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TECHNICAL SPECIFICATION OF PORTABLE ELECTRONIC REFERENCE SUBSTANDARD ENERGY METER (ERS METER) FOR LT THREE PHASE ENERGY METERS:-

1.0 SCOPE:-

A portable lightweight electronic precision portable energy meter testing equipment which shall be capable of testing and calibration of all type of LT single phase, 3 phase, 4 wire whole current and CT operated induction as well as electronic Active, Reactive and Apparent Energy Meters at lab & site. The specification covers the design, manufacturing, testing and supply of high accuracy class 0.2 precision LT ERS meters in direct Mode up to 5 A. In Clamp on CT mode accuracy Class should be 0.2 accuracy class, Up to 200 Amp.

The PCB of equipment shall be manufactured using surface mounting technology.

2.0 SERVICE CONDITIONS: -

Equipment to be supplied against this order shall be suitable for satisfactory continuous operation under the following tropical conditions:

- | | |
|--|------------------|
| (a) Maxi. Amb. Temp. | 50 °C |
| (b) Maxi. Temp. in shade | 45 °C |
| (c) Mini. Temp. of air in shade | 3.5 °C |
| (d) Relative Humidity | 10 to 95 |
| (e) Maxi. Annual Rainfall | 1450 MR |
| (f) Maxi. Wind pressure | 150 Kg. Sq. Mtr. |
| (g) Maxi. Altitude above sea level | 1000 meter |
| (h) Moderately hot & Humid tropical Climate – conducive to pest & fungus growth. | |

3.0 APLICABLE STANDARDS IEC 60687/92 and IS 14697

Equipment meeting with the requirement of other authoritative standards, which ensure equal or better quality than this specification, shall also be considered. When the equipment offered by the tender confirm to other standard, salient point of difference between the standard adopted & this specification shall be clearly brought out. The copies of such standards, in English authentic translation shall be furnished along with the offer.

4.0 APLICATION: LT

ERS meters are suitable for Lab/site testing of LT 3 ph. 4 wire tri vector meter/electronic/electro-mechanical meters and single phase meters as mentioned in the scope. The testing should be possible with phantom load available at Lab. also.

5.0 SUPPLY SYSTEM :-

- | | |
|--------------------|---|
| (A) Supply Voltage | 415 V +/- 30% (Ph to Ph)
3 ph 4 w |
| (B) Frequency | 50 HZ +/- 10% |
| (C) Basic Current | 5Amp in direct mode and 200Amp. with Clamp on CTs mode. |

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(D) Working Range	0.1 % to 120 % Ib
(E) PF range	0.lag – UPF-0 lead (4 quadrant)
(F) Temp. Coefficient	0.01% per degree centigrade.

6.0 DISPLAY: -

The meters shall have 20 characters x 4 lines or bigger display to display test parameters.

6.0 DISPLAY: -

The meters shall have suitable LCD Display with backlit facility. The parameters to be displayed should be selected through front panel switch. Following parameters are to be displayed.

- | | |
|-------------------------|--|
| (a) Phase parameters | Per phase voltage
Per phase active, reactive and line current & PF of individual phase (Lag/Lead) Line Frequency. |
| (b) Instantaneous power | KW, KVA, KVAR(with lag/lead indication) |
| (c) Energy Consumption | KWH/WH, KVARH/VARH (with lag/lead indication), KVAH/VAH. |
| (d) Date and time | |
| (e) Tampering features | (i) Missing potential
(ii) Missing Current
(iii) Reverse current
(iv) Phase sequence-forward & reverse. |

7.0 (a) DISPLAY RESOLUTION:-

Minimum resolution for various parameters will be as follows.

Voltage -	0.01V
Current -	0.001A
Power Factor -	0.001
Energy -	0.001 (WH/VARH/VAH)
Inst. Load -	0.001 (KW/KVAR/KVA)

(b) Measurement Mode:-

The ERS shall have the following measurement modes to test LT CT operated meters & direct connected type meters.

- (i) To test LT CT operated meter bigger clamp on CT shall be provided on the equipment. The inside diameter of the CT shall be of 50mm.
- (ii) Clamp on CT mode Three Clamp on Type CT shall be provided along with ERS to test direct connected meters without disconnecting them from the circuit. The measuring mode shall be selectable by using key board of the equipment. The static portable reference energy meter should not get damaged if 150% high rated current is applied for 30 minutes i.e. CT's should not be saturated up to 150% of the high rated current.

8) ACCURACY

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The accuracy shall be sufficient in any condition for-testing KHW meter of accuracy class 0.5 & 1 and confirming to IS 13010 , IS 13779 & IS 14697 . The accuracy class shall be as under for LT ERS meter.

1. In direct mode : 200 mA to 5 A - 0.2 accuracy class &
50 mA to 200 mA - 0.5 accuracy class
2. In Clamp CT mode : 10 A to 200 A - 0.2 accuracy class &
2 A to 10 A - 0.5 accuracy class

9) STARTING CURRENT: 0.01 IB at UPF

10) POWER LOSS: 10 VA per phase

11) CONSTRUCTIONAL FEATURES

- 11.1 Errors are displayed directly with the help of bright LCD display.
- 11.2 The instantaneous value of per phase voltage, per phase current, instantaneous PF, Active/reactive/apparent power, frequency, phase sequence etc. shall be obtained by pressing the push -bottom.
- 11.3 Alphanumeric keyboard shall be provided for testing, for entering meter Sr. No. Consumer identification number, meter constant, CT Ratio of meter under test, test revolution, Alphabets. Decimal & for other functions like result, enter, delete & shift.
- 11.4 The ERS meter shall have memory to record the test date. The error data up to at least 200 tests, shall be stored in meter memory and these can be down loaded to computer using communication cord/pot (RS 232) so that print outs of test results can be taken out with compatible software. The test data stored in the memory of the ERS shall not be lost by roll over mode but after the memory is exhausted it should flashed the message on the LCD display. Test result should be with date and time.
- 11.5 The ERS meter shall be provided with optical sensor head for sensing red mark of rotating disc or pulsing LED of static meter.
- 11.6 The meter shall be suitable for testing single phase and 3 phase 4 wire connection solidly earthed & capable of testing meter supplying balanced, unbalanced loads of all PF ranging from zero leg. UPF and zero lead PF.
- 11.7 Meter shall have facility to display the readings directly.
- 11.8 Suitable arrangement shall be provided to test in direct Mode up to 5 A. and in Clamp on CT mode up to 200 Amp on front panel & meter shall comply the requirement of relevant standards of different load & PF errors.
- 11.9 Meter shall be provided with suitable leads for safe/quick connections and insulated leads for current/voltage connection. The leads should be capable of being connected to the meter test terminal block of the meter.
- 11.10 A selector switch is to be provided for selecting single or three phase system.
- 11.11 The meter shall have test output in the form of blinking LFD to be provided to test its own accuracy.
- 11.12 Self diagnose feature LCD test is required to be provided on meter's display to indicate the healthiness of all segments of LCD display.
- 11.13 The ERS meter derives its power from main voltage only and does not need any battery back up for its operation or data storage.
- 11.14 Meter may be fitted in brief case. (i.e. of standard make like VIP, Safari, Aristrocate etc.)
- 11.15 Snap switch for Start/stop of meter shall be provided. Start/stop operation should be possible from key board also in absence of snap switch.

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11.16 One set of potential and current leads to be provided.

11.17 A complete 3 meter long power cord, connecting 3 terminals/plugs.

11.18 Any other accessory required to the extra pollution of specified measuring capabilities of sub standard ref. Meter.

12) ADDITIONAL INDICATIONS

Provision shall be made for the following additional indications.

(i) The energy flow direction.

(ii) Warning for over load beyond the limits specified in the voltage & current circuits.

13) AUXILIARY POWER SOURCE:

The auxiliary power source shall be supplied to the device by the 50 Hz net work at 240 V or device shall have facility to power up with the help of long range power supply. In any case auxiliary power consumption of the device shall be less than 30 VA.

14) ELECTROMAGNETIC COMPATIBILITY

The equipment shall be fully protected against electromagnetic interference, introduced through the connection cable, through capacitive or inductive coupling or by radiated electromagnetic compatible shall be within the limits specified in IEC 60687/92 & IS-14697

15) ERS meter shall have snap switch optical scanning head for counting number of revolution /pulse output of meter under test.

16) Adequate protection fuses or otherwise should be provided in particulars for current circuit.

17) The Provision for direct print out of the error of meter under test starting errors, date, time and meter Sr. No. shall be in built feature of the equipment.

18) Shock and Vibration Protections.

19) The equipment shall be immune to impact, vibration and bumping due to transport. It shall be within the limits specified in IEC 687/92 or IS 11426 & IS-14697

20) DIELECTRIC STRENGTH

The equipment shall be capable to withstand between circuits, and between circuits and case 2000 VAC 50 HZ.

21) TEST CERTIFICATE

Routine test report, calibration certificate & operation manual is to be provided along with equipments.

22) TYPE TEST REPORT

The tender shall have to submit type-test report carried out as IEC-60687/92 & IS 14697 at Govt. approved Laboratory, NPL, Delhi or equivalent along with offer. No time limit will be given for submission. The offer without type test report shall be ignored.

23) 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

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- 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

24) 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.**

25) 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.

26) 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.

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

27) GUARANTEE

The L.T ERS meters shall be guaranteed for five years from the date of receipt in PGVCL Store. Any defects observed during guarantee period shall be required / rectified / replaced by the bidders free of cost.

28) AFTER SALES SERVICE

The bidder has to indicate clearly what type after sales service will be provided within guarantee period and outside guarantee period and address of Sales service central, details of Engineers shall be submitted with offer.

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Guaranteed Technical Particulars of Three 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	<ul style="list-style-type: none"> a Instantaneous voltage of each phase b Instantaneous Line current of each phase c Instantaneous Active current of each phase d Instantaneous Reactive current of each phase e Simultaneous display of Active , Reactive and Apparent power f Instantaneous power factor of each phase & total power factor. g Instantaneous frequency. h Phase sequence. i Active, Reactive (lag / lead) and apparent three phase energies. j Continuous update of active, reactive (lag/ lead), and apparent energies on display. k Date & Time 	
7.	Display Resolution	<ul style="list-style-type: none"> a Voltage : b Current : c Power factor : d Energy : e % Error Resolution: 	
8.	Connection check	<ul style="list-style-type: none"> a Missing potential b Missing current c Reverse current if any current is reverse d Phase sequence Forward or Reverse e Over current f Over voltage 	

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Sr. No.	Description	PGVCL Requirement	Supplier's Data
9.	Type of Display	Minimum 20 Character x Minimum 4 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 200 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 of each phase f Instantaneous Line Current of each phase g Instantaneous reactive current of each phase h Instantaneous frequency i Instantaneous Power Factor j Energy logged by equipment k Test duration l Test Date & time	
13.	Scanning head	Common for rotor mark & LED pulses to sense pulses minimum 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 Aluminum or suitable rigid casing	
18.	Type Test	Type test report from recognized NABL lab shall be submitted. Without type test reports tender will be rejected.	

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