

**STANDARD TECHNICAL SPECIFICATION**

**FOR**

**3Ph 4 WIRE HT CT/PT OPERATED FULLY STATIC  
AMR COMPATIBLE TRI-VECTOR ENERGY METERS  
DLMS COMPLIANT – CATEGORY ‘C’**

**FOR**

**11KV BULK CONSUMER METER**

# **TECHNICAL SPECIFICATION FOR 3PHASE 4 WIRE CT/PT OPERATED FULLY STATIC AMR COMPATIBLE TRI-VECTOR ENERGY METERS FOR BULK CONSUMER**

## **1.0 SCOPE:**

Design, manufacturing, testing, supply and delivery of AC, 3 Phase 4wire, CT/PT operated lag only, fully Static and AMR compatible Tri-Vector Energy Meters for measurement of different electrical parameters listed elsewhere in the document including Active Energy (kWh/MWh), Reactive Energy (kVArh/MVArh), Apparent Energy (kVAh/MVAh) etc.

## **2.0 APPLICATION:**

CONSUMER METER . **Category “C”**

## **3.0 STANDARDS TO WHICH METERS SHALL COMPLY:**

IS 14697:1999(2004) Specification for AC Static Transformer operated Watt Hour & VAR-Hour meters (class 0.5S);

IS 15959:2011 Data Exchange For Electricity Meter Reading Tariff & Load Control . Companion Specification

CBIP - 325 Manual on Standardization of AC Static Electrical Energy Meter

IEC 62052-11 Electricity metering equipment (AC) . General requirements, tests and test conditions -Part 11: Metering equipment;

IEC 62053-22 Electricity metering equipment (AC) . Particular requirements - Part-22: Static Meters for Active Energy (Class 0.5S);

IEC 62053-23 Electricity metering equipment (AC) . Particular requirements - Part-23: Static Meters for Reactive Energy;

IS 15707 Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice.

Guidelines on Data Exchange for Electricity Meter Reading, Tariff and Load Control . Companion Specification+

IEC 62056-21 Electricity metering: Data exchange for meter reading, tariff and load control- Part 21: Direct local data exchange

IEC 62056-31 Electricity metering: Data exchange for meter reading, tariff and load control -Part 31: Local Area Network data exchange

IEC 62056-61 Electricity metering: Data exchange for meter reading, tariff and load control- Part 61: Object identification system (OBIS)

The equipment meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standard mentioned above, also shall be considered.

#### 4.0 GENERAL TECHNICAL REQUIREMENTS:

1	<b>TYPE</b>	AMR Compatible Static, 3Ph, 4Wire (11KV) CT/PT operated Tri-Vector Energy Meter for bulk consumers
2	<b>FREQUENCY</b>	50 Hz $\pm$ 5%
3	<b>ACCURACY CLASS</b>	0.5S
4	<b>VOLTAGE RATING</b>	Suitable for operation from 11 KV $\sqrt{3}$ /110V $\sqrt{3}$ , Ph-N (3P, 4W)
	<b>VOLTAGE VARIATION</b>	(-) 30% to (+) 20%
5	<b>BASIC CURRENT (Ib) &amp; CURRENT RATING</b>	5 A, 50/5A for CT/PT operated (3P,4W)
6	<b>MAXIMUM CONTINUOUS CURRENT</b>	200% of Ib
	<b>STARTING CURRENT</b>	0.1% of Ib at UPF
7	<b>POWER CONSUMPTION</b>	The active and apparent power consumption, in each voltage circuit, at reference voltage, reference temperature and reference frequency shall not exceed 1.5 W and 8 VA.  <b>Low power consumption in voltage circuit will give preference.</b>  The apparent power taken by each current circuit, at basic current, reference frequency and reference temperature shall not exceed 1.0 VA.
8	<b>POWER FACTOR</b>	0 Lag . Unity . 0 Lead
9	<b>DESIGN</b>	Meter shall be designed with Application Specific Integrated Circuit (ASIC) or Microcontroller; shall have no moving part; electronic components shall be assembled on printed circuit board using surface mounting technology; factory calibration using high accuracy (0.02 class) software based test bench.
10	<b>DLMS TEST CERTIFICATE</b>	Manufacturer must have test certificate for conformance to DLMS from CPRI of Category - %G+

## **5.0 TEMPERATURE RISE:**

Under normal condition of use, winding and insulation shall not reach a temperature, which might adversely affect the operation of the meters. IS14697:1999(2004) should be followed.

## **6.0 CLIMATIC CONDITIONS:**

Temperature	:	-10° C to 55° C (in shade)
Humidity	:	up to 95% RH non-condensing
Average annual rainfall	:	150 cm.
Max Wind Pressure	:	150 kg/sq.m.
Max. altitude above MSL	:	3000 m.

## **7.0 TROPICAL TREATMENT:**

The meters shall be suitably designed and treated for normal life and satisfactory operation under hot & hazardous tropical climate conditions and shall be dust and vermin proof. All the parts & 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.

## **8.0 CONSTRUCTION:**

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 should be compact & reliable in design, easy to transport & immune to vibration & shock involved in the transportation & handling. The construction of the meter should ensure consistence performance under all conditions especially during heavy rains / very hot weathers. The insulating materials used in the meter should be non-hygroscopic, non-ageing & have tested quality.

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

The meter should 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 casing should not change shape, colour, size, and dimensions when subjected to 200 hrs on UV test as per ASTM D 53. It should withstand 650 deg. C. glow wire test and heat deflection test as per ISO 75.

Meters must be supplied with 2 (two) nos. manufacturers seals between meter base and meter cover at both the sides.

Both the communication port (Optical and RS232/RJ11 port) should have proper sealing arrangement.

The bidder shall submit relevant documents regarding the procurement of polycarbonate material. The polycarbonate material of only the following manufacturers shall be used.

a) G.E. Plastics/Sabic:           **LEXAN 943A, or equivalent like 123R for cover & Terminal cover/503R or equivalent like 143R for base & Terminal Block.**

b) BAYER :                           Grade corresponding to above

c) DOW Chemicals :               -Do-

d) MITSUBISHI :                   -Do-

e) TEJIN :                           -Do-

f) DUPONT :                         -Do-

## **9.0 METER CASE AND COVER:**

Wherever polycarbonate cover is specified, it shall conform to IS11731 (FH-1 category) besides meeting the test requirement of Heat deflection test as per ISO 75, glow wire test as per the IS:11000 (part 2/SEC. 1) 1984 or IEC PUB, 60695-2-12, Ball pressure test as per IEC-60695-10-2 and Flammability Test as per UL 94 or as per IS 11731 (part-2) 1986. **The meter cover should be translucent with transparent display window**, for easy reading of displayed parameters, and observation of operation indicators. The meter base may or may not be transparent, **but it should not be black in colour**. The meter should 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. **This is to be achieved by using continuous Ultrasonic welding on the Meter body, fully flushed between case and cover**. In case, ultrasonic welding using plate/strip is used the material of plate/strip should be same as that of cover and base and the strip should **flush with meter body**. The manufacturer's logo should be embossed on the strip / plate.

The meter cover should be fixed to the meter base (case) with Unidirectional Screws, so that the same cannot be opened by use of screwdrivers. These unidirectional screws should be covered with transparent caps ultrasonically welded with the meter body and the screw covers should 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. 304. including 0.5 Tesla permanent magnet.

## **10.0 TERMINAL BLOCK AND COVER:**

The terminals may be grouped in a terminal block having adequate insulating properties and mechanical strength. The terminal block should 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.

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 M 4 and head having 4-6mm. diameter. The screws shall not have pointed ends at the end of threads. All terminals and connecting screws should be of tinned/nickel plated brass material.

The internal diameter (minimum) of terminal hole should be 5.5 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also.

The terminal cover shall be transparent High grade Engineering Plastic/Polycarbonate/Thermosetting 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 should be sufficient to accommodate adequate length of external cables.

## **11.0 WORKING ENVIRONMENT:**

As per IS 14697:1999(2004). Meter to perform satisfactorily under Non-Air Conditioned environment (within stipulations of IS) IP51 housing for indoors.

The meter shall be suitable designed for satisfactory operation under the hot and hazardous tropical climate 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 provided suitable protection to them from any injurious effect of excessive humidity.

## **12.0 MANUFACTURING PROCESS, ASSEMBLY AND TESTING:**

Meters shall be manufactured using latest and state of the art technology and methods prevalent in electronics industry. The meter shall be made from high accuracy and reliable surface mount technology (SMT) components. All inward flow of major components and sub assembly parts (CT, PT, RTCs / Crystal, LCDs, LEDs, power circuit electronic components etc.) shall have batch and source identification. Multilayer PCB assembly with using surface mounted component shall have adequate track clearance for power circuits. SMT component shall be assembled using automatic pick-and-place machines, Reflow Soldering oven, for stabilized setting of the components on PCB. For soldered PCBs, cleaning and washing of cards, after wave soldering process is to be carried out as a standard practice. Assembly line of the manufacturing system shall have provision for testing of sub-assembled cards. Manual placing of components and soldering, to be minimized to items, which cannot be handled by automatic machine. Handling of PCB with ICs / C-MOS components, to be restricted to bare minimum and precautions to prevent ESD failure. Complete assembled and soldered PCB should undergo functional testing using **Computerized Automatic Test Equipment.**

Fully assembled and finished meter shall undergo burn-in test process for 24 Hours at 55 degree Celsius (Max. temperature to not exceed 60 degree Celsius) under base current (Ib) load condition.

Test points should be provided to check the performance of each block/stage of the meter circuitry.

RTC shall be synchronized with NPL time at the time of manufacture. Meters testing at intermediate and final stage shall be carried out with testing instruments, duly calibrated with reference standard, with traceability of source and date.

## **13.0 DISPLAY OF MEASURED VALUES:**

The meter display shall have 8 digits (complete) for energy counter with alphanumeric digits for parameter identifier and tamper indication with backlit Liquid Crystal Display (LCD) of minimum 10 mm height, wide viewing angle suitable for temperature withstand of 70° C. LCD to be of STN (super twisted numeric) type construction.

The data stored in the meters shall not be lost in the event of power failure. The meter shall have Non Volatile Memory (NVM), which does not need any battery backup. The NVM shall have a minimum retention period of 10 years.

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

Auto display cycling of each parameter should be minimum 10-12 Seconds. The time between two auto display cycles shall preferably be within 100-120 sec. OBIS code in display is optional.

It should be possible to easily identify the single or multiple displayed parameters through symbols/legend on the meter display itself or through display annunciation. **Meter display should be in KWH / KVAH / KVARH.**

**AUTO MODE:**

- i) LCD Test
- ii) Meter Serial Number
- iii) Date
- iv) Real Time
- v) Rising Apparent Demand with elapsed time
- vi) Cumulative Power off Hours
- vii) History 1 Total Active Forward Energy Register
- viii) History 1 Reactive Lag Forward Energy Register
- ix) History 1 Reactive Lead Forward Energy Register
- x) History 1 Total Apparent Forward Energy Register
- xi) History 1 Apparent Forward MD Register (0-24 hrs) (Upto 2 decimal points)
- xii) History 1 TOD Total Active Forward Energy Register (Reg 1)
- xiii) History 1 TOD Total Active Forward Energy Register (Reg 2)
- xiv) History 1 TOD Total Active Forward Energy Register (Reg 3)
- xv) History 1 TOD Apparent Forward Energy Register (Reg 1)
- xvi) History 1 TOD Apparent Forward Energy Register (Reg 2)
- xvii) History 1 TOD Apparent Forward Energy Register (Reg 3)
- xviii) History 1 TOD Apparent Forward MD Register (Reg 1)
- xix) History 1 TOD Apparent Forward MD Register (Reg 2)
- xx) History 1 TOD Apparent Forward MD Register (Reg 3)
- xxi) Apparent Forward Cumulative MD Register (upto 2 decimal points)
- xxii) MD Reset or Bill Count
- xxiii) Cumulative Tamper Count
- xxiv) Present Voltage and Current Status with Phase Sequence (Voltage & Current).

- xxv) Connection Check
- xxvi) Self Diagnostic Flag
- xxvii) Battery Status

**PUSH BUTTON MODE:**

- i) LCD Test
- ii) Meter Serial Number
- iii) Date
- iv) Real Time
- v) Rising Apparent Demand with elapsed time
- vi) Cumulative Power off Hours
- vii) History 1 Total Active Forward Energy Register
- viii) History 1 Reactive Lag Forward Energy Register
- ix) History 1 Reactive Lead Forward Energy Register
- x) History 1 Total Apparent Forward Energy Register
- xi) History 1 Apparent Forward MD Register (0-24 hrs) (Upto 2 decimal points)
- xii) History 1 TOD Total Active Forward Energy Register (Reg 1)
- xiii) History 1 TOD Total Active Forward Energy Register (Reg 2)
- xiv) History 1 TOD Total Active Forward Energy Register (Reg 3)
- xv) History 1 TOD Apparent Forward Energy Register (Reg 1)
- xvi) History 1 TOD Apparent Forward Energy Register (Reg 2)
- xvii) History 1 TOD Apparent Forward Energy Register (Reg 3)
- xviii) History 1 TOD Apparent Forward MD Register (Reg 1)
- xix) History 1 TOD Apparent Forward MD Register (Reg 2)
- xx) History 1 TOD Apparent Forward MD Register (Reg 3)
  
- xxi) MD Reset or Bill Count
- xxii) Cumulative Tamper Count
  
- xxiii) Total Active Forward Energy Register
- xxiv) Reactive Lag Forward Energy Register
- xxv) Reactive Lead Forward Energy Register
- xxvi) Total Apparent Forward Energy Register
- xxvii) Apparent Forward MD Register (0-24 hrs) (Upto 2 decimal points)

- xxviii) TOD Total Active Forward Energy Register (Reg 1)
- xxix) TOD Total Active Forward Energy Register (Reg 2)
- xxx) TOD Total Active Forward Energy Register (Reg 3)
- xxxi) TOD Apparent Forward Energy Register (Reg 1)
- xxxii) TOD Apparent Forward Energy Register (Reg 2)
- xxxiii) TOD Apparent Forward Energy Register (Reg 3)
- xxxiv) TOD Apparent Forward MD Register (Reg 1)
- xxxv) TOD Apparent Forward MD Register (Reg 2)
- xxxvi) TOD Apparent Forward MD Register (Reg 3)
- xxxvii) Apparent Forward Cumulative MD Register
- xxxviii) Present Voltage and Current Status AND Phase Sequence Check (Voltage and Current Sequence)
- xxxix) Connection Check
- xl) Self Diagnostic Flag
- xli) Battery Status
- xl ii) Cumulative Programming Count
- xl iii) Last MD Reset Time and Date
- xl iv) Phase to Neutral Voltage . R phase
- xl v) Phase to Neutral Voltage . Y phase
- xl vi) Phase to Neutral Voltage . B phase
- xl vii) R phase Line Current
- xl viii) Y phase Line Current
- xl ix) B phase Line Current
- l) R Phase Power Factor
- li) Y Phase Power Factor
- lii) B Phase Power Factor
- liii) Instantaneous Average Power Factor
- li v) Instantaneous Load Active
- li v) Instantaneous Load Apparent
- li vi) Supply Frequency
- li vii) Present PT Tamper Status

- lviii) Present CT Tamper Status
- lix) Present Other Tamper Status
- lx) First Occurance Tamper ID
- lxi) First Occurance Tamper Date
- lxii) First Occurance Tamper Time
- lxiii) Last Occurance Tamper ID
- lxiv) Last Occurance Tamper Date
- lxv) Last Occurance Tamper Time
- lxvi) Last Restoration Tamper ID
- lxvii) Last Restoration Tamper Date
- lxviii) Last Restoration Tamper Time
- lix) History 1 Billed Average Power Factor
- lxx) Front Cover Open Count
- lxxi) Last Cover Open Date
- lxxii) Last Cover Open Time
- lxxiii) High Resolution Energy Total Active Forwarded
- lxxiv) High Resolution Energy Reactive Lag Forwarded
- lxxv) High Resolution Energy Reactive Lead Forwarded
- lxxvi) High Resolution Energy Total Apparent Forwarded

**Power OFF Mode**

1. Meter Serial Number
2. Real Time
3. Date
4. Total Active Forward Energy Register
5. Reactive Lag Forward Energy Register
6. Reactive Lead Forward Energy Register
7. Total Apparent Forward Energy Register
8. Apparent Forward MD Regsiter ( 0- 24 hrs)
9. History 1 Total Active Forward Energy Register

10. History 1 Rective Lag Forward Energy Register
11. History 1 Reactive Lead Forward Energy Register
12. History 1 Apparent Forward Energy Register
13. History 1 TOD Apparent Forward MD Register
14. MD Reset or Bill Count

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

High resolution registers required in display min 4 digits (for kWh/kVArh/kVAh) and after decimal in case of Energy & Min 2 digits after decimal in case of Demand.

Push button mechanism should be of high quality and should provide trouble free service for a long span of time. Up and Down scrolling facility should be there for Push Button Mode.

#### **14.0 MAXIMUM DEMAND:**

The meter should be capable of recording the Apparent/Active MD with integration period of 15 minutes. It commence at the fixed time intervals of the real time must be provided. 12 (twelve) months back up data for KWH, KVARH (lag and lead), KVAH and MD in KVA with date and time should be available in BCS.

##### **MD RESET OPTION**

- i) Billing Date at 00:00 Hrs (Programmable) first day of the month.
- ii) Push button
- iii) By Authenticated Command from BCS through HHU or directly from PC/REMOTE

MD reset button should have proper sealing arrangement. Specific Operation should be available in downloaded data.

#### **15.0 PERFORMANCE UNDER INFLUENCE QUANTITIES:**

The meters performance under influence quantities shall be governed by IS 14697:1999 (2004) and CBIP 325. The accuracy of meter shall not exceed the permissible limits of accuracy as per standard IS 14697:1999(2004) and CBIP 325.

#### **16.0 OUTPUT DEVICE:**

Energy Meter shall have test output, accessible from the front, and be capable of being monitored with suitable testing equipment while in operation at site. The operation indicator must be visible from the front and test output device shall be provided in the form of LED. Resolution of the test output device shall be sufficient to enable the starting current test in less than 10 minutes. Minimum gap should be maintained between Active & Reactive Test LED.

## 17.0 REAL TIME INTERNAL CLOCK (RTC):

RTC shall be pre-programmed for 30 Years Day/date is preferable without any necessity for correction. The maximum drift shall not exceed  $\pm 300$  Seconds per year. Capacity of RTC battery should be 350mAh ( $\pm 10\%$ ).

The clock day/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 be authenticated from BCS for individual meter.
- b) From remote server through suitable communication network with authentication from BCS.

## 18.0 TIME OF DAY FACILITIES:

The meter should have facilities to record Active, Apparent Energies and MD with a facility of 8 time zones. The time zones should be user programmable through authenticated command from BCS with the help of HHU. Necessary software for the same has to be provided.

## 19.0 METER READING DURING POWER OFF:

It should be possible to read the meter-display visually and with MRI and in absence of input voltages with the help of internal battery for display in power off condition or external battery pack/PPU. The interface preferred will be inductive coupling. If internal battery is used then it shall be capable of supplying the required power for at least two years under meter un-powered conditions and, after powering up the battery life should be guaranteed till the expiry of guarantee period. **Any downloading problem due to battery will treated as defective within the guarantee period.**

## 20.0 BASE COMPUTER SOFTWARE (BCS): Exclusively used for the manufacturers meter only.

The BCS should be user friendly. **Windows 7/8/10 based** BCS shall be supplied. The data transfer should be reliable and fraud proof. BCS should give all details pertaining to billing and load survey data. The meter condition details should also be transferred into the BCS including abnormalities/anomalies of voltage current conditions or tamper conditions which can occur due to mistake in connections or intentionally done for the purpose of tamper.

The software should show electrical conditions existing at the time of reading the meter in tabular forms as well as in graphical format (Phase diagram) i.e. Phase diagram is required for voltage, current and pf only.

All the information about energy, maximum demand and their respective TOD register readings, billing register readings and billing history readings should be shown in a manner which user can understand quickly, preferably in tabular format.

All the load survey data should be available in numerical as well as graphical format. It should also be possible to view this data in daily, weekly and monthly formats. The load survey graph should show values.

All the information about tamper events should be accompanied with date and time stamping along with the ~~SNAPSHOT~~ (details) of the respective electrical conditions. This information should be displayed in the sequence in which it happened, in cumulative format as well as in summary format. The cumulative format should segregate a particular tamper information and summary report should show count of tamper occurrence, restoration and the duration for which meter has remained under tamper condition.

Facility to view data incorporating External multiplying factor due to Installed CTs & PT should be provided.

The software should be capable of preparing CMRI to read the meter information or to reconfigure the meter to change the setting of the meter as per IS 15959:2011.

The BCS should have the facility for ASCII conversion of all recorded meter data. There should be "user friendly" approach for viewing meter data for the reading collected now or for the reading collected in the past. All information about a particular consumer should be segregated and available at one place so that locating any consumer's past data is easy. It should be possible to locate/retrieve data on the basis of one of the following particulars:

- a) Consumer ID/Number.
- b) Meter Sr. No.
- c) Date of meter reading.
- d) Location.

The BCS shall have multi level password for data protection and security. The first level should allow the user to enter the system. The different software features shall be protected by different passwords. The configuration of passwords should be user definable. The software installed on one PC should not be copyable on to another PC.

**It is very important that the BCS has the feature to export available data to ASCII format for integrating with the WBSEDCL's billing system. Here again a "Wizard" utility should be available whereby user can select file format (for ASCII), what data to export, the field width selection (whether 8 characters or 10 characters, to include decimal point or not, number of digits after decimal point) etc.**

Help should be available with the software so that user can use all the features of the software by just reading the Help contents.

## **21.0 LOAD SURVEY:**

The meter should be capable of recording load survey data of Phase wise current, Phase wise Voltage, Active Energy, Apparent Energy, Apparent Demand for a period of minimum 45 days for 15-minute integration period. Real time and date should be shown in all the load survey graphs and table.

## **22.0 MEASUREMENT OF ENERGY:**

The meter should 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 only shall be used for billing purpose.

The Fundamental Energy shall be logged in the meter memory and be capable of downloading to the BCS through the HHU and be available for viewing at the BCS end.

## **23.0 MARKING OF METERS:**

Every meter shall have a nameplate clearly visible and indelible and distinctly marked in accordance with the relevant Standard mentioning Category - C. The following information should appear on an external plate attached to the meter cover.

- i) Manufacturers Name or trademark and place of manufacture.

- ii) Designation of type.
- iii) Number of phases and wires.
- iv) Serial number of meter.
- v) Month and year of manufacture.
- vi) Principal unit of measurement.
- vii) P.T. Ratio.
- viii) Basic Current and rated maximum current.
- ix) C.T. Ratio.
- x) Reference frequency in Hz.
- xi) Meter constant (impulse/unit).
- xii) Class index of meter.
- xiii) Reference temperature.
- xiv) %Property of WBSEDCL+
- xv) Purchaser's Order No. & Date.
- xvi) Guarantee for 5 & ½ years from the date of supply.
- xvii) Sign. of insulation.
- xviii) Bar coding of Serial Number, month & year of manufacture.

The meter shall also store name plate details as given in the Annexure . F of IS 15959:2011

## **24.0 COMMUNICATION CAPABILITY:**

The meter shall be provided with two ports for communication of the measured/collected data. The hardware port (with sealing facility) compatible with RS 232 specifications which shall be used for remote access through suitable Modem and an Optical port complying with hardware specifications detailed in IEC-62056-21. This shall be used for local data downloading through a DLMS compliant HHU or direct through BCS.

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

**Optical Cord (i.e. Optical Port of Meter to PC) preferably is USB type.**

**Data downloading time from meter to HHU/PC should be within 2 min for meter data (with in 6 min for meter data with load survey).**

## **25.0 HAND HELD UNIT (HHU):**

To enable local reading of meters data a **DLMS compliant HHU (DOS Based)** shall be used. The HHU shall be as per IS 15959:2011. It shall be compatible to the DLMS compliant energy meters that are to be procured / supplied on the basis of the specification having at least one USB communication port otherwise serial to USB converter to be supplied

## **26.0 TAMPER & FRAUD MONITORING FEATURES:**

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

The accuracy of meter should not be affected with the application of abnormal voltage/ frequency generating device such as spark discharge of approximately 35 kV.

The meters should work even in the presence of any two Potential wires.

Meter should work correctly irrespective of phase sequence.

Meter should work correctly without neutral wire.

Also, Meter should also be immune for tamper by application of remote induction device i.e. radiated spark through Jammer circuit.

Meter should record Invalid Phase Association Tamper.

Multiple Tamper should not occur for a particular tamper situation.

Tamper details shall be stored in internal memory for retrieval by authorized personnel through either of the following:

- a) DLMS compliant HHU.
- b) Remote access through suitable communication network.
- c) Direct by PC.

Meter should have a continuous and clear indication / annunciation in its display if top cover is removed/open and even re-fixed (Non Roll Over) and only Cover open must be logged in BCS without any restoration. Auto scroll display must be sacrificed for that COVER OPEN.

**Minimum 400 numbers preferable (compartment wise) of events (i.e. 200 no. events for occurrences & 200 no. events for restoration with date & time and snapshot) should be available in the meter memory.**

**Default occurrence and restoration time shall be 5 minutes but it shall be programmable.**

**Following are the tampers which need to be incorporated in the meter:**

- 1. Missing potential (Phase Wise)**
- 2. Voltage Unbalance**
- 3. Low Voltage**
- 4. High Voltage**
- 5. Invalid Voltage**
- 6. Power failure**
- 7. Current open (phase wise)**
- 8. Current Bypass**
- 9. Current Unbalance**
- 10. Current Reversal**
- 11. Over Current**
- 12. Low PF**
- 13. Invalid Phase Association**
- 14. Magnetic Tamper**
- 15. Cover Open**

Threshold values for the above mentioned tampers will be provided with purchase order.

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

Properly designed meter tamper logic with threshold value, should be provided and clearly explained in the bid. **The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log / record tamper due to source side abnormalities. The meter should be able to distinguish between HT PT fuse blowing and Single Phasing and record the former.**

## **27.0 TYPE TESTS:**

Meters shall be fully type tested as per relevant Standard (latest version). The type test certificates should be submitted along with the offer. Offer without Type Test Report shall be liable for rejection. The type test certificate shall not be more than five years old.

## **28.0 ACCEPTANCE & ROUTINE TESTS:**

All acceptance tests as per relevant standards shall be carried out in the presence of utility representatives.

Further Purchaser shall reserve the right to pick up energy meters at random from the lots offered and get the meter tested from NABL accredited lab. The supplier has no right to contest the test results NABL accredited lab or for additional test and has to replace/take corrective action at the cost of the supplier.

## **29.0 INSPECTION:**

The inspection shall be carried out at any stage of manufacture, by the WBSEDCL authorized representatives, with prior intimation to the supplier. The manufacturer shall grant all reasonable facilities for testing free of charge for inspection and testing to satisfy the purchaser that the materials to be supplied are in accordance with their specification.

**The supplier shall keep the WBSEDCL informed in advance, about the manufacturing program so that the arrangement can be made for inspection.**

The representative / Engineer of the WBSEDCL attending the above testing shall carry out testing as per relevant standards and issue test certificate approval to the manufacturer and give clearance for dispatch.

## **30.0 QUALITY ASSURANCE:**

The manufacturer shall have a comprehensive quality assurance program at all stages of manufacture for ensuring products giving reliable, trouble free performance. Details of the bidder's quality assurance and test set up shall be furnished with the bid. A detailed quality assurance program shall be finalized with the successful bidder during the award stage. Bidder shall furnish following information along with his bid:

- a) Organization structure of the manufacturer and his main sub-suppliers (PCBs, SMT cards, CT/PT) with details of QAP setup, overall workflow.
- b) Copy of system manual showing QAP (Quality Assurance Plan) as actually practiced during manufacturing and final testing.
- c) **List of raw materials and critical components (ASIC chip, crystal clock, memory register Chip, transformers, optical ports etc.) with their suppliers and procurement details.**
- d) Stage inspection of product before final testing.

- e) Procedure adopted for ~~in~~-situ testing of PCBs, after placement of surface mounted component, for quantitative parametric variation of tolerance by self or sub-contractor.
- f) Testing and calibration facility, date of calibration of test bench, manpower data of bench operators;
- g) Sample copies of test certificate of bought out components.

### **31.0 TESTING FACILITIES:**

The Bidder shall have Auto Test Bench facilities and at least the following testing facilities to ensure accurate calibration:

- a) Insulation resistance measurement
- b) Starting current test
- c) Running at no load
- d) Limits of error
- e) Dial Test
- f) Tamper Test
- h) Power loss in voltage and current ckt.
- i) Transportation test
- i) Ageing Test

The Bidder shall give a detailed list of bought out items with name of the manufacturer and details about quality control.

### **32.0 GUARANTEE:**

Equipment (Meter) supplied shall be guaranteed for a period of 66 months 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.

### **33.0 FIXING & SEALING ARRANGEMENT:**

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

Necessary provision may be kept for fixing the utility seal also.

The manufacturers seal (two nos.) provided with the meter should be of high quality with tamper proof features. Necessary provision shall be kept for fixing utility seal also.

### **34.0 Supply of Power Pack, HHU, Communication Cord: (HHU to PC & Meter to PC)**

For every 100 nos. of meters and part thereof one power pack (if not internal battery) and one HHU not less than 32 MB(DOS Based) & 50 nos. meter to pc USB type and communication cord with (Moxa converter) for each type should be supplied free of cost. The guarantee period of HHU and Power Pack will be of 66 months from the date of supply.

### **35.0 SUBMISSION OF SAMPLE & DOCUMENTS:**

2 No Sample meters shall be submitted along with 1 no. ultrasonically welded case and cover to C.E. (DTD). A confirmation from C.E. (DTD) regarding submission of sample shall have to be submitted to the office of C.E. (P&C) .

HHU, Power-Pack, Modem along with SIM Card, if required, to be brought at the time of testing of sample meters, submitted against the tender.

### **36.0 SCHEDULES:**

The Bidder shall submit the following schedules (as per Standard Format), which is part and parcel of the Specification.

- Schedule A    Guaranteed Technical Particulars
- Schedule B    List of Raw Material(as per enclosed format)
- Schedule C    Pre Qualification Condition
- Schedule D    List of Documents to be submitted during sample submission
- Schedule E    Component Specifications
- Schedule F    Deviations from Specified Standards (As per standard format of the Bidder)
- Schedule G    Deviations from Specified Test Requirements (As per standard format of the Bidder)
- Schedule H    Deviations from Technical Specification (As per Annexure . IV . Deviation sheet of GCC)
- Schedule I    Bidders Experience (As per standard format of the bidder and also Copies of order executed along with GTP of the supplied meters.)

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## Schedule - A

### GUARANTEED TECHNICAL PARTICULARS FOR 11KV STATIC TRIVECTOR METERS

Sl.No.	Description	Required Specification	Manufacturer's particulars
1	Maker's Name and Country	To be mentioned	
2	Type of meter/model	To be mentioned	
3	Accuracy class	0.5S	
4	Parameters displayed	To be mentioned	
5	P.F. Range	0 Lag . Unity - 0 Lead	
6	Basic Current (Ib)	5A	
7	Maximum Current	200 % of Ib	
8	Minimum starting current	0.1% of Ib	
9	Rated Voltage	Ph . N : 63.5 V	
10	Variation of voltage at which meter functions normally	-30% to + 20% of V ref	
11	Rated Frequency	50Hz	
12	Power Loss in Voltage & Current circuits	Voltage Circuit Less than 1.5W/8VA, Current Circuit Less than 1VA. (Less VA/ Watt getting the preference)	
13	Dynamic range	To be mentioned	
14	MD reset Provisions	a) Through authenticated CMRI or Remote Communication Command  b) Automatic resetting at preset date & time.  c) Push Button	
15	No. of digits of display and height of character	Seven segment, min. 7 digit Liquid Crystal Display (LCD) with backlit or LED, having minimum character height of 10 mm.	
16	Size of Non volatile memory	To be mentioned	
17	Principle of operation	To be mentioned	

<b>18</b>	MD Integration period	15 Minutes	
<b>19</b>	Weight of meter	To be mentioned	
<b>20</b>	Dimensions	To be mentioned	
<b>21</b>	Warranty	5½ years from date of commissioning	
<b>22</b>	Outline drawings & Leaflets	To be furnished	
<b>23</b>	a) Remote meter-readout facility	To be mentioned	
	b) Communication protocol used.	To be mentioned	
	c) Sealing provision for meter & optical port.	To be mentioned	
	d) Baud rate of data transmission	To be mentioned	
	e) Required software to be resident in CMRI and BCS.	To be mentioned	
	f) Ultrasonic welding of body	To be mentioned	
	g) Manufacturer's Seal provided	To be mentioned	
<b>24</b>	Base Computer Software	Windows 7 / Windows 8 / Windows 10 based	
<b>25</b>	Type Test Certificates	To be furnished	
<b>26</b>	Time of Day Zones (Selectable)	To be mentioned	
<b>27</b>	Whether meter measures both fundamental & Harmonic Energy	Both required	
<b>28</b>	Real Time Clock Accuracy	Max. drift per annum $\pm 300$ sec for Class 0.5S.	
<b>29</b>	Anti Tamper Features	To be mentioned in details.	
<b>30</b>	Data retention by NVM without battery back up and un-powered condition.	10 years	
<b>31</b>	Guarantee period of meter	5½ Years from the date of supply. Guarantee period shall be printed on the nameplate.	

<b>32</b>	BIS license	To be mentioned	
<b>32.1</b>	BIS license No. & dt. With its validity for ISI certification mark on offered meter.	To be mentioned	
<b>32.2</b>	Details of meter design for which above BIS certification has been obtained: -	To be mentioned	
<b>(i)</b>	Ratio of Ib to I <sub>max</sub>		
<b>(ii)</b>	Material of meter body		
<b>(iii)</b>	Grade of printed circuit Board material		
<b>(iv)</b>	Type of assembly of component used (SMT)		
<b>(v)</b>	Meter constant (IMP /kWh)		
<b>(vi)</b>	Accuracy class		
<b>33</b>	ISO accreditation no. & dt. with its validity		
<b>34</b>	Other parameters / features not covered in the above GTP	Conform to specification of IS 14697:1999(2004) & CBIP technical report No. 304 (with its latest amendment).	
<b>35</b>	Past Experience	Copies of order executed in last three years along with GTP of the supplied meters to be enclosed. Past experience to be considered for manufacturing meter as per IS 14697:1999(2004) & CBIP-304	

**SCHEDULE – B**

**LIST OF RAW MATERIAL & CRITICAL COMPONENTS**

<b>Sl. No.</b>	<b>Component Function / Feature</b>	<b>Make / origin</b>
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	

**SCHEDULE – C**

**Pre-Qualification Conditions for HT Static Meters**

<b>Sl. No.</b>	<b>Particulars</b>	<b>Remarks</b>
1	Bidders must have valid BIS certification for the offered meter.	Yes / No
2	Bidder preferably posses ISO 9001 certification	Yes / No
3	Bidder should be manufacturers of static meters having supplied Static 11 KV H.T. Meters with memory and LCD display as per IS 14697 & CBIP 304 to Electricity Boards / Utilities during the past 3 years.	Yes / No
4	Bidders should have dust free, static protected environment for manufacture, assembly and Testing.	Yes / No
5	Bidder should have automatic computerized test bench for lot testing of meters.	Yes / No
6	Bidder has facilities of Oven for ageing test.	Yes / No

## SCHEDULED – D

### LIST OF DOCUMENTS TO BE SUBMITTED DURING SAMPLE SUBMISSION

Sl. No.	LIST OF DOCUMENTS TO BE SUBMITTED			
1	<i>Attested copy of type test reports from NABL accredited laboratory as per new IS(If Published)</i>			
2	<i>Attested copy of BIS certificates of the same type of meter submitted as sample</i>			
3	<i>Attested certificates as regards material used for meter case, cover &amp; terminal block.</i>			
4	<i>Schedule-B as per tender documents</i>			
5	<i>Schedule-C as per tender documents</i>			
6	<i>Operating manual &amp; Tamper logic of the meter submitted</i>			

## SCHEDULE - E

### 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.

Sl. no.	Component Function / Feature	Requirement	Make / origin
1.	Current Element	E-beam /spot welded C.T. 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 should be with the Surface mount type along with the ASICs.	USA: Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments, Teridian, Japan: NEC, Freescale, Renesas, Holland: Phillips
3.	Memory chips	The memory computing chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: National Semi Conductor, Atmel, SAMES, Texas Instruments, Teridian, ST, Microchip. Japan: Hitachi, OKI, Freescale, Renesas, Holland / Korea: Phillips
4.	Display modules	The display modules should be well protected from the external UV radiations. The display should be clearly visible over an angle of at least a cone of 70°. The construction of the modules should be such that the displayed quantity should not be disturbed with the life of display. The display should be TN type industrial grade with extended temperature range.	Singapore: Bonafied Technologies, Korea: Advantek, Japan : Hitachi, SONY, Hijing, Truly Semiconductor. China: Tianma
5.	Communication modules	Communication modules should be compatible for the RS 232 ports	USA: National Semiconductors, HP, ST, Texas Instruments, Agilent, Avago. USA / Korea: Fairchild Holland/ Korea: Philips, Japan: Ligitek, Hitachi, Germany: Siemens, Tiwan: Everlight,

6.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	USA: National Semiconductors, Texas Instruments, HP, Agilent, Avago, Germany/USA :Osram Japan: Hitachi, , Germany:Siemens, Holland / Korea:Philips, Taiwan:Everlight,
7.	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should 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 should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	USA: National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi. Japan: Hitachi, Oki, Toshiba. Freescale Korea: Samsung.
9.	Mechanical parts	The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. The other mechanical components should 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,
11.	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Dallas, Atmel, Motorola, NEC, Teridian Renesas, Texas Instruments, ST, Micro chips, Epson, Holland / Korea: Philips, Japan: NEC, OKI, Hitachi, Mitsubishi, Freescale,

