WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

Technical Specification for AC 3 Phase 4 Wire 240V LT CT Operated Fully Static AMR Compatible DLMS Compliant Category C1 Tri Vector Energy Meter of 0.5s Accuracy Class and 200/5A CTR

1.0 SCOPE:

This scope covers design, engineering, manufacture, assembly, inspection, testing at manufacturer's works before dispatch, supply and delivery at destination anywhere in the state of West Bengal of **AC 3 Phase 4 Wire 240V LT CT Operated Fully Static AMR Compatible DLMS Compliant Category C1Tri Vector Energy Meter of 0.5s Accuracy Class and 200/5A CTR** with backlit LCD display used for balanced/unbalanced load. The meter shall be capable of measuring, recording and displaying different electrical parameters listed elsewhere in the document including Active Energy in kWh, Reactive Energy in kVArh, Apparent Energy in kVAh over a Power Factor range of Zero Lag to Unity to Zero Lead. Meter shall have facility of recording tamper information & load survey data in nonvolatile memory. These meters shall have communication port for remote meter reading.

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 APPLICATION: Consumer Meter

3.0 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 its up-to-date and latest amendments / revisions thereof as on 90 days prior to floating of the 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 15959(2011) read with latest amendments, if any	Data Exchange for Electricity Meter Reading Tariff and Load Control Companion Specification
4	CBIP Technical Report No. 111	Specification for Common Meter Reading Instrument
5	IS 12346(1999) & its latest amendments, if any	Testing Equipment for AC Electrical Energy Meters

4.0 CLIMATIC CONDITIONS:

The meters to be supplied 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.

The meters to be supplied shall be suitable for satisfactory continuous operation under the following tropical conditions.

4.1 Maximum Ambient Air Temperature in shade: 55^0 C

4.2 Minimum Ambient Air Temperature: (-)10^0 C

4.3 Maximum Relative Humidity: 95%(non-condensing)

4.4 Minimum Relative Humidity: 10%
4.5 Height above mean sea level: Up to 3000 meters
4.6 Average number of months for Tropical Monsoon per Annum: 5
4.7 Annual Rainfall: 100 mm to 1500 mm
4.8 Maximum Wind Pressure: 150 Kg/Sqm

5.0 SUPPLY SYSTEM:

System	3 Phase 4 Wire
Rated Voltage (V_{ref})	415V Ph-Ph or 240V Ph-N
Voltage Range for Operation	70% to 120% of V_{ref}
Rated Current (I_b) & CT Ratio	5A, balanced and unbalanced load CTR: 200/5A for LT CT(3P, 4W)
Maximum Continuous Current (I_{max})	10 A
Rated Frequency	50 Hz
Frequency Variation	50Hz ±5%

6.0 POWER FACTOR RANGE: Power Factor Range shall be Zero (Lag) - Unity - Zero (Lead). The meter shall be lag only.

7.0 ACCURACY CLASS:

7.1 Class of Accuracy of the meter shall be 0.5s.
7.2 Maximum error limit at 1%I_b and UPF shall not exceed ±1%.
7.3 There shall be no drift in accuracy, at least for a period of ten years from the date of its supply. In case any drift is noticed which is beyond the permissible limits, the meter shall have to be replaced 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 per phase at reference voltage, reference temperature and reference frequency shall be within 1.5W and 10VA as per IS 14697.
8.2 Current Circuit: The apparent power taken by current circuit phase wise at basic current, reference frequency and reference temperature shall be within1.0 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 I_b(basic current) at UPF(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% of V_{ref} (Reference 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.

11.2 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. of 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.

11.3 The meter shall comply with latest technology such as Microcontroller 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.

11.4 The meter shall be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized virgin Polycarbonate/ High Grade Engineering Plastic / Thermosetting Plastic 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 color. The meter casing shall not change in shape, color, size and dimensions when subjected to 72hrs 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.

11.5 In addition to the above, the meter cover shall be sealable to the meter base with at least 2 no. of manufacturer's 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 both the communication ports (Optical and RS232/RJ11).

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

11.6.1 **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.

11.6.2	**BAYER :**	Grade corresponding to above
11.6.3	**DOW Chemical :**	--do--
11.6.4	**MITSUBISHI :**	--do--
11.6.5	**TEJIN :**	--do--
11.6.6	**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 shall flush with meter body. 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 shall 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 with the help of screw adjustable metal plates to increase the surface of contact and reduce the contact resistance. 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 °C and the terminal shall withstand at least 135 °C as per IS.

13.3 The internal diameter of terminal hole shall be minimum 5.5 mm and center to center distance shall be 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 2.0 mm thickness 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. The terminal cover shall preferably be detachable.

13.5 The terminals and all connecting screws will be of suitable material capable of withstanding a current of 150% of I_{max} for two hours, continuously and the meter shall be capable of providing phase to neutral protection up to 415V for 1(one) hour followed by accuracy testing as per relevant IS.

14.0 MARKING OF THE METER:

Every meter shall have a nameplate clearly visible and indelible and **distinctly marked** in accordance with the relevant Standard mentioning **"Category – C1".**

The marking on the meter shall be in accordance with relevant clauses of IS 14697 and shall appear on an external plate attached to the meter cover. 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 Secondary Current (Ib)
14.8 Rated Maximum Current (Imax)
14.9 CT Ratio (200/5A)
14.10 Operating Frequency
14.11 Principal unit(s) of measurement
14.12 Meter Constant (impulse/kWh)
14.13 Class index of meter
14.14 "Property of WBSEDCL"
14.15 Purchase Order No. & Date
14.16 Guarantee (Guaranteed for a period of 5 ½ years from the date of delivery)
14.17 BIS marking& License no.
14.18 Place of manufacture
14.19 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.

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

14.21 The sign of Double Square for insulating encased meters.

14.22 Firmware version

15.0 CONNECTION DIAGRAM AND TERMINAL MARKING: Every meter shall be indelibly marked with a diagram of connection. For the polyphase 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 digits with LCD backlit display, having minimum character height of 10 mm. The meter display shall have 7 digits(complete) for energy counter with alphanumeric digits for parameter identifier and tamper indication.

16.2 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.

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

16.4 In addition to nameplate, serial number of the meter shall have to be programmed into meter memory for its identification through CMRI / Laptop / meter reading printout where data shall be downloaded through communication port.

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.

16.6 Each parameter shall be on meter display for 10 sec and the time gap between two auto display cycles shall be 20 sec.

16.7 Meter shall have Scroll Lock facility to display any one desired parameter continuously from display parameters.

16.8 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.

16.9 Connection check, Phase sequence and Self diagnostic shall give clear message on display.

16.10 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 check (All segment check on display)

17.1.2 Connection Check /Phase Sequence (Voltage & Current)

17.1.3 Meter Serial Number BIS

17.1.4 Real Day/ Date (dd:mm:yy)

17.1.5 Real Time (hh:mm:ss)

17.1.6 Rising Demand with elapsed time

17.1.7 R-Phase to Neutral Voltage

17.1.8 Y-Phase to Neutral Voltage

17.1.9 B-Phase to Neutral Voltage
17.1.10 R-Phase Line Current
17.1.11 Y-Phase Line Current
17.1.12 B-Phase Line Current
17.1.13 Instantaneous Average PF
17.1.14 Instantaneous Active Demand
17.1.15 Instantaneous Apparent Demand
17.1.16 Total Active Forward Energy
17.1.17 TOD-wise Total Active Forward Energy
17.1.18 Total Apparent Forward Energy
17.1.19 TOD-wise Total Apparent Forward Energy
17.1.20 Active MD with Date & Time [0-24 hrs.]
17.1.21 Average PF Associated with Active MD Date & Time Slot [0-24 hrs.]
17.1.22 TOD-wise Active MD with Date & Time
17.1.23 Average PF Associated with TOD-wise Active MD Date & Time Slot
17.1.24 Apparent MD with Date & Time [0-24 hrs.]
17.1.25 Average PF Associated with Apparent MD Date & Time slot [0-24 hrs.]
17.1.26 TOD-wise Apparent MD with Date & Time
17.1.27 Average PF Associated with TOD-wise Apparent MD Date & Time Slot

17.2 **Push Button mode:** In addition to the auto display mode parameters the following parameters shall be displayed on pressing the Push Button:
17.2.1 History 1 Total Active Forward Energy
17.2.2 History 1 TOD-wise Active Forward Energy
17.2.3 History 1 Total Apparent Forward Energy
17.2.4 History 1 TOD-wise Apparent Forward Energy
17.2.5 History 1 Active MD with Date & Time [0-24 hrs.]
17.2.6 History 1 Average PF Associated with Active MD Date & Time Slot [0-24 hrs.]
17.2.7 History 1 TOD-wise Active MD with Date & Time
17.2.8 History 1 Average PF Associated with TOD-wise Active MD Date & Time Slot
17.2.9 History 1 Apparent MD with Date & Time [0-24 hrs]
17.2.10 History 1 Average PF Associated with Apparent MD Date & Time Slot [0-24 hrs.]
17.2.11 History 1 TOD-wise Apparent MD with Date & Time
17.2.12 History 1 TOD wise Average PF Associated with Apparent MD Date & Time Slot
17.2.13 History 1 Average PF
17.2.14 History 1 Average LF
17.2.15 History 1 Power Off Duration
17.2.16 History 1 Power Off Count
17.2.17 MD Reset Time(hh:mm:ss) & Date(dd:mm:yy)
17.2.18 Cumulative Apparent MD
17.2.19 MD Reset or Bill Count
17.2.20 Cumulative Tamper Count
17.2.21 Cumulative Programming Count
17.2.22 Cumulative Power Off Duration (hhhh:mm)/(dddd:hh:mm)
17.2.23 Cumulative Power Off Count
17.2.24 R-Phase PF
17.2.25 Y-Phase PF
17.2.26 B-Phase PF
17.2.27 Supply Frequency
17.2.28 Average PF [Current Month]
17.2.29 Present Power Related Status
17.2.30 Present Current Related Status
17.2.31 Present Voltage Related Status
17.2.32 Present Other Status
17.2.33 First Occurred Tamper Event
17.2.34 Date of Occurrence of First Tamper Event
17.2.35 Time of Occurrence of First Tamper Event
17.2.36 Lastly Occurred Tamper Event

17.2.37 Date of Occurrence of Last Tamper Event
17.2.38 Time of Occurrence of Last Tamper Event
17.2.39 Lastly Restored Tamper Event
17.2.40 Date of Restoration of Lastly Restored Tamper Event
17.2.41 Time of Restoration of Lastly Restored Tamper Event
17.2.42 High Resolution Cumulative Active Forward Energy
17.2.43 High Resolution Cumulative Reactive Lag Energy
17.2.44 High Resolution Cumulative Reactive Lead Energy
17.2.45 High Resolution Cumulative Apparent Energy
17.2.46 Date of Occurrence of Front Cover Open Tamper Event
17.2.47 Time of Occurrence of Front Cover Open Tamper Event
17.2.48 Self-Diagnostic Feature

17.3 **[Manual Battery Mode/Sub Active Mode]:**

17.3.1 Meter Serial Number BIS
17.3.2 Real Day/ Date (dd:mm:yy)
17.3.3 Real Time (hh:mm:ss)
17.3.4 History 1 Total Active Forward Energy
17.3.5 History 1 TOD-wise Active Forward Energy
17.3.6 History 1 Total Apparent Forward Energy
17.3.7 History 1 TOD-wise Apparent Forward Energy
17.3.8 History 1 Apparent MD with Date & Time [0-24 hrs]
17.3.9 History 1 Average PF Associated with Apparent MD Date & Time Slot [0-24 hrs.]
17.3.10 History 1 TOD-wise Apparent MD with Date & Time
17.3.11 History 1 TOD wise Average PF Associated with Apparent MD Date & Time Slot
17.3.12 History 1 Average PF
17.3.13 History 1 Power Off Duration
17.3.14 History 1 Power Off Count

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 The register shall be able to record and display starting from zero, for a minimum of 2500 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.
17.5.2 High resolution display can be given in separate mode.
17.5.3 No decimal is required for main kWh, kVAh, kVArh (lag & lead) display.
17.5.4 Push button mechanism shall be of high quality and shall provide trouble free service for a long span of time.
17.5.5 Up and Down scrolling facility of display parameters shall be there for Push Button Mode.

18.0 For OBIS Codes of parameters, specified in this Technical Specification, other applicable standards may be referred, in case those are not available in the standards referred in this document.

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

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

19.2 The meter shall work correctly even in absence of neutral. For reference voltage Vref between 70% to 120 %, accuracy must be maintained as specified in relevant IS.

19.3 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.

19.4 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.to earth is applied to the meter neutral. Meters which are immune or will maintain better accuracy, will be preferred.

19.5 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.

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

19.6.1 Power failure (Tamper count not to be increased) - as per tamper logic
19.6.2 Invalid Voltage- as per tamper logic
19.6.3 Missing Potential (phase wise) —as per tamper logic
19.6.4 High Voltage – as per tamper logic
19.6.5 Voltage Unbalance – as per tamper logic
19.6.6 CT Open (phase wise)- as per tamper logic
19.6.7 CT Bypass/ CT Short - as per tamper logic
19.6.8 CT Reversal (phase wise)– Forward energy Recording
19.6.9 Over Current - as per tamper logic
19.6.10 Neutral Disturbances (If it is logged) - as per tamper logic
19.6.11 Magnetic Disturbances - as per tamper logic
19.6.12 Low Voltage
19.6.13 Invalid Phase Association
19.6.14 Cover Open
19.6.15 35 kV ESD
19.6.16 Jammer

19.7 Threshold Values of all above occurrence and restoration are attached in annexed Tamper Logic Snapshot values of Phase Voltage, Phase Current &Phase wise Power Factor, Cumulative Active Energy during occurrence & restoration to be provided in all the above specified 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.

19.8 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 months' transactions).

19.9 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.

19.10 More than one tamper *CT related/ Power 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 and snapshot shall be available in meter memory compartment wise. The events will be divided into three compartments like *CT related (148 Events), Power related (88 Events) and others (64 Events)*. The logging will be on FIFO basis.

19.11 All the tamper information logged by the meter shall be available in BCS with snapshot, Date & Time as per Table 39 of IS 15959:2011 with occurrence and restoration.

19.12 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.

19.13 **Measurement of Harmonics**: The meter shall be capable of measuring fundamental energy as well total energy i.e., fundamental plus harmonics energy. Fundamental energy shall be made available on meter display and the same shall be used for billing purpose. Provision for measuring Total 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

20.0 RESETTING OF MAXIMUM DEMAND:

20.1 The meter shall be capable of recording the Apparent and Active MD with integration period of 15 minutes (programmable).

20.2 The meter shall be capable of recording the Actual average power factor of the time block corresponding to the period of recording the maximum demand.

20.3 MD Reset Options:

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

20.3.2 Manually i.e., by Push Button

20.3.3 By authenticated command from BCS through CMRI or directly from PC and Remote Communication.

20.4 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 CMRI command shall be provided at BCS.

20.5 MD reset button shall have proper sealing arrangement.

20.6 There shall be separate Push button for scrolling display (up and down) and MD reset. If only two Push buttons are used, minimum 20 sec. pressing is required for MD reset.

21.0 LOAD SURVEY: The meter shall be capable of recording load survey data for the following parameters for a period of minimum 60 POWER ON days - subject to availability of all parameters listed below with 15-minute (programmable) integration period.

21.1 Active Energy in kWh
21.2 Reactive Energy (lag & lead) in rkVAh
21.3 Apparent Energy in kVAh
21.4 Demand in kVA and kW
21.5 Phase-wise Current
21.6 Phase-wise Voltage
21.7 Average Power Factor

Real time & date shall be shown in all the load survey graphs and tables. All the load survey data shall be available in numerical as well as graphical format. It shall be possible to view this data in daily, weekly and monthly formats. The load survey graph shall show value.

22.0 The meter data shall be stored in Nonvolatile Memory (NVM) and shall not be lost in the event of power failure. 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 CMRI/Laptop or RMR. The Load Survey 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.

23.0 REAL TIME INTERNAL CLOCK(RTC)

RTC shall be pre-programmed for 30 years day and date without any necessity for correction. The maximum drift shall not exceed ± 300 Sec per year **even if meter is in power off condition continuously for 2 years.** (less than 730 days) from date of supply but RTC shall not drift more than ± 300 Sec.

The clock day and date setting and synchronization shall only be possible through password/Key code command from one of the following:

a) **Hand Held Unit (HHU) or directly through BCS and this shall have authentication from BCS for individual meter.**
b) From remote server through suitable communication network with authentication from BCS.

24.0 TIME OF DAY FACILITIES: The meter shall have facilities to record Active, Apparent Energies and MD in at most 8 time zones. The time zones shall be user programmable through authenticated CMRI/Laptop/RMR command. Necessary software for the same is to be provided by the bidder.

Default settings for the TOD timings shall be as follows:

24.1 TOD 1: 06:00 Hrs to 17:00 Hrs.
24.2 TOD 2: 17:00 Hrs to 23:00 Hrs.
24.3 TOD 3: 23:00 Hrs to 06:00 Hrs.

25.0 METER READING DURING POWER OFF: It shall be possible to read the meter-display visually and with CMRI/Lap top in absence of input voltages with the help of internal battery or external battery pack/PPU for display in power off condition.

If internal battery is used then it shall be capable of supplying the required power for at least two years under meter unpowered condition. 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/PPU. Separate battery shall be used for this purpose (Not RTC or processor battery). In case of Lithium battery rating shall be at least 500mAh.

26.0 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 in 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, Battery status, NVM status, RTC Status etc. and it shall be available in display as well as BCS end data.

27.0 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.

28.0 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.

29.0 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:

29.1 Electromagnetic field
29.2 External magnetic field

29.3 Radio frequency interference

29.4 Vibration

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

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

30.0 COMMUNICATION CAPABILITY:

30.1 The meter shall be provided with two ports for communication of the measured and stored data. A Serial Port (RS232 or RJ11) shall be used for remote access through suitable Modem and shall be housed inside the meter terminal cover so that it can't be accessed without opening the sealed terminal cover.

The other one shall be an Optical port complying with hardware specifications detailed in IEC-62056-21. This Optical port shall be provided with proper sealing arrangement so that its cover can't be opened without breaking its seal. This shall be used for local data downloading through a DLMS compliant HHU or direct through BCS.

30.2 Both ports shall support the default and minimum baud rate of 9600 bps.

30.3 Optical Cord (for connecting Optical Port of Meter to PC) must be having USB connector.

30.4 Data downloading time from meter to HHU/PC shall be within 2 minutes for meter data (without load survey) and within 6 minutes for meter data (with load survey).

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

30.6 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.

30.7 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 for particular meter Serial No & this shall be recorded as a transaction and to be recorded in meter memory and also shall be available at subsequent BCS data with date & time stamping.

30.8 Billing parameters shall be factory programmable.

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

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

31.0 BASE COMPUTER SYSTEM & SOFTWARE REQUIREMENTS:

31.1 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.

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

31.3 The data stored in the meter memory including defrauded energy shall be available on the BCS.

31.4 Six no. of BCS shall be provided for downloading data from CMRI and for authenticated command from Laptop or for programming CMRI for any transaction.

31.5 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.

31.6 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.

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

31.8 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.

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

31.10 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.

31.11 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.

31.12 In BCS twelve months' data for kWh (Total & Fundamental), kVAh (Total & Fundamental), MD in kW & kVA (Total & Fundamental) [All these parameters Cumulative & TOD wise i.e. kWh, kVAh, kVA], average load factor, average power factor must be available. Cumulative MD KVA data must be available at BCS end.

31.13 Midnight Energy Parameters Cumulative and TOD wise may be available at BCS end data (For Fundamental as well as total) as it is required sometimes at the time of extrapolating provisional billing.

32.0 GENERAL REQUIREMENTS:

32.1 **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.

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

32.3 **INSPECTION & TESTING:**

32.3.1 The meters manufactured as per requisite technical specification along with accepted changes recorded in minutes of pre-bid meeting, shall be subject to tests as per relevant Indian Standards.

32.3.2 No change/ deviation/ modification in the technical specification of the meters offered for inspection & testing in respect to the approved sample meters shall be entertained.

32.3.3 BCS and CMRI software version shall be the same as accepted during approval of the related sample meter. In case any change in BCS and/or CMRI software is felt necessary by the supplier, the Chief Engineer(DTD) shall have to be approached in writing for his approval elaborately clarifying the necessity prior to commencement of inspection. The deviation(s) shall be accepted if and only if the Chief Engineer(DTD) approves the proposed deviation(s).

32.3.4 **STAGE INSPECTION**: Stage Inspection, if required may be conducted at manufacturers' works. For this, the supplier must give prior intimation at least 15(fifteen) days before final calibration (with RTC reset). The supplier shall extend all facilities for such inspection and testing for which no extra cost shall be charged and the physical inspection report, containing observation against components, raw materials, display modules, push button, nameplate etc. shall have to be signed jointly. Otherwise offer for final inspection will not be accepted.

32.3.5 **ROUTINE TEST**: Routine Tests as per relevant Indian Standards and requisite technical specification shall be conducted for each & every meter after its production.

32.3.6 **LOT ACCEPTANCE TEST:**

32.3.6.1 The supplier shall give prior intimation about the readiness of the meters at the works for inspection and testing at least 15 (fifteen) days before their proposed inspection schedule. The supplier shall extend all facilities for such inspection and testing for which no extra cost shall be charged and the inspection report shall have to be signed jointly. Otherwise the offered lot(s) shall be treated as cancelled.

32.3.6.2 While offering inspection and testing, one hard copy & one soft copy of the test reports indicating test results of each meter of the offered lot containing its sequential

meter serial no. and the serial no. of the two no. of body seals shall be submitted to the Office of the Chief Engineer (DTD), WBSEDCL, Abhikshan, Sector - V, Salt Lake City, Kolkata - 700091 with copies to the Office of the Chief Engineer (P&C), WBSEDCL. Otherwise inspection offer will not be considered.

32.3.6.3 However, WBSEDCL reserves the right to depute their Engineers for carrying out inspection and testing on the offered lot as per relevant Indian Standards and requisite technical specification, already notified and also reserves the right to reject either raw materials or finished products found to be not conforming to the requisite technical specifications and/or relevant Indian Standards.

32.3.6.4 The Engineers of WBSEDCL shall witness the various quality control measures adopted in production line and satisfy themselves about the same. They shall also inspect the protocol for maintaining the accuracy of the meter testing equipment at the testing laboratory of the manufacturer with reference to the standard. The instruments and equipment required for inspection & testing shall have valid calibration certificates as specified in relevant clause of this order.

32.3.6.5 Physical examination of the meters on minimum 5% of offered quantity will be carried out. If during physical inspection anomaly is found in more than 2% of the offered quantity, no further test will be carried out and offered quantity will be rejected.

32.3.6.6 After satisfactory result in physical examination, lot acceptance tests shall be carried out by the representatives of WBSEDCL at the works of the manufacturer as stated hereunder:

32.3.6.6.1 The maximum no. of meters in each lot: 1000

32.3.6.6.2 No. of meters to be selected at random from the lot: 32

32.3.6.7 After selection of sample meters, the following tests shall be carried out on all the 32 no. of meters selected at random.

32.3.6.7.1 High Voltage test

32.3.6.7.2 Insulation Resistance test

32.3.6.7.3 Test of Protection for withstanding 433V between Phase & Neutral for 1(one) hour

32.3.6.7.4 Test of Endurance at 150% of Imax for 2(two) hours

32.3.6.7.5 Test of Starting Current at 0.1% Ib at UPF

32.3.6.7.6 Test of No Load condition: At 70% and 120% of Vref at No Load for a period as mentioned in Clause 12.12 of IS 14697 i.e. 20 times the actual test period of starting current. The maximum test period shall be limited to 200 minutes. The Meter shall not emit more than one output pulse during such test.

32.3.6.8 In the above tests, if the number of defective meter is at most one, the lot shall be considered conforming to the tests.

32.3.6.9 If the number of defective meters is more than three, the lot shall be outright rejected.

32.3.6.10 However, if the number of defective meters is within three, while the lot shall be considered not conforming to the tests, further sampling from the lot at random shall be made. If the number of defective meters from two such samples (i.e. from 64 meters) is less than four only then the lot shall be considered as conforming to the test.

32.3.6.11 Further testing for 8 number of meters, selected from 32 number of sample meters will be carried out as follows:

32.3.6.11.1 Limits of error on all the same 8 no. of sample meters for both active & reactive energy for balanced & unbalanced loads

32.3.6.11.2 Test of the Meter Constant and Meter Dial as per technical specification at 200% I basic, Power Factor 0.866(lag& lead)

32.3.6.11.3 Power consumption on Voltage Circuit (through power analyzer) and Current Circuit.

32.3.6.12 Further testing of 3 number of sample meters will be carried out as follows:

32.3.6.12.1 Repeatability of Error Test

32.3.6.12.2 If any of the meters fails on any of the above tests, the lot will be rejected.

32.3.6.13 Further testing for 1 number of sample meter will be carried out as follows:

32.3.6.13.1 Tamper & Fraud protection (Anti-tamper feature) as per relevant clause of the specification.

32.3.6.13.2 Physical verification of internal components.

32.3.6.14 If the meter fails on any of the above tests, the lot will be rejected.

32.3.6.15 Few mention-worthy relevant points regarding tamper testing :

32.3.6.15.1 AC Chopped signal may be generated through Regulator or Dimmer

32.3.6.15.2 In Discharge Test, meter performance will be checked applying 35 KV spark

32.3.6.15.3 Provision must be there for tamper logging in BCS in case the spark exceeds 35 KV

32.3.6.15.4 In BCS, Average PF & LF, kWh, kVAh, MD in kW & kVA, TOD-wise kWh and kVAh must be made available for last twelve (12) months.

32.3.6.15.5 In Magnetic Tamper Test, magnetic influence shall be checked at 10mT AC, 0.27T DC, 0.2T AC and 0.5T Permanent Magnet. Facility to measure the capacity of these magnetic fields must be available at manufacturers' premises and must be calibrated from any NABL accredited laboratory.

32.3.7 **DRY HEAT TEST:**

32.3.7.1 Facilities or arrangement for conducting ageing test shall be available with the manufacturer.

32.3.7.2 Dry heat test as per clause 12.6.1 of IS: 14697(1999) – At least one sample selected from any lot of the meters offered for first inspection will be sealed by the inspecting authority of WBSEDCL and handed over to the supplier for testing at NABL accredited laboratory. In the test report, meter serial no. & meter body seal nos. are to be mentioned.

32.3.7.3 Test result must be submitted within 30 days after selecting the meter at the manufacturer's works. If not submitted within the stipulated time frame, no further offer for inspection will be accepted.

32.3.7.4 If the meter fails at dry heat tests, the particularly delivered lot will not be accepted and the delivered meters are to be taken back by the supplier at their own cost from different site offices within 30 days from the date of receipt of intimation in this regard. Only after withdrawal of the delivered meters, further inspection shall be conducted against subsequent offered lot of meters.

32.3.7.5 If the meter, selected during inspection at first lot of meters, fails in dry heat test, the same test is to be conducted for the consecutive offered lots of meters following the above procedure, unless satisfactory performance on above test is observed.

32.4 **REOFFER FOR INSPECTION:**

32.4.1 Materials shall have to be reoffered for the following cases:

32.4.1.1 Failure to present the offered materials during inspection & testing, i.e, in case of fake offer.

32.4.1.2 Failure of any particular lot of offered materials in two consecutive inspections.

32.4.1.3 Inspected materials not delivered within one month after the stipulated period specified in the order without any valid reason. [The dispatch clearance already issued against the said lot shall be considered to be withdrawn.]

32.4.1.4 The date of reoffer shall be the date of submission of reoffer along with WTC & copy of DCR.

32.5 **RETESTING CHARGE:** Retesting fee for carrying out inspection of the lot of materials after reoffer shall be charged as per existing rate.

33.0 SUBMISSION OF SAMPLE METER:

33.1 The bidder will submit his sample Meters in sealed casing / cartoon along with relevant Meter documents (**As per Annexure-IV**), on any working day as per schedule of submission specified in the related Tender Document, 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.

33.1.1 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, two ultrasonic welded and one without welding and another dummy meter case (for checking ultrasonic welding).

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

33.1.3 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 schedule 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.

33.1.3.1 BCS (as per specification)

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

33.1.3.3 Modem and accessories for testing the remote meter reading.

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

34.0 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.

34.1 The factory shall be completely dust proof.

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

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

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

34.5 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.

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

35.1 Meter frame dimensions tolerances shall be minimal.

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

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

36.0 MANUFACTURER'S TESTING 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).

The bidder shall indicate the sources of all equipment / instruments. 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.

The Bidder shall have at least the facilities to test the following to ensure accurate calibration:

a) AC high voltage test
b) Insulation resistance measurement
c) Running at no load
d) Starting current test
e) Limits of error
f) Dial Test
g) Test of meter constant
h) Power loss in voltage and current circuit
i) Repeatability of error
j) Transportation test
k) Tamper Test including test of magnetic influence
l) Ageing Test

37.0 MANUFACTURING ACTIVITIES:

37.1 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.

37.2 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.

37.3 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.

37.4 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.

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

37.4.2 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 equipment (testing jig).

37.5 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.

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

38.0 DOCUMENTATION:

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

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

38.3 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.

39.0 GUARANTEE: The Meters shall be guaranteed arising out of faulty design, materials, bad workmanship for a period of **5½ years** from the date of supply. Bidders shall guarantee to replace the meters, which are found to be defective/inoperative at the time of installation, or become inoperative/ defective during guarantee period. **Replacements shall be effected within 1 month from the date of intimation.**

40.0 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.

41.0 PACKING & FORWARDING:

41.1 The energy meters shall have to be securely packed in transportable lots. If the energy meters are found acceptable after inspection and testing, the same shall have to be suitably sealed by the Inspecting Officer. Due care shall have to be ensured during transportation to keep the packing and seals intact for acceptance by consignee stores.

41.2 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.

41.3 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.

42.0 DELIVERY:

42.1 Delivery of the meters shall be made only after receipt of the Dispatch Instruction (DI) to be issued by the Chief Engineer (DTD) upon approval of the supplier's test reports. The supplier shall send intimation regarding dispatch of the meters to the Offices of the Chief Engineer (P&C) and Chief Engineer (DTD), WBSEDCL immediately after dispatch of the consignment. Prior to dispatch of the consignment the supplier shall intimate the consignee duly so that consignee can acknowledge receipt of information.

42.2 The equipment/materials are to be delivered as per "Delivery Schedule" clause given hereunder. Allotment of serial number of meters will be available from the Distribution Testing Department, Abhikshan, WBSEDCL, Salt Lake, Kolkata-91, on any working day after issuance of this order upon receipt of written requisition for the same.

42.3 The materials shall reach the destination stores within 21 (twenty one) working days from the date of issue of the Dispatch Instruction (DI). Failure to do so for reasons, solely attributable to the supplier, shall attract LD as per relevant clause of this order.

42.4 Delay in offer beyond the Delivery Schedule for reasons solely attributable to the supplier shall attract imposition of LD as per relevant clause of this order.

42.5 In case the inspected materials are not delivered within one month after the stipulated period specified in the order without any valid reason the Dispatch Instruction (DI) already issued against the said lot shall be considered to be withdrawn.

42.6 Delivery of the meters shall be made only after receipt of the Dispatch Instruction (DI) to be issued by the Chief Engineer (DTD) upon approval of the supplier's test reports. The supplier shall send intimation regarding dispatch of the meters to the Offices of the Chief Engineer (P&C) and Chief Engineer (DTD), WBSEDCL immediately after dispatch of the consignment. Prior to dispatch of the consignment the supplier shall intimate the consignee duly so that consignee can acknowledge receipt of information.

42.7 For every 100 no. of meters and part thereof one HHU (DOS Based) with set of communication cord and accessories shall be supplied to the Office of the Chief Engineer (DTD), free of cost. The guarantee period of HH/Tab will be of 66 months from the date of supply.

43.0 DELIVERY SCHEDULE: Shall be specified in LOA.

44.0 CHECKING OF METER AFTER DELIVERY:

The materials delivered to the consignee stores will be subjected to re-inspection/re-testing in presence of authorized representative of suppliers for which due notice in advance will be furnished by the Chief Engineer (DTD). If any discrepancy/dispute in quality arises in any sample selected from a lot, the supplier shall have to replace the entire lot at the supplier's cost and WBSEDCL reserves the right to take any penal action whatsoever without any further reference.

45.0 INSPECTION AFTER RECEIPT AT STORES:

45.1 WBSEDCL shall carry out acceptance testing of the supplied meters (collected from consignee stores) at their laboratory against DI of inspected lot. Advance intimation will be given to local representatives of the supplier over telephone. Such testing of the meters will be commenced within 10 days and completed within 20 days from the date of receipt of meters at consignee stores.

45.2 Acceptance Test as per "Inspection & Testing" clause of this order except dry heat test & shunt test will be conducted at the laboratory of Distribution Testing Department or any Zonal Testing Unit on sample meters selected from meters delivered at consignee stores. Sampling procedure will be followed as per relevant Indian Standards. Date of testing will be intimated to the suppliers and testing can be witnessed by authorized representatives of the suppliers. In case, the authorized representatives are not present, WBSEDCL shall test the meters unilaterally and the results obtained during testing will be binding on the suppliers.

45.3 In case the meters are found "Not In Order" as per observation during inspection and testing of the offered lot, the lot will be declared defective and in that event meters supplied are to be replaced by the manufacturers free of cost including free transportation from the site to their works and back. Before delivery of the replaced meters Acceptance Test shall be conducted by the supplier as per "Inspection and Testing" clause of this order in presence of WBSEDCL-representatives. Only if the test results are found to be satisfactory, replaced meters shall be allowed to be delivered.

46.0 SUBMISSION OF REPORTS AGAINST DEFECTIVE METERS:

46.1 After delivery of the meters, if any defect is detected by the Testing Engineer / Site Office Personnel, the same will be intimated to the supplier. After getting intimation, the supplier

shall send their competent personnel to the consignee store to set right the problem with intimation to Distribution Testing Department (DTD) and to the Consignee. In case of minor defect, which can be set right at site, the same shall be taken up by the supplier without affecting the activity of the consignee store, failing which the meters are to be lifted from the consignee store for necessary rectification. If the detected defect is beyond repair, the meters are to be replaced by newly tested meters and the defective meters will be handed over to the supplier by the consignee store. The replaced meters are to be sent to concerned Zonal Testing unit or DTD, Abhikshan for further testing.

46.2 The meter serial numbers for the meters, replaced against defective meters, shall bear numbers from the rolling stock serial numbers allotted by DTD against this order.

46.3 Regarding these defective meters, the supplier shall submit a report to DTD mentioning nature of defects (like, fault at Current Element / Potential Divider / SMPS / Computing Chip / Communication Module/ Display Module / NVM Module / Battery) against meter serial number. A format in this regard shall be provided by DTD duly.

47.0 CONSIGNEE: To be intimated by the Chief Engineer (DTD), Abhikshan, WBSEDCL, Kolkata - 700091 through the Dispatch Instructions (DI).

48.0 CALIBRATION OF MEASURING INSTRUMENTS / EQUIPMENT:

The instruments/equipment required for Inspection & testing shall have valid calibration as per following guideline:

48.1 Calibration Certificate issued by Laboratory accredited by NABL shall be accepted unconditionally provided the certificate bears an accreditation body logo. For testing equipment, where NABL accreditation is not available, calibration certificate from Educational Institutions like IITs, NITs, JU, CU, BHU only shall be accepted provided traceability can be ascertained.

48.2 Necessary confirmation regarding above is to be given along with inspection offer failing which the inspection offer will not be accepted.

48.3 If during inspection & testing the supplier fails to produce valid Calibration Certificate as indicated above the offered lot shall be rejected.

49.0 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 of reputed makes so as to ensure higher reliability, longer life and sustained accuracy. 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 Surfacemount type along with the ASICs.	Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments, Teridian, NEC, Freescale, Renesas, Phillps, Maxim
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	The display modules shall be well	Bonafied Technologies, Advantek , Hitachi,

	modules	protected from the external UV radiations. The display shall be clearly visible over an angle of atleast 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	SONY, Hijing, Truly Semiconductor, Tianma
5	Communication modules	Communication modules shall be compatible for the RS 232 or RJ11 port	National Semiconductors, HP, ST, Texas Instruments, Agilent, Avago, Fairchild, Philips, Ligitek, Hitachi, Siemens, Everlight, Murata Manufacturing, Sharp, Vishay , Molex, Samtec
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 easily.	National Semiconductors, Texas Instruments, HP, Agilent, Avago (Broadcom Inc., Osram, Hitachi ,Siemens, Philips, Everlight, EG&G Vactec (Perkin Elmer Optoelectronics)
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 (SMPS type)
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.	
10	Battery	Lithium-ion with guaranteed life of 10 years	Renata, Panasonic,Varta, , Sanyo, National,Tadiran, Sony,Duracell,Tekcell,Mitsubishi,EVE, SAFT , XENO, Maxell, Vitzrocell
11	RTC / Micro controller	The accuracy of RTC shall be as per relevantIEC / IS standards	Dallas, Atmel,Motorola, NEC,TeridianRenesas, TexasInstruments, ST, Microchips,Epson,Philips, NEC, OKI,Hitachi, Mitsubishi,Freescale,Intersil

Components accepted in any previous tenders of WBSEDCL will also be accepted

Annexure-I

Guaranteed Technical Particulars (GTP) for 240V LT CT, Static Tri Vector 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)	5A, CTR 200/5A
8	Maximum Current (Imax)	10A
9	Minimum starting current	0.1% of Ib
10	Rated Voltage	415 V : Phase to Phase, 240 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 (programmable)	15 minutes
22	Weight of meter	To be specified by the Bidder
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

Sl.No.	Item Description	Manufacturer's Particulars
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 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
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	Bidderhas valid BIS Certification for the offered meter (Mandatory)	Yes / No
2	Bidder has Type Test Certificate for the Type of offered meter fully type tested from NABL accredited Laboratory not more than 3 (three) years old (Mandatory)	Yes / No
3	Bidder shall submit Certificate for immunity against magnetic influence of 0.2T AC. & 0.5 T DC from NABL accredited Laboratory, for the same type of meter as offered.	Yes / No
4	Bidder possesses ISO 9001 Certification (Preferable)	Yes / No
5	Bidder is Manufacturer of Static Energy Meters having supplied Static 1- or 3-Phase Meters with memory and LCD display as per IS 14697 & CBIP 325 to Electricity Utilities in the past 2 years	Yes / No
6	Bidders shall have dust free, static protected environment for manufacture, assembly and testing.	Yes / No
7	Bidder shall have Automatic Computerized Test Bench for lot testing of Meters.	Yes / No
8	Bidder has facilities of Oven for ageing test.	Yes / No

Annexure – III

List of Components

Sl. No.	Component Function / Feature	Requirement	As per Offer (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

List of Documents to be submitted during Sample Submission

Sl. No.	Requisite Documents
1.	Attested copy of type test Certificate for the offered meter from NABLaccredited 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	Attested copy of Certificate for immunity against magnetic influence of 0.2T AC. & 0.5 T DC from a NABL accredited Laboratory
5	Attested copy of ISO 9001 Certification
6	Annexure – II as per tender document
7	Annexure – III as per tender document
8	Operating manual of the Offered Meter

14.12.20
P K Banerjee
CE: P&E-Dist

14/12/2020
A Banerjee
Advisor(Engg)

14-12-2020
S K Ghosh
CE: P&CD

S Chakrabarty
CE:DTD

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A Bir
CE: CCD

D K Paul 14/12/2020
CE: REM

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S K Ghatak
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A Mitra
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