WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

Technical Specification for AC 3 Phase 4 Wire 33kV/$\sqrt{3}$ **/110V/**$\sqrt{3}$ **Solid State (Static) Import - Export Energy Meter of 0.5S Class Accuracy**

1.0 SCOPE

This scope covers design, engineering, manufacture, testing, inspection and supply of AC 3 Phase 4 Wire **33**kV/$\sqrt{3}$ **/110V/**$\sqrt{3}$ Solid State (Static) Import – Export Energy Meter of 0.5S Class accuracy with backlit LCD display used for balanced/unbalanced load. The meter shall be capable of recording and displaying energy in KWh & demand in KVA, power factor having the range of zero lag-unity-zero lead. Meter shall have facility / capability of recording tamper information & load survey of active energy (both import & export), apparent energy, reactive energy, phase currents, Phase Voltages & Other parameters in non volatile memory.

1.1 It is not the intent to specify completely herein all the details of the design and construction of meter. However the meter shall conform in all respect to high standards of engineering, design and workmanship and shall be capable of performing commercial operation continuously in a manner acceptable to WBSEDCL, who will interpret the meanings of drawings & specification and shall have the right to reject any work or material which in its judgment is not in accordance herewith. The meter shall be complete with all components, accessories necessary for their effective and trouble free operation for the purpose mentioned above. Such components shall be deemed to be within the scope of bidder's supply irrespective of whether those are specifically mentioned or not in this specification or in the commercial order.

2.0 STANDARDS APPLICABLE: Unless specified elsewhere in this specification, the performance & testing of the meters shall conform to the following Indian / International standards, to be read with up-to-date and latest amendments / revisions thereof as on 90 days prior to floating of tender.

Sl. No.	Standard No.	Title
1	IS 14697 (1999):	ac Static Transformer Operated Watt hour and Var-hour Meters
2	CBIP Report No. 325 & its latest amendments, if any	Specification for AC Static Electrical Energy Meters
3	IS 12346 :1988	Specification for testing equipment for AC Static Electrical Energy Meter (latest amendment)
4	IEC687 – 1992	Specification of AC Static Watt Hour meters for active energy (Class 1.0)
5	CBIP Technical Report III	Specification for Common Meter Reading Instrument

3.0 CLIMATIC CONDITIONS :

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions. Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climatic conditions. The meters shall be suitably designed and treated for normal life and satisfactory operation under hot and hazardous tropical climatic conditions and shall be dust and vermin proof. All the parts and surface, which are subject to corrosion, shall either be made of such material or shall be provided with such protective finish which provides suitable protection to them from any injurious effect of excessive humidity.

3.1 Maximum Ambient Air Temperature in shade: 55^0 C
3.2 Minimum Ambient Air Temperature: (-)10^0 C
3.3 Maximum Relative Humidity: 95%(non-condensing)
3.4 Minimum Relative Humidity: 10%
3.5 Height above mean sea level: Up to 3000 meters
3.6 Average number of tropical monsoon per annum: 5 months
3.7 Annual Rainfall: 100 mm to 1500 mm
3.8 Maximum Wind Pressure : 150 Kg/Sqm

4.0 SUPPLY SYSTEM :

System	3 Phase 4 Wire
Rated voltage (V_{ref})	110 V : Phase to Phase, 63.5 V : Phase to Neutral
Rated Current	-/1 Amp, balanced and unbalanced load
Rated Frequency	50 Hz

5.0 POWER FACTOR RANGE: The meter shall be lag only in import mode suitable for full power factor range from zero (lagging) through unity to zero (leading).

6.0 POWER SUPPLY VARIATION: The meter shall be suitable for working with following supply system variations.

System	3 Phase 4 Wire
Specified range of operation	70% to 120% of reference Voltage
Frequency	50Hz $\pm$5%

7.0 ACCURACY

7.1 Class of accuracy of the meter shall be 0.5S.
7.2 Maximum error limit at 1% Ib and UPF shall not exceed +2%.
7.3 There shall be no drift in accuracy, at least for a period of ten years from the date of supply. In case any drift is noticed which is beyond the permissible limits, the bidder shall have to replace the meter with a new one free of cost.

8.0 POWER CONSUMPTION

8.1 Voltage Circuit: The active and apparent power consumption in the voltage circuit/phase at reference voltage, reference temperature and reference frequency shall be less than 1.5W / 10 VA as per IS 14697.

8.2 Current Circuit: The apparent power taken by current circuit/phase at basic current, reference frequency and reference temperature shall be less than 1.0 VA as per IS 14697.

9.0 STARTING CURRENT & RUNNING AT NO LOAD

9.1 The meter shall start registering energy at 0.1% of basic current at unity power factor and shall be fully functional within five seconds after the rated voltage is applied.

9.2 Running at no load: When 70% & 120% voltage is applied and no current flows in the current circuit, the test output of the meter shall not produce more than one pulse.

10.0 MAXIMUM CONTINUOUS CURRENT :

The maximum continuous current in meters shall be the current at which the meter purports to meet the accuracy requirement of the specification. The same is indicated in table in Supply System Clause of this specification.

11.0 CONSTRUCTION :

11.1 The case, winding, voltage circuit, sealing arrangements, registers, terminal block, terminal cover & name plate etc. shall be in accordance with the relevant standards. The meter shall be compact & reliable in design, easy to transport & immune to vibration & shock involved in the transportation & handling. The construction of the meter shall ensure consistence performance under all conditions especially during heavy rains / very hot weathers. The insulating materials used in the meter shall be non-hygroscopic, non-ageing & have tested quality. The meter shall be sealed in such a way that the internal parts of the meter becomes inaccessible and attempts to open the meter shall result in viable damage to the meter cover i.e. break to open type. This is to be achieved by using continuous Ultrasonic welding on all the four sides of the Meter base and cover or any other technology which is either equally or more efficacious.

11.2 The meter shall comply latest technology such as Microcircuit or Application Specific Integrated Circuit (ASIC) to ensure reliable performance. The mounting of the components on the PCB shall compulsorily be Surface Mounted Technology (SMT) type. Power supply component may be of PTH type. The electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter for at least ten years. The circuitry of the meter shall be compatible with 16 Bit (or better) ASIC with compatible processor and meter shall be based on Digital measuring and sampling technique.

11.3 The meter shall be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized, virgin Polycarbonate casing of projection mounting type. The meter cover shall be transparent / translucent. But the viewing portion shall be transparent for easy reading of displayed parameters, and observation of operation indicators. The meter base may not be transparent, but it shall not be black in colour. The meter casing shall not change in shape, colour, size and dimensions when subjected to 72 hrs on UV test as per ASTMD 53. It shall withstand 650 deg. C. glow wire test and heat deflection test as per ISO 75 or as per IEC 60068 -2-5.

11.4 In addition to the above, the meter cover shall be sealable to the meter base with at least 2 nos. bar coded seals bearing the identification marks of the Manufacturer. Suitable arrangement shall be made for fitting/fixing of utility seal at two sides of meter terminal cover in such a manner that any access to the terminal cannot be made possible without removing the seal. There shall also be provision for sealing at the optical port.

11.5 The polycarbonate material of only the following manufacturers shall be used:

11.5.1 **G.E. Plastic :** LEXAN 943A or equivalent like 943, 123R, 143 for meter cover & terminal cover / LEXAN 503R or equivalent like 500, 143R, 500R for meter base and terminal block.

11.5.2 **BAYER :** Grade corresponding to above

11.5.3 **DOW Chemical : --do--**

11.5.4 **MITSUBISHI : --do--**

11.5.5 **TEJIN : --do--**

11.5.6 **DUPONT : --do—**

12.0 METER CASE AND COVER :

12.1 In case, ultrasonic welding using plate / strip is used, the material of plate / strip shall be same as that of cover and base and the strip. The manufacturer's logo shall be embossed on the strip / plate. The material of the meter body (case and cover) shall be of Engineering Plastic.

12.2 The meter cover shall be fixed to the meter base (case) with Unidirectional Screws, so that the same cannot be opened by use of screwdrivers. These unidirectional screws shall be covered with transparent caps (not required for screw less design), ultrasonically welded with the meter body and the screw covers shall be embedded in the meter body in a groove. The meter shall withstand external magnetic influence as per latest amendments of CBIP Technical Report No.325 including 0.2T AC Magnet, 0.5T Permanent magnet.

13.0 TERMINAL BLOCK AND COVER:

13.1 The terminals may be grouped in a terminal block having adequate insulating properties and mechanical strength. The terminal block shall be made from best quality non-hygroscopic, flame retardant material (capable of passing the flammability tests) with nickel plated brass inserts / alloy inserts for connecting terminals. It shall be rigidly fixed to the base of the meter so that it cannot be separated from the meter base without breaking either the meter base or the terminal block and this fixing arrangement shall be in parallel to the meter base in such a way that it cannot be viewed or approached from any part of the meter without breaking the meter.

13.2 The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor. The screws shall have thread size not less than M4 and head having 6 mm. Diameters. The screws shall not have pointed ends at the end of threads. All terminals and connecting screws and washers shall be of tinned / nickel plated brass material. The terminal shall withstand glow wire test at 960 + 15 ^{o}C and the terminal shall withstand at least 135 ^{o}C.as per IS.

13.3 The internal diameter of terminal hole shall be minimum 5.5 mm and center to center distance is 13 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also.

13.4 The terminal cover shall be transparent re-enforced Polycarbonate, Engineering Plastic with minimum thickness 2.0 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes. The space inside the terminal cover shall be sufficient to accommodate adequate length of external cables.

13.5 The terminals and all connecting screws will be of suitable material capable of withstanding a current of 150% of I_{max} f or two hours, continuously and the meter shall be capable of providing phase to neutral protection up to 63.5 V for 1(one) hours.

14.0 MARKING OF THE METER :

The marking on the meter shall be in accordance with relevant clauses of IS 14697. The basic marking on the meter nameplate shall be as follows. All other markings as per IS shall also be there.

14.1 Manufacturer's name & trade mark
14.2 Type Designation
14.3 No. of phases & wires
14.4 Serial number (Size not less than 5mm)
14.5 Month & year of manufacture
14.6 Reference Voltage
14.7 Rated Current
14.8 Operating Frequency
14.9 Principal unit(s) of measurement

14.10 Meter Constant (imp/kwh)

14.11 Class index of meter

14.12 "Property of WBSEDCL"

14.13 Purchase Order No. & Date

14.14 Guarantee (Guaranteed for a period of 5 ½ years from the date of delivery)

14.15 BIS marking

14.16 Place of manufacture

14.17 Barcode for meter serial no. in alpha numeric form, date of manufacture, current rating of the meter and PO reference, readable by single layer barcode reader.

14.18 The reference temperature if different from 27 ^{0}C.

14.19 The sign of Double Square for insulating encased meters.

14.20 Firmware Version

15.0 CONNECTION DIAGRAM AND TERMINAL MARKING: Every meter shall be indelibly marked with a diagram of connection. For this poly phase meters, this diagram shall also show the phase sequence for which the meter is intended. It is permissible to indicate the connection diagram by an identification figure in accordance with relevant standards. The marking of meter terminals shall appear on this diagram.

16.0 DISPLAY OF MEASURED VALUES :

16.1 The meter shall have alphanumeric display with at least 7 full digit with LCD backlit display, having minimum character height of 10 mm. The data shall be stored in nonvolatile memory. The non-volatile memory shall retain data for a period of not less than 10 years under unpowered condition. Battery back-up memory will not be considered as NVM.

16.2 It shall be possible to easily identify the single or multiple displayed parameters through symbols / legend on the meter display itself or through display annunciation which shall be self explanatory and symmetric.

16.3 In addition to provide Serial Number of the meter on the display plate, the meter serial no. shall also be programmed into meter memory for identification through communication port for CMRI / laptop / meter reading printout.

16.4 Visibility of display in poor light conditions is an important criterion. STN or TN or any better type of advanced LCD to be used. Proper legends for the displayed parameters to be provided (Factory programmable). Back lit provided for clear visibility shall be uniform throughout all part of the LCD.

16.5 The meters shall have auto-display mode for pre-selected parameters. Push-Button mode of display shall display all parameters and it shall have priority over auto mode. The meter shall give clear message on display to indicate that the meter has experienced tampers and the nature of tamper with date and time of first occurrence, last occurrence and last restoration, if the Last tamper status is not restored, then meter will indicate first occurrence, last restoration and last occurrence.

16.6 Connection check, Phase sequence and self diagnostic shall give clear message on display. The meter shall have a test output **(**blinking **LED)** accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output device shall be provided in the form of one common LED for active and reactive energy with the provision of selecting the parameter being tested (separate LED may also be used with proper separation).

17.0 DISPLAY SEQUENCE: The meter shall display the required parameters in two different modes as follows. Display sequence for both auto and Push button must be maintained, no interchange in sequence or display parameter will be accepted. All the display shall have proper legend to identify the same.

17.1 Auto Display Mode: The following parameters shall be displayed in auto cycle mode, in the following sequence.

17.1.1 LCD test
17.1.2 Meter serial number
17.1.3 Real Date (dd mm yy)
17.1.4 Real Time (hh mm ss)
17.1.5 Cumulative Active Import Energy
17.1.6 Cumulative Active Export Energy
17.1.7 Cumulative Apparent Import Energy
17.1.8 Cumulative Apparent Export Energy
17.1.9 Maximum Demand in Active Import
17.1.10 Maximum Demand in Active Export
17.1.11 Instantaneous Average Power Factor
17.1.12 TOD Active Energy Import
17.1.13 TOD Active Energy Export
17.1.14 TOD Apparent Energy while Active Import
17.1.15 TOD Apparent Energy while Active Export
17.1.16 R Phase to Neutral Voltage
17.1.17 Y Phase to Neutral Voltage
17.1.18 B Phase to Neutral Voltage
17.1.19 R Phase Current
17.1.20 Y Phase Current
17.1.21 B Phase Current
17.1.22 Cumulative Tamper Count
17.1.23 Cumulative Power OFF Hours
17.1.24 Power OFF Hours of present month
17.1.25 Cumulative Billing Count

17.2 Push Button mode: The following parameters shall be displayed on pressing the push button. The meter display should return to Auto Display mode (mentioned above) if the 'push button' is not operated approx. more than 6 seconds.

17.2.1 LCD test
17.2.2 Meter serial number
17.2.3 Real Date (dd mm yy)
17.2.4 Real Time (hh mm ss)
17.2.5 History 1 TOD wise Active import energy
17.2.6 History 1 TOD wise Active export energy
17.2.7 History 1 TOD wise Apparent import Energy
17.2.8 History 1 TOD wise Apparent export Energy
17.2.9 History 1 TOD wise Maximum Demand in Apparent while Active import
17.2.10 History 1 Maximum demand in Apparent while Active import Occurrence Time and Date
17.2.11 History 1 TOD wise Maximum Demand in Apparent while Active export
17.2.12 History 1 Maximum demand in Apparent while Active export Occurrence Time and Date
17.2.13 History 1 Maximum demand in Active import
17.2.14 History 1 Maximum demand in Active import Occurrence Time and Date
17.2.15 History 1 Maximum demand in Active export
17.2.16 History 1 Maximum demand in Active export Occurrence Time and Date
17.2.17 History 1 Reactive import while active import energy
17.2.18 History 1 Reactive import while active export energy
17.2.19 History 1 Reactive export while active import energy
17.2.20 History 1 Reactive export while active export energy
17.2.21 Cumulative Active Import Energy
17.2.22 Cumulative Active Export Energy
17.2.23 Cumulative Apparent Import Energy
17.2.24 Cumulative Apparent Export Energy
17.2.25 Maximum Demand in Active Import
17.2.26 Maximum Demand in Active Export
17.2.27 Maximum Apparent Demand While Active Import
17.2.28 Maximum Apparent Demand While Active Export
17.2.29 Cumulative Reactive Import while Active Import Energy
17.2.30 Cumulative Reactive Import while Active Export Energy
17.2.31 Cumulative Reactive Export while Active Import Energy
17.2.32 Cumulative Reactive Export while Active Export Energy
17.2.33 Instantaneous Average Power Factor
17.2.34 TOD Active Energy Import
17.2.35 TOD Active Energy Export

17.2.36 TOD Apparent Energy while Active Import
17.2.37 TOD Apparent Energy while Active Export
17.2.38 TOD Reactive Import while Active Import Energy
17.2.39 TOD Reactive Import while Active Export Energy
17.2.40 TOD Reactive Export while Active Import Energy
17.2.41 TOD Reactive Export while Active Export Energy
17.2.42 R Phase to Neutral Voltage
17.2.43 Y Phase to Neutral Voltage
17.2.44 B Phase to Neutral Voltage
17.2.45 R Phase Current
17.2.46 Y Phase Current
17.2.47 B Phase Current
17.2.48 Cumulative Tamper Count
17.2.49 Cover Open Information with date and time
17.2.50 Cumulative Power OFF Hours in hour: minute from the date of manufacturing.
17.2.51 Power OFF Hours of present month
17.2.52 Inst. Power Factor – Phase Wise
17.2.53 Average Power Factor (Previous Month)
17.2.54 Avg. Load Factor (Previous Month)
17.2.55 Instantaneous Active Power
17.2.56 Instantaneous Apparent Power
17.2.57 Instantaneous Frequency
17.2.58 Present Tamper Status (PT/CT/Others)
17.2.59 First Occurrence with Date & Time
17.2.60 Last Occurrence with Date & Time
17.2.61 Last Restoration with Date & time
17.2.62 High resolution display both Import & Export for Wh, VArh (Lag + Lead) and VAh (minimum 4+2)
17.2.63 High resolution display both for Import & Export for Wh, Phase wise (minimum 4+2)
17.2.64 Phase Sequence
17.2.65 Connection check(when all phase are forward or reverse)
17.2.66 Self Diagnosis
17.2.67 Battery Status

17.3 Power OFF Mode Display:

17.3.1 Meter Serial No.
17.3.2 Real Time
17.3.3 Date
17.3.4 History 1 TOD wise Active import energy
17.3.5 History 1 TOD wise Active export energy
17.3.6 History 1 TOD wise Apparent import Energy

17.3.7 History 1 TOD wise Apparent export Energy
17.3.8 History 1 TOD wise Maximum Demand in Apparent while Active import
17.3.9 History 1 TOD wise Maximum Demand in Apparent while Active export
17.3.10 Cumulative Billing Count
17.3.11 Cumulative Tamper Count
17.3.12 Cumulative Active Import Energy
17.3.13 Cumulative Active Export Energy

17.4 Display for Auto and manual mode must be listed by two headers:

17.4.1 "Auto Display Mode"
17.4.2 "Push Button Mode"

17.5 Display: Other requirements:

17.5.1 Each parameter shall be on meter display for 10 sec and the time gap between two auto display cycles shall be 120 sec.
17.5.2 The register shall be able to record and display starting from zero, for a minimum of 1500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register shall not roll over in between this duration.
17.5.3 High resolution display can be given in separate mode and its registers required in display min 4+2 digits (for Wh) after decimal in case of Energy.
17.5.4 No decimal is required for main Wh, VAh, Varh (lag & lead) display. Push button mechanism shall be of high quality and shall provide trouble free service for a long span of time. Up and Down scrolling facility shall be there for Push Button Mode.

18.0 ANTI TAMPER FEATURES : The meter shall have the following anti-tamper features:

18.1 The meter shall be capable of recording energy correctly at Import as well as Export mode. If any phase current flows in forward direction, the meter shall register energy in phase-wise Import counter and if phase current flows in reverse direction, it shall register energy in Export counter. Simultaneous Import & Export in different phases shall be allowed and this will not be treated as any Tamper event.

18.2 The meter shall work correctly irrespective of phase sequence of supply. (There must be an indication in display & down loaded data).

18.3 The meter shall work correctly even in absence of neutral. For reference voltage V_{ref} between 70% to 120 %, accuracy must be maintained within as per IS

18.4 Meter shall record energy within maximum error of + 4% on injection of DC, pulsating DC (7-10 Hz), chopped AC in Neutral along with logging of ND tamper. In case tamper event is not logged, i.e, meters are immune to neutral disturbance, accuracy of the meters must not be affected. Maximum chopping for AC injection will be 25% to 30% at peak end.

18.5 The registration shall not be affected more than + 4% if high frequency (55Hz to 100Hz) or low frequency (45Hz to 30 Hz) AC signal w.r.t. earth is applied to the meter neutral. Meters which are immune or will maintain better accuracy, will be preferred.

18.6 The meter shall be immune to Electro Static Discharge or Sparks of 35 KV (approx) induced by using frequency-generating devices having very high output voltage.

Tests in this respect will be conducted by using commonly available devices and during spark discharge test, spark will be applied directly at all vulnerable points of the meter for a period of 10 minutes (at an interval of 1minute (approx) between two consecutive strokes) and meter shall maintain accuracy after the test under this condition. Accuracy will be checked during and after application of spark discharge Test. Meter shall record correctly within the specified limits of errors. Beyond 35 KV the meter shall record tamper if not immune.

18.7 The meter shall be capable of recording occurrence and restoration with date and time in respect to the following tamper events:

18.7.1 Power failure (Tamper count not to be increased) - as per tamper logic
18.7.2 Invalid Voltage - as per tamper logic
18.7.3 Missing Potential (phase wise) —as per tamper logic
18.7.4 High Voltage – as per tamper logic
18.7.5 Voltage Unbalance – as per tamper logic
18.7.6 CT Open - as per tamper logic
18.7.7 CT Bypass/ CT Short - as per tamper logic
18.7.8 CT Unbalance - as per tamper logic
18.7.9 Over Current - as per tamper logic
18.7.10 Neutral Disturbances (If it is logged) - as per tamper logic
18.7.11 Magnetic Disturbances - as per tamper logic

18.8 Threshold Values of all above occurrence and restoration are attached herewith. Snapshot values of Phase Voltage, Phase Current & Phase wise Power Factor, Active Energy value during occurrence & restoration to be provided in all the above mentioned tamper conditions in BCS with date and time. (In Event logging Snapshots shall be considered when the actual phenomenon occurred). The logging time for recording occurrence and restoration of all tamper events except Magnetic & Neutral Disturbance tamper, shall be 5 min. Magnetic tamper shall appear instantaneously, Neutral Disturbance within 3 min.

18.9 All authenticated commands shall be Base Computer Software(BCS) controlled. All transactions with meter shall be date and time logged, in the downloaded data (Last 12 month's transactions).

18.10 Properly designed meter tamper logic shall be provided and clearly explained in the bid. The tamper logic shall be capable of discriminating the system abnormalities from source side and load side and it shall not log/record tamper due to any source side abnormalities. More than one tamper *CT related/ PT related/ others* shall not be logged at a time. A minimum of 300 events (one event means either occurrence or restoration) of all types of tamper with date & time stamping shall be available in meter memory compartment wise. The logging will

be on FIFO basis. The events will be divided into three compartments like *CT related (148 Events), PT related (88 Events) and others (64 Events)*.

18.11 Meter shall have a continuous and clear indication in its display if top cover is removed / opened and even re-fixed (non rollover) and only cover open must be logged in BCS without any restoration. COVER OPEN tamper is to be displayed after every parameter displayed in Auto Display Mode.

18.12 **Measurement of Harmonics**: The meter shall be capable of measuring fundamental energy as well total energy i.e., fundamental plus harmonics energy. Total energy shall be made available on meter display and the same shall be used for billing purpose. Provision for measuring fundamental energy shall be kept for utilization in future. The total energy and fundamental energy shall be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end separately.

19.0 RESETTING OF MAX. DEMAND:

19.1 The meter shall be capable of recording the Apparent MD with integration period of 15 minutes (programmable). MD reset shall be through each of the three means:

19.1.1 Automatic resetting at preset date & time (at present it will be at 00.00 hrs of the first day of the month)

19.1.2 Manually i.e., by push button.

19.1.3 Through authenticated command from MRI or through Remote Communication.

19.2 The means by which the reset has been done shall be made available to downloaded data. Facility to invoke any of the above through authenticated MRI command shall be provided at BCS. MD reset button shall have proper sealing arrangement.

19.3 There shall be separate Push button for scrolling display (up and down) and MD reset. If only two Push buttons are used minimum 180sec pressing is required for MD reset.

20.0 LOAD SURVEY: The meter shall be capable of recording load survey for the following parameters for a period of minimum 60 days - subject to availability of all parameters listed below with 15 minutes integration period.

20.1 Energy in KWh & KVAh, (Import & Export mode shall be shown clearly)

20.2 Demand in KVA and KW, (Import & Export mode shall be shown clearly)

20.3 Current – phase-wise

20.4 Voltage – phase-wise

21.0 The NVM shall not require any additional battery backup to retain the data in case of power failure, for up to 10 years and the data storage shall be independent of battery backup unit. The life of the RTC battery in circuit condition shall be minimum 10 years in case of power failure. It shall be possible to transfer this data to base computer software through MRI/Laptop or RMR. The data so

obtained shall be displayed in both graphical & numeric form in the BCS. The BCS with all details is to be provided by the supplier at no extra cost.

22.0 TIME OF DAY FACILITIES : The meter shall have facilities to record Active, Apparent Energies and MD in at least 8 zones. The time zones shall be user programmable through authenticated MRI/Laptop/RMR command. Necessary software for the same is to be provided by the bidder. At present TOD timings will be programmable as follows:

22.1 TOD 1: 06:00 Hrs to 17:00 Hrs.
22.2 TOD 2: 17:00 Hrs to 23:00 Hrs.
22.3 TOD 3: 23:00 Hrs to 06:00 Hrs.

23.0 METER READING DURING POWER OFF: It shall be possible to read the meter-display visually and with MRI/Lap top in absence of input voltages with the help of internal battery backup. In case of external battery the arrangements shall be such that hands free operation is possible. In case of external battery 10 years guarantee must be given for external battery/power pack. Separate battery shall be used for this purpose (Not RTC or processor battery). In case of Lithium battery rating shall be more than 500mAh.

24.0 SELF DIAGNOSTIC FEATURES: The meter shall be capable of performing complete self-diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory location all the time. If possible, the details of malfunctioning shall be recorded in the meter memory. The bidder shall furnish the details of self-diagnostic capability feature, viz Memory status (NVM) and Battery status, RTC Status etc. and it shall be in display.

25.0 IMMUNITY TO ELECTRO MAGNETIC DISTURBANCE: The meter shall be designed in such a way so that external electromagnetic field or electrostatic discharges do not influence the performance of the meter as per IS 14697.

26.0 TECHNICAL SUPPORT, MANUALS & TRAINING: Extensive technical support, detailed technical literature (shall supply with each meter at the time of packing) & training is to be provided by the manufacturer. Supply of External Battery Packs if required to be provided by the manufacturer and shall be clearly offered in their bids.

27.0 INFLUENCE QUANTITIES : The meter shall work satisfactory with guaranteed accuracy as per limit provided in IS: 14697 (clause No.9.2.1 and 11.2) under presence of the following quantities:

27.1 Electromagnetic field

27.2 External magnetic field

27.3 Radio frequency interference

27.4 Vibration

27.5 Voltage variation (70% - 120% of Vref.) in 0.5 lag and upf both in 5% and 100% of I_b

27.6 Frequency variation (+/-) 5% of 50 Hz in 0.5 lag and upf both in 5% and 100% of I_b

28.0 COMMUNICATION CAPABILITY:

28.1 The meter shall have a galvanic isolated Optical Port as per IEC 1107/ANSI/PACT so that it can be easily connected to a handheld Common Meter Reading Instrument (CMRI)/Laptop/PC for data transfer. The optical port shall be provided with proper sealing arrangement so that its cover can't be opened without breaking its seal.

28.2 A Serial Port (RS232 or RJ11) shall also be provided inside the terminal cover to enable automatic meter reading through Modem, if required in future. The Serial Port shall be housed inside the meter terminal cover so that it can't be accessed without opening the sealed terminal cover.

28.3 The stored data in the meter shall be available through CMRI even when the display of the meter is not available.

28.4 No alteration shall be possible without authenticated commands set by the BCS after scheduling the meters. Moreover, no alternation shall be possible using CMRI only, i.e. the control has to be with the BCS as well.

28.5 Date in the meter shall be reset only through commands from the CMRI or Laptop. Correction of RTC time, change of TOD timings etc. shall be done through CMRI or Laptop utilizing authenticated command set by BCS.

28.6 Billing parameters shall be factory programmable.

28.7 The BCS shall have multi-level password for data protection & security.

28.8 Bidder has to submit CMRI software (.exe format) also at the time of sample meter testing.

28.9 Infrared communication port is not acceptable.

29.0 BASE COMPUTER SYSTEM & SOFTWARE REQUIREMENTS:

29.1 The Common Meter Reading Instrument (CMRI) shall be loa0ded with user-friendly software (MS-DOS 5.0 or higher version compatible) for reading and/or downloading meter data.

29.2 Windows (Windows 7.0 or higher version) based Base Computer Software (BCS) shall be provided for receiving data from CMRI and downloading instructions from BCS to CMRI.

29.3 The data stored in the meters memory including defrauded energy shall be available on the BCS.

29.4 Only one BCS shall be provided for downloading data and authenticated command from CMRI/ Laptop.

29.5 The BCS shall have facility to convert meter reading data into user definable ASCII file format so that it can be integrated with the billing system or any other third party software. The user shall have the flexibility to select the parameters to be converted into ASCII file.

29.6 All the data available in the meter including energy, MD etc. with date and time stamp, new TOD time zones and historical data shall be available in BCS after down loading.

29.7 The bidder shall supply the necessary CMRI software during sample meter testing.

29.8 The bidder has to supply the meter reading protocol and API free of cost. The bidder shall indicate the relevant standard to which the protocol is compliant.

29.9 Transfer of data from the meter to CMRI & then to the BCS shall be easily executed.

29.10 Any change or up gradation of CMRI software or BCS in future, required for any reason, has to be done by the supplier at his own cost.

29.11 The same software shall be capable of preparing CMRI to read the meter information or to reconfigure the meter for change of TOD timings and / or time setting of the meter etc. The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

29.12 In BCS twelve months' data for KWh, KVAh, MD & KVA (total & TOD wise), average load factor, average power factor must be available.

30.0 GENERAL REQUIREMENTS:

30.1 GUARANTEED TECHNICAL PARTICULARS: The bidder shall furnish all the necessary information as desired in the Schedule of Guaranteed Technical Particulars and data, appended with this Specification. If the bidder desires to furnish any other information in addition to the details as asked for, the same may be furnished against the last item of this Annexure– I.

30.2 TECHNICAL DEVIATIONS: Any deviation in Technical Specification as specified in the Specification shall be specifically and clearly indicated in the Schedule of deviation format.

30.3 TESTS :

30.3.1 **Type Testing of Meter:** The offered meters shall be type tested at any NABL accredited laboratory in accordance with relevant IS and CBIP Report 325 with their latest amendments. The type test report shall not be more than 3 (three) years old. A copy of the Type Test results shall be enclosed with the offer. If there is any modification in the design / parameters of the specifications or use of constituent materials in the offered meters submitted with the offer, from the meter which was submitted type tested, which may affect the characteristics as well as parameters of the meter, revised type test certificates as per the design, parameters and constituent material used in the offered meter, shall have to be submitted failing which the offer may be liable to be rejected. Type Test Certificate from any NABL

accredited Lab shall only be considered. Type test certificate shall contain the following information clearly:

30.3.1.1 Type of display or LCD
30.3.1.2 Class of accuracy
30.3.1.3 Meter constant
30.3.1.4 Type of meter

30.3.2 **Acceptance tests:** The acceptance tests as stipulated in CBIP / IS (with latest amendments) shall be carried out by the supplier in presence of purchaser's representative. In case of failure of Meters as specified in Recommended Sampling Plan of IS-14697, the entire lot will be treated as rejected. Also the following additional tests are to be carried out on one meter randomly selected from each lot offered for inspection / acceptance testing. In case of failure of any single meter the entire lot will be rejected.

30.3.2.1 Magnetic induction of external origin (AC & DC)
30.3.2.2 Tamper & Fraud protection, as per relevant Clause of this specification.
30.3.2.3 Test of endurance up to 150% of I_{max}, for two hours, followed by verification of limits of error.
30.3.2.4 Verification of internal components.
30.3.2.5 Dry Heat Test under Test of Climatic Influences in relevant IS of one meter from the offered lot is to be arranged by the supplier at any NABL accredited laboratory, at his cost.

30.3.3 **Routine Tests :** Each and every meter of the offered lot shall undergo the routine tests as well as functional tests as per IS: 14697/1999, CBIP Report 325 and after sealing the meters, the manufacturers will have to submit the routine test report of all the meters as well as a statement showing seal Sl. Nos. against each meter Sl. No. of offered lot in soft copy (MS WORD or EXCEL format), to the Chief Engineer(Procurement and Contract) and the Chief Engineer(DTD), along with offer letter for acceptance test.

30.4 TEST FACILITIES: The tests for equipment / instrument shall be carried out as per relevant Standards and test certificates shall be furnished for scrutiny. The Bidder shall indicate the details of the equipment available with him for carrying out the various tests as per relevant Standards. The bidder shall indicate the sources of all equipments / instruments.

30.5 The standard meters used for conducting tests shall be calibrated periodically at any NABL Accredited Test Laboratories and test certificates shall be available at Works for verification by purchasers' representative.

30.6 The manufacturer shall have at least the following testing facilities to ensure accurate calibration:-

30.6.1 AC high voltage test
30.6.2 Insulation test
30.6.3 Test of no load condition
30.6.4 Test of Starting condition
30.6.5 Test on Limits of error (Automatic Testing facility with ICT)
30.6.6 Power loss in voltage and current circuit
30.6.7 Test of Repeatability of error
30.6.8 Test of meter constant
30.6.9 Test of magnetic influence (As per CBIP 325 & Permanent Magnet)

30.7 INSPECTION:

30.7.1 The purchaser may carry out the inspection at any stage of manufacture. The manufacturer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing the equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. All acceptance tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the Bidder and purchaser at the time of purchase. The Bidder shall provide all reasonable facilities without charge to the inspector, to satisfy him that the equipment is being furnished in accordance with this specification.

30.7.2 The supplier shall keep the purchaser informed in advance, about the manufacturing programme for each lot so that arrangement can be made for inspection. The purchaser reserves the right to insist for witnessing the acceptance / routine testing of the bought out items. The supplier shall give 15 days for local supply / 30 days in case of foreign supply advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

30.7.3 The purchaser reserves the right to get type test any meter, for meter casing etc. from any of the offered lots, reserve at any destination stores.

31.0 SUBMISSION OF SAMPLE METER:

31.1 The bidder will submit his sample Meters in sealed casing / cartoon along with relevant Meter documents (**As per Annexure-IV)**, on any working day, from 11.00 A.M. to 04.00 P.M. on weeks days & from 11.00 A.M. to 01.00 P.M. on Saturday within the specified period of submission latest by 01.00 P.M. on the last day of submission of bid to the Office of the Chief Engineer (DTD), Abhikshan, Sec-V, Salt Lake, Kolkata-91. The bidder will be given a receipt, jointly signed by the bidder and DTD officials, mentioning the samples and papers submitted by the bidder as per check list.

31.1.1 While submitting the samples and required documents as per Annexure-IV, the bidder shall submit three numbers of sealed meters as per the specifications stated herein before, 2 nos ultrasonic welded and 1 no without welding and another dummy meter case (for checking ultrasonic welding).

31.1.2 They shall also submit one prototype of meter base and cover (with body screw caps) properly welded.

31.1.3 The date of testing of sample meters will be intimated to the bidders by CE (DTD) and during such test other bidders will also be allowed to witness the testing. Sample submission and Test procedure may be changed due to emergency requirement. On the date of testing of sample meters of a particular bidder, he shall come prepared with the following.

31.1.3.1 BCS (as per specification)

31.1.3.2 CMRI compatible with BCS and loaded with CMRI software and laptop compatible with BCS.

31.1.3.3 Modem and accessories for testing the remote meter reading.

31.1.3.4 Any other accessories required for observing the performance and capabilities of the meters.

32.0 QUALITY ASSURANCE PLAN: 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.

32.1 The factory shall be completely dust proof.

32.2 The test rooms shall be temperature and humidity controlled as per relevant standards.

32.3 The test and calibrating equipments shall be automatic and all test equipment shall have their valid calibration certificates.

32.4 Meter will be tested (in case of lot test) in fully automatic test bench with ICT. No. human intervention will be allowed during test.

32.5 Power supplies used in test equipment shall be distortion free with sinusoidal wave forms and maintaining constant voltage, current and frequency as per the relevant standards.

33.0 THE CHECKS TO BE CARRIED OUT DURING MANUFACTURING OF THE METERS:

33.1 Meter frame dimensions tolerances shall be minimal.

33.2 The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.

33.3 The meters shall be batch tested on automatic, computerized test bench and the results shall be printed directly without any human errors.

34.0 INFORMATION TO BE FURNISHED WITH THE BID: The Bidder shall invariably furnish the following information along with the bid, failing which the bid shall be liable for rejection. Information shall be separately given for individual type of material offered.

34.1 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.

34.2 Information and copies of test certificates in respect of bought out accessories.

34.3 List of manufacturing facilities available.

34.4 Level of automation achieved and lists of areas where manual processing exists.

34.5 List of areas in manufacturing process, where stage inspections are normally carried out of quality control and details of such tests and inspections.

34.6 List of testing equipment available with the bidder for final testing of equipment specified and test-plant limitations, if any, vis-à-vis 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.

34.7 The list of components used in the meter.

34.8 A detailed list of bought-out items, which are used in the manufacturing of the meter indicating the name of firms from whom these items are procured. The details of quality assurance procedures followed in respect of the bought-out items.

34.9 The details of testing facilities available for conducting the routine and acceptance tests and other special tests on the meter.

34.10 The facility available if any for conducting type test.

34.11 Principle of operation of the meter, outlining the methods and stages of computation of various parameters starting from input voltage and current signals including the sampling rate, if applicable.

34.12 The relevant documents regarding the procurement of polycarbonate material.

35.0 LAB FACILITY: The laboratory of manufacturer 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).

36.0 MANUFACTURING ACTIVITIES:

36.1 All the materials, electronics and power components, ICs used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy. The manufacturer shall use Application Specific Integrated Circuit (ASIC) or Micro controller for metering functions.

36.2 The electronic components shall be mounted on the printed circuit board using latest Surface Mounted Technology (SMT) except power components by deploying automatic SMT pick and place machine and re flow solder process. The electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter at least up to 10 years.

36.3 Further, the Bidder shall own or have assured access (through hire, lease or sub-contract) of the mentioned facilities. The PCB material shall be of glass epoxy FR-4 grade conforming to relevant standards.

36.4 All insulating materials used in the construction of meters shall be non-hygroscopic, non-ageing and tested quality. All parts that likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating. Quality shall be ensured at the following stages.

36.4.1 At PCB manufacturing stage, each board shall be subjected to bare board testing.

36.4.2 At insertion stage, all components shall undergo testing for conforming to design parameters and orientation. Complete assembled and soldered PCB shall undergo functional testing using test equipments (testing jig).

36.5 Prior to final testing and calibration, all meters shall be subjected to accelerated ageing test to eliminate infant mortality, i.e., meters are to be kept in ovens for 72 hours at 55 deg Centigrade temperature & atmospheric humid condition. After 72 hours meters shall work correctly. Facilities / arrangement for conducting ageing test shall be available with the manufacturer.

36.6 The calibration of meters shall be done in-house.

37.0 DOCUMENTATION:

37.1 Twenty sets of operating manuals shall be supplied to the office of the CE (DTD) for distribution at sites.

37.2 One set of routine test certificates shall accompany each dispatch consignment.

37.3 The acceptance test certificates in case pre-dispatch inspection or a routine test certificate in cases where inspection is waived shall be approved by the purchaser.

38.0 GUARANTEE:

38.1 The Meters shall be guaranteed arising out of faulty design, materials, bad workmanship for a period of **5½ years** from the date of supply.

38.2 Life of battery used for the meter shall be guaranteed for 10 years.

39.0 REPLACEMENT OF DEFECTIVE METERS: The meters declared defective within the above guarantee period by the WBSEDCL shall be replaced by the supplier up to the full satisfaction of the WBSEDCL at the cost of supplier within one month on receipt of intimation. Failure to do so within the time limit prescribed shall lead to imposition of penalty of twice the cost of meter. The same may lead to black listing even, as decided by WBSEDCL. In this connection the decision of WBSEDCL shall be final.

40.0 PACKING & FORWARDING:

40.1 The equipment shall be packed in cartons / crates suitable for vertical / horizontal transport as the Case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbol. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc., shall be provided. Supplier without any extra cost shall supply any material found short inside the packing cases immediately.

40.2 The packing shall be done as per the standard practice as mentioned in IS 15707: 2006. Each package shall clearly indicate the marking details (for e.g, manufacturer's name, Sl. Nos. of meters in the package, quantity of meter, and other details as per supply order). However, the supplier shall ensure the packing is such that, the material shall not get damaged during transit.

41.0 COMPONENT SPECIFICATIONS: The meters shall be designed and manufactured using SMT (Surface Mount Technology) components, except for power supply components, LED / LCD etc., which are PTH type. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed makes so as to ensure higher reliability, longer life and sustained accuracy. The Components used for manufacture of meter shall be of high quality and the bidders shall confirm component specification as specified below in Annexure-III Bidders shall compulsorily fill Annexure-I, Annexure-II & Annexure-III for technical qualification.

Sl. no.	Component Function / Feature	Requirement	Make / origin
1	Current Element	E-beam /spot welded CT shall be provided in the phase element and in the neutral with proper isolation.	Any make or origin conforming to IS-2705
2	Measurement / computing chips	The Measurement / computing chips used in the meter shall be with the Surface mount type along with the ASICs.	Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments, Teridian, NEC, Freescale, Renesas, Phillps
3	Memory chips	The memory computing chips shall not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	National Semi Conductor, Atmel, SAMES, Texas Instruments, Teridian, ST, Microchip, Hitachi, OKI, Freescale, Renesas, Phillps
4	Display modules	The display modules shall be well protected from the external UV radiations. The display shall be clearly visible over an angle of at least a cone of 70o.The construction of the modules shall be such that the displayed quantity shall not disturbed with the life of display. The display shall be TN type industrial grade with extended temperature range	Bonafied Technologies, Advantek , Hitachi, SONY, Hijing, Truly Semiconductor, Tianma
5	Communication modules	Communication modules shall be compatible for the RS 232 ports	National Semiconductors, HP, ST, Texas Instruments, Agilent, Avago, Fairchild, Philips, Ligitek, Hitachi, Siemens, Everlight,
6	Optical port	Optical port shall be used to transfer the meter data to meter reading instrument. The mechanical construction of the port shall be such to facilitate the data transfer	National Semiconductors, Texas Instruments, HP, Agilent, Avago, Osram, Hitachi, , 21, Siemens, Philips, Everlight,

		easily.	
7	Power Supply	The power supply shall be with the capabilities as per the relevant standards. The power supply unit of the meter shall not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	As specified.
8	Electronic components	The active & passive components shall be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi, Hitachi, Oki, Toshiba. Freescale, Samsung.
9	Mechanical parts	The internal electrical components shall be of electrolytic copper & shall be protected from corrosion, rust etc. The other mechanical components shall be protected from rust, corrosion etc. by suitable plating / painting methods.	N.A.
10	Battery	Lithium-ion with guaranteed life of 10 years	Renata, Panasonic, Varta, , Sanyo, National, Tadiran, Sony, Duracell, Tekcell, Mitsubishi, EVE, SAFT , XENO
11	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	Dallas, Atmel, Motorola, NEC, Teridian Renesas, Texas Instruments, ST, Micro chips, Epson, Philips, NEC, OKI,Hitachi, Mitsubishi, Freescale,

Annexure-I
GTP for Meter

Sl.No.	Item Description	Manufacturer's Particulars
1.	Maker's name and country	To be specified by the Bidder
2.	Type of meter/model	To be specified by the Bidder
3.	Standard Applicable	IS 14697, IS 15959, CBIP 325
4.	Accuracy/Interface class	0.5S
5.	Parameters displayed	As per Specification
6.	P.F. Range	Zero lag – unity – Zero Lead
7.	Basic Current (Ib) (-/1A)	-/1A
8.	Maximum Current (Imax)	2A
9.	Minimum starting current	0.1% of I-basic
10.	Rated Voltage	110 V : Phase to Phase, 63.5 V : Phase to Neutral
11.	Meter Constant	To be specified by the Bidder
12.	Variation of voltage at which meter functions normally	70% to 120% of reference Voltage
13.	Rated Frequency	50Hz±5%
14.	Power Loss in Voltage circuit (VA & watt) & Current circuits (VA)	Voltage Circuit :- Will not exceed 1.5W and 10VA per phase Current Circuit:- Will not exceed 1.0 VA per phase
15.	Dynamic range	As per IS 14697
16.	MD reset Provisions	Possible to reset MD by any of the following options:- 1. Remote MD reset 2. Manual MD reset 3. MD reset by HHU 4. Auto Monthly Reset
17.	Display: a) Type of register b) No. of digit of display and height of character c) Auto display mode & scroll mode d) Type of push button for scroll mode	Display will be a) LCD b) 7 digit 7 segment, height- 10x5mm c) As per approved sample d) Spring loaded push button
18.	Non volatile memory	To be provided as per Specification
19.	Details of provision for taking reading during power off condition	Through internal non rechargeable battery
20.	Principle of operation	As per technical Specification
21.	MD integration period	15 minutes
22.	Weight of meter	To be specified by the Bidder

Sl.No.	Item Description	Manufacturer's Particulars
23.	Dimensions	To be specified by the Bidder
24.	Warranty	5 ½ years from the date of supply
25.	Outline drawings & leaflets	To be provided by the Bidder
26.	a) Remote meter- readout facility	Provision required
	b) Communication protocol used	DLMS
	c) Sealing provision for meter & optical port	To be provided as per Specification
	d) Baud rate of data transmission	9600 bps
	e) Required software to be resident in CMRI and BCS	To be provided by the Bidder
	f) Ultrasonic welding of body or any other technology which is equally or more efficacious	To be provided
	g) Manufacture Seal	To be provided
27.	Base Computer software	Compatible with windows 7 or above.
28.	Type test certificates	To be provided by the Bidder
29.	Time of day zones (selectable)	3 TOD Zones to be provided with a provision for 8 TOD Zones
30.	Whether meter measures both fundamental & harmonic energy	As per Specification
31.	Real time clock accuracy	Maximum drift ± 5 Minutes per annum.
32.	Battery for real time clock	It shall be Lithium-ion / Lithium battery having at least 10 years of life
33.	Anti tamper features	As per Tamper logic provided by WBSEDCL.
34.	Effect of accuracy under tamper conditions	As per technical specification
35.	Drift in accuracy of measurement with time	As per IS: 14697 & CBIP 325.
36.	Name plate details	As per specification
37.	Type of calibration	Software calibrated
38.	Type of mounting	Projection mounting
39.	Testing facility	Shall be available with manufacturer, details to be provided
40.	Data retention by NVM without battery backup and un-powered condition	As per specification
41.	Type of material used:	
a.	Base	As per specification
b.	Cover	As per specification
c.	Terminal block	As per specification
d.	Terminal cover	As per specification

Sl.No.	Item Description	Manufacturer's Particulars
42.	Screw	
	i. Material	As per specification
	ii. Size	As per specification
43.	Internal diameter of terminal hole	5.5mm
44.	Centre to centre clearances between adjacent terminals	As per IS: 14697
45.	Security profiles	
	a) Basic Security	To be provided
	b) Advance security	To be provided

Annexure - II
Pre-Qualification Conditions for Three Phase Static Meters

Sl. No.	Particulars	Remarks
1	Bidders must have valid BIS certification for the offered meter.	Yes / No
2	Bidder preferably posses ISO 9001 certification	Yes / No
3	Bidder shall be manufacturers of static meters having supplied Static 1-ph or 3-phase meters with memory and LCD display to Electricity Boards / Utilities in the past 2 years	Yes / No
4	Bidder has Type Test certificate for the Type of offered meter not more than 3 (three) years old	Yes / No
5	Bidders shall have dust free, static protected environment for manufacture, assembly and Testing.	Yes / No
6	Bidder shall have automatic computerized test bench for lot testing of meters.	Yes / No
7	Bidder has facilities of Oven for ageing test.	Yes / No
8	Bidder shall submit certificate for immunity against magnetic influence of 0.2 T AC. & 0.5 T DC. from a NABL accredited Laboratory, for the same type of meter as offered.	Yes / No

Annexure – III

Sl. No.	**Component Function / Feature**	**As per Requirement**	**Make / origin**
1	Current Element		
2	Measurement / Computing chips		
3	Memory chips		
4	Display modules		
5	Communication modules		
6	Optical port		
7	Power Supply		
8	Electronic components		
9	Mechanical parts		
10	Battery		
11	RTC / Micro controller		

ANNEXURE – IV

Sl. No.	*LIST OF DOCUMENTS TO BE SUBMITTED DURING SAMPLE SUBMISSION*			
1	*Attested copy of type test reports from NABL accredited laboratory*			
2	*Attested copy of BIS certificates of the same type of meter submitted as sample*			
3	*Attested certificates as regards material used for meter case, cover & terminal block.*			
4	*Annexure – II as per tender documents*			
5	*Annexure – III as per tender documents*			
6	*Operating manual of the meter submitted*			

Tamper Logic: 3 Phase 4 Wire Import Export Meter

Sl. No.	TAMPERS	Occurrence Condition	Restoration Conditions	Occurrence Time (Min/Sec)	Restoration Time (Min/Sec)
A	**Import Mode:**				
1	**Power Failure**	$V_{3x} \leq$ 50% of V_{ref}	Any . $V_x >$ 50% of V_{ref}	5 min.	Immediate
		$I_{3x} >$ 5% of I_b	I_{3x} ignored		
2	**Invalid Voltage**	$V_{3x} >$ 60% of V_{ref} & <115% of V_{ref}	$V_{3x} >$ 60% of V_{ref} & <115% of V_{ref}	5 min.	5 min.
		Angle difference of any two phases >±10^o	Angle difference of any two phases < ±10^o		
3	**Missing Potential**	Any $V_x <$ 30% of V_{ref} other phase voltage >40% of V_{ref} & <115% of V_{ref}	Any $V_x >$ 40%of V_{ref} other phase voltage >40% of V_{ref} & <115% of V_{ref}	5 min.	5 min.
		Current >10% of I_b	Current >10% of I_b		
		Missing Potential detection will be Phase wise			
4	**High Voltage**	Any $V_x >$ 115% V_{ref}	$V_{3x} <$ 115% V_{ref}	5 min.	5 min.
		Current ignored	Current ignored		
5	**Voltage Unbalance**	$V_{3x} >$ 70% V_{ref} & <115% of V_{ref}	$V_{3x} >$ 70% V_{ref} & <115% of V_{ref}	5 min.	5 min.
		$(V_{max} - V_{min}) >$ 30% of V_{ref}	$(V_{max} - V_{min}) <$ 30% of V_{ref}		
6	**CT Open**	$I_{Residual}$ >20% of I_b	$I_{Residual}$ < 20% of I_b	5 min.	5 min.
		$I_x <$ 2% of I_b	$I_x >$ 2% of I_b		
		Average line Current :Ignored	Average Phase Current > 10% of I_b		
		$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}	$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}		
		CT open detection will be phase wise			
6	**CT Bypass**	$I_{Residual}$ >20% of I_b	$I_{Residual}$ < 20% of I_b	5 min.	5 min.
		$I_{3x} >$ 2% of I_b	Phase Current Ignored		
		Average line Current :Ignored	Average Current>10 % I_b		
		$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}	$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}		
7	**Over current**	Any $I_x >$ 150% of I_{max}	$I_{3x} <$ 150% of I_{max}	5 min.	5 min.
		$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}	$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}		
8	**Low PF**	$I_{3x} >$ 10% of I_b	$I_{3x} >$ 10% of I_b	5 min.	5 min.
		Average PF <0.3	Average PF >0.3		
		$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}	$V_{3x} >$ 70% of V_{ref} & <115% of V_{ref}		
9	**Neutral Disturbance**	Frequency < 45 Hz or > 55 Hz	Frequency is between >=45Hz or <=55Hz	20 Secs - 40 Secs	20 Secs - 40 Secs
10	**Magnet**	Whenever the Meter functionality gets affected on account of presence of any magnetic field, meter shall log it as an event and start recording at I_{max} if does not remain immune. In Tamper Snap Shot I_{max} must be shown (either occurrence or restoration), with Date and Time stamp. If meter detects magnetic tamper in "Export" mode, the energy increment shall be made in Import mode as per V_{ref}, I_{max} and UPF.		20 Secs	20 Secs
11	**Cover Open**	On removal of meter cover the meter will log cover open event along with date and time	No restoration	Immediate	

Tamper Logic: 3 Phase 4 Wire Import Export Meter

B	**Export Mode**			
	Neutral Disturbance and Magnet	In Export Mode, meter recording must not start at I_{max}. Under any circumstances, if meter logs Neutral Disturbance or Magnetic Field Tamper event and starts recording at I_{max} then it will log in Import Register instead of Export Register.		Bidders Choice
	Manual Resetting of Maximum Demand:	When Reset Button is pressed within an Integration Period, Rising Demand will not reset to Zero. The Demand will be registered for the entire Integration Period and will be logged as Current Max. Demand at the end of the Integration Period.		
Please note: V_{3x} = Voltage in all Phases V_x = Voltage In any Phase I_{3x} = Current in all Phases I_x = Current in any phase				