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Ref No: IIT/ SIIC/Mole/5PositionSingleMeter/BV/17-11-2014

INVITATION FOR QUOTATIONS FOR SUPPLY OF SINGLE PHASE AUTOMATIC ENERGY METER

Brief Description of the Goods	Specifications*	Qty.	Delivery Period	Place of Delivery	Installation Requirement if any
Single Phase 5 Positions Automatic Energy Meter Testing Bench	Mentioned below	01 Unit	20 Days	Central Store, IIT Kanpur	Yes

SPECIFICATION OF 5 POSITION FULLY AUTOMATIC METER TESTING EQUIPMENT FOR TESTING OF SINGLE PHASE METERS

1. OBJECTIVE:

To provide facilities for doing routine, acceptance and certification test (error test and dial test) on 1 phase, 2 wire Energy meters. The following types of single phase Sub Standard Meter of Accuracy class 0.2, 0.5, 1 and 2.0 available with utility can be tested (electronic and electromechanical type).

2. SCOPE:

Design, engineering, manufacture, delivery, installation and commissioning, spares for 2 years smooth running of the system of 5 positions, fully automatic test bench. In addition to above, vendor shall also be required to provide:

- Operations & Maintenance Manuals including drawings.
- Training to at least two personnel from board on all aspects of operation and maintenance.
- Continued technical support during warranty period.
- The Major component like Source, Reference Standard Meter, and digital system of Meter Test System should be only from one manufacture to provide better integrity and after sales of offered product.

3. QUALIFYING REQUIREMENT:

The offer of those tenderers, who fulfill following criteria, will only be considered:

- The bidder should be original manufacturer/sole authorized dealer/accredited representative of manufacturer of the tendered item. In case of dealers/authorized representative, an authorization Letter for quoting in this tender with mentioned tender no. shall be obtained from original manufacturer and submitted along with this bid.



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- II. In case the bidder is not an original Manufacturer, the operating experience of the bidder shall be more than 5 years for supplying and providing after sales support of similar or better equipment to NABL accredited laboratories and power utilities in India.
- III. The bidder should have supplied at least 3 nos. of similar or better equipments of higher capacity during the last three financial years (2011-2012, 2012 - 2013 & 2013 - 2014) to National accredited laboratories or power utilities. Necessary purchase order copies from original equipment manufacturer shall be submitted along with the bid.
- IV. Bidder should have past record of supply of Meter Testing Equipments of similar or better specification to NABL Accredited laboratories like IITs/CPRI/ ERDA and have satisfactory performance. Bidder should submit minimum 5 performance certificate of Meter Test Benches showing satisfactory operation of meter testing equipment for at least 3 years. Purchaser has right to directly contact concerned laboratory regarding performance of the Meter test benches.
- V. The Bidder should declare that he is not been ever black listed /defaulter by any utility/ ESCOMs/Distribution Company/ Laboratories/ Any department of State Government or Centre Government on record of poor performance such as not properly completing the contract, inordinate delays in supply completion, not supplying the items as per commitment of contract etc.
- VI. The Major component like Source, Reference Standard Meter, and digital system of Meter Test System should be only from one manufacture to provide better integrity and after sales of offered product.
- VII. Bidder should have fully equipped technical support office/laboratory for facilities of testing, calibration, adjustment, diagnosis and repair of equipment in India itself. Bidder should have technical support staff posted in India for technical support after sale.
- VIII. The Bidder should have its own service centre and trained engineers dedicated for trouble shooting and technical support permanently posted in India. The bidder shall enclosed necessary proof that he has necessary facility to adjust and calibrate the offered measuring unit within the country and position to take AMC of the offered equipment. List of Plant and Machinery, tools and tackles to carry out service shall be submitted along with offer. In support of that copy of Annual Maintenance Contract (AMC) of minimum 2 Nos. of Energy Meter test benches from power utilities/laboratories shall be submitted.
- IX. The average yearly turnover of bidder of last Three (3) financial years (2011-12, 2012-13 & 2013-14) should not be less than Rs. 1.5.00 Crores. Bidder shall submit notarized audited financial reports for the last two financial years in support of proving the financial standing of the bidder.

Note: Documentary proof furnished in support of Qualifying Requirement shall be Original/Notarized.

4. OPERATING CONDITIONS:

The meter test equipment shall be suitable for giving an uninterrupted service in following conditions:

- a. Ambient temperature (-) 10°C to (+) 45°C for operation and from (-) 10°C to (+) 60°C for storage.
- b. Relative humidity up to 90%.
- c. Mains voltage shall be 3x240V ± 10%.
- d. Frequency 50Hz ± 5 %.
- e. Cabinet for source must be dust proof.

5. APPLICABLE STANDARD

Purpose	Applicable
Meter Testing	IEC 62052-11, 62053-11, 21,22,23
Safety	IEC 61010
Meter Testing Equipment	IEC 60736, IS 12346, IS15707

6. TEST TO BE PERFORMED

The offered meter test system shall be capable to perform the following tests on the meters as per IEC 62052-11, 62053-11, 21, 22, 23

- Pre-warming
- Accuracy test as per IS/IEC
- Starting current test
- Creep test
- Dial test
- Influence quantity test related to accuracy test
 - Voltage, Frequency,
 - Influence of Harmonic component in voltage and current circuit, odd and sub harmonic and Voltage dip and interruption test.

Note: Details of different wave form shall be submitted along with offer.

In addition, the offered meter-testing system shall be capable to perform the following tests on RSS and ERSS under testing using frequency output of built-in ERSS

- Accuracy testing of reference standard used into test system against high precision reference standard
- Accuracy testing of reference standard (low accuracy) against the built in reference standard.

7. CONSTRUCTION AND COMPONENT OF SYSTEM

The complete system shall consist of at least the following essential components, the specifications of which are defined hereinafter in this document:

A source, which shall be microprocessor-based, modular type, of 19" rack design and which shall, at least, have in-built Voltage Amplifier and Current Amplifier, specifications of which are given subsequently in this specification as per clause nos. 8 and 9 respectively.

- Single Phase Reference Meter (ERSS) – clause 10
- Meter Mounting Rack with error display units – clause 12
- Windows based software
- to operate the system - clause 17

The cabinet in which the source and ERSS are housed shall be 19" rack mounted type in which the source and ERSS (including all their components) shall be placed. This cabinet shall have facility for easy opening and closing as and when required, preferably with doors system. Screwed panels which take time in opening / closing shall not be acceptable. Doors shall be lockable to allow access by



authorised personnel only. In the case of closed-type cabinet, a cooling fan of suitable capacity shall be provided to avoid temperature increase inside the cabinet during normal operation.

The cabinet shall have protective earth terminals which shall be earthed during installation at site. The cabinet shall have one mains-switch to switch-off the incoming power supply. The cabinet shall also be protected against overload, under voltage and over voltage through suitable protection devices.

With its doors closed, the cabinet housing the source and ERSS shall provide degree of protection equal to or better than IP-30.

The source shall be easily programmable so as to give:

- a) Reference output frequency independent of mains, with quartz controlled operation range from 40 Hz. to 70 Hz. in steps of 0.01 Hz. with high efficiency, power-factor compensation according to IEC 60555.
- b) Stability at inductive, capacitive and non-linear loads for the power factor.
- c) Protection against overload and short circuit and provision for superimposition of harmonics in the range of 2nd to 20th harmonics.

Power Factor compensation shall be provided as per IEC 60555 so that the meter-testing system shall draw purely sinusoidal current from the mains A.C. supply without polluting it.

8. SPECIFICATION OF VOLTAGE AMPLIFIER:

The voltage amplifier used in the Source shall be a digital resonant switch mode voltage amplifier. It should have closed control conception of the frequency generator for high stability and high precision of test voltage. It should have output VA burden rating not less than 500 VA. The voltage amplifier should have following capabilities and features:

- a. Electronic protection against Overload and Short Circuit
- b. LED indication for faults such as overload, short-circuit, power-supply failure
- c. Efficiency better than 85%.
- d. Stability 100 ppm / h with integration time of 60 seconds
- e. Distortion factor 0.5 %
- f. Maximum possible DC content < 0.05 %
- g. Provision for super- imposition of harmonics in the range of 2nd to 20th harmonics
- h. Test voltage range: 0 - 300 V (Phase-Neutral) with steps of 160 V and 320 V.
- i. Accuracy of the test setting amplitude in closed loop with reference meter 0.05 %
- j. Accuracy of the test setting phase adjustment 0.01°

9. SPECIFICATION OF CURRENT AMPLIFIERS :

10. The current amplifiers used in the Source shall be digital resonant switch mode type amplifiers. It should be closed control conception of the frequency generator for high stability and high precision of test current. It should have output VA burden rating not less than 600 VA. The current amplifiers should have following capabilities and features:

- a. Electronic protection against Overload and Open Circuit.
- b. LED indications for different faults such as overload, open-circuit, failure of power supply.
- c. Efficiency better than 85%.
- d. Stability 100 ppm / h with integration time of 60 seconds
- e. Accuracy of the test setting amplitude in closed loop with reference meter : 0.05 %



- f. Accuracy of the test setting phase adjustment : 0.01 °
- g. Distortion factor : 0.5 %
- h. Maximum possible DC content : <0.05 %
- i. Provision for super- imposition of harmonics in the range of 2nd to 20th harmonics
- j. Test Current range 10 mA to 120 Amps. and facility to generate starting current in the range of 1 mA to 10 mA.

11. SPECIFICATION OF ELECTRONIC REFERENCE STANDARD:

The class of accuracy of reference standard shall be 0.02% or better for active and reactive ranges. Current range of reference standard shall be 1 mA... 120 A direct connected and voltage range from 10 - 500 V (phase - neutral), selectable through PC.

Reference standard shall have auto-range selection facility and facility of dial test (power dosing) and RS 232 serial communication port for communicating with PC. It must frequency output proportional to the power to calibrate against better standard

Technical Data of Reference Standard Meter

a) Measuring modes

- 2 wire active / reactive mode

b) Frequency Range

Basic frequency 15 ... 70 Hz and total detectable frequency range 0...3500 Hz.

c) Voltage Range

10 ...500 V Phase to Neutral

d) Current Ranges

- 1 mA to 120 Amps. (working range)
- 50 mA to 120 Amps. (measurement range)

e) Accuracy

- Voltage : 0.01 % for the range of 30 V to 500 V (P-N)
- Current : 0.01 % (50 mA to 120 A)
: 0.03 % (2 mA to 50 mA)
- Power / Energy (For active and reactive)
: 0.02 % at $\cos \phi = 1$ or $\sin \phi = 1$ (50mA to 120A)
: 0.04 % at $\cos \phi = 0.5$ or $\sin \phi = 0.5$ (50mA to 120A)
: 0.04 % at $\cos \phi = 1$ or $\sin \phi = 1$ (2 mA to 50 mA)

The Accuracy shall be same for Active and reactive measurement

- Phase Angle Accuracy < 0.02 °

A common modular cabinet with door on front and rear shall be used for housing source and reference standard.



f) Display :

The RSM shall have following display following parameters.

- True RMS value of voltage & current input
- Phase angle between voltage / current and defined reference
- Power factor
- Active, reactive & apparent power
- Frequency
- Integration time

g) Integration time

Facility to select integration time between 1 to 99 second shall be provided in the RSM.

h) Operation

Membrane key board with membranes push button to operate the RSM shall be provided in the front of the RSM

i) Reference Channel

The RSM shall have facility to select reference for phase angle measurement. Selection of reference shall be provided manually & automatically.

j) Frequency output :

The bidder shall provide power proportional to frequency output to calibrate the reference standard against high or lower precision reference standard. The output shall be in commonly used BNC type socket.

k) Temperature Coefficient:

Temperature coefficient of the reference meter will be $<10 \text{ ppm /}^\circ\text{C}$.

l) Calibration:

The reference meter shall be provided along with calibration certificate from national/international accredited laboratory.

12. SPECIFICATION OF HARMONIC INJECTION UNIT:

Over the range 2nd to the 20th harmonic to the test voltage and test current, Magnitude of each harmonic shall be adjustable from 0-40% of fundamental wave with maximum peak value of the wave form shall be 130% of the magnitude of the fundamental wave. Facility of controlling the phase angle of harmonics shall be provided (0 to 180 degree). Necessary proof for generation of wave form and desired harmonics shall be submitted along with offer. The offered Equipment shall be capable to generate sub harmonics (as per clause no. 8.2 of IEC62053-21, 22, 23), odd harmonics (as per clause no. 8.2 of IEC62053-21, 22, 23), voltage dips and interruption test (as per clause no. 7.1.2 of IEC62052-11).

11. SPECIFICATION OF METER MOUNTING RACK:

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- a. One no. of Meter Mounting Rack shall consist of a lightweight aluminum frame for mounting of sensor heads, display devices and meters-under-test.
- b. Meters-under-test shall get connected to the voltage and current circuits by means of connecting leads.
- c. Design of the frames should be such that 5 nos. energy meters of any type, single phase meters can be safely and easily accommodated on it.
- d. Necessary BNC type socket to test the ERSS against a precision standard of higher accuracy shall be provided on Meter Mounting Rack.
- e. Necessary BNC type socket or any other suitable arrangement shall be provided on the Meter Mounting Rack to test the inbuilt ERSS against a precision standard of higher accuracy without removing the inbuilt ERSS from the source cabinet.
- f. The Meter Mounting Racks shall be provided with one number of BNC type sockets for the testing of one ERSS of lower accuracy. The offered software shall have facility to test these ERSS in automatic mode by using these BNC type sockets.
- g. Necessary cables shall be provided along with equipment to test ERSS having frequency output on BNC type socket.
- h. There should be a warning lamp and two emergency push-buttons fitted on the each Meter Mounting Rack.

12. SPECIFICATION OF SCANNING HEADS AND ERROR INDICATION UNITS :

- a. 1 photoelectric scanning head for each position suitable for reading the LED pulse output of the meters-under-test shall be provided.
- b. Scanning head shall have mechanical type fixing arrangement. Each scanning head should be designed in such a way that the scanning head can be fixed easily in a position which would facilitate accurate and proper testing of the meter-under-test.
- c. The scanning head should be insensitive to ambient light. It should give optical indication of pulses by LED.
- d. The scanning head must be able to measure LED pulse output (as per IEC 62052-11, clause 5.11) of frequency up to 1 kHz.

An Error Indication Device shall be mounted on each test position. The resolution of error indication shall be 4 ½ digits with decimal point configurable by software. There shall be provision on the error indication unit to reset the error or to repeat it if something is wrong. The same should have acknowledgement function while doing testing of starting current and creep tests manually.

13. SPECIFICATION OF DIGITAL PROCESS UNIT :

For the simultaneous error measurement of 5 meters under test, the basic unit shall be equipped with:

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- i. 5 inputs for scanning head pulses.
- ii. 1 input for reference output
- iii. 1 interface for connection with PC.
- iv. Controlled output for Dosage Operation (Dial Test).

14. MULTI SECONDARY VOLTAGE TRANSFORMER:

The automatic test bench will be supplied with Multi Secondary Voltage Transformer, (the details of which are as follows) connected to the voltage circuit on each test rack, suitable for simultaneous testing of forty meters in close link condition.

Each MSVT shall be supplied according to following specification:

Parameter	Value
No. of windings	(5 + 2 for Reference Meter)
Primary Voltage	220V...240V, 50...60 Hz
Secondary Voltage	220V...240V
Range of secondary burden	4...15 VA
Error prim/sec	$\leq \pm 0,1\%$, ± 2 min
Error between the secondary windings, concerning the a.m. range of secondary burden	$\leq \pm 0,05\%$, ± 0.8 min

15. CONNECTION CABLES:

Apart from connection cable required to install and commission the meter test system itself, supplier shall provide the following set of connection cable for meter under test

Requirement / Meter Type	Qty. (minimum)
Voltage connection cables for phase (one side with omega pin and other side with 2.5 mm safety pin)	5 nos.
Voltage connection cables for neutral (one side with straight pin and other side with 2.5 mm safety pin)	5 nos.
Current connection cables for testing of 1 phase 2 wire meters (5 nos.) both side pin type lug	4 nos.
Current connection cables for testing of 1 phase 2 wire meters (5 nos.) one side pin type lug and other side connection to test bench	2 nos.

16. SPECIFICATION OF COMPUTER SYSTEM (DESKTOP PC, PRINTER, MONITOR, SOFTWARES & ACCESSORIES THEREOF) :

The operating of the test equipment, the display of the actual values, the processing and display of the test results and the print out of the test results, reports etc. should be effected by the associated Desktop PC (Personal Computer) system complete with licensed Windows based operating system, licensed proprietary software of the meter-testing equipment and a LaserJet printer having minimum



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specifications as given below to be supplied along with the meter testing system by the successful bidder.

The Desktop PC (PC) shall be connected to the measuring device and power source and necessary leads and cables for making these connections shall be provided by the vendor at his cost.

The licensed proprietary software of the meter-testing equipment shall be supplied installed on the PC. This software should be Windows based, user- friendly and menu driven, operated with the help of a mouse and keyboard in manual or automatic mode.

The manual mode of operation of the licensed proprietary software of the meter-testing equipment shall allow, at least, performance of the following tasks:

- Controlling of the source
- displaying of test parameters (actual values) on PC screen
- displaying the wave form of output voltage and current and harmonics analysis
- Performance of the accuracy tests

The automatic mode of operation licensed proprietary software of the meter-testing equipment should have different modules to prepare meter test- sequence so as to carry out the testing in fully automatic mode. These modules shall be designed in such a way that user can prepare the test sequence very easily.

The licensed proprietary software of the meter-testing equipment shall allow, at least, performance of the following tasks:

- User interface to operate the system
- Easy to prepare test-tables by using "drag & drop" concept
- Supervision and control of the test procedure
- Supervision and display of the test current and voltage
- Indication of the errors of the meters- under- test
- Evaluation of the test results and generation of test-reports
- Manual testing and automatic testing facility
- Facility to define test parameters in terms of percentage and absolute terms
- Facility to define error limit in two levels
- Facility to protect the system from over voltage in manual mode and automatic mode
- Facility to check meters for short circuit and open circuit conditions prior to starting of the testing in fully automatic mode for each sequence
- Facility to interrupt the testing and restart it again
- Password facility for administrator and operator with different levels
- Print out facility of test-reports with desired header
- Facility to take back-up of data
- Absolute measurement with higher precision / more accurate standard in fully automatic mode using BNC type socket provided on Meter Mounting Rack
- Testing facility of at-least 5 different meters with 5 different constants
- Software shall have facility for display of different output voltages and currents
- Facility to display the curve of test voltage and current in presence of harmonics
- Protection of meters- under- test from high voltage and current

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The licensed proprietary software of the meter-testing equipment shall have facility to display following parameters:

- Voltage
- Current
- Power Factor
- Power (Active, Reactive and Apparent)
- Frequency
- Measurement mode
- Vectorial display

◆ **TECHNICAL DATA FOR PC :**

Processor	:	Core i3/i5/ better
RAM	:	minimum 4 GB DDR
HDD	:	500 GB minimum
Optical Drive	:	48X / 32X DVD / CD RW Combo Drive or better
Keyboard & Mouse	:	USB Multimedia / 107 keys Keyboard or better.
I/O ports	:	Minimum 4 high-speed USB 2.0/3.0 (2 front), Mic-In, Headphone-Out, Line- In, 1 serial, 1 parallel, 2 PS2, One RJ-11, One RJ-45 minimum or better.
Networking	:	Onboard 10/100/1000 Mbps / Gigabit LAN with slot available for adding wireless networking card.
Operation System	:	PC shall be supplied with licensed operating system installed windows 7 or better.
Monitor	:	Minimum 17 inches flat screen, TFT / LCD color monitor, preferably with built-in speakers.
Printer	:	LaserJet Dual, suitable for paper size up to A4.

17. CALIBRATION AND TESTING

The equipment shall be supplied along with the manufacturer's test certificate/s of the individual components of the meter-testing system (excluding the PC system) such as Source, Voltage and Current Amplifiers, ERSS, Harmonics Injection Unit, Meter-Mounting Rack, Scanning-heads, Digital Process Unit, the complete meter- testing system (excluding the PC system), as well as a calibration certificate of the ERSS, valid for at least 12 months from the date of calibration. The calibration certificate of the ERSS shall be issued by any nationally or internationally recognized / accredited laboratory.

18. DOCUMENTATION

One set of following documents shall be supplied along with each test system.

- Operating manual of each components of test equipment like reference standard, amplifier, etc.
- Wiring diagram



- o Calibration certificate of reference standard
- o Test certificate of complete test system

19. INSTALLATION AND COMMISSIONING

The supplier shall be responsible to install & commission the meter test equipment at the purchaser location. The supplier shall submit the layout plan, installation proposal and electric supply requirements within 4 weeks after receiving the purchase order. The Purchaser shall arrange the appropriate room, location, electric supply etc. as defined in IEC 62052-11 before the supply of the system so as to permit the smooth and proper installation of the system immediately upon its delivery to the designated location/s.

20. TRAINING

The supplier shall provide training on operation and maintenance of the meter test equipment to 2 engineers for three days of purchaser.

Guarantee Technical Specification

Desired Specifications	Manufacturers/ authorized dealers/ representatives' comments regarding Compliance/Non-compliance	Remarks if any.
Name and Address of the Manufacturer		
Model		
Qualifying Requirement as per the Clause No.- 3 of Technical Specification		
The Major component like Source, Reference Standard Meter, and digital system of Meter Test System should be only from one manufacture to provide better integrity and after sales of offered product. Bidder Shall specify the name of Make or OEM		
FREQUENCY GENERATOR: 1. Facilities shall be should be available for programming reference output frequency. 2. The operating range shall be 40 Hz to 70 Hz in steps of 0.01 Hz. 3. PF compensation should conforms to IEC 555		
VOLTAGE AMPLIFIER:		





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1. VA rating not less than 500VA
2. Electronic protection against O/L and Short Circuit.
3. LED indication for fault shall be provided on amplifier.
4. Efficiency better than 85%.
5. Stability 100 ppm / h integration time 60 sec
6. Distortion factor 0.5 %
7. Maximum possible DC content < 0.05 %
8. Provision for super position of harmonics in the range of 2nd to 20th harmonic
9. Test voltage range 0 -300 V (Phase-Neutral) with the step of 160 and 320 V.
10. Accuracy of the test setting amplitude in closed loop with reference meter 0.05 %
11. Accuracy of the test setting phase adjustment 0.01 °

CURRENT AMPLIFIER:

1. VA rating not less than 600VA
2. Electronic protection against Overload and Open Circuit
3. LED indications for different faults such as overload, open-circuit, failure of power supply
4. Efficiency better than 85%.
5. Stability 100 ppm / h with integration time of 60 seconds
6. Accuracy of the test setting amplitude in closed loop with reference meter: 0.05 %
7. Accuracy of the test setting phase adjustment : 0.01 °
8. Distortion factor : 0.5 %
9. Maximum possible DC content : < 0.05 %
10. Provision for super- imposition of harmonics in the range of 2nd to 20th harmonics
11. Test Current range 10 mA to 120 Amps. and facility to generate starting current in the range of 1 mA to 10 mA

CONSTRUCTION FEATURES :

1. Source and Reference Standard Must be housed in one cabinet
2. Cabinet must have door in front and rear to provide accessibility and for ease in maintenance.
3. Meter Mounting Racks shall be constructed by Aluminum section

HARMONIC INJECTION UNIT:-



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Over the range 2nd to the 20th harmonic to the test voltage and test current, Magnitude of each harmonic shall be adjustable from 0-40% of fundamental wave with maximum peak value of the wave form shall be 130% of the magnitude of the fundamental wave. Facility of controlling the phase angle of harmonics shall be provided (0 to 180 degree). Necessary proof for generation of wave form and desired harmonics shall be submitted along with offer. The offered Equipment shall be capable to generate sub harmonics (as per clause no. 8.2 of IEC62053-21, 22, 23), odd harmonics (as per clause no. 8.2 of IEC62053-21, 22, 23), voltage dips and interruption test (as per clause no. 7.1.2 of IEC62052-11).

REFERENCE STANDARD METER:

Bidder shall specify make of reference meter:

The class of accuracy of reference standard shall be 0.02% or better for active and reactive ranges. Current range of reference standard shall be 1 mA... 120 A direct connected and voltage range from 10-500 V (phase - neutral), selectable through PC.

Reference standard shall have auto-range selection facility and facility of dial test (power dosing) and RS 232 serial communication port for communicating with PC. It must frequency output proportional to the power to calibrate against better standard.

Technical Data of Reference Standard Meter

a) Measuring modes

- 2 wire active / reactive mode

b) Frequency Range

Basic frequency 15... 70 Hz and total detectable frequency range 0...3500 Hz

c) Voltage Range

10 ...500 V Phase to Neutral



d) Current Ranges

- 1 mA to 120 Amps. (working range)
- 50 mA to 120 Amps. (measurement range)

e) Accuracy

- Voltage : 0.01 % for the range of 30 V to 500 V (P-N)
- Current : 0.01 % (50 mA to 120 A)
: 0.03 % (2 mA to 50 mA)
- Power / Energy (For active and reactive)
: 0.02 % at $\cos \phi = 1$ or $\sin \phi = 1$ (50mA to 120A)
: 0.04 % at $\cos \phi = 0.5$ or $\sin \phi = 0.5$ (50mA to 120A)
: 0.04 % at $\cos \phi = 1$ or $\sin \phi = 1$ (2 mA to 50 mA)

The Accuracy shall be same for Active and reactive measurement

- Phase Angle Accuracy $< 0.02^\circ$

A common modular cabinet with door on front and rear shall be used for housing source and reference standard.

f) Display :

The RSM shall have following display following parameters.

- True RMS value of voltage & current input
- Phase angle between voltage / current and defined reference
- Power factor
- Active , reactive & apparent power
- Frequency
- Integration time

g) Integration time

Facility to select integration time between 1 to 99 second shall be provided in the RSM.

h) Operation

Membrane key board with membranes push button to operate the RSM shall be provided in the front of the RSM

i) Reference Channel

The RSM shall have facility to select reference for phase angle measurement. Selection of reference shall be provided manually & automatically.



<p>j) Frequency output : The bidder shall provide power proportional to frequency output to calibrate the reference standard against high or lower precision reference standard. The output shall be in commonly used BNC type socket.</p> <p>k) Temperature Coefficient: Temperature coefficient of the reference meter will be <10 ppm /°C.</p> <p>l) Calibration: The reference meter shall be provided along with calibration certificate from national/international accredited laboratory.</p>		
<p>SCANNING HEAD:</p> <ol style="list-style-type: none">1. One photoelectric scanning head for each position suitable for reading the LED pulse output of the meters-under-test shall be provided.2. Scanning head shall have mechanical type fixing. Each scanning head should be designed in such a way that the scanning head can be fixed easily in a position which would facilitate accurate and proper testing of the meter-under-test.3. The scanning head should be insensitive to ambient light. It should give optical indication of pulses by LED.4. The scanning head must be able to measure LED pulse output (as per IEC 62052-11, clause 5.11) of frequency up to 1 kHz.		
<p>METER MOUNTING RACK:</p> <ol style="list-style-type: none">a. One no. of Meter Mounting Rack shall consist of a lightweight aluminum frame for mounting of sensor heads, display devices		



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and meters-under-test.

- b. Meters-under-test shall get connected to the voltage and current circuits by means of connecting leads.
- c. Design of the frames should be such that 5 nos. energy meters of any type, single phase meters can be safely and easily accommodated on it.
- d. Necessary BNC type socket to test the ERSS against a precision standard of higher accuracy shall be provided on Meter Mounting Rack.
- e. Necessary BNC type socket or any other suitable arrangement shall be provided on the Meter Mounting Rack to test the inbuilt ERSS against a precision standard of higher accuracy without removing the inbuilt ERSS from the source cabinet.
- f. The Meter Mounting Racks shall be provided with minimum one number of BNC type sockets for the simultaneous testing of minimum one ERSS of lower accuracy. The offered software shall have facility to test these ERSS in automatic mode by using these BNC type sockets.
- g. Necessary cables shall be provided along with equipment to test ERSS having frequency output on BNC type socket.
- h. There should be a warning lamp and two emergency push-buttons fitted on the each Meter Mounting Rack.



MULTI SECONDARY VOLTAGE TRANSFORMER:

The automatic test bench will be supplied with Multi Secondary Voltage Transformer, (the details of which are as follows) connected to the voltage circuit on the each test rack, suitable for simultaneous testing of forty meters in close link condition.

Each MSVT shall be supplied according to following specification:

Parameter	Value
No. of windings	(5 + 2 for Reference Meter) for each rack
Primary Voltage	220V...240V, 50...60 Hz
Secondary Voltage	220V...240V
Range of secondary burden	4...15 VA
Error prim/sec	$\leq \pm 0,1\%$, ± 2 min
Error between the secondary windings, concerning the a.m. range of secondary burden	$\leq \pm 0,05\%$, ± 0.8 min

AA



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CONNECTION CABLES:

supplier shall provide the following set of connection cable for meter under test:

Requirement / Meter Type	Qty. (minimum)
Voltage connection cables for phase (one side with omega pin and other side with 2.5 mm safety pin)	5 nos.
Voltage connection cables for neutral (one side with straight pin and other side with 2.5 mm safety pin)	5 nos.
Current connection cables for testing of 1 phase 2 wire meters (5 nos.) both side pin type lug	4 nos.
Current connection cables for testing of 1 phase 2 wire meters (5 nos.) one side pin type lug and other side connection to test bench	2 nos.

SOFTWARE:

The operating of the test equipment, the display of the actual values, the processing and display of the test results and the print out of the test results, reports etc. should be effected by the associated Desktop PC (Personal Computer) system complete with licensed Windows based operating system, licensed proprietary software of the meter-testing equipment and a Laserjet printer having minimum specifications as given below to be supplied along with the meter testing system.

The licensed proprietary software of the meter-testing equipment shall be supplied installed on



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the PC. This software should be Windows based, user- friendly and menu driven, operated with the help of a mouse and keyboard in manual or automatic mode.

The licensed proprietary software of the meter-testing equipment shall allow, at least, performance of the following tasks:

- User interface to operate the system
- Easy to prepare test-tables by using "drag & drop" concept
- Supervision and control of the test procedure
- Supervision and display of the test current and voltage
- Indication of the errors of the meters- under-test
- Evaluation of the test results and generation of test-reports
- Manual testing and automatic testing facility
- Facility to define test parameters in terms of percentage and absolute terms
- Facility to define error limit in two levels
- Facility to protect the system from over voltage in manual mode and automatic mode
- Facility to check meters for short circuit and open circuit conditions prior to starting of the testing in fully automatic mode for each sequence
- Facility to interrupt the testing and restart it again
- Password facility for administrator and operator with different levels
- Print out facility of test-reports with desired header
- Facility to take back-up of data
- Absolute measurement with higher precision / more accurate standard in fully automatic mode using BNC type socket provided on Meter Mounting Rack
- Testing facility of at-least 5 different meters with 5 different constants
- Software shall have facility for display of different output voltages and currents
- Facility to display the curve of test voltage and current in presence of harmonics



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- Protection of meters- under- test from high voltage and current

The licensed proprietary software of the meter-testing equipment shall have facility to display following parameters:

- voltage
- current
- Power Factor
- Power (Active , Reactive and Apparent)
- Frequency
- Measurement mode
- Vectorial display

TECHNICAL DATA FOR PC:

Processor	: Core i3/i5 / better
RAM	: 4 GB DDR minimum
HDD	: 500 GB minimum
Optical Drive	:48X / 32X DVD / CD RW Combo Drive or better
Keyboard & Mouse	:USB Multimedia / 107 keys Keyboard or better .
I/O ports	:Minimum 4high-speed USB 2.0/3.0 (2 front), Mic-In, Headphone-Out, Line- In, 1 serial, 1 parallel, 2 PS2, One RJ-11, One RJ-45 minimum or better.
Networking	: Onboard 10/100/ 1000 Mbps / Gigabit LAN with Slot available for adding wireless networkng card.
Operation System:	PC shall be supplied with



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licensed operating system installed windows 7 or better.		
Monitor	:Minimum 17 inches flat screen, TFT / LCD, color monitor, preferably with built-in speakers.	
Printer	:LaserJet Dual, suitable for paper size up to A4	

Terms & Condition

1. The scope includes:

- a. Setting up machine in IIT Kanpur.
- b. Initial Installation and configuration.
- c. Training.

2. Bid Price

- a) The contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, initialing, dating and re writing.
- b) All duties, taxes and other levies payable on the raw materials and components shall be included in the total price. **Except Central Excise Duty & CDEC** (custom duty), as IIT Kanpur is exempted from these duty.
- c) Sales tax in connection with the sale shall be shown separately.
- d) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
- e) The Prices shall be quoted in Indian Rupees only.

3. Each bidder shall submit only one quotation.

4. Validity of Quotation

Quotation shall remain valid for a period not less than 60 days after the deadline date specified for submission.

5. Evaluation of Quotations

The Purchaser will evaluate and compare the quotations determined to be substantially responsive i.e. which



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- (a) are properly signed ; and
- (b) Conform to the terms and conditions, and specification

The Quotations would be evaluated separately for each item

Sales tax in connection with sale of goods shall not be taken into account in evaluation.

6. Award of contract

The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive (includes technically suitable) and who has offered the lowest evaluated quotation price.

- 6.1 Notwithstanding the above, **the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.**
- 6.2 The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.
7. Payment shall be 90% against the delivery and 10% after satisfactory installation & configuration.
8. Warranty/ guarantee shall be 60 months to the supplied goods.
9. You are requested to provide your offer latest by 2.30 p.m. hours on 27/11/2014
10. We look forward to receiving your quotations and thank you for your interest in this project.



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FORMAT OF QUOTATION *

Sl. No.	Description Goods	Specifications	Qty.	Unit	Quoted Unit Rate in Rs.	Total Amount	
						In Figures	In Words
	TOTAL						
	Sales Tax						

Gross Total Cost : Rs.

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs.(amount in figures) (Rs. amount in words) within the period specified in the Invitation for Quotations.

We also confirm that the normal commercial warrantee/guarantee of 60 months shall apply to the offered goods.

Signature of Supplier

SPECIAL CONDITION

1) Authorization from Manufacturer

In the case of a Bidder offering to supply goods under the contract which the Bidder did not manufacture or otherwise produce, the Bidder has been duly authorized by the goods' Manufacturer or producer to supply the goods in India.



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- 2) **Proof of Manufacturing and past performance.**
Details of experience and past performance of the bidder on equipment offered and on those of similar nature within the past one years and details of current contracts in hand and other commitments.

Dr. B.V Phani

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