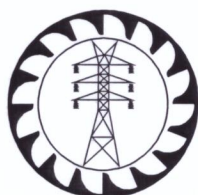


084: 2021

CEB  
SPECIFICATION

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**PORTABLE SINGLE /THREE PHASE  
METER TESTING EQUIPMENT**



**CEYLON ELECTRICITY BOARD  
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## SPECIFICATION FOR PORTABLE SINGLE/ THREE PHASE METER TESTING EQUIPMENT

### 1.0 SCOPE

This Specification covers the general requirements of the design, manufacture, testing, supply and delivery of;

- (i). Portable Single Phase Meter Testing Equipment (MTE) suitable for onsite testing with/ without portable printer.
- (ii). Portable Three Phase Meter Testing Equipment (MTE) suitable for onsite testing of 3 Phase 4 wire and 3 Phase 3 wire energy meters with/ without portable printer.

### 2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	400 V	11 kV	33 kV
(b)	System highest voltage ( $U_m$ )	415 V	12 kV	36 kV
(c)	System frequency	50 Hz		
(d)	Method of earthing	Effectively earthed	Effectively earthed	Non-Effectively earthed
(e)	System fault level	25 kA	12.5 kA	16 kA

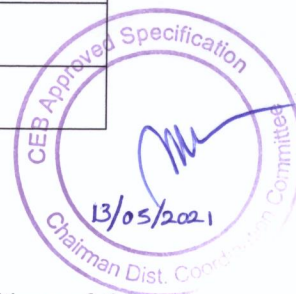
### 3.0 SERVICE CONDITIONS

(i).	Annual average ambient temperature	30 °C
(ii).	Maximum ambient temperature	40 °C
(iii).	Maximum relative humidity	90%
(iv).	Solar Radiation	4.5 kWh/m <sup>2</sup> /day
(v).	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(vi).	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(vii).	Isokeraunic (Thunder days) level	100 days

### 4.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

(a)	IEC 60529:1989	Degrees of protection provided by enclosures (IP Code)
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(b)	IEC 61140:2016	Protection against electric shock - Common aspects for installation and equipment
(c)	IEC 60736:1982	Testing equipment for electrical energy meters
(d)	IEC 61010-2-032 (2019)	Safety requirement for hand-held current clamp for electrical measurement and test
(e)	IEC 61326-1: 2020	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

Material conforming to other International Standards which are not less stringent than the Standards stipulated above may be offered. When such alternative Standards are used, reference to such Standards shall be quoted and English language copies of such Standards shall be provided with the offer.

**However, in the event of discrepancy, details given in this CEB specification supersede above standards.**

## 5.0 BASIC FEATURES

### 5.1 Design

- a) The portable single/ three phase meter testing equipment (MTE) shall be of the static, programmable type suitable for operation on low voltage single/three phase supply. In addition, it shall have:
  - (i). Fuse protected power supply.
  - (ii). Internal clock to record time with password protection. Precision of the clock shall retain for the life span of the MTE.
  - (iii). Possibility to test meters when there is bi-directional energy flow in single phase supply/ different phases of three phase supplies (e.g.: in case of distributed generation).
- b) The MTE shall be suitable for testing:
  1. For single phase MTE:
    - i. Single phase electronic/ electromechanical meters of accuracy class 2 and Class 1.
  2. For three phase MTE:
    - i. Electromechanical (Ferraris) meters of accuracy class 2 and Class 1 having rotating disc.
    - ii. Three Phase Static meters 440V four wire, Direct Connected (up to 100 A) and CT Connected (1A or 5A), conforming to IEC 62053-21, IEC 62053-22 and IEC 62053-24 of accuracy class 1 and 0.5S for active energy and accuracy class 2 for reactive energy respectively having light emitting diodes. In case of CT Connected meters primary current shall be up to 2,000A.





- iii. Three Phase Static meters 110V three wire CT/VT Connected conforming to IEC 62053-22 and IEC 62053-24 of accuracy class 0.2S for active energy and accuracy class 1S for reactive energy respectively having light emitting diodes. CT primary current shall be up to 400A and secondary current shall be 1A or 5A.
- c) The MTE shall have the following features;
- (i). An input for scanning head, which can be used for sensing of disc revolutions in the electro-mechanical meters and indicating LED in static meters.
  - (ii). Keys to enter the following data and information
    - Meter Number, Customer Account No and Address
    - Accuracy class of the meter
    - Meter Constant (Revolutions/kWh or pulses per kWh)
    - Current/Voltage Transformers ratios, etc.
    - Configuration Method
    - Energy Reading for dosage test
  - (iii). Start stop button to check the meter accuracy without scanning head.
  - (iv). The MTE shall be capable to display Voltage, Current, Power factor, Power (active, reactive & Apparent), Phase Diagram, Harmonic %, THD, Waveform, Accuracy Result and Harmonic Chart.
  - (v). Facility to check the connection of installed meters at site (through vectoral display).
  - (vi). Storage of test results, electrical parameters, meter constant, no of revolutions etc.
  - (vii). Retrieval of stored data through USB interface and download into PC.
  - (viii). Should have facility to store at least 300 test results and retrieve saved data.
  - (ix). The MTE shall be of rugged construction, lightweight and shall be of portable and compact type. The MTE 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 specially;
    - Personal safety against electric shock and effects of excessive temperature.
    - Safety against spread of fire
    - Protection against penetration of solid objects, dust and water
  - (x). The MTE shall be designed in such a way that they shall not conduct or radiate noise, electromagnetic disturbance and electrostatic discharge which could damage or influence the meter.



d) The MTEs shall fulfil following technical requirements.

	Requirement	Single phase MTE	Three phase MTE
(i).	Operating Voltage Range (V)	230V $\pm$ 10% (Phase to neutral)	230 $\pm$ 10% Phase to Neutral for testing Direct and CT connected meters 110 $\pm$ 10% Phase to Phase for testing CT/VT connected meters
(ii).	Operating Current Range (A) a) For direct measurement b) With clamp on CT – Fixed jaws c) With clamp on CT – Flexible	N/A 0.5 – 80 N/A	0.005 - 6 0.5 -100 100 – 2,000 (CT diameter should be large enough to accommodate three 300 mm <sup>2</sup> cables and with a minimum probe length of 400mm)
(iii).	Accuracy of power/ energy measurement %	$\leq 0.2$	$\leq 0.1$ (For direct measurement) $\leq 0.2$ (Overall accuracy with CT clamps up to 100A)
(iv).	Measuring Modes	Single-phase two-wire kWh	3 Ph. Four wire kWh and kVAR 3 Ph Three wire kWh and kVAR (Provision shall be made for quick and easy selection of the measuring modes.)
(v).	Accuracy of energy measurement with clamp on CT		0.2
(vi).	Interface		USB

## 5.2 Accessories

Following accessories shall be supplied along with the meter testing equipment.

- i. 1 No. Scanning head suitable for sensing of rotor mark of Ferrari wheel meters and LED of static meters. Suitable clamping components for clamping the scanning head to the meter.
- ii. Clamp on CT
  - a. For single phase MTE: One number of Clamp-on type current transformers (CT) to measure a maximum of 80 Amp and suitable for use with cables of overall diameter up to 12mm, and the CT leads shall be provided for testing meters without interrupting the power supply.
  - b. For three phase MTE: 3 Nos. Clamp on CT to measure current up to 100 Amp for testing the direct connected meters without interrupting meter connection. Minimum CT hole diameter shall be 12mm.
- iii. Flexible CT
  - a. For three phase MTE: 3 Nos. Flexible CT to measure current up to 2000 Amp (for





testing of CT operated meters without interrupting meter connection). Minimum probe length shall be 400mm.

- iv. All necessary leads with quick connecting terminals.
- v. Power supply cable to power up the MTE during data download.
- vi. USB interface cable for data download.
- vii. PC Software (which is compatible with MS Windows 7 or Higher environment) for handling the stored results to use in multiple computers. This software shall be suitable for data download and analysis testing results, electrical parameters (like voltage, current, power factor, power, meter constant etc. Future updates if any shall be provided free of charge.
- viii. Hard carrying case for instrument and accessories, suitable for carrying out field test and to prevent damage during transit.
- ix. A 230V portable printer (Thermal Printer) with necessary connecting leads (to take the printouts of the test results in the field) shall also be provided **if specified in the Price Schedule.**

## 6.0 REQUIREMENTS FOR SELECTION

### 6.1 Quality Assurance

The manufacturer shall possess ISO 9001:2015 or latest Quality Assurance Certification for the design, manufacture of MTEs. The certificate shall be valid throughout the delivery period of this bid. In the event the meters are manufactured in a plant under the license of the manufacturer, the manufacturing plant shall possess ISO 9001:2015 or latest Quality Assurance Certificate for manufacturing and testing of Programmable Static Energy Meters. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer

### 6.2 Manufacturing Experience

The manufacturer shall have minimum of 10 years' experience in manufacturing MTEs of accuracy class 0.2 or better. The manufacturer shall have supplied MTEs similar to the offered, to minimum of 5 Electricity Authorities/Utilities out of which at least 3 are from outside the country of manufacture during last 5 years.

The manufacturer shall furnish a list of Authorities/Utilities to whom meters were supplied during the past 5 years, indicating their names, addresses and contact details clearly. The purchaser reserves the right to communicate with Electricity supply authorities/utilities to whom meters have been supplied with regard to the performance of the meters.

If the manufacturer has supplied similar items to CEB for the last 5 years with proven sales records; without any adverse performance records, such manufacturers will be exempted from above requirements.



### 6.3 Test Certificates

Following test certificates issued by an independent accredited laboratory, shall be furnished with the offer;

- i. Test certificates to conform the technical requirements of the MTEs indicated in clause 5.1.
- ii. Calibration Certificate of formally supplied equipment of same model.
- iii. Calibration Certificates of Equipment used to calibrate the Meter Testing Units being manufactured.

### 6.4 Spares

The manufacturer shall provide at least an additional set of Clamp on CTs (operating current range as applicable according to clause 5.1 d (ii)) for every 10 equipment or part there of purchased.

## 7.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The following shall be furnished with the offer.

- a) Technical details in English clearly identifying the offered items, but not limited to:
  - i. The Comprehensive catalogues,
  - ii. The dimensional drawings,
  - iii. Schematic diagrams,
  - iv. Calculations, graphs and tables
  - v. Literature describing the operational features
  - vi. A copy of the manual of the software.
  - vii. Video demonstration
- b) ISO 9001:2015 or latest Quality Assurance Certificate in accordance with clause 6.1.
- c) Manufacturer shall furnish a list of supplies with supplied item, purchaser (specifying address contact persons and contact details, country), year & quantity to prove his manufacturing experience and outside the country sales in accordance with Clause 6.2.
- d) Test Certificates in accordance with the clause 6.3.
- e) Duly filled and signed relevant annexes
- f) Other relevant Technical Details, protection operating curves and Calculations.

**Not furnishing above documents and details may result in offer being rejected.**





## 8.0 PERFORMANCE GUARANTEES AND WARRANTY

### 8.1 Warranty

Manufacturer shall provide 3-year warranty to CEB for the MTEs and accessories from the date of FOB dispatch of the meters to CEB stores. Manufacturer should forward the duly signed Warranty Certificate together with the letter of acceptance of the award.

If MTEs become defective within the warranty period, they shall be replaced or repaired free of charge by the supplier. Further, the manufacturer shall guarantee to provide necessary spares and after sales services to ensure trouble-free operation of the equipment for a period of 5 years.

## 9.0 DOCUMENTS TO BE SUBMITTED WITH DELIVERY

- i. Operating manual of equipment in English
- ii. Operating manual of software in English
- iii. Calibration and test certificates of each equipment

## 10.0 SAMPLES

Not applicable.

## 11.0 INSPECTION AND TESTING

Depending on the choice of the applicable standards, relevant Routine/Functional Test Certificates conforming to, but not limited to, standards in clause 4.0 shall be furnished for the observation of the Engineer appointed by the CEB at the time of inspection unless CEB waive off the inspection. In addition, the routine test certificates shall be sent with the shipment of the items.

## 12.0 PACKING AND LABELING/MARKING

### 12.1 Packing

Each MTE shall be suitable packed separately in a bio-degradable packing material to withstand rough handling and carry a label indicating the name of item, model/type No. etc.

### 12.2 Identification and Labelling/Marking

Every meter testing equipment shall be provided with a Name - plate incorporating the following minimum information as applicable:

- a) Words "Property of CEB" with warranty period shall be marked on the nameplate.
- b) A serial number (which will be indicated at the time of placing the order)
- c) Ratings: voltage U0/U (Um)/ current / size / capacity
- d) Standard adopted
- e) Model no.



- f) Year of manufacture, manufacturer's name or trade mark

### 13.0 ANNEXES

- Annex – A1: Schedule of Technical Requirements and Guaranteed Technical Particulars  
(For Portable Single Phase Meter Testing Equipment)
- Annex – A2: Schedule of Technical Requirements and Guaranteed Technical Particulars  
(For Portable Three Phase Meter Testing Equipment)
- Annex – B: Non - Compliance Schedule



**Annex A1 - SCHEDULE OF TECHNICAL REQUIREMENTS AND GUARANTEED TECHNICAL PARTICULARS (For Portable Single Phase Meter Testing Equipment)**

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer)

		Offered
1.	Name of the Manufacturer	
2.	Country of the Manufacture	
3.	Model No./ Catalogue Ref. No.	
4.	Applicable Standards	
5.	Supply Voltage range (Phase to Neutral) V	
6.	Current Range	
	a) For clamp on CT measurement – Fixed jaws A 0.5 – 80	
7.	Accuracy of Power/Energy measurement % $\leq 0.2$	
8.	Display size mm x mm	
9.	Power Losses	
10.	Operating Temperature range	
11.	Degree of protection (IP Category)	
12.	Insulation level	
	(a) Insulation withstand voltage for 1 min. Yes/No	
	(b) Impulse withstand voltage Yes/No	
13.	Whether the MTE is programmable? Yes/No	
14.	Whether the MTE is suitable for field-testing of Static meters specified in clause 5.1 b) 1	
15.	Whether the MTE is capable of displaying instantaneous voltage, current, power factor and parameters specified in clause 5.1 c) iv?	
16.	No of test results which can be stored and retrieved? Minimum 300	
17.	Whether the software conform to Clause 5.2 vii?	
18.	Type of the interface provided? USB	
19.	Whether the accessories as per Clause 5.2 provided?	
20.	Weight of the equipment kg	
21.	Whether the calibration certificate of same equipment could be provided? Yes/ No	
22.	Whether the marking as per Clause 12.2 provided? Yes/ No	
23.	Whether a certified copy of ISO 9001:2015 or latest furnished with the offer?	
24.	Whether the entire Test Certificates in accordance with clause 6.3 furnished with the offer?	
25.	Whether spares in accordance with clause 6.4 furnished with the offer?	
26.	Whether the information requested in clause 7.0 furnished with the offer?	
27.	Whether the display is non-volatile memory type?	



28.	Memory retention period (months)	
29.	Whether the Acceptance tests as per clause 11.0 is carried out by the manufacturer?	
30.	Guaranteed Life Span of MTEs and accessories	
31.	Warranty for MTEs and accessories	Minimum 3 years
32.	Whether the manufacturer shall guarantee to provide necessary spares and after sales services to ensure trouble-free operation of the equipment for a period of 5 years as per clause 8.1	Yes

.....  
**Signature of the Manufacturer and seal**

.....  
**Date**

**I/We certify that the above data are true and correct**

.....  
**Signature of the Bidder and seal**

.....  
**Date**



**Annex A2 - SCHEDULE OF TECHNICAL REQUIREMENTS AND GUARANTEED TECHNICAL PARTICULARS (For Portable Three Phase Meter Testing Equipment)**

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer)

		Offered
1.	Name of the Manufacturer	
2.	Country of the Manufacture	
3.	Model No./ Catalogue Ref. No.	
4.	Applicable Standards	
5.	Supply Voltage range (Phase to Neutral and Phase to Phase) V	
6.	Current Range	
	b) For direct measurement A 0.005 - 6	
	c) For clamp on CT measurement – Fixed jaws A 0.5 -100	
	d) For clamp on CT measurement – Flexible A 100 – 2,000	
7.	Accuracy of Power/Energy measurement	
	a) For direct measurement % $\leq 0.1$	
	b) For clamp on CT measurement (up to 100A) % $\leq 0.2$	
8.	Display size mm x mm	
9.	Power Losses	
10.	Operating Temperature range	
11.	Degree of protection (IP Category)	
12.	Insulation level	
	(c) Insulation withstand voltage for 1 min. Yes/No	
	(d) Impulse withstand voltage Yes/No	
13.	Whether the MTE is programmable? Yes/No	
14.	Whether the MTE is suitable for field-testing of:	
	a) Electromechanical meters of accuracy class 1 and class 2 having rotating disc in clause 5.1 b) 2 i	
	b) Static meters specified in clause 5.1 b) 2 ii	
	c) Static meters specified in clause 5.1 b) 2 iii	
15.	Whether the MTE is capable of displaying instantaneous voltage, current, power factor and parameters specified in clause 5.1 c) iv?	
16.	No of test results which can be stored and retrieved? Minimum 300	
17.	Whether the software conform to Clause 5.2 vii?	
18.	Type of the interface provided? USB	
19.	Whether the accessories as per Clause 5.2 provided?	
20.	Weight of the equipment kg	
21.	Whether the calibration certificate of same equipment could be provided? Yes/ No	

22.	Whether the marking as per Clause 12.2 provided?	Yes/ No	
23.	Whether a certified copy of ISO 9001:2015 or latest furnished with the offer?		
24.	Whether the entire Test Certificates in accordance with clause 6.3 furnished with the offer?		
25.	Whether spares in accordance with clause 6.4 furnished with the offer?		
26.	Whether the information requested in clause 7.0 furnished with the offer?		
27.	Whether the display is non-volatile memory type?		
28.	Memory retention period (months)		
29.	Whether the Acceptance tests as per clause 11.0 is carried out by the manufacturer?		
30.	Guaranteed Life Span of MTEs and accessories		
31.	Warranty for MTEs and accessories	Minimum 3 years	
32.	Whether the manufacturer shall guarantee to provide necessary spares and after sales services to ensure trouble-free operation of the equipment for a period of 5 years as per clause 8.1	Yes	

.....  
**Signature of the Manufacturer and seal**

.....  
**Date**

**I/We certify that the above data are true and correct**

.....  
**Signature of the Bidder and seal**

.....  
**Date**





### Annex B - NON-COMPLIANCE SCHEDULE

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....  
Signature of the Manufacturer

.....  
Date

I/We certify that the above data are true and correct

.....  
Signature of the Bidder and seal

.....  
Date

