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TECHNICAL SPECIFICATION FOR PORTABLE ELECTRONIC REFERENCE STANDARD METER (ACCURACY CLASS 0.5) FOR TESTING OF SINGLE PHASE KILOWATT HOUR ENERGY METERS

1. SCOPE:

The specification covers the requirement of design, manufacturing, & delivery of electronic reference standard meter (RSM) duly calibrated/ tested from NABL accredited government laboratory with accessories suitable for testing of single phase electro-mechanical (Ferraris) and static energy meters of accuracy class 1.0 & 2.0

2. APPLICATION:

The function of the RSM shall be suitable to measure the system parameters and verify the accuracy of the single-phase energy meters in the laboratory and at site without disconnecting consumers supply when used with the clamp-on CT.

The RSM shall be extensively used in field & laboratory for verification of the accuracy of all types of single-phase energy meters.

3. SYSTEM TECHNICAL DATA:

The RSM shall be suitable to test energy meters under the following conditions.

- | | |
|----------------------------------|--------------------------------------|
| 3.1. Voltage | : 240V \pm 30% (P-N) |
| 3.2. Frequency | : 50 Hz \pm 5 % |
| 3.4. Power Factor | : zero Lag - unity - zero Lead |
| 3.5. Current Range (Imin –Imax) | : 200 mA to 60 Amps with clamp on CT |
| | : 200 mA to 10 Amps with Ring CT |
| 3.6 Accuracy Class | : 0.2 with Ring CT |
| | : 0.5 with Clamp on CT |

4. SERVICE (CLIMATIC) CONDITIONS :

The equipment to be supplied against this specification should be capable of performing and maintaining the required accuracy for satisfactory operation under all tropical conditions mentioned below:

- | | |
|---|-------------|
| a) Maximum ambient temperature | : 50 Deg. C |
| b) Minimum ambient temperature | : 0 Deg. C |
| c) Maximum ambient air temperature in shade | : 45 Deg. C |
| d) Average daily ambient temperature | : 40 Deg. C |
| e) Minimum relative humidity | : 25 % |
| f) Maximum relative humidity | : 95% |
| g) Annual average ambient temperature | : 40 Deg. C |

5. STANDARDS APPLICABLE:

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Date:	Place:	

Unless otherwise specified elsewhere in this specification, the RSM shall confirm in all respects including performance and testing thereof to the following Indian / International Standards to be read with up to date and latest amendments / revision thereof :

IEC 687	:	Alternating current static watt-hour meters for Active Energy.
IS 12346	:	Testing equipment for AC Electrical Energy Meters
IS 14697	:	AC Static Transformer operated Watt Hour and Var Hour Meters, Class 0.2S, 0.5S and 1.0S

6. GENERAL REQUIREMENTS:

- a All the materials, electronic and power components ICs used in the manufacturing of the reference standard meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
- b The electronic components shall be mounted on the PCB using latest surface mount technology (SMT).
- c The RSM shall be of rugged construction, lightweight and shall be of portable, handy and compact type. It shall have ergonomic design.
- d The RSM shall be suitable for laboratory and field testing of single phase electronic/electromechanical energy meters of accuracy class 1 and 2 as per relevant standard.
- e Clamp-on CT along with a suitable connecting cable and a set of voltage leads with injection type crocodile clips which enable the testing without isolating or interrupting the supply of the consumer shall be supplied along with the RSM.
- f An error calculator shall be incorporated in the RSM which shall have facility to calculate error in percentage of meter under test by feeding the meter constant and number of revolutions / pulses for which meter was tested with RSM, through the inbuilt key board.
- g The equipment shall have provision for input of data such as a key-pad. It should be in the front of the equipment. The key pad shall have facility to enter alpha-numeric characters.

7. STANDARD RATED CURRENT AND MAXIMUM CURRENT:

The Standard current rating of the RSM shall be –

- 200 mA to 10 Amp through Ring CT
- 200 mA to 60 Amp through clamp on CT.

8. MEASUREMENT MODES:

The offered equipment should have one number Clamp-On type current transformer (CT) with connecting cable of suitable length. The CT shall be suitable to measure a maximum current up to 60 Amp. and suitable for use with cables of overall diameter not more than 10 mm .

The CT shall not saturate up to 120% of the highest rated current i.e. if 120% of highest rated current is applied for 30 minutes, The RSM shall not get damaged and

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- a Consumer Number for minimum 20 alpha-numeric characters.
- b Consumer ID minimum 10 digit
- c Meter Serial Number for minimum 10 alpha-numeric characters.
- d Meter Constant Revolution or pulses per kWh for minimum 5 digits
- e Meter Type for minimum 10 digit
- f Make of meter for minimum 10 digit

14. DATA STORAGE:

The equipment shall have non-volatile memory (NVM). The NVM shall have a facility to store minimum 175 test results. The following parameters should be logged along with the test results and to be displayed by reading software.

- a Serial number of MUT
- b Serial Number of RSM
- c Consumer identification
- d Meter constant of MUT
- e No. of revolution / pulses for which test is being carried out
- f Instantaneous Voltage
- g Instantaneous Current
- h Frequency
- i Power factor
- j Energy logged by reference meter
- k Test duration, test time & date
- l Average PF during the test
- m Error in percentage

The NVM shall store 175 results on first-in, first-out basis. It shall be possible to download the stored data to a PC using the supplied communication cord with RS232 connector (at computer end). If the RSM results are not downloaded to a PC and the memory becomes full, the oldest (first) result shall automatically get overwritten by the new result, then the second and so on. The RSM should provide suitable warning message before overwriting.

15. SAFETY REQUIREMENTS :

The RSM shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal working conditions, so as to ensure especially;

- a) Personal safety against electric shock
- b) Personnel safety against effects of excessive temperature

All parts, which are subject to corrosion, shall be suitably protected and shall not be liable to damage by normal handling.

16. CASE AND WINDOW:

The RSM shall have an insulated case and any non-permanent deformation of the case shall not affect the satisfactory performance of the equipment. The window shall be made of transparent material.

17. POWER CONSUMPTION:

The power consumption of the RSM at a reference voltage, frequency, temperature and rated current shall not be more than 2 VA in current circuit excluding clamp on CT & 10 VA in voltage circuit excluding the leads.

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18. CARRYING CASE:

Each RSM shall be supplied with a carrying case suitable for easy portability, rugged use and to prevent damage during transit

19. MARKING ON RSM :

The RSM shall have a name plate. The marking on the name-plate shall be indelible, distinct and easily readable. The basic markings on the RSM name-plate shall be as follows:-

- a Manufacturer's name.
- b Designation of type.
- c Serial number.
- d Current range
- e Accuracy Class
- f Property of "PGVCL "
- g Purchase order no. & date
- h Guarantee Period

Terminals & marking: One terminal shall be provided on the RSM to connect communication cord or snap switch or scanner.

20 SOFTWARE :

Each RSM shall be supplied along with PC Software. The software shall be suitable for downloading the test results into PC having Win98/ Win2000/ Win XP/Window 7/Window 2010 operating system using RS 232 port. The software shall have facility to generate the test report.

The offered software shall have facility to convert all stored test results in ASCII file format. The offered software shall be user friendly & menu driven .The Supplier shall impart necessary training regarding installation and use of the above software.

21. ACCESSORIES

Each RSM shall be supplied along with following accessories:

- i) Common optical sensor for automatic testing, which can be used to sense disc revolutions in electromechanical meters as well as calibration pulse output LED's of static meters from a minimum distance of 30mm. i.e. it should be capable to sense the LED from the outside of the front cover of clean transparent polycarbonate meter box.
- ii) Mounting arrangement (clamp) for the optical sensor.
- iii) Clamp on CT for on-line testing.
- iv) A set of voltage leads with insulated clips.
- v) Cable to power up the equipment in the office.
- vi) Serial communication cord with RS232 connector to retrieve stored data from the RSM and download the same to a PC.
- vii) Snap switch along with detachable lead.
- viii) Windows based Base Computer Software (BCS)

22. SAMPLE

A sample shall be submitted along with the bid with manual and complete accessories.

23. TESTING AND CALIBRATION

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Each RSM shall be supplied duly tested /calibrated from the NABL accredited government laboratory. Certificate of such lab should be supplied with each RSM.

24. ACCURACY OF RSM:

The supplier shall furnish written undertaking on Rs.100.00 Non Judicial Stamp paper that there shall be no drift in the accuracy of meters for a period of at least 10 years from the date of supply. In case any drift is noticed which is beyond the permissible limits, the Bidder shall replace the defective meter by a new meter duly tested/calibrated from Govt. accredited lab without any extra cost.

25. GUARANTEE

The RSM should be guaranteed for performance for a minimum period of 5 years from the date of receipt in stores. The equipment found defective within the above guarantee period shall be replaced with the new RSM duly tested/calibrated from accredited government laboratory by the supplier free of cost within one month of receipt of intimation.

26. 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 desire to furnish any other information(s) in addition to the details as asked for, the same may be furnished against the last item of this Schedule.

A statement of guaranteed technical particulars shall be furnished in the format attached as per Schedule III 'A' along with the bid without which the Bid shall be treated as Non-Responsive.

27. AFTER SALES SUPPORT AND TRAINING:

The supplier shall arrange to provide free training at places as desired by the purchaser for use of RSM and Base Computer Software. The supplier shall provide competent and timely after sales service support.

28. TEST AND FACILITIES:

The bidder shall provide at his cost, facilities to carry out the following tests at the time of inspection of this equipments as per sampling plan of relevant IS:-

- a AC voltage test.
- b Insulation resistance measurement test.
- c Limits of errors test.
- d No-load test.
- e Repeatability of error test.
- f Test of influence of supply voltage
- g Test of operation of snap switch
- h Verification of RSM , data storage and BCS features
- i Test of operation of optical scanner
- j Test of Power Consumption

29. TESTS:

- a Type Tests:
The Electronic Reference Standard Meter should be type tested at any of the test laboratories by the bidder as per relevant standards and this technical

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specification. The bidder shall furnish following type test reports along with the bid.

- Test of insulation properties.
- Test of Accuracy requirements.
- Repeatability of error test.
- Test of influence quantities
- Test of operation of optical scanner
- Test of power consumption

b Acceptance tests:

All acceptance tests as stipulated in the relevant standards and in this specification shall be carried out by the Supplier.

c Routine Tests:

All routine tests as stipulated in the relevant standards shall be carried out and routine test-certificates/reports shall be submitted to the Purchaser for approval.

30. INSPECTION :

The inspection may be carried out by the purchaser's representative before dispatch.

The manufacturer shall grant free access to the purchaser's representative, at a reasonable time, when the work is in progress.

All Acceptance tests and inspection shall be performed at the place of the manufacturer unless otherwise especially agreed upon by the Bidder and Purchaser at the time of purchase.

The bidder shall provide the inspectors representing the purchaser all reasonable facilities without charge, to satisfy himself that the equipment is being furnished in accordance with this specification during stage inspection, if any and final inspection.

After inspection of the lot the L.T. ERS meters shall be sent for calibration at ERDA, Baroda or at any NABL approved laboratory only. After calibration of the meter and on submission of calibration certificate to C.E. (Mat), PGVCL the Dispatch Instruction shall be given. The charges for calibration of L.T. ERS meters shall be **borne by the bidders only.**

31. PACKING AND FORWARDING:

The equipment shall be packed suitably for transport to withstand handling during transport.

Each consignment shall be accompanied with a detailed packing list containing the following information.

- i. Name of the consignee.
- ii. Details of consignment.
- iii. Destination.
- iv. Handling and packing instructions.
- v. Bill of material indicating contents of each package.

The packing shall be done as per the manufacturer's standard practice. However, the supplier should ensure the packing is such that, the material should not get damaged during transit by Rail/ Road/ Sea.

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The marking on each package shall be as per the relevant Standards.

32. QUALIFYING REQUIREMENT

The tender is open to manufacture only who can provide satisfactory evidence to substantiate following:-

- (i) The single phase and three phase portable calibrators shall be supplied strictly as per tender specification, for which they have to submit type test as relevant to IEC / IS .
- (ii) The firm should have ISO 9001 certificate.

Guaranteed Technical Particulars of Single Phase LT Electronic Reference Standard Meter

Sr. No.	Description	PGVCL Requirement	Supplier's Data
1.	Makers name and country	Please specify manufacturer name	
2.	Type of Meter		
3.	Accuracy Class	Specify by supplier	
4.	Basic Current in direct mode Maximum Current	Specify by supplier	
5.	Basic Current with clamp On CT Maximum Current	Specify by supplier	
6.	Parameters Displayed	a Instantaneous Phase voltage b Instantaneous Line current Instantaneous Active Power c Instantaneous power factor d Instantaneous frequency. e Active, energy. f Continuous update of active energy on display. g Time & Date	
7.	Display Resolution	a Voltage b Current : c Power factor : d Energy : e % Error Resolution:	
8.	Connection check	a Missing potential b Missing current c Reverse current if any current is reverse d Over current e Over voltage	

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Sr. No.	Description	PGVCL Requirement	Supplier's Data
9.	Type of Display	Minimum 20 Character x Minimum 2 lines backlit LCD display	
10.	Interfaces	a) RS232 connector for connecting to the PC. b) Scanning Head. c) Remote snap switch to count pulses	
11.	Memory	Minimum 175 test results	
12.	Instantaneous Parameters to be logged in memory during each test	a Serial number of MUT b Consumer identification c Meter Constant of MUT d No. of revolution / pulses for which test is being carried out e Instantaneous Voltage Instantaneous Line Current f Instantaneous frequency g Instantaneous Power Factor h Energy logged by equipment i Test duration j Test time & Date	
13.	Scanning head	Common for rotor mark & LED pulses to sense pulses up to 200 Hz	
14.	Snap Switch	Snap switch to operate equipment remotely	
15.	Dial test facility	Relay output for dial test	
16.	Key Board	16 key Alphanumeric key pad	
17.	Carrying Case	Shall be packed in durable casing suitable for carrying equipment in field area.	
18.	Type Test	Type test report from recognized lab shall be submitted. Without type test reports tender will be rejected.	

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