62053-22 clause No: 8.2.1 & Table: 6 shall also be furnished on the same rating of meter. Without above type test certificate the offer shall not be considered. PGVCL reserves right to select randomly one meter from the offered lots for inspection for its type test and if meter during type test found failed then either order placed shall be cancelled and supplier has to collect all the meters at its cost for the supplied meters or shall have to replace all supplied meters at their cost after manufactured and successful type test within time frame given by the PGVCL & in this case cost of the type test will be borne by supplier.

**25 PROTOTYPE TEST:**

The supplier shall have to manufacture 3 nos. of sample meters complying to all above technical specification, type rating functional requirements, tamper features, display design etc. and shall have to offer for inspection within one month from the date of placement of LOI and before commencement of bulk supply.

During the proto type sample inspection, all the display parameter and other parameters shall be checked and same shall be tested /observed for acceptance test & other tests mentioned in Annexure F. The tests are to be carried out at supplier's works as per relevant standards. The firm has to assure for testing facility for all the tests as per Annexure F and all the functional verification as per this technical specification at the time of offering the inspection call.

The bulk manufacturing must be commenced only after confirmation on Proto samples from PGVCL authority. The three no. of samples tested as above shall have to be preserved till the completion of the supply of last lot.

The supplier shall also have to offer one no. of MRI for functional testing and verifications / testing of related software.

**26 ACCEPTANCE TEST:**

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The acceptance tests (Annexure G) are to be carried out at supplier’s works for acceptance of Lot as per relevant standards. The firm has to assure for testing facility to test as per Annexure G and all the functional verification as per this technical specification at the time of offering the inspection call.

The tests as per ANNEXURE G are to be carried out by the supplier in presence of purchaser’s representative at their works during regular inspection of each lot offered for inspection. If required, other tests as stipulated in CBIP (with latest amendments)/IS/IEC and technical specification shall be carried out during regular inspection of each lot.

If required, one meter selected from offered lot shall get tested for its compliance of DLMS as per IS 15959 :2011 from CPRI or other Govt. approved laboratory. Cost of the test shall be borne by the supplier. If meter fail on the test, the entire lot shall be rejected.

**27 ROUTINE TEST:**

Each and every meter of the offered lot shall undergo the routine tests as well as functional tests as per IS:14697/1999 . The firm shall produce Test reports for the following tests for each & every meter in the form of CD with each offered lot.

- AC High Voltage test
- Insulation Resistance Test.
- Starting current Test
- No load Test.
- Limits of error Test.

**28 Deviation Statement:**

The supplier should submit details of deviation (If any) in proforma as shown below. If it is observed that there are deviations in the offered in Guaranteed Technical particulars other than those specified in the deviation schedule then such deviation shall be treated as deviation offers with deviation are liable for rejection. If no deviation is there, they should mentioned as ‘NIL’ and submit the proforma as shown below.

Sr. No.	Sr. No. of Specification	Detail in Brief	Deviation	Reason for Deviation

**29 Minimum Testing Facility:**

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Manufacturer should possess fully computerized meter test bench system for carrying out routine and acceptance tests as per IS 14697 or CBIP 88. In addition to this facility, supplier should produce test reports for each and every meter. The bidder should have the necessary minimum testing facilities for carrying out the tests which are to be carried out for Proto Sample (Annexure F) & lot acceptance samples (Annexure G).

**30 AUDIT TESTING:**

From any dispatched lot, eight (8) nos. of meters shall be randomly selected and sent for audit testing at any NABL accredited Lab. decided by PGVCL & on receipt of test reports acceptability of lot will be decided. The tests are to be carried out during the audit testing is as per ANNEXURE H.

**31 BIS MARK-** The meter manufacturer having valid BIS license for HT Meters for required rating shall only be considered. Meters offered must have ISI marking.

**In case of offer being submitted for Foreign make of meters the same shall be tested for relevant tests specified under IEC-62053-22 and IS 14697. The suppliers shall have to submit the valid License in accordance with IEC-62053 issued by the respective country.”**

**32 PREQUALIFICATION CRITERIA:**

Bidder shall have pre-qualification conditions specified as per ANNEXURE I. The bidder shall not be considered if any of the above pre qualification conditions are not met. The bidder shall have to submit this Annexure duly filled and supported by relevant documentary proof for the details furnished.

**33 QUALITY ASSURANCE PLAN**

The manufacturer shall have a comprehensive quality assurance program at all storages of manufacture for ensuring products giving reliable, trouble free performance. The bidder shall furnish with their offer a comprehensive Quality Plan covering all aspects of the design, procurement, assembly, testing etc for purchaser evaluation along with a detailed Manufacturing flow diagram. The QP shall also give details of the quality control procedures, documentation, certification available / being practiced by the manufacturer and their major suppliers/ sub suppliers.

The design life of the meter shall be minimum 20 years and to prove the design life the firm shall have at least the following quality Assurance Plan:

I The factory shall be completely dust proof.

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- II The testing rooms shall be temp. and humidity controlled as per relevant standards.
- III The testing and calibrating equipments should be automatic and all test equipment shall have their valid calibration certificates.
- IV Power supplies used in testing equipment shall be distortion free with sinusoidal, waveforms and maintaining constant voltage, current and frequency as per the relevant standards.
- V During the manufacturing of the meters the following checks shall be carried out.
  - A) Meter frame dimensions tolerances shall be minimum.
  - B) The assembly of parts shall be done with the help of jigs and fixtures so that Human errors are eliminated.
  - C) The meters shall be batch tested on automatic, computerized test bench and The results shall be printed directly without any human errors

Further, the Bidder shall invariably furnish the following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of material offered.

- A) Statement giving list of important raw materials, names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials.
- B) Information and copies of test certificates as above in respect of bought out accessories.
- C) List of manufacturing facilities available.
- D) Level of automation achieved and list of areas where manual processing exists.
- E) List of areas in manufacturing process, where stage inspections are normally carried out of quality control and details of such tests and inspections.
- F) List of testing equipment available with the bidder for final testing of equipment specified and test plant limitations, if any, visàvis type, special acceptance and routine tests specified in the relevant standards and this specification. These limitations shall be very clearly brought out in schedule of deviations.
- G) The manufacturer laboratory must be well equipped for testing of the meters. They must have computerized standard power source and standard equipment calibrated not later than a year (or as per standard practice). The details of testing facilities available for conducting (a) The routine tests and (b) Acceptance tests shall be furnished with the bid.
- H) Organization structure of the works with details of QA set up in overall work flow.
- I) Copy of system manual showing QAP as actually practiced at works.

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- J) List of raw materials and critical components (ASIC chip, crystal clock, memory register chip, LCD etc) with their suppliers.
- K) Stage inspection of product before final testing.
- L) Procedure adopted for in situ testing of PCBs, after placement of SMT component, for quantitative parametric variation of tolerance.
- M) Testing and calibration facility with manpower data of bench operators.
- N) Sample copies of test certificate of bought out components.

**34 MANUFACTURING ACTIVITIES:**

- (I) Meter should be manufactured using SMT (Surface Mount Technology) components and by deploying automatic SMT pick and place machine and Wave soldering process.
- (II) Quality should be ensured at the following stages:
  - A) At insertion stage, all components should undergo computerized testing for conforming to design parameters and orientation.
  - B) Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment's (ATEs)
  - C) Prior to final testing and calibration, all meters shall be subjected to aging Test (i.e. Meters will be kept in ovens for 72 hours at 55deg. C temperature and atmospheric humidity under real life condition at its full load currents. After 72hours meters should work satisfactorily) to eliminate infant mortality.
  - D) The calibration of meters shall be done in-house with a automated computerized test set-up.
  - E) All the components should be sourced directly from the reputed manufacturers or their authorized distributors.
  - F) A detailed list of bought out items which are used in the manufacture of the meter Should be furnished indicating the name of firm from whom these items are procured
  - G) The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought out items.

**35 PACKING:**

The meters shall be suitably packed in order to avoid damage or disturbance during transit and handling each meter should be suitably packed in the first instance to prevent ingress of moisture and dust and placed in a cushioned cartoon of a suitable material to prevent damage due to shocks during transit. The lid of cartoon should be suitably sealed as suitable member of sealed cartoons may be packed in a case of adequate strength with extra cushioning. The cases may then be properly sealed against accidental opening in transit. The packing cases may be marked to indicate the fragile nature of the contents.

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**36 Meter manual and routine test report:**

Test Results of Routine test carried out by meter manufacturer shall be attached with each meter.

Operation manual with blank reading sheet for readings in all three modes shall be attached with each meter.

**37 GUARANTEE PERIOD:**

The meters shall be guaranteed for satisfactory performance, any manufacturing defect and/or bad workmanship for a period of at least 5 years from the date of commissioning or 5 & 1/2 years from date of supply, whichever is earlier.

The meters found defective within the above guarantee period shall be replaced/repared by the supplier free of cost with transportation within one month of the receipt of intimation. Failing which the PGVCL shall recover an equivalent amount of meter cost plus 15% supervision charges from any of the bills of the supplier.

**38 SERVICES:**

The supplier shall provide following services -

- A) Services free of cost shall be provided during guarantee period.
- B) To train PGVCL staff for installation and handling of these meters.
- C) To assist PGVCL Lab. staff to install calibration, checking etc.
- D) Ordered quantity of meters are to be supplied in stipulated time.
- E) To provide necessary personnel for taking reading, documentation of report and submission of the same to PGVCL authority as required
- F) Inspection and test certificates will have to be submitted prior to dispatch of ordered material and each lot shall be inspected at your works prior to dispatch of material. All material shall be subject to acceptance after final inspection/ checking and testing as per IS.
- G) They should provide necessary assistant to PGVCL staff for any meter related problems and wrapped meter checking at Lab., for taking data through MRI up to guarantee period of 5 years without any extra cost.

**ANNEXURE A**  
**Security Seal**

In addition to 2 Nos. of polycarbonate seals, further 2 Nos. of tamper proof void seals are to be provided on the Meter body in such a way that both the side covers shall be Sealed by the tamper proof void seals. The tamper proof void seals to be provided on Meters shall be as per the following specification:

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1. Size of the seal -- 3 x 1 inches.
2. The seal should be digitally printed on white VOID film having UV destructive inks printed with thermal resin ribbon technology.
3. The seal should be water proof and should withstand all the weather conditions. The seal should have adhesive of sufficient strength to avoid peeling off under extreme temperature and environmental conditions.
4. The seal should be sticker type seal and applied on both the side of the Meter which connects the body and the box.
5. If someone lifts the seal, "VOID" impression should be transferred on the meter and if this is applied back, "VOID" impression should be readable from the surface of the seal.
6. The disturbed portion of the seal should glow under UV light if the seal is disturbed from any part.
7. Barcodes of serial numbers should be printed on the seals and the barcodes should be readable with a barcode scanner.
8. The seals should have continuous variable serial numbers along with security codes of last three digits of serial numbers printed in black and the same serial numbers along with code of serial numbers shall also be printed in a vertical semi circular Shape which should be visible only under Ultra-violet (UV) light.
9. Two security cuts should be given on the seal on both the sides, and if someone tries to lift the seal it should tear off from the security cuts. The security cuts should be made with a computer controlled plotter which should put the security cuts on the same position on each seal.
10. The name of the supplier and supplier logo along with the security warning or any other information in any language as given by the company should be printed on the seal.
11. There should be a provision of incorporating officers' signature on the seal as given by the company.
12. If someone tries to remove the seal by applying heat, the printing should get disturbed and the shape of the seal should change if more heat is applied.

The seals to be used for sealing of Meters are to be fixed after inspection is over.

**ANNEXURE B**

**MODEWISE LIST OF PARAMETERS TO BE DISPLAYED ON STATIC TVM**

There should be Three Modes for displaying parameters.

**MODE - 1**

Mode-1 Should be displayed in auto mode as well as push button.

Up and Down facility is required for viewing display parameter.

Sequence	Name of Parameters
1	Meter Sr. No.
2	R-Phase Voltages
3	Y-Phase Voltages

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4	B-Phase Voltages
5	R-Phase Current
6	Y-Phase Current
7	B-Phase Current.
8	Frequency
9	Voltage and current phase sequence
10	Instantaneous PF (resultant of all the three phase)
11	Instantaneous KW (Total of all the three phase)
12	RTC - Date and Time.
13	Rising demand in KVA with elapse time
14	Cumm. KWH (TOTAL forwarded WITH HARMONICS)
15	Cumm. KVARH (lag)
16	Cumm. KVARH (lead)
17	Cumm. KVAH derived from vectorial summation of Total Forwarded Active Energy( i.e. Fundamental +Harmonics ) and Reactive (lag only) energy.
18	Cumm KWH Time Zone 1 i.e Peak hours
19	Cumm KWH Time Zone 2 i.e Night hours
20	Cumm KWH Time Zone 3 i.e Remaining hours
21	MD KVA for present billing period
22	Present MD in KVA for Time Zone 1 i.e Peak Hours
23	Present MD in KVA for Time Zone 2 i.e Night hours
24	Present MD in KVA for Time Zone 3 i.e Remaining hours
25	MD KVA for last billing period
26	Billing MD in KVA for Time Zone 1 i.e Peak Hours
27	Billing MD in KVA for Time Zone 2 i.e Night hours
28	Billing MD in KVA for Time Zone 3 i.e Remaining hours
29	Cumulative MD in KVA
30	No. of Reset count
31	No. of Total tamper count
32	Cumulative Programming count
33	Anomaly / circuit check in meter display
34	Cumulative Reverse KWh
35	Cumulative Fundamental KWh
36	Display check

Note :- Each parameter shall be displayed for 10 sec.

**MODE - 2**

Mode-2 is with Push Button Mode

1	Average power factor for last billing period
2	Instantaneous load in KVA
3	Instantaneous load in KVAR

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4	CummKVAH Time Zone 1 i.e Peak hours
5	CummKVAH Time Zone 2 i.e Night hours
6	CummKVAH Time Zone 3 i.e Remaining hours
7	CummKVARH lag Time Zone 1 i.e Peak hours
8	CummKVARH lag Time Zone 2 i.e Night hours
9	CummKVARH lag Time Zone 3 i.e Remaining hours
10	Present Max. Demand in Kw
11	Last Reset date and time
12	Total Voltage failure tamper count (Phase wise)
13	Total Current failure tamper count (Phase wise)
14	Total Voltage unbalance tamper count
15	Total Current unbalance tamper count
16	Total Current reverse tamper count (Phase wise)
17	Total High Voltage count
18	Total Low Voltage count
19	Total neutral disturbance count
20	Total magnet temper count

**MODE - 3**

Separate High Resolution registers for testing purpose.

Mode-3 is with Push Button Mode

Sequence	Name of Parameters
1	High Resolution display for Total KWH(12.34567)
2	High Resolution display for KVARH-Lag(12.34567)
3	High Resolution display for KVAH(12.34567)
4	High Resolution display for fundamental KWH(12.34567)

Note: -

1. In the meter display especially for the consumption of time zone, proper and adequate legible and understandable text shall be incorporate with the display. Bidder should have to specify this in his bid.
2. Push button for up and dawn scroll should be provided and it should be separate from MD reset button. All buttons should clearly marked its function.
3. Any parameter scrolled on display by push button shall be continuing on the display for 5 Minutes if no further push button is pressed. After 5 minutes, scrolling of auto mode shall be start.

Signature of Tenderer

Company's Round Seal

Date:

Place:

**ANNEXURE C**

Sr. No	Type of Tamper	Requirement	Tamper Logics / Conditions & (Occurrence & Restoration) Persistence Time					
			Occurrence			Restoration		
			Voltage	Current	Persistence Time	Voltage	Current	Persistence Time
1	Voltage Failure	Phase wise	$V_x < 40\%$ of $V_{ref}$ irrespective to any other phase voltage	$I_x > 10\%$ of $I_n$	15 Minutes	$V_x > 75\%$ $v_{ref}$ irrespective to any other phase voltage		5 Minutes
2	Current Failure	Phase wise	All voltages $> 75\%$ of $V_{ref}$ .	$I_r$ or $I_y$ or $I_b < 2\%$ of actual max. current and any one phase has value $> 10\% I_n$	15 Minutes	$I_r$ or $I_y$ or $I_b > 2\%$ of actual max. current and any one phase has value $> 10\% I_n$		5 Minutes
3	Voltage Unbalance	-	$(V_{max} - V_{min}) > 10\%$ of max Voltage of 3 phase voltages and all voltages $> 60\%$ of $V_{ref}$ .	$I_x > 10\%$ of $I_n$ For at least any one phase	15 Minutes	$(V_{max} - V_{min}) < 10\%$ of max voltage of 3 phase voltages		5 Minutes
4	Current Unbalance	-	All voltages $> 75\%$ of $V_{ref}$ .	(Diff. of Actual Max current & Actual Min current ) $> 30\%$ of Actual maximum current and all	15 Minutes	(Diff. of Actual Max current & Actual Min current ) $< 30\%$ of Actual maximum current		5 Minutes

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Date:

Place:



				phase has value greater than 10% In				
5	Current reversal	Phase wise	All voltages > 75 % of Vref.	$I_x > 10\%$ of In, direction of current reverse and PF value > 0.2	15 Minutes		$I_p > 10\%$ of In, direction of current forward and PF value > 0.2	5 Minutes
6	Magnetic Influence	-		When magnet influence start affecting the accuracy, meter should start recording at I <sub>max</sub> and UPF	1 Minute		When magnet influence stop affecting the accuracy, meter should start recording at actual load	1 Minute
7	Low Voltage	-	$V_x > 40\%$ of Vref & $V_x < 75\%$ of Vref	$I_x > 10\%$ of In For at least any one phase	15 Minutes	$V_x > 75\%$ of Vref		5 Minutes
8	High Voltage	-	$V_x > 120\%$ of Vref	$I_x > 10\%$ of In For at least any one phase	15 Minutes	$V_x < 110\%$ Vref		5 Minutes

Note: For tamper logics, following points shall be taken in consideration

1. During High Voltage & Low Voltage tampers, Voltage unbalance tamper shall not be logged.
2. During Voltage failure Tamper, Voltage Unbalance & Low Voltage tamper shall not be logged.
3. During current failure Tamper, Current Unbalance tampers shall not be logged.

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Date:

Place:

4. During power failure duration, if any tampers persisting, those tampers shall not get recovered until it meets the logic for restoration and duration of respective tamper shall be from occurrence of that tamper irrespective of power failure duration.
5. For tamper events logging, snap shot data i.e. voltage, current, power factor, active energy register reading (Total Kwh) & date & time should be corresponds to starting of occurrence and starting of restoration.
6. Snap shot of date and time should be available for occurrences and restorations of events.

#### ANNEXURE D

#### DETAILED SPECIFICATION FOR COMMON METER READING INSTRUMENT (CMRI)

#### References of National and International Standards: -

- (I) CBIP Technical Report No:111
- (II) IEC 1107
- (III) IS-12063
- (IV) CISPR 22
- (V) IS-9000
- (VI) IEC-529
- (VII) IEC-1000

#### SCOPE AND OBJECTIVE:--

This outlines the basic requirements of Common Reading Instrument as a TWO way communicating interface between various Make static energy Meters and a Base Computer station for the purpose of exchange of data.

It shall be a Meter Reading Instrument with necessary accessories which should be capable of interrogating with various makes of AC static energy meters when loaded with the corresponding meter's specific software called meter reading instrument program.

#### GENERAL REQUIREMENTS :--

1. Suitable Hand Held Equipment (CMRI) for Data Retrieval should be offered for retrieval of data stored on the magnetic storage of the meter for dumping it BCS and getting a print out subsequently. The necessary software for transfer of data on the floppy and reading it on the standard IBM compatible PC shall also be supplied.
2. The CMRI shall be handy and small in size. CMRI shall be able to withstand repeated drop up to 2 (Two)-meter height on concrete surface without physical damage or loss of data.

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3. Display: - A minimum of 4 lines and 20 characters per line of the screen shall be provided. The size of the character shall be 4 mm. Minimum. The contrast and intensity control to get a clear display in varying ambient light shall be provided.
4. Input/Output Port: - The CMRI shall have minimum two serial Input/Output ports. One shall be serial port RS232 compatible shall be used for meter communication purpose. The other port shall be used to connect peripheral such as bar-code reader, printer and loader charger (battery) etc.
5. Physical Interface: - The CMRI shall be provided with detachable cable(s) for providing connectivity with the optical port of the energy meter and the CMRI. For ease of use it will be preferable to have twin optical head suitable for connection with PACT/IEC1107 ports or open Protocol.
6. Suitable cable for communication between CMRI and Base Computer shall be provided. The communication shall be RS232. On the Base Computer end of cable a 9 pin D type female connector shall be provided.
7. For CMRI program preferably window base / MS DOS Version 3.0 /higher operating system shall be used.
8. The CMRI shall have adequate Memory to store at least 50nos of meters billing data, load survey data in the form of three electrical parameters (KW, KVA and KVAR), and tamper data at a time.
9. A real Time Clock shall be provided in CMRI and shall have minimum 20 days continuous battery back up. The clock shall have minimum 50 years calendar. The time drift of Real Time clock considering all influencing quantities shall not exceed 3 minute per year.
10. The CMRI shall be powered with rechargeable battery housed in CMRI enclosure. The average life of charged battery shall be at least six to eight hours.
11. The CMRI shall be a single instrument suitable to be carried in hand from one meter installation to the next in-order to down load/up load data from/to meters manufactured by different/various meter manufacturers with adequate data Security and facility of fraud prevention but without interfering/disturbing the working of any particular meter's system.

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Date:

Place:

**PHYSICAL REQUIREMENTS :-**

1. Size: - Common CMRI shall be handy and small in size for ease of carrying. The maximum dimension shall not exceed 250 x 100 x 60 mm (LxWxH). However the display part could be wider.
2. Weight: - Weight of the common CMRI including the weight of battery shall not exceed 1.5 Kg.
3. Enclosure: - The casing shall be of electrical insulating material of high stability and mechanical strength. The degree of protection shall be **Level (1)IP 65 Level (2)IP 67** depending on requirement as per IEC 529 / IS 12063 The CMRI enclosure shall be Solvent resistant and same shall be provided with a suitable holding strap.
4. CMRI shall be able to withstand harsh field environment without physical damage or loss of data. The tests for this requirement shall be complied as given under Cl.No:5.0 of CBIP Technical Report No: 111
5. Display:-The display of CMRI shall have following minimum features.
  - a. Readability shall be ensured under any varying ambient light condition through very efficient LCD or LED display.
  - b. Software selected LCD contrast and backlight intensity shall be provided in case of LCD display or otherwise the manual intensity contrast control may be provided.
  - c. A minimum of 4-lines and 20 characters per line alphanumeric display on the screen shall be provided.
  - d. CMRI shall also be provided with Graphic capability having screen of equivalent pixels handled by conventional PC monitor.
  - e. The CMRI shall have minimum two serial Input/ Output ports. One port shall be serial port RS232 compatible and another port may be used for connecting peripherals such as Bar-code reader, battery charger etc.
  - f. The CMRI shall be able to provide power supply for optical sensor used for meter reading application.
6. Climatic requirement: - As per Cl. No: 4.1.8 of CBIP Technical Report No:111.
7. Interface between Meter and CMRI: - This interface consists of two parts.
  - a. A cable of the length of MINIMUM 1 meter having optical sensor on one end and 9-pin D type male connector on other end, to be provided by the supplier. The configuration of 9-pin connector shall be as described under Appendix-A of CBIP Report - 111
  - b. Another cable of the length of 2 meter having matching 9-pin D type female connector on one end and compatible connector on another end to connect

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with CMRI serial port so that after retrieving data from the Meter the same can be Off-loaded to Base Computer with this cable (i.e. through serial RS232 communication) connecting 9-pin D type female connector to BC. The standard configuration of the D type male & female connectors shall be as per Appendix - "A" and "B" of CBIP Tech Report No: 111. The cable shall have to be supplied by the supplier.

8. Interface between CMRI and Base Computer: - Suitable cable for communication between CMRI and Base Computer station shall be provided. This communication shall be serial RS232. The type and configuration of the cable shall be as described under Cl. No: 4.2.2 of CBIP Tech Report - 111. Both above cables shall be made of flexible material and shielded and the two ends of both cables shall be stress relieved.
9. Operating system:-For the use of different make meter's CMRI program in One CMRI, the MS DOS version 3.0 or higher operating system shall be used. The facility to upgrade the BIOS/OS by a CMRI supplier shall be available without exposing the hardware of CMRI. The additional program necessary to transfer application program with serial ports shall be provided.
10. Memory: --The CMRI shall have generally a memory capacity of 16 MB Static RAM with battery backup and upgradeable. The BIOS/OS shall be on FLASH/EEPROM memory.
11. Communication: -- The CMRI shall be required to communicate in following different modes.
  - (a) Downloading/Uploading data from/to the meter
  - (b) Uploading/Downloading data to/from the base computer station.
  - (c) CMRI shall be able to read bar coded information using a bar code scanner from bar codes of AC static / electromechanical electricity meters.
  - (d) CMRI shall have flexible Baud rate from 300 Baud to 19200 Baud to meet with the above communication needs.
12. Real Time Clock:- A real time clock must provided in CMRI with following features. The Real Time Clock with the back up life of minimum Ten (10) years for operation of the time clock. The clock must have a 50 years calendar. The time drift of real time clock considering all influence quantities shall not exceed 3 minute per year.
13. The CMRI shall have the facility to get its time set from the base computer station after due authentication through protected Password. The meter's specific CMRI programs (for all type of meters) shall have the facility to use CMRI Real Time Clock to stamp/tag all time related events.
14. Power Supply: - The CMRI shall have following features for its power requirements.
  - (i) The CMRI shall be provided by rechargeable battery housed in its enclosure.
  - (ii) The average capacity of a charged battery shall be sufficient to communicate with the meters and bas computer station for
    - (a) Six Hours While Communicating through Optical Interface Of Meters

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Place:

- (b) Eight hours without powering I/O ports for optical interface or printer etc.
- (iii) There shall also be a provision to charge the CMRI battery without being removed from CMRI. A suitable battery charger for automatic charging of CMRI battery shall be provided. I.e. Loader Charger
- (iv) Provision of Auto Power Save shall also be provided so that in case of NO activity the instrument shall go in to Power Save Mode for saving of power.
- (v) The battery used for data retention in Static RAM shall have a minimum of Five years backup capacity.
- (vi) The CMRI shall have a battery low indication and automatic cutoff to avoid battery drain.
15. Communication Protocol and Software:--  
Protocol: - This may be as per offer Software :-  
(I) CMRI must be embedded MS-DOS 3.0 or higher operating system.  
(II) Necessary software for loading application program via a serial port for uploading and down loading between CMRI and base computer station shall be provided.
16. The meter supplier must clearly mention the nos of meters that CMRI is capable of retrieving all the parameters/functional requirements as listed under (11) above and storing the same before down loading to base computer station.
17. The meter supplier must also mention clearly the time to be taken in seconds/minutes by CMRI to retrieve the required data.

#### **Requirement and Specification of DLMS/COSEM Compliant HHU /CMRI**

Communication standards in the Indian metering scenario require supporting considerations for the utilization of those standards in HHUs (Hand held units) or in CHHUs (Common Meter Reading Instrument). This annexure provides a suitable approach to the implementation of the IEC-62056 standards and this Indian Companion Specification in such devices the terms of this suggested implementation are as below

- 1) HHUs may retrieve data from DLMS/COSEM Meters conforming to this standard using the same DLMS/COSEM communication port that is provided for remote meter reading
- 2) HHUs shall exclusively use the Meter Reading association (MR) and shall support all the features and specifications listed in this specification for the MR Association
- 3) HHUs shall have the same data access rights that are available to the MR Association, as that available for remote meter reading.
- 4) HHUs shall implement the DLMS/COSEM communication standard conforming to this specification to provide a DLMS/COSEM client protocol driver to communicate with the meters to download billing data or perform other services available to the MR Association
- 5) HHUs shall provide a DLMS/COSEM server interface to the BCS (Base Computer System - the Data collection software) over a suitable communication medium (local serial port implementing the DLMS/COSEM CO 3-layer stack is suggested)

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- 6) HHUs shall internally map the individual meter data to Logical Devices (one Logical Device for each meter). Inside each Logical Device the structure and naming of the data shall be the same as that retrieved from the meter
- 7) The BCS shall maintain a mapping table that maps the individual meter identifications (the same IDs that are used to identify the meter during remote meter reading) to Logical Device addresses. During upload of data from HHU to BCS, the BCS shall query each Logical device to download the data of each meter over the local serial port
- 8) The mapping table described in Item 7 above shall require that the Logical device addresses allocated to each meter are at least unique across all meters that are to be retrieved using one HHU. Other HHUs may re-use the same addressing from their own range of allocated meters.
- 9) The BCS shall take care to ensure that the re-use of addresses does not create conflicts in Meter

**THE FOLLOWING SOFTWARE SHALL BE MADE AVAILABLE BY EACH METER SUPPLIER ALONG WITH THE METERS AND CMRI FOR INTERFACING WITH OTHER MAKE METERS AND CMRI**

- A) All Software to be loaded in CMRI for the purpose of reading and programming the other specific makes of static meters.
- B) All Software for Base Computer Station for accepting data from CMRI, processing, generating reports and down loading instructions from Base Computer to CMRI.
- C) A third party software may also be loaded for manual meter reading, data entry, printing, display of balance memory etc.

(10) Data Protection: --*The meter supplier shall be responsible for maintaining the security of data extracted from the meters using manufacturer specific algorithms in the software up to down loading to Base Computer Station.*

(11)Type Tests: -- All type test certificates for the following tests as prescribed under CBIP Tech Report No:111, conducted at any Govt. Testing House must be submitted along with the Technical Offer for supply of meters.

Sr No	Name of Test	Clause No as per CBIP Tech Report No:111
1	Free Fall Test	5.1.1
2	Shock Test	5.1.2
3	Vibration Test	5.1.3
4	Tests of protection against penetration of dust and water	5.2.1
5	Dry Heat Test	5.2.2
6	Cold Test	5.2.3
7	Damp Heat Cyclic Test	5.2.4
	Test for Electromagnetic Compatibility (EMC)	

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Place:

8	Test of Immunity to Electrostatic Discharge	5.3.1
9	Test of Immunity to Electromagnetic HF Fields	5.3.2
10	Radio Interference Measurement	5.3.3

(12) Types of Optical Ports: -- Since different meter manufacturers use different type of optical port and the standardization of the optical port are not so far made by any Govt Body, the scope is left to discretion of supplier subject to compliance to all above requirements. NOTE : However in No case the CMRI shall be capable / featured for resetting the nos. of temper events and tamper duration once restored by the meter.

### ANNEXURE E

#### Inspection / Testing for Tender samples

Following tests are to be carried out on Tender Sample at ERDA / any other NABL accredited Laboratory as per PGVCL's discretion

1. Insulation resistance test as per IS 14697.
2. Impulse voltage test at 10 KV as per IS 14697:99.
3. AC high voltage test method as per IS 14697:99 but shall be taken at 4 KV for one minute.
4. Test for limit of error as per IS 14697:99 with balance and unbalanced load and on active energy and reactive energy.
5. Interpretation of test results, if required.
6. Test for meter constant IS 14697:99.
7. Test of starting condition at 0.1 % of basic current as per IS 14697:99.
8. Test of no load condition as per IS 14697:99.
9. Test of repeatability of error as per IS 14697:99.
10. Test of power consumption as per IS 14697:99.
11. Test for total energy i.e. fundamental + harmonics as per IEC 62053-22
12. Test for influence of quantities i.e. .Voltage and frequency variation test and 10% of 3rd harmonics, Reverse Phase Sequence, Voltage Unbalance as per IS 14697:99.
13. Test for influence of AC / DC & Permanent magnetic field as per CBIP 325 & PGVCL requirement.
14. Tamper condition tests with tamper logics as per Annexure C .
15. Dry heat test: This is the special requirement of PGVCL. The test will be conducted as per the clause no.12.6.1 of IS 14697. However, instead of meter in non operating condition the test will be conducted keeping the meter in operating condition at basic current at 0.866 lag at 115% of rated voltage. The other conditions of the test will remain same.
16. Test of Short time over current test as per IS 14697.
17. 35 KV Test as per Application of abnormal voltage/frequency :  
Meter should not be affected/or hanged by non standard equipment like jammer. The accuracy of the meter should not be affected with the

Signature of Tenderer

Company's Round Seal

Date:

Place:



application of abnormal voltage/frequency such as spark discharge of approximately 35KV in any of the following manner for total 10 minutes:

- i) On any of the phases and neutral terminal
- ii) On any connecting wires of the meter
- iii) Voltage discharge with 10 mm spark gap
- iv) At any place in load circuit
- v) Spark on meter body.

“After the application of spark discharge meter should operate normally and meter should register the correct energy”

18. Verification of Display parameters and Functional requirement.

**Note :** PGVCL reserves right for carry out any acceptance tests / Type test on samples from any lot at ERDA/CPRI/any NABL accredited laboratory as per relevant standards & PGVCL specifications. If the sample found failed in any of the test carried out, the offer of that bidder will not be considered and rejected.

**ANNEXURE F**

**Inspection / Testing for Proto type samples**

Following tests are to be carried out at supplier’s works during inspection of Proto type samples. The firm has to assure for testing facility for following tests at the time of offering the inspection call.

1. Insulation resistance test as per IS 14697:99.
2. AC high voltage test method as per IS 14697:99 but shall be taken at 4 KV for one minute.
3. Test for limit of error as per IS 14697:99 with balance and unbalanced load and on active energy and reactive energy.
4. Interpretation of test results, if required.
5. Test for meter constant IS 14697:99.
6. Test of starting condition at 0.1 % of basic current as per IS 14697:99.
7. Test of no load condition as per IS 14697:99.
8. Test of repeatability of error as per IS 14697:99.
9. Test of power consumption as per IS 14697:99.
10. Test for total energy i.e. fundamental + harmonics as per IEC 62053-22
11. Test for influence of quantities i.e .Voltage and frequency variation test and10% of 3rd harmonics, Reverse Phase Sequence, Voltage Un balance as per IS 14697:99.
12. Test for influence of AC / DC& Permanent magnetic field as per CBIP 325 & PGVCL requirement.
13. Tamper condition tests with tamper logics as per Annexure C .
14. 35 KV Test as per Application of abnormal voltage/frequency :  
Meter should not be affected/or hanged by non standard equipment like jammer. The accuracy of the meter should not be affected with the

Signature of Tenderer

Company’s Round Seal

Date:

Place:

application of abnormal voltage/frequency such as spark discharge of approximately 35KV in any of the following manner for total 10 minutes:

- i) On any of the phases and neutral terminals
- ii) On any connecting wires of the meter
- iii) Voltage discharge with 10 mm spark gap
- iv) At any place in load circuit
- v) Spark on meter body.

“After the application of spark discharge meter should operate normally and meter should register the correct energy”

15. Verification of Display Parameters and Functional requirement

**ANNEXURE :G**

**Inspection / Testing for ACCEPTANCE TEST**

Following tests are to be carried out at supplier's works on samples selected for acceptance of lot. The firm has to assure for testing facility for following tests at the time of offering the inspection call.

1. Insulation resistance test as per IS 14697:1999.
2. AC high voltage test method as per IS 14697:99 but shall be taken at 4 KV for one minute.
3. Test for limit of error as per IS 14697:99 with balance and unbalanced load and on active energy and reactive energy.
4. Interpretation of test results, if required.
5. Test for meter constant IS 14697:99.
6. Test of starting condition at 0.1 % of basic current as per IS 14697:99.
7. Test of no load condition as per IS 14697:99.
8. Test of repeatability of error as per IS 14697:99.
9. Test of power consumption as per IS 14697:99.
10. Test for total energy i.e. fundamental + harmonics as per IEC 62053-22
11. Test for influence of quantities i.e .Voltage and frequency variation test and 10% of 3rd harmonics, Reverse Phase Sequence, Voltage Unbalance as per IS 14697:99.
12. Test for influence of AC / DC & Permanent magnetic field as per CBIP 325 & PGVCL requirement.
13. Tamper condition tests with tamper logics as per Annexure C .
14. 35 KV Test as per Application of abnormal voltage/frequency :  
Meter should not be affected/or hanged by non standard equipment like jammer. The accuracy of the meter should not be affected with the application of abnormal voltage/frequency such as spark discharge of approximately 35KV in any of the following manner for total 10 minutes:
  - i) On any of the phases and neutral terminals
  - ii) On any connecting wires of the meter
  - iii) Voltage discharge with 10 mm spark gap

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Date:

Place:

iv) At any place in load circuit

v) Spark on meter body.

“After the application of spark discharge meter should operate normally and meter should register the correct energy”

15. Verification of Display Parameters and Functional requirement

**ANNEXURE : H**

### Inspection / Testing for AUDIT TEST

Following tests are to be carried out on Samples for audit inspection at ERDA /PGVCL NABL lab or any other NABL accredited Laboratory as per PGVCL’s discretion

1. Insulation resistance test as per IS.
2. AC high voltage test method as per IS 14697:99 but shall be taken at 4 KV for one minute.
3. Test for limit of error as per IS 14697:99 with balance and unbalanced load and on active energy and reactive energy.
4. Interpretation of test results, if required.
5. Test for meter constant IS 14697:99.
6. Test of starting condition at 0.1 % of basic current as per IS 14697:99.
7. Test of no load condition as per IS 14697:99.
8. Test of repeatability of error as per IS 14697:99.
9. Test of power consumption as per IS 14697:99.
10. Test for total energy i.e. fundamental + harmonics as per IEC 62053-22
11. Test for influence of quantities i.e. Voltage and frequency variation test and 10% of 3rd harmonics, Reverse Phase Sequence, Voltage Un-balance as per IS 14697:99.
12. Test for influence of AC / DC & Permanent magnetic field as per CBIP 325 & PGVCL’s requirements
13. Tamper condition tests with tamper logics as per Annexure C.
14. Verification of Display Parameters.

Note : PGVCL reserves right for carry out any acceptance tests / Type test/ DLMS compliance test on samples from any lot at ERDA/CPRI/any NABL accredited laboratory as per relevant standards & PGVCL specifications.

### ANNEXURE-I

#### PREQUALIFICATION CONDITIONS FOR HT STATIC METERS

Sr.No.	Particulars	Remarks
1	Bidders must have produced/ executed order of tendered item to any SEBS/power utility company in last 3 years. The bidder should submit the order copies along with their Bid as	Yes/No

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Date:

Place:

	a evidence.	
2	Bidders must have valid ISI license	Yes/No
3	Bidder preferably possesses ISO 9001 certification	Yes/No
4	Bidder shall be manufacturer of static meters. Offer from traders /agents are not acceptable	Yes/No
5	Bidder shall have ISI license for similar design product and/or type test certificate for all the type tests as per IS 14697or IEC-62053-22 from International or from Indian Govt. approved lab	Yes/No
6	Bidder shall have to submit type test report for AC/DC, Permanent magnetic field as per CBIP 325 & PGVCL requirements from independent Govt. Approved lab.	Yes/No
7	Bidders shall have dust free & air conditioned environment for assembly as well as testing.	Yes/No
8	Bidders shall have automatic computerized test bench for lot testing of meters and oven for ageing test. The document evidence is to be attached along with the bid.	Yes/No

### ANNEXURE-J

#### DETAILED SPECIFICATIONS FOR HT TEST TERMINAL BLOCK

3 phase 4 wire Test Terminal Block suitable for 3 phase 4 wire 50 Hz with neutral point at 440v and 10 Amp. Class of power supply and insulated for 1100v as per relevant Indian Standard manufactured from high grade resin content bakelite material along with 2 mm thick MS Sheet cover minimum 25mm overhung on both entry and exit having minimum 3 mm hole for sealing on diagonally placed 6 mm dia bolts suitable for connecting 2.5 or 4mm<sup>2</sup> Cu. Either stranded or solid PVC insulated cable from either two current transformers or three current transformers and 440 volt line potential in 3 phase 4 wire system along with neutral terminals having front of Board connection type (i.e. L&G type) Test terminal block should have following quality.

- 1) All terminators l shall be heavy duty to sustain against fault current up to 20x1c amps. and manufactured either from brass or from copper metals.
- 2) Potential links shall be manufactured from minimum 16 gauge brass sheet and fixing screws must be minimum 6 mm diameter to secure proper contract.

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Date:

Place:

- 3) Current shorting screws shall be minimum 8 mm dia with proper threading to ensure proper contact. Minimum clearance of 5 mm between adjoining screw heads of each current guide terminator shall be maintained.
- 4) All brass screws terminators (guides) and brass links shall be nickel plated to ensure corrosion resistance.
- 5) Superior quality of bakelite powder in heavy duty electrical insulation grade shall be used in molding the bakelite blocks.

### SCHEDULE - B

#### SOURCE OF MATERIAL AND PLACES OF MANUFACTURING, TESTING AND INSPECTION

Sr. No	Item part	Name of manufacturer	Place of manufacturer	Place of testing and inspection	Source of procurement of material not manufactured
1	Current Transformers				
2	Measurement Chips				
3	Quartz Crystal				
4	Memory chips				
5	Display modules				
6	Communication Modules				
7	Optical port				
8	Power supply				
9	Electronic components				
10	Battery				
11	RTC & Micro controller.				
12	PCB				

Note: Supplier should ensure that components of above mentioned make shall be utilized in tender sample & prototype samples. It is also ensured that in entire supply of meters, make of components shall not be differed from make used in proto type sample.

Signature of Tenderer

Company's Round Seal

Date:

Place: