

**HEDNO S.A.
SPECIFICATION**

**PORTABLE REFERENCE STANDARD
ELECTRICITY METER**

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**Issued by the
Metering Branch**

Network Department

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TECHNICAL SPECIFICATION
PORTABLE REFERENCE STANDARD ELECTRICITY METER

SCOPE

This specification determines the manufacturing, the operational, the physical and the electrical specifications, the tests and packaging for transportation and delivery to HEDNO warehouses of Portable Reference Standard Electricity Meter.

OPERATING CONDITIONS

1. The portable reference standard electricity meter should be able to operate and be stored in the following operating conditions:

Minimum ambient temperature	-10°C
Maximum ambient temperature	50°C
Minimum Storage Temperature	-20°C
Maximum Storage Temperature	60°C
Maximum relative humidity	95%

STANDARDS

2. The portable reference standard electricity meter shall be industrial products manufactured according to this Technical Specification, the International EN/IEC/ISO Regulations /Standards and Directives mentioned in the table below, as they apply on the day of the bids submission.

STANDARD/ REGULATION	TITLE
IEC EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
IEC EN 62053-24	Electricity metering equipment (a.c.) - Particular requirements - Part 24: Static meters for reactive energy at fundamental frequency(classes 0,5 S, 1 S and 1)
IEEE 1459	Standard Definitions for the Measurement of Electric Power Quantities Under Sinusoidal, Non-sinusoidal, Balanced, or Unbalanced Conditions.
EN/IEC 60529	Degrees of protection provided by enclosures (IP Code)
EN/IEC 61326	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

ISO 9001	Quality management systems – Requirements
ISO 17025	General requirements for the competence of testing and calibration laboratories
2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility Directive
2002/95/EC	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
93/465/EEC	"CE" conformity marking

3. Whenever the requirements of this Specification contradict with the above editions of International Regulations / Standards or any other relevant Standards, the corresponding HEDNO specification shall prevail.
4. The portable reference standard electricity meter shall have markings according to the European Standards and they are particularly required to have the "CE" conformity mark.

GENERAL

5. The portable reference standard electricity meter shall be used for on-site testing of:
 - 5.1. 1-phase supplies with a direct meter (2-wires, 1x 100A/ 1x 230V AC).
 - 5.2. 3-phase supplies with a direct meter (4-wires, 3x100A and 3x230/400V AC)
 - 5.3. 3-phase supplies with a CT meter (4-wires, 3x1/5A and 3x230/400V AC)
 - 5.4. 3-phase supplies with a CT &VT meter (3-wires, 2x1/5A and 2x100V AC)
 - 5.5. 3-phase supplies with a CT &VT meter (4-wires, 3x1/5A and 3x57/100V AC)
6. The portable reference standard electricity meter shall have an auxiliary supply input range of at least:
 - 6.1. 50 to 300 VAC @ 47- 63 Hz
 - 6.2. 65 to 423 VDC
7. The power supply input of the portable reference standard electricity meter shall withstand at least up to 500 VAC (phase to neutral).

8. The portable reference standard electricity meter shall have measurement category of 300 V Cat III.
9. The portable reference standard electricity meter shall have environment protection of at least IP 40.
10. The portable reference standard electricity meter shall have isolation protection according to IEC EN 61010-1.
11. The portable reference standard electricity meter shall have a maximum weight of 2kgr.

PERIPHERALS

12. The portable reference standard electricity meter shall be accompanied with at least the following:
 - 12.1. One set of 3 clamp-on CTs with at least 2m long cables and connectors. The clamps-on CTs shall be suitable for cable diameter of at least 10 mm.
 - 12.2. 4 voltage cables, at least of 2 m long.
 - 12.3. 4 crocodile clamps for the voltage cable with appropriate connectors. The crocodile clamps shall be suitable for the screw heads of a typical meter.
 - 12.4. 4 magnet adapters for voltage cable with appropriate connectors. The magnet adapters shall be suitable for the screw heads of a typical meter.
 - 12.5. 1 scanning head for detection disk marks of Ferraris meters as well as LED pulses from electronic meters with a 3m cable and connector.
 - 12.6. 1 hand switch with 2 m cable.
 - 12.7. Cable and adapter for calibrating the instrument.
 - 12.8. Operation manual.
 - 12.9. USB cable and connectors.
 - 12.10. Mains cable and connectors.
 - 12.11. Standard manufacturer calibration certificate.
 - 12.12. Software and license to remote control all functions and read out/evaluate stored data.
 - 12.13. Carrying bag with handles and shock absorption material for the instrument and all the above.

OPTION

13. One set of 3 flexible current probes with at least 2m long cables and connectors. The flexible current probes shall be suitable for cable/bar diameter of at least 160 mm. The current range shall be at least from 3 to 3000A. The current range shall be selectable 30,300 or 3000 A. The measurement accuracy shall be equal to $E_{in} + E_m$.

E_{in} : Accuracy of instrument input
 E_m : Accuracy specified by manufacturer
Basic specifications for 45 Hz ... 65 Hz:
Accuracy: $\pm 1\%$ of the selected range (30 or 300 or 3000A)
Phase error: $< \pm 1^\circ$
Position sensitivity: $\pm 2\%$ of reading

MEASUREMENT MODES

14. The portable reference standard electricity meter shall have the following measurement modes:
 - 14.1. 2 wire active / reactive (true, cross-connected, fundamental regarding IEC 62053-24, non-active regarding IEEE 1459) / apparent (geometric/arithmetic)
 - 14.2. 3 wire active / reactive (true, cross-connected, fundamental regarding IEC 62053-24, non-active regarding IEEE 1459) / apparent. (geometric/arithmetic)
 - 14.3. 4 wire active / reactive (true, cross-connected, fundamental regarding IEC 62053-24, non-active regarding IEEE 1459) / apparent (geometric/arithmetic)
15. The portable reference standard electricity meter shall have voltage range:
 - 15.1. 46 to 300 V Phase-Neutral
 - 15.2. 80 to 520 V Phase-Phase
16. The portable reference standard electricity meter shall have maximum voltage error less than 0.1% relative to the measured value.
17. The portable reference standard electricity meter shall have current range 0,01 to 120 A with the clamp-on CTs.
18. The portable reference standard electricity meter shall have maximum current error less than 0,2% relative to the measured value.

19. The portable reference standard electricity meter shall have frequency range from 45 to 65 Hz.
20. The portable reference standard electricity meter shall have maximum active power/energy error less than 0,2% with 120A current clamps.

CALIBRATION

21. The portable reference standard electricity meter shall have a metrological power proportional frequency output with nominal frequency at least 30 kHz.
22. The instruction manual of portable reference standard electricity meter shall include the calibration procedure. Calibration of the instrument shall be performed by HEDNO's technical personnel.

FUNCTIONALITY

23. The portable reference standard electricity meter shall have a colored TFT touch screen.
 - 23.1. The size of the screen shall be at least 7".
 - 23.2. The resolution of the screen shall be at least 800 x 480 pixels.
24. The portable reference standard electricity meter shall have at least the following functions:
 - 24.1. Energy comparison measurement with integrated error calculator by using a scanning head or a hand switch.
 - 24.2. Statistical error evaluation incl. average error and standard deviation.
 - 24.3. Displaying 3 phase actual values (Voltage, current, active/reactive/apparent power, power factor, frequency, voltage sequence).
 - 24.4. Registration of active/reactive energy with start/stop function for register test.
 - 24.5. Registration of the average power for maximum demand test
 - 24.6. Vectorial diagram.
 - 24.7. Harmonic analysis.
 - 24.8. Oscilloscope function, displaying voltage and current per phase together.
25. The portable reference standard electricity meter shall have:
 - 25.1. auto ranging function for current and voltage.
 - 25.2. manual fixing of the voltage and current ranges.

26. The portable reference standard electricity meter shall have configurable integration time for the actual values 0.1 s ... 999.9 s.
27. The portable reference standard electricity meter shall store data in removable SD memory card.
28. The measurement results shall be evaluable by displaying in the portable reference standard electricity meter as preview function.
29. The portable reference standard electricity meter shall have a switch selector between test voltage and auxiliary supply voltage.
30. The portable reference standard electricity meter shall be remote controlled by any common notebook, smartphone or tablet using Web server functionality.
31. The portable reference standard electricity meter shall have a comprehensive help function its firmware.
32. The portable reference standard electricity meter shall have the operation manual stored in the device and accessible in its menu.

COMMUNICATION & ACCOMPANYING SOFTWARE

33. The portable reference standard electricity meter shall have:
 - 33.1. USB port
 - 33.2. WLAN
34. The portable reference standard electricity meter shall be accompanied by a WINDOWS PC software to remote control all functions and read out/evaluate stored data.
35. The portable reference standard electricity meter shall be accompanied by software with the relevant user licenses, and instructions for usage, installation and configuration.
36. The software shall generate an SQL database with all evaluation reports.
37. The software shall export evaluation reports to excel file.
38. Documentation shall be submitted that fully include the description of the structure of the messages that can be exchanged using the interface functionality of the portable reference standard electricity meter's wireless port. These will include at least the serial number of the evaluated meter, the serial number of the portable reference standard meter, time stamps, all the remote controlled functions and all the evaluation results. HEDNO will use this documentation to develop an application for on-site inspections running on tablet and develop a central database of these inspections.

SPARE PARTS

39. The suppliers shall guarantee the availability of spare parts for a period of 10 years after delivery of the final batch.
40. The suppliers shall submit with their bid, a price list for the necessary spare parts. The list of spare parts shall include at least:
 - 40.1. One set of 3 clamp-on Cts with at least 2m long cables and connectors. The clamps-on CTs shall be suitable for cable diameter of at least 10mm.
 - 40.2. 4 voltage cables, at least of 2 m long.
 - 40.3. 4 crocodile clamps for the voltage cable with appropriate connectors. The crocodile clamps shall be suitable for the screw heads of a typical meter.
 - 40.4. 4 magnet adapters for voltage cable with appropriate connectors. The magnet adapters shall be suitable for the screw heads of a typical meter.
 - 40.5. One scanning head for detection disk marks of Ferraris meters as well as LED pulses from electronic meters with a 3m cable and connector.
 - 40.6. 1 hand switch with 2 m cable.
 - 40.7. Cable and adapter for calibrating the instrument.
 - 40.8. Carrying bag with handles and shock absorption material for the instrument and all the above.
 - 40.9. One set of 3 flexible current probes with at least 2m long cables and connectors. (§13).

GUARANTEE

41. The portable reference standard electricity meter shall be accompanied by five (5) years warranty from their delivery date for proper use of the instrument according to user manual instruction.

PACKAGING

42. The portable reference standard electricity meter shall be placed, carefully packed, inside protective boxes.
43. The boxes shall be placed on EU palettes to facilitate transport.
44. These boxes shall be externally and indelibly marked with the Contract number, the material Code (issued by HEDNO) and the Manufacturer's Data.

TESTS

DEFINITION OF TESTS

- **Type Tests**

All tests intended to identify the type characteristics of the material in

order to prove the compliance with the requirements of the relevant standards/regulations that these characteristics are required to comply with.

- **Series tests**

Tests performed on new materials to ensure that they comply with the results of the above tests or to prove that the batch meets the specialized general and specific requirements of the relevant specification.

- **Acceptance tests**

Sampling tests performed on a batch of materials prior to delivery for the purpose of making a decision regarding the acceptance or rejection of the batch.

45. All tests shall be performed as described in each relevant and most recent issue of the IEC standards.

Type Tests

Not applicable

Series Tests

46. Each portable reference standard electricity meter with its peripherals shall be accompanied by a factory Test Certificate, proving the measurement accuracy for active energy/ power and reactive energy /power of the portable reference standard electricity meter.

Sample tests (acceptance tests)

Not applicable

DOCUMENTS TO BE SUBMITTED

47. Each tender shall include the following documents:

- 47.1. Technical description of the offered materials, including the description for all its peripherals.
- 47.2. Factory Test Certificate or Test Protocol of the portable reference standard electricity meter (§46).
- 47.3. Test Certificate or Test Protocol of the submitted sample of the portable reference standard electricity meter, issued by an independent, internationally accredited and certified by EN ISO / IEC 17025 test laboratory.
- 47.4. Full Quality Management System Certificate according to EN/ISO 9001 covering the production of the offered materials.
- 47.5. Instructions for usage and configuration of the offered materials Greek and/or English.
- 47.6. Full versions of the necessary software and licenses.

- 47.7. Instructions for usage and configuration for the necessary software in English.
- 47.8. Instruction manual with calibration procedure (§22)
- 47.9. Documentation of the structure of the messages that can be exchanged using the interface functionality of the portable reference standard meter's wireless port (§38).
- 47.10. List of spare parts without prices (§40).
- 47.11. Declaration of the tenderer that firmware updates shall be provided to HEDNO free of charge for a 5 year period after the last delivery.