

# **Instruction Manual for Digital Grounding Resistance Meter**

# **Instruction Manual for Digital Grounding Resistance Meter**

## Table of Contents

I. Overview.....	2
II. Open-case Inspection.....	3
III. Safety Precautions.....	4
IV. Work Principle.....	7
V. Appearance Description.....	9
VI. Technical Characteristics.....	10
VII. Resistance Measurement Method..	12
VIII. Battery Installation.....	20
IX. Troubleshooting.....	22

## **Warning**

The warnings and safety requirements stated in this manual must be strictly observed to ensure safety. Please read the operating instructions carefully before using this meter.

## **I. Overview**

Grounding Resistance Meter, as a professional instrument for measurement of grounding resistance of electrical equipment, is **made by** improving the circuit, structure and technology of traditional ground resistance meter. With a beautiful and practical fashion style, this meter will provide more complete function, higher accuracy and more convenient **operation**. Thanks to the

dust-and-moisture proof structure, this meter is better suited to field operation. It is designed to measure the grounding resistance of grounding systems of a variety of power systems, electrical equipment and lightning protection equipment, and also to measure AC voltage.

## **II. Open-case Inspection**

1. Grounding resistance meter

1 set

2. Canvas bag

1 Pcs

3. Ground drill rod

2 Pcs

4. Auxiliary testing wire

1 set

(including: a piece of 15-meter red

wire, 10-meter yellow wire, and 5-meter green wire)

5. Simple testing wire

1 set

(including: a piece of 1.6-meter red wire and 1.6-meter green wire)

6. 5# alkaline battery (LR 6 AA) (1.5V)

x 8

8 Pcs

7. Instruction manual

1 copy

8. Strap


1 piece

### **III. Safety Precautions**


1. Please read this instruction manual carefully before using this grounding resistance meter

2. Do not use the grounding resistance








meter and measuring wire with damaged surface.

3. Do not touch the conductor with a voltage of higher than DC 60V or AC36V RMS in order to prevent electric shock, since the said voltage has reached the standard of electric shock.
4. Before the measurement of resistance, the tester must be completely isolated with power circuit in order to ensure accurate readings and personal safety.
5. The meter shall not be stored at high temperature; direct sunlight shall be avoided so as not to affect the service life of LCD.
6. When the symbol "  " which indicates "low battery" appears, the battery shall be replaced. Before

long-term storage, the batteries shall be taken out to prevent the damage to meter caused by battery leakage.

7. Special care should be exercised during the measurement for bare wires.
8. The battery will be disconnected when an external adapter is used. In this case, the battery cannot be recharged. Note: please select the power supply mode (+-).
9. Grounding resistance testing requirements:
  - a. The AC grounding resistance shall not be greater than  $4 \Omega$  ;
  - b. The safety grounding resistance shall not be greater than  $4 \Omega$  ;
  - c. The DC grounding resistance shall be determined according to specific requirements of computer system;

- d. Lightning protection grounding resistance shall not be greater than  $10 \Omega$  ;
- e. For the joint grounding of shielding system, the grounding resistance shall not be greater than  $1 \Omega$  ;

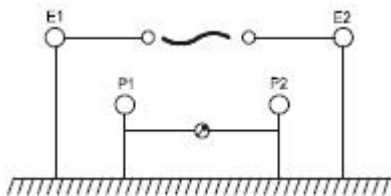
	Warning!	$\Omega$	Resistance
	High Voltage! Dangerous!		AC
	Earth		Battery under-voltage
	Double insulation		CE complied

#### IV. Work Principle

The measuring principle of grounding resistance is based on the law of



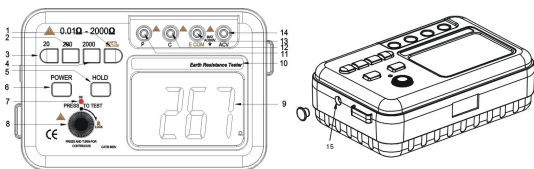
resistance. Insert 4 electrodes (E1, P1, P2, E2) to a certain depth under the ground, and the distance between electrodes shall be around 20 meters. See the figure below:



AC signals act on electrodes E1 and E2, and the current that flows through the earth shall be measured by ammeter through electrodes P1 and P2. If the current value is a constant, the measured voltage will be proportional to earth resistance. The displayed value depends on swamping resistance; hence, the appropriate range shall be determined

according to measured resistance values in order to get the best readings. AC signal is generated by the built-in converter.

## V. Appearance Description




1, 2, 3 and 4: Range selector switch (2 0  $\Omega$  /200  $\Omega$  /2000  $\Omega$  /EARTH VOLTAGE).

5: Digital holding switch (HOLD)

6: Power Switch: self-locking power switch (POWER)

7: Testing indicator: this lamp goes on during the testing if the connection is correct.

- 8: Test button.
- 9: LCD: display measurement data and unit symbols.
- 10: Instrument model
- 11: P port: potential pole.
- 12: C port: current pole.
- 13: E port: grounding pole.
- 14: ACV port: voltage pole.
- 15: Power adapter jack (+  -).

## VI. Technical Characteristics

### 1. General features

- (1) Display: 84.8 × 59.8mm window-type LCD display; Maximum displayed value "1999".
- (2) Over-range indication: the first digit is "1" when the upper limit is exceeded.

- (3) Power supply: 5# alkaline battery LR6 (1.5V) x 8 (can be connected to optional adapter); under-voltage indication function is provided.
- (4) Power consumption: power consumption during no-load testing is  $\leq 800\text{mw}$ .
- (5) Operating environment:  $0^{\circ}\text{C} - 40^{\circ}\text{C}$ .  
Relative humidity: 30% - 85%RH.
- (6) Overall dimensions:  $175(\text{L}) \times 110(\text{W}) \times 70(\text{D}) \text{ mm}$
- (7) Weight: about 680g (including batteries).

## 2. Technical data

Grounding resistance

Measuring range	Basic accuracy	Resolution
20Ω	$\pm (2\%+0.1\Omega)$	0.01Ω
200Ω	$\pm (2\%+3d)$	0.1Ω
2000Ω		1Ω

### Grounding voltage (50Hz - 200Hz)

Measuring range	Basic accuracy	Resolution	Input impedance	Overload protection
200 V	$\pm(2.0 \% + 6 d)$	0.1 V	1 MΩ	200V rms

## VII. Resistance Measurement Method

### 7-1. Battery voltage inspection

After the startup, if the battery symbol is not indicated on the display, it means that the current power is

sufficient. When the display flashes or shows this symbol, please replace the battery in accordance with instructions in Chapter VIII.

## 7-2. Testing wire connection

Please make sure the plug of testing lead has been completely inserted into the test side. The loose connection may lead to errors in the measurement results.

## 7-3 Test method

Danger: an AC voltage of up to 50V may occur between E-C or E-P terminals during the measurement of grounding resistance. Do not touch test lead so as to avoid electric shock.

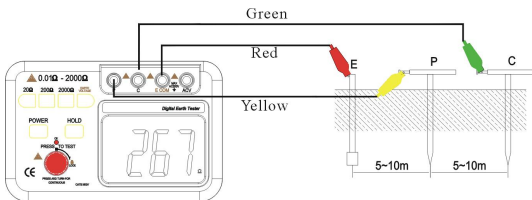
### 7-3-1 Conventional resistance measurement method

#### 1) Test lead connection

As shown below, insert the auxiliary grounding rods P and C into the ground vertically at the point 5-10 meters from the grounded object, connect the green wire to instrument terminal E, the yellow one to terminal P, and the red one to terminal C.

Note: Please insert the auxiliary grounding rod into the ground with high water content. If the rod is to be inserted into dry ground, silica-containing ground or the ground with gravels, the ground shall be wetted with water in order to ensure that the grounding rod be inserted into wet ground. In case of cement ground, please apply water to the horizontally placed grounding rod, and cover it with wet towel before the

measurement.




## 2) Grounding voltage measurement

Please set the range selector switch to Earth Voltage position. If the voltage value is displayed on the screen, it means there is grounding voltage in the system. Please check if the voltage value is lower than 10V. If the value is above 10V, an error of measured grounding resistance value may occur. In this case, please turn off the power supply of tested grounding device, and carry out the measurement after the grounding voltage drops.

## 3) Grounding resistance measurement



Start from the  $2000\ \Omega$  level, and press the "TEST" key. Backlight goes on to indicate that a test is in progress. If the displayed value is too small, you can change the level to  $200\ \Omega$ ,  $20\ \Omega$  .... The displayed value under this circumstance is the measured value of grounding resistance.

Note: The symbol "" means the grounding impedance of auxiliary grounding rod C is too high. In this case, please check if the connection is loose, or increase the humidity of ground around the auxiliary grounding rod to reduce ground impedance.

Note: Ensure that the wires are not entwined. If the testing wires are

entwined with each other, the mutual induction may occur during the testing in "false connection" condition and will influence the readings. If the auxiliary grounding impedance is too strong, an error of display value may occur. Ensure that the auxiliary grounding rods P and C are inserted into wet ground, and all the connection parts are in full contact.

### 7-3-2. Simple grounding resistance measurement method

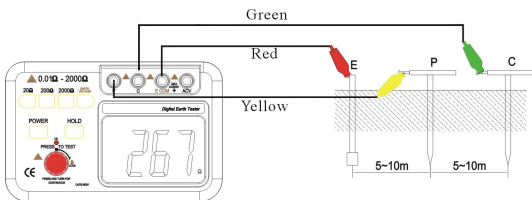
This is a simple method for the places where insertion of auxiliary grounding rod is not available. For this method, a grounding electrode like metal water pipe, commercial electric power system common grounding terminal or structure grounding terminal, etc. with extremely weak grounding impedance is

used instead of auxiliary grounding rods C and P. Please use simple test leads.

## 1) Test lead connection

Please connect the leads according to the figure below.

Note: If the simple test leads supplied together with this instrument are not used, please make a short circuit for terminals C and P.



## 2) Grounding voltage measurement

Please set the range selector switch to

Earth Voltage position. If the voltage value is displayed on the screen, it means there is grounding voltage in the system. Please check if the voltage value is lower than 10V. If the value is above 10V, an error of measured grounding resistance value may occur. In this case, please turn off the power supply of tested grounding device, and carry out the measurement after the grounding voltage drops.

### 3) Grounding resistance measurement

Start from the 2000  $\Omega$  level. Please press the "TEST" button. The backlight goes on to indicate a test is in progress. If the displayed value is too small, please switch to the 200  $\Omega$  /20  $\Omega$  level. The value displayed in this case is the grounding resistance value. Please turn off the power switch after the test is

completed in order to save power.

Note: ● The measured current is about 2mA. The circuit breaker will not be actuated even if a leakage circuit breaker is connected.


- The real grounding resistance value  $R_X$  is subject to the following formula:

$$R_X = R_E - r_e$$

$r_e$ : grounding resistance of common ground terminal of commercial power system etc.

$R_e$ : instrument grounding resistance reading

## **VIII. Battery Installation**

When the battery power is low, a "  " symbol will appear on the screen, which means the battery needs to be replaced.

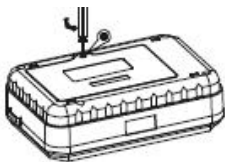
Turn off the instrument and take out the batteries.

Unscrew the screws at battery door with a screwdriver.

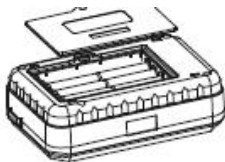
Open the battery door.

Load a new battery (pay attention to polarity).

Close the battery cover and tighten the screws.




Step I



Step II

## IX. Troubleshooting

If your meter can't operate properly, the following methods can help you quickly resolve general problems. If the faults are still not removed, please contact the service center or distributor.

Symptom	Check position and method
No display	<ul style="list-style-type: none"><li>● Power supply is not connected;</li><li>● Replace the battery.</li></ul>
 symbol occurs	<ul style="list-style-type: none"><li>● Replace the battery.</li></ul>
Big display error	<ul style="list-style-type: none"><li>● Replace the battery.</li></ul>

This manual is subject to change without notice.

The contents of this manual are considered correct. If you find some errors and omissions therein, please contact the manufacturer.

We are not responsible for any accident and hazard due to user's faulty operation.

The functions described in this manual cannot be taken as the reason for using this product for special purposes.

**601E-4105-000A**