

EM4056



EARTH RESISTANCE TESTER

- ✓ EARTH RESISTANCE MEASUREMENT
- ✓ GROUND RESISTIVITY (WENNER'S METHOD)
- ✓ HIGH SPURIOUS VOLTAGE REJECTION
- ✓ SPURIOUS VOLTAGE MEASUREMENT
- ✓ 0.01Ω RESOLUTION
- ✓ UP TO 20kΩ RESISTANCE RANGE
- ✓ AUTO-RANGE
- ✓ ALPHANUMERICAL DISPLAY
- ✓ HEAVY DUTY EQUIPMENT
- ✓ AUTOMATIC INTERFERENCE DETECTION
- ✓ RECHARGEABLE BATTERY
- ✓ BUILT-IN PRINTER (OPTIONAL)
- ✓ DIRECT READING OF GROUND RESISTIVITY
- ✓ UP TO 50m SELECTABLE DISTANCE
- ✓ BUILT-IN MEMORY
- ✓ USB INTERFACE
- ✓ IP54 PROTECTION
- ✓ CE MARK

The **EM-4056** earth tester is a digital, microprocessor controlled instrument that allows to measure the earth resistance and ground resistivity (using Wenner's method), as well as to detect parasitic voltages present in the ground. This instrument is suitable to measure earth systems in power substations, industries, distribution networks, etc., according to IEC 61557-5.

It is also suitable for soil resistivity measurements, in order to optimise the earth systems project. It is a fully automatic and easy-to-operate equipment. Before starting each measurement, the equipment will check that conditions are within appropriate limits and will notify the operator in case any abnormality turns up (too high interference voltage, too much resistance in test spikes, very low test current, etc). Then, it will look for the most suitable range and show measurement results in an alphanumeric display.

In order to conveniently test the earth system, **EM-4056** allows to perform measurements using the test current which frequency may be operator-selected (270Hz, 570Hz, 870Hz, 1170Hz or 1470Hz). On one hand, the lowest frequency will allow to analyse the earth system behaviour related to fault currents of industrial frequency, while on the other hand, the measurement performed with the highest frequency will best show the behaviour in connection with electrical currents caused by lightning and will offer a very high immunity related to interference voltages that are usually present in soils, specially near substations.

The instrument has four ranges that are automatically selected, covering measurements from 0.01Ω up to 20kΩ, which allows to obtain very accurate measurements for any kind of soils. During ground resistivity measurement, the operator may indicate the distance between spikes in order for the equipment to apply Wenner's formula and to show the resistivity value directly.

The **EM-4056** has a Frequency Scan feature that performs an earth resistance measure with all available frequencies automatically and calculates, display and print the average result besides the individual result of each frequency. Those results are saved on the internal memory.

The **EM-4056** has a built-in memory to store measurements and a built-in printer (optional), besides the USB interface that allows to communicate measured values to a computer or data logger for their later analysis. It is a portable, strong and lightweight equipment, suitable to be used out in the field and under severe weather conditions. It is powered by a rechargeable battery with a 110V or 220V charger and it is supplied with all the necessary accessories for measurements (test spikes, leads, etc) within an auxiliary case that makes it simple to carry.

EM 4056 - TECHNICAL SPECIFICATIONS

APPLICATION

Earth resistance measuring of simple or complex electrode systems, Ground resistivity measurements (Four terminal Wenner's principle), and Spurious voltage according to IEC 61557-5.

RESISTANCE MEASUREMENT METHOD

The equipment injects an electronically generated current in the soil, and measures, with high precision, both that current and the voltage developed in the soil by means of that current flowing through grounding diffusion resistance.

OPERATION FREQUENCY

During **R** measurement, operator should select the following test frequencies: 270 Hz \pm 1 Hz, 570 Hz \pm 1 Hz, 870 Hz \pm 1 Hz or 1470 Hz \pm 1 Hz.

VOLTMETER

In the voltmeter function, the equipment operates as a CA conventional voltmeter, making it possible to measure voltages generated by parasitic currents.

MEASUREMENT RANGES

Resistance: 0 - 20 k Ω (autoranging).
Resistivity: 0 - 50 k Ω m (autoranging).
Voltage: 0 - 60 V \sim .

ACCURACY

Resistance and Resistivity measurements:
R \leq 2 k Ω : \pm (2% of the measured value \pm 2 digits)
R $>$ 2 k Ω : \pm (5% of the measured value \pm 2 digits)
Voltage measurement:
 \pm (3% of the measured value \pm 2 digits)

READING RESOLUTION

0.01 Ω in the resistance measurement.
0.01 Ω m in the resistivity measurement.
0.1 V in the voltage measurement.

OUTPUT CURRENT

The short-circuit current is limited to less than 20mA R.M.S. (according to the IEC 61557-5 - 4.5).

IMMUNITY TO SPURIOUS VOLTAGE INTERFERENCE

During the **R** measurement, it allows the presence of spurious voltage up to 7 V \sim .

EARTH RESISTANCE OF AUXILIARY RODS

In the R measurement it allows Raux = 100R up to Raux \leq 50 k Ω with error $<$ 30%.

BATTERY STATUS CHECKING

The battery charge status is verified under normal using conditions.

ADVANCED FEATURES

Automated detection of abnormal conditions that may cause excessive errors (low battery, too high noise interference, too high test spikes resistance).

SOIL RESISTIVITY COMPUTING

When performing soil resistivity measurements, the operator informs to the EM-4056 the distance between spikes and the equipment automatically computes soil resistivity using the Wenner full equation.

INTERFACE

USB.

BUILT-IN PRINTER (OPTIONAL)

For a printed register document of measured values.

POWER SUPPLY

Internal rechargeable battery, 12 V - 2.3 Ah.

BATTERY CHARGER

For 100-240 V \sim mains supply.

SAFETY CLASS

In accordance with IEC 61010-1:1990.

E.M.C

In accordance with IEC 61326-1.

ELECTROSTATIC IMMUNITY

In accordance with IEC 61000-4-2.

ELECTRO MAGNETIC IRRADIATION IMMUNITY

In accordance with IEC 61000-4-3.

ENVIRONMENTAL PROTECTION

IP54 with closed lid.

OPERATION TEMPERATURE

-10 $^{\circ}$ C to 50 $^{\circ}$ C.

STORAGE TEMPERATURE

-25 $^{\circ}$ C to 65 $^{\circ}$ C.

HUMIDITY

95% RH (without condensation).

EQUIPMENT WEIGHT

Approx. 3.6 kg (without printer).

DIMENSIONS

274 x 250 x 124 mm.

INCLUDED ACCESSORIES

- 4 steel rods.
- 1 rod extractor.
- 1 charger power cord.
- 1 40 meters cable.
- 2 20 meters cable.
- 1 5 meters cable.
- 1 5 meters cable to connect to the grounding system to be measured.
- 1 USB cable.
- 1 canvas bag.
- 1 user guide.

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