TECHNICAL SPECFICATION FOR

STATIC CT-PT OPERATED 132 KV TRI-VECTOR TRACTION METER

1. SCOPE:

This specification covers the design, manufacture, testing before despatch, supply & delivery of Static CT-PT operated 132 KV Tri-Vector 1 Phase 2 Wire, 2-Channel 0.2S Class meter for Traction application only.

2. APPLICABLE STANDARDS:

Unless otherwise specified elsewhere in this specification, the meter shall conform in all respects including performance and testing thereof to the following Indian/ International Standards to be read with up-to-date and latest amendments/ revisions there of :

Sl.No.	Standard No.	Title
1.	IS 14697-1999	AC Static Transformer Operated Watt-hour and VAR-hour Meters, Class 0.2S & 0.5S.
2.	CBIP Technical Report 88 & 304	Specification for AC Static electrical Energy Meters.
3.	IEC 687-1992	Alternating current static watt-hour meters for active energy (classes 0.2S & 0.5S)
4.	CBIP Technical Report 111	Specification for Common Meter Reading Instrument.
5.	IS 9000	Basic Environmental Testing Procedures for Electronic & electrical Items.

Meters matching with requirements of other national or international standards which ensure equal or better performance than the above mentioned standards shall also be considered. When the equipment offered by the bidder conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this specification shall be clearly brought out in the relevant schedule. A copy of such standards alongwith their English translation shall invariably be furnished along with the offer.

3. CLIMATIC CONDITIONS:

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

4. 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.

5. ELECTRICAL SPECIFICATIONS:

Class of accuracy : 0.2 S.
(No drift in tolerance of accuracy with time)

Type of Meter :1 Phase 2 Wire, 2-Channel

Supply Voltage (PT Secondary): 1 Phase 2 Wire (2-Channel)
1st and 3rd PT terminals should be internally shorted
110V with variation -40% to +20%

Frequency : 50 Hz +/- 5%

Power factor Range : From Zero lagging through Unity to Zero leading.

Current Range (basic) : 1A

Maximum Current : >120% of Ib

Starting Current : 0.1% 0f Ib at UPF

Power Loss : Voltage Circuit Less than 1.5W/8VA
Current Circuit Less than 1VA

Resistance to surge voltage of 1.2/50 Microsec. : minimum 8kV peak

Test Voltage at 50 Hz for 1min. : 4KV rms

Clock Time Accuracy : +/- 2minutes for Class 0.2S
Maximum drift *per annum*.

6. TEMPARATURE RISE :

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

7. ANTI TAMPER FEATURES :

The meter should have the following anti-tamper features:

a) The meter shall be capable of recording; occurrences and restoration with date and time the following tamper conditions:

- Missing Potential with phase identification for all phases.
- CT polarity reversal with phase identification for all phases.
- All Potential missing or Power Failure.
- Magnetic influence.
- Cover Open
- Neutral Disturbance

Default occurrence and restoration time shall be 5 minutes but it shall be programmable. Each parameter shall be on meter display for 10-15 sec. And the time between two auto display cycles shall be maximum 180 sec. Minimum time gap must be maintained (more than display time) between two auto cycles.

b) Snapshot values of phase Voltage, Current & Power Factor, Active Energy value during occurrence & restoration to be provided in the above mentioned first three tamper conditions.
Default occurrence and restoration time shall be 5 minutes but it shall be programmable.
c) The meters should work even in the presence of any two Potential wires.
d) Meter should work correctly irrespective of phase sequence.

f) The following facilities also to be provided:

- ✓ The duration of tamper before it is logged should be a user programmable through authenticated commands.
- ✓ All authenticated commands should be Base Computer Software controlled.
- ✓ All transactions with meter should be date & time logged (minimum 20 transactions).

g) The meter should have sealing features, which should be such that after factory calibration opening of the meter will lead to breaking of meter cover.

h) A properly designed meter tamper logic 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.

i) A minimum of 300 events (one event means either occurrence or restoration) of all types of tamper with date & time stamping should be available in meter memory.

8. CONSTRUCTION:

The case, winding, voltage circuit, sealing arrangements, registers, terminal block, terminal cover & name plate etc. shall be in accordance with relevant standard. The meter should be compact and reliable in design, easy to transport and immune to vibration & shock involved in transportation & handling. The construction of the meter should ensure consistent performance under all conditions especially during storms/heavy rain/very hot weather. The insulating material used in the meter should be non-hygroscopic, non-ageing and of tested quality. The meter should be sealed in such a way that the internal parts of the meter becomes inaccessible and attempt to open the meter will result in visible damage to the meter cover. **This is to be achieved by using continuous Ultrasonic welding on the Meter body.**
No cut should be there in the terminal cover to prevent undesirable access to the meter current/voltage terminals.

The meter should employ latest technology such as Microcircuit or application Specific Integrated Circuit (ASIC) to ensure reliable performance. The mounting of the components on PCB should compulsorily be Surface Mounted Technology (SMT) 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.

9. DISPLAY OF MEASURED VALUES:

The measured value(s) shall be displayed on seven segment, seven digit Liquid Crystal Display (LCD) with backlit or LED, having minimum character height of 10 mm. LCD to be of 'STN' (super tested knemutics) type construction suitable for temperature 70 Deg. C. continuously.

The data should be stored in non-volatile memory. The non-volatile memory should retain data for a period of not less than 10 years under un-powered condition. Battery back-up memory will not be considered as NVM.

It should be possible to easily identify the single or multiple displayed parameters through symbols/legend on the meter display itself or through display annunciator.

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.

The meter should be capable of displaying the measured parameters in two different Modes as follows:

A) Auto Display Mode:

- LED/LCD Test
- Rising Apparent Demand with elapsed time
- Real Time & Date (dd mm yy)
- Cumulative Power On Hours
- Active Energy (Import)
- Active Energy (Export)
- Reactive Energy Lag
- Reactive Energy Lead
- Apparent Energy (Lag only)
- Apparent Max Demand (with date and time stamping)
- TOD Active Energies
- TOD Apparent Energies
- TOD Apparent Demand
- Cumulative MD
- MD reset count
- Total Number of Tamper occurance

B) Push Button Mode:

- LED/LCD Test
- Rising Apparent Demand with elapsed time
- Real Time & Date (dd mm yy)
- Cumulative Power On Hours
- Active Energy (Import)
- Active Energy (Export)
- Reactive Energy Lag
- Reactive Energy Lead
- Apparent Energy (Lag only)
- Apparent Max Demand (with date and time stamping)
- TOD Active Energies
- TOD Apparent Energies
- TOD Apparent Demand
- Cumulative MD
- MD reset count
- Inst. Phase Voltages
- Inst. Phase Currents.
- Inst. Load Active & Apparent
- Inst. Power factor with sign for Lag/Lead.
- Inst. Frequency

- Tamper Information
  a) Present status of tamper
     i) Missing Potential to metering circuit with phase identification.
     ii) Current circuit polarity reversal with phase identification.
     iii) Magnetic influence.
     iv) All potential missing & Power failure
  b) Date & Time of First tamper occurrence with tamper identification.
  c) Date & Time of First tamper restoration with tamper identification.
  d) Date & Time of Last tamper occurrence with tamper identification.
  e) Date & Time of Last tamper restoration with tamper identification.
  f) Cumulative tamper count of all types of tampers & all phases.

  First-in-first-out feature of tampering will be preferred.

High resolution registers required in display min 3/4 digits after decimal in case of energy & Min 1/2 digits after decimal in case of demand i.e.

i) MVA - **.** ,**
ii) MWH /MVARH/ MVAH -*.****

Visibility of display in poor light conditions is an important criterion.
Proper Annunciation legends for the displayed parameters to be provided.
Push-Button mode of display should display all parameters and it should have priority over auto mode. **Push button mechanism should be of high quality and should provide trouble free service for a long span of time.**

The meter shall have a test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output device should be provided in the form of one seperate LED for active, reactive and apparent energies with the provision of selecting the parameter being tested.
Meters with calibrating LED pulse output for Energy Vectors will be preferred.
The meter should also record values of Energies at preset date & time.

10. Measurement of Harmonics

The meter should 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 only shall be used for billing purpose.
The total 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.

11. MAX. DEMAND:

The meter should be capable of recording the Apparent MD with integration period of 15 minutes. The meter should also record MD at preset date and time.
MD reset should be through all of the three means: 1) Manually 2) Through authenticated MRI or Remote Communication Command. 3) Automatic resetting at preset date & time.
Facility to invoke any of the above through authenticated MRI command should be provided.
MD reset button should have proper sealing arrangement.
Push button for scrolling display & M.D. reset should be separate.

12. LOAD SURVEY:

The meter should be capable of recording load survey of Active energy, Reactive Lag and Lead Energy, Apparent MD, Active MD, Current phase-wise, Voltage phase-wise & Power factor for a period of minimum 60 days for 15-minute integration.
It should be possible to transfer this data to base computer software directly from meter or through MRI or remote Telephone Modem or *GSM/CDMA* communication. The data so

obtained should 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.

13. TIME OF DAY FACILITIES:

The meter should have facilities to record Active, Apparent Energies and MD in at least 8 time zones. Default TOD Time zones should be as follows: TOD1 (06:00hours to 17:00 hours), TOD2 (17:00 hours to 23:00 hours) & TOD3 (23:00hours to 06:00 hours). The time zones should be user programmable through **authenticated** MRI command. Necessary software for the same has to be provided.

14. METER RELATED SOFTWARE & INTERFACE:

i) BASE COMPUTER SOFTWARE (BCS): The BCS is to be provided by the meter manufacturer and it should be capable of the following:

- To prepare a MRI for authenticated transaction with the meter.
- To collect meter reading data directly from meter as well as from the MRI.
- To generate user friendly reports from the above data.
- To read a meter through telephone modem or GSM/CDMA communication.
- To convert data in ASCII format, which is changeable, if required, for transfer to WBSEDCL billing software.
- To maintain databases of consumers.

The BCS should be WINDOWS 7 /8 /10 compliant & latest Pentium processor compatible. Proper security features should be in-built to safeguard unauthorized access to different functions.

BCS should be provided during sample testing.

ii) COMMON METER READING INSTRUMENT (CMRI) SOFTWARE:

CMRI software compatible with MRI as per CBIP specification No 111 is to be provided.

iii) APPLICATION PROGRAM INTERFACE (API):

Necessary interface software etc. has to be provided as & when required.

15. 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. The interface preferred will be inductive coupling. If otherwise, proper sealing arrangement of coupling port to be provided.

16. Self-diagnostic features:

The meter shall be capable of performing complete self-diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory location all the time.
If possible, the details of malfunctioning should be recorded in the meter memory.
The details of self-diagnostic capability feature should be furnished by the bidder.

17. IMMUNITY TO ELECTRO MAGNETIC DISTURBANCE:

The meter should be designed in such a way so that external electromagnetic fields up to 0.5 Tesla or electrostatic discharges up to 35KV do not influence the performance of the meter.

18. TECHNICAL SUPPORT, MANUALS & TRAINING:

Extensive technical support, detailed technical literature & training is to be provided by the manufacturer free of cost.
Supply of External Battery Packs to be provided by the manufacturer and should be clearly offered in their bids.

19. METER CASE AND COVER

The meter should have a case, which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the seal and cover. This is to be achieved by use of **Ultrasonic Welding**. The material of the meter body (case and cover) shall be either

A. THERMOSETTING PLASTIC

Self-insulating non corroding black thermosetting material which would ensure maximum strength against distortion and also injury to working parts during normal use and rough handling during transportation. The material shall not soften /melt on heating.

B. ENGINEERING PLASTIC

The meter casing material should be glass reinforced, flame retardant, unbreakable engineering plastic material with minimum thickness of 2.5 mm to ensure high reliability, long trouble free life, safety against electric shock, spread of fire and effects of excessive temperature. The material should be corrosion resistant, inert to chemicals, oxidizing agents, petro-chemical products, acids, salts, and ultraviolet radiation. The meter chamber shall be dust proof. The supplier should indicate hardness, melting temperature and tensile yield strength of the material and necessary test certificate of the same shall be furnished. The meter case and cover should be sturdy enough to prevent damage during transportation and installation.

The meter shall withstand external magnetic influence as per latest amendments of CBIP Technical Report No. 88.
The engineering plastic used shall conform to IS 11731 besides meeting the test requirement of heat deflection test as per ISO 75 and glow wire test as per relevant standard.

20. 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 given in IS 11731)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 two screws. The screws shall have thread size not less than M4 and head having 4-6mm. diameter. The screws shall not have pointed ends at the end of threads. All terminals and connecting screws and washers should be of tinned/nickel plated brass material or aluminum alloy.

The internal diameter of terminal hole should be minimum 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 of Engineering plastic with minimum thickness 2.5 mm. and the terminal cover shall be of extended type completely covering the terminal block and fixing holes except for the provision of conductor entry at the bottom for incoming and outgoing leads.

21. NAMEPLATE AND MARKING:

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

1) Manufacturers name or trademark and place of manufacture.
2) Designation of type.
3) Number of phases and number of wires for which the meter is suitable.
4) Serial number of meter.
5) Month and year of manufacture.
6) Principal unit in which the meter records.
7) Reference voltage P.T.Ratio.
8) Basic current and rated maximum current.
9) C.T. Ratio.
10) Reference frequency in Hz.
11) Meter constant (impulse/unit).
12) Class index of meter.
13) Reference temperature.
14) " Property of WBSEDCL"
15) Purchaser's Order No. & Date.
16) Guarantee for 5 & ½ years from the date of commissioning.
17) Sign. of insulation.
18) Bar coding of Serial Number, month & year of manufacture.

22. INFLUENCE QUANTITIES:

The meter shall work satisfactory with guaranteed accuracy as per limit or relevant IS under presence of the following quantities:

i) External magnetic field
ii) Electromagnetic field
iii) Radio frequency interference
iv) Vibration
v) Harmonic wave form
vi) Voltage fluctuation
vii) Electromagnetic high frequency field
viii) Electrostatic Discharge up to 35KV

23. POWER CONSUMPTION BY METER: As per IS 14697

24. STARTING CURRENT: The starting current of the meter shall be 0.1%Ib at unity power factor.

25. FIXING 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.

26. SEALING ARRANGEMENT:

At least, two sealing screws (UNIDIRECTIONAL) should be provided for proper fixing of the meter cover so that access to the working part should not be possible without breaking the seal. Necessary provision may be kept for fixing the utility seal also.

Meter cover should be **ultrasonically welded continuously** to prevent opening of the meter without damaging the cover.

The manufacturers seal provided with the meter should be of high quality with tamper proof features.

27. COMMUNICATION CAPABILITY:

The meter shall have a galvanically isolated optical communication port as per PACT/IEC 1107/ANSI so that it can be easily connected to a hand-held common meter reading instrument (CMRI) for data transfer. Additional communication port RS 232 should be provided for remote meter reading purpose.

The above ports suitable for interface of the meter with appropriate protocol to

i) Common Meter Reading Instrument (CMRI)

ii) IBM PC

iii) Facilitate reading by the utility from remote locations, preferably through a sealable port other than optical port.

Calibration of meter should not be possible through the meter-reading instrument to avoid meter tampering through MRI.

Protocol of the meter for AMR is to be submitted before delivery of the meters.

28. Base Computer System & Software Requirements:

(A) Base Computer Software (BCS):

The BCS should be user friendly. Windows 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 abnormal/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 BCS should have the facility for ASCII conversion of all recorded meter data.

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

i. Meter Data Display:

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).

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 where the cursor/pointer is placed for the selected or all parameters.

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 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 for change of TOD timings and/or time setting of the meter.

ii. Support Display:

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.

iii. The Data Transfer:

It should be possible to transfer the data to and fro from CMRI through serial interface. Facilities for adjustment of RTC of meter, changing of Tariff requirements (TOD) timings, Billing Dates, MD integration period, Energy Definitions etc through MRI by authenticated transactions, controllable through BCS should be provided. Transaction directly through MRI without BCS control will not be acceptable.

vi. Configurability:

It should be possible to have selective printing out of all the available data of the meter. Print out should not include anything and everything available with the BCS. The software should support "Print Wizard" or similar utility whereby user can decide what to print out. The user of the software need not revert back to the supplier of the software for modifying the software just to print what he desires.

It is very important that the BCS has the feature to export available data to ASCII or spreadsheet format for integrating with the WBSEDCL billing system. Here again an "Export Wizard" or similar utility should be available whereby user can select file format (for ASCII or for spreadsheet), 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.

v. Security:

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 copy-able on to another PC.

vi. Help:

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

29. RUNNING AT NO LOAD:

The meter should comply with the requirements of the relevant standard.

30. D.C. IMMUNITY TEST: The meter should comply with requirements of relevant standard.

31. PACKING:

The meter should be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing.

32. ACCURACY:

There shall be no drift in accuracy, for a period of ten years from the date of supply.
In case any drift is noticed which is beyond the permissible limits, the Bidder shall re-calibrate/replace by a new meter without any extra cost.

33. TESTING & INSPECTION:

A) TYPE TEST:

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.

The Acceptance and Routine Tests shall be carried out as per the latest version of the relevant standard.

B) TEST CERTIFICATES:

The Type Test Certificates shall be from Institutions approved by the purchaser / As per Appendix 'G' of CBIP Technical Report No. 88 (Amended).

Type tests reports to be submitted as per offered sample.

C) INSPECTION :

The inspection shall be carried out at any stage of manufacture, by the WBSEDCL authorised representatives, with 15 days prior intimation to the supplier. The manufacturer shall grant all reasonable facilities 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 programme 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 despatch.

All expenditure (travelling, boarding & lodging) for inspection, testing of meters and associated equipment at manufacturer's works by the WBSEDCL officials shall be borne by WBSEDCL.

34. GUARANTEE:

The meter should be guaranteed for a period of 5&1/2 Years from the date of delivery. The meter found defective within the above guarantee period should be replaced by the supplier free of cost within one month of receipt of intimation. If the defective meters are not replaced within the above-specified period, the purchaser shall recover an equivalent amount plus 15% supervision charges.

35. 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:

a) The factory shall be completely dust proof
b) The testing room shall be temperature and humidity controlled as per relevant Standards.
c) The testing calibrating equipment should be automatic and all test equipment shall have their valid calibration certificates.
d) Power supply used in testing equipment shall be distortion free with sinusoidal wave-forms and maintaining constant voltage current and frequency as per the relevant Standards.
e) During the manufacturing of the meters the following checks shall be carried out.

1) Meter frame dimension tolerance should be minimal.
2) The CT coil shall be made totally encapsulated and care shall be taken to avoid ingress of dust and moisture inside the coil.
3) The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.
4) The meters shall be batch tested on automatic, computerized test bench and the results shall be printed directly without any human errors.

36. TESTING AND MANUFACTURING FACILITIES:

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

a) Insulation resistance measurement
b) Running at no load
c) Starting current test

d) Limits of error
e) Range of adjustment
f) Power loss in voltage and current coil
g) Repeatability of error
h) Transportation test
i) Low load run test
j) Heating test

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

37. Supply of Power Pack & CMRI:

For every 20 meters and part thereof one CMRI (DOS Based Analogic Make) of 32 MB RAM size and one power pack should be supplied free of cost in case of meters without internal battery.

38. SUBMISSION OF SAMPLE & DOCUMENTS :

While submitting the Quotation to the Material Controller, Central Stores & Purchase Department, Vidyut Bhavan, 4th Floor, Kolkata- 700 091, a sample meter having all the mentioned features, BCS with allied software, API and sample of seal etc. along with the Type Test Certificates and with the test results and ISI Certificate is to be submitted *to* Chief Engineer (DTD), Abhikshan within 12-00 hrs. and copy of letter indicating acceptance of Sample by the Office of the Chief Engineer (DTD) is to be submitted to the Material Controller prior to Opening of Offer. Offer will not be accepted without submission of sample and the Tender will not be opened. Any other accessories required for observing the performance & capabilities of the Meter, BCS, API etc is to be submitted along with offer.

Following sample shall be submitted to Chief Engineer (DTD). *A confirmation from* Chief Engineer (DTD) *regarding submission of sample as detailed below shall have to be submitted along with the Techno-Commercial Bid (Cover-I).*

i) 132 KV Tri-Vector 1Phase 2Wire, 132KV/110V, 200/1A 2-channel meter for Traction application: Class of Accuracy 0.2s – 1No.

CMRI & Power-Pack *to be brought at the time of testing of sample meters submitted against the tender and to be taken back by the bidder after testing of the said meters.*

39. 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 Deviations from Specifications
Schedule C Bidders experience
Schedule D Deviations from Specified Standards
Schedule E Deviations from Specified test Requirements

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GUARANTEED TECHNICAL PARTICULARS
FOR 132 KV TRACTION 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	0.2S	
4	CMRI	Minimum 32MB RAM size capacity.	
5	Power Pack	To be mentioned	
6	Parameters displayed	To be mentioned	
7	P.F. Range	O Lag-unity-O Lead	
8	Basic Current (Ib)	1A	
9	Maximum Current	> 120% of Ib	
10	Minimum starting current	0.1% of Ib	
11	Rated Voltage	Ph-Ph : 110 V	
12	Variation of voltage at which meter functions normally	-30% to + 20% of Vref	
13	Rated Frequency	50Hz	
14	Power Loss in Voltage & Current circuits	Voltage Circuit Less than 1.5W/8VA, Current Circuit Less than 1VA	
15	Dynamic range	To be mentioned	
16	MD reset Provisions	a) Manually b) Through authenticated CMRI or Remote Communication Command c) Automatic resetting at preset date & time.	
17	No. of digits of display and height of character	Seven segment, seven digit Liquid Crystal Display (LCD) with backlit or LED, having minimum character height of 10 mm.	

Sl. No.	Description	Required Specification	Manufacturer's particulars
18	Non volatile memory	To be mentioned	
19	Principle of operation	To be mentioned	
20	MD Integration period	15 Minutes	
21	Weight of meter	To be mentioned	
22	Dimensions	To be mentioned	
23	Warranty	5&1/2 years from date of commissioning	
24	Outline drawings & Leaflets	To be furnished	
25	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) Manufacturers Seal provided	To be mentioned	
26	Base Computer Software	Windows based and suitable for latest version	
27	Type Test Certificates	To be furnished	
28	Time of Day Zones (Selectable)	To be mentioned	
29	Whether meter measures both fundamental & Harmonic Energy	Both required	
30	Real Time Clock Accuracy	+/- 2min for Class 0.2S Max. Drift per annum.	
31	Anti Tamper Features	To be mentioned in details.	
32	Data retention by NVM without battery back up and unpowered condition	10 years	

Tamper logging threshold values for Single Phase Two Channel Traction 132 KV meter

Tamper event	Occurrence	Restoration
1. CT polarity Reversal		
Line current*	> 10 % of I_{basic}	> 10% of I_{basic}
Direction	Negative	Positive
Power Factor	> 0.300	> 0.300
Persistence time	5 Min	5 Min
CT polarity reversal detection will be channel wise		
2. High Voltage		
Voltage threshold	> 115 % Vnom	< 110 % Vnom
Persistence time	5 Min	5 Min
3. Low Voltage		
Voltage threshold	<75 % Vnom	> 80 % Vnom
Persistence time	5 Min	5 Min
4. Over current		
Current threshold	> 100 % Imax	< 100 % Imax
Persistence time	5 Min	5 Min
5. Low Power Factor		
Line current	> 10 % Ib	>10 % Ib
Avg. Power Factor	<0.5	>0.5
Persistence time	5 Min	5 Min

6. Power ON/OFF event

Power ON/OFF occurs if power goes for more than persistence time and restored when power resumes.

Occurrence persistence time: 5 minutes

Restoration persistence time: immediate

7. Magnet

Whenever the meter functionality gets affected on account of magnetic field, meter log it as an event and recording starts on Imax or it remains immune.

Same shall be logged with date & time stamp.

Persistence time: 20 seconds (approx) for occurrence and restoration

8. Radio Frequency Disturbance

For any radio frequency disturbance signal, in the range of mobile frequency range as approved by TRAI and commonly used by all cellular operators, meter should remain immune or in case the meter functionality is getting affected, RF disturbance tamper will be logged with date and time stamp.

Occurrence persistence time: 20 sec. (approx)

Restoration persistence time: 20 sec. (approx)

9. Cover open

On removal of meter cover the meter will log cover open event along with data and time.