

EARTH RESISTANCE & RESISTIVITY TESTER



INSTRUCTION MANUAL

| INDEX | Page |
|---------------------------|-------------|
| 1. INTRODUCTION..... | 1 |
| 2. SAFETY NOTES..... | 2 |
| 3. FEATURES..... | 3 |
| 4. SPECIFICATIONS..... | 4-5 |
| 5. INSTRUMENT LAYOUT..... | 6 |
| 6. MEASURING METHODS..... | 7-10 |
| 7. MAINTENANCE..... | 11-12 |

1. INTRODUCTION

This tester has been designed and tested according to EN 61010-1, EN 61326-1, EN 61557-1, EN 61557-5 and other safety standards. Follow all warnings to ensure safe operation.

The tester meets EN 61010-1 CAT IV 300V Electrical test & measurement tools are assigned to 4 different designations from CAT I-IV (category) rating. The higher the category, the more risk there is that a high voltage can overload a circuit and cause electrical and physical damage. Usually, the higher the CAT rating, the safer the rating.

2. SAFETY NOTES

- Read the following safety information carefully before attempting to operate or service the voltage tester.
- Use the meter only as specified in this manual. Otherwise, the protection provided by the meter may be impaired.
- Rated environmental conditions:
 - (1) Indoor & outdoor use.
 - (2) Installation Category IV 300V.
 - (3) Pollution Degree 2.
 - (4) Altitude up to 2000m.
 - (5) Relative Humidity 80% max.
 - (6) Ambient temperature 0°C~40°C.
- Observe the International Electrical Symbols listed below:



Detector is protected throughout by double insulation or reinforced insulation.



Warning! Risk of electric shock.



Caution! Refer to this manual before using the detector.



Earth (ground) terminal.



Equipment complies with current EU directives.

3. FEATURES

- Auto-Rating microprocessor controlled.
- Earth resistivity (ρ) test.
- Earth testing at 20Ω , 200Ω , 2000Ω .
- Earth Voltage measuring: 0-300V AC
- Automatic C spike check.
- Automatic P spike check.
- 2-Wire test, 3-Wire test, 4-Wire test.
- LCM display.
- Auto power OFF.
- Data hold.
- 200 measurement results can be saved in the memory and recalled on the display.
- Interval between auxiliary earth spikes is 1.0~50.0m.
- EN 61010-1 CAT IV 300V
IEC 61557-1 IEC 61557-5
EN 61326-1

4. SPECIFICATIONS

| | |
|-----------------------------|---|
| Measuring Ranges | Earth Resistance 0-20 Ω , 0-200 Ω , 0-2000 Ω Earth Resistivity 0.06~6.28 k Ω .m 0.62~62.8 k Ω .m 6.28~628 k Ω .m Earth Voltage 0-300V AC |
| Accuracy | Earth Resistance: 0-20 Ω : $\pm(2\%rdg+0.1\Omega)$ 0-200 Ω , 0-2k Ω : $\pm(2\%rdg+3dgt)$ Earth Voltage: $\pm(2\%rdg+3dgt)$ |
| Earth Resistance Resolution | 0-20 Ω :0.01 Ω 0-200 Ω :0.1 Ω 0-2000 Ω :1 Ω |
| Measuring System | Earth resistance by constant current Inverter 820Hz approx. 2mA |
| Temperature & Humidity | Operating:0 $^{\circ}$ C~40 $^{\circ}$ C \leq 80%R.H. Storage:-10 $^{\circ}$ C~50 $^{\circ}$ C \leq 80%R.H. |
| Power Source | 1.5V(AA) x 8 |
| Dimensions | 250(L) x 190(W) x 110(D)mm |
| Weight | Approx. 1500g (battery included) |
| Accessories | Test leads (red-15m, black-10m, yellow-10m, green-5m) Auxiliary earth bars Instruction manual Carry case Shoulder belt Batteries |

- **Maximum Operating Error**

Operating error (B) is an error obtained within the rated operating conditions, and calculated with the intrinsic error (A), which is an error of the instrument used, and the error (En) due to variations.

$$B = \pm(|A| + 1.15\sqrt{E_2^2 + E_3^2 + E_4^2 + E_5^2})$$

A: Intrinsic error

E₂: Variation due to changing the supply voltage

E₃: Variation due to changing the temperature

E₄: Variation due to series interference voltage

E₅: Variation due to resistance of the probes and auxiliary earth electrode resistance

- **Range to keep the maximum operating error**

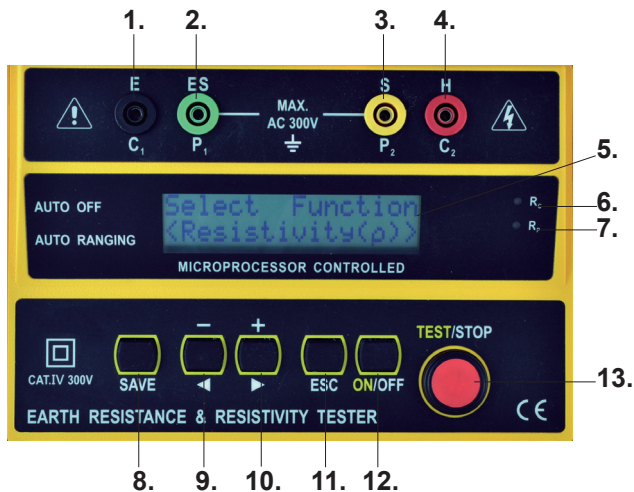
Measurement range within which the maximum operating error ($\pm 30\%$) applies.

20Ω Range : 5 ~ 19.99Ω

200Ω Range : 20 ~ 199.9Ω

2000Ω Range : 200 ~ 1999Ω

5. INSTRUMENT LAYOUT



- | | |
|---|-----------------------|
| 1. C ₁ terminal (Black test lead connection) | 6. R _c LED |
| 2. P ₁ terminal (Green test lead connection) | 7. R _p LED |
| 3. P ₂ terminal (Yellow test lead connection) | 8. SAVE button |
| 4. C ₂ terminal (Red test lead connection) | 9. Cursor button |
| 5. LCM display | 10. Cursor button |
| | 11. ESC button |
| | 12. Power button |
| | 13. TEST/STOP button |

6. MEASURING METHODS

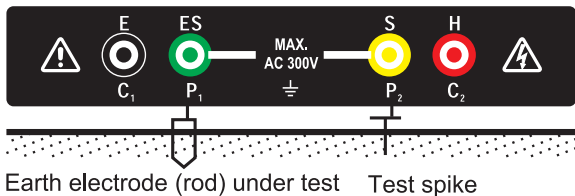
 Before Measuring

- Battery voltage check
 - a. Before testing, press the "ON/OFF" button, when the "Battery: Low" appears on the display, replace with new batteries.
 - b. Prior to measuring, if "Battery: Low" appears on the display, replace with new batteries.

1. Earth voltage check

- a. Test leads connection.

Earth Voltage measurement



- b. Press "ON/OFF" button, "

Select function
<.....2P.....>

- c. Press "▶" button 3 times until "

Select function
<.....ACV.....>

- d. Press "TEST/STOP" button.
- e. Take a reading.

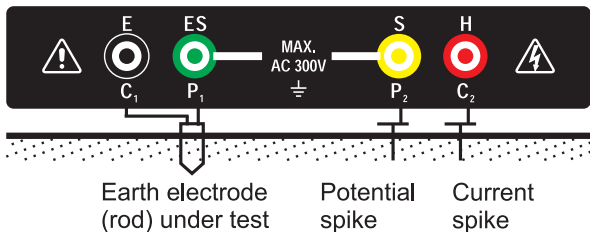
2. Earth resistance measurement

CAUTION

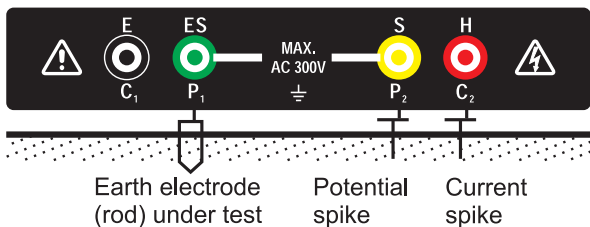
The measured results may be influenced by indication if measurements are made with the test leads twisted or connected each other. When connecting the probes, they should be separated.

a. Test leads connections.

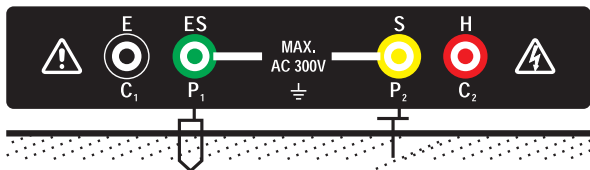
Four-terminal earth resistance measurement



Three-terminal earth resistance measurement



Two-terminal earth resistance measurement



b. Wiring system Selection: Press the "ON/OFF" and " ► " button. Select "2P", "3P", "4P".

c. Press "TEST/STOP" button and take a reading.

⚠ Insert the three Auxiliary Earth Spikes into the ground. The distance must be 5~10m between the Auxiliary Earth Spikes.

Notes:

Check the following prior to proceeding with measurement:

Rc: When the "Rc" LED lit, this means there is no test current output.

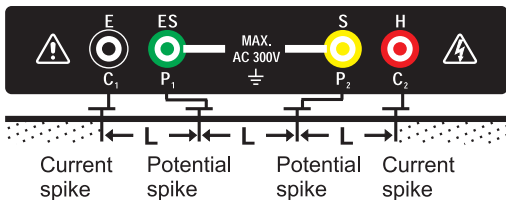
Stop testing and check relevant testing point.

Rp: When the "Rp" LED is lit, the "R" value on the LCD will be displayed ">2kΩ". This means testing Earth Resistance value is over 2kΩ.

3. Earth resistivity(ρ) measurement

a. Test lead connections.

Earth resistivity measurement(ρ)



b. Wiring system Selection:

Press the "▶" button 4 times, select "Resistivity(ρ)".

c. Press "TEST/STOP" button,"

Setting length
 -< xm >+

appears on the display, "⊕" count up, "⊖" count down; can setting length 1~50m.

d. Press the "TEST/STOP" button and take a reading.

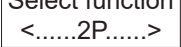


CAUTION

- Insert the four Auxiliary Earth Spikes into the ground deeply. They should be aligned at an interval(L) of 1-30m.
The depth should be 5% or less of the interval between the spikes.
- The spikes should be inserted to the depth of 25cm or less when the interval of the Auxiliary Earth Spikes is 5m.

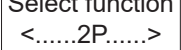

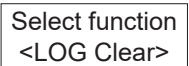
4. SAVE function

Pressing "SAVE" can store test data and display "Save No.".

5. Log Display

- Press "ON/OFF" button, "  "
- Press "  " 5 times until "  "
- Press "TEST/STOP" button.
- Press "+" or "-" select want read Log data.

6. Log Clear

- Press "ON/OFF" button, "  "
- Press "  " 6 times until "  "
- Press "TEST/STOP" button, display "Are you sure?"
- Press "TEST/STOP" display "Successful !".
- Press "TEST/STOP" display "No Log Data".

7. MAINTENANCE

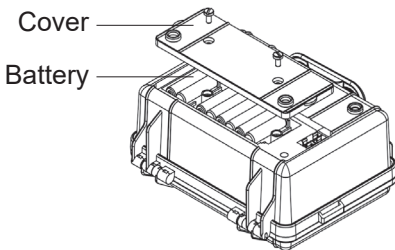
- Battery replacement

CAUTION

- Do not mix new and old batteries.
- Install batteries in the orientation as shown inside the battery compartment, observing correct polarity.

When the "Battery: LOW" appears on the display, replace the batteries as follows:

1. Disconnect the test leads from the instrument and turn off the power.
2. Remove the battery cover and the batteries.
3. Replace with eight 1.5V(AA) new batteries, taking care to observe correct polarity.
4. Reinstall battery holder and the battery cover.

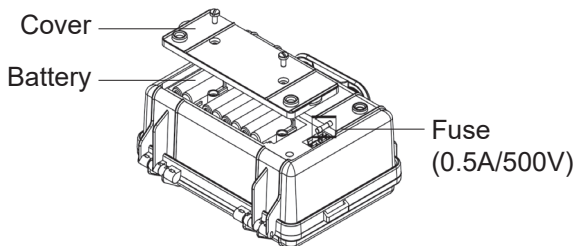


- Fuse replacement:

CAUTION

When replacing the fuse, it must be replaced with same specification as the original.

1. Press the "ON/OFF" button to turn off the power and disconnect the test leads from the instrument.
2. Open and remove the battery cover.
3. Replace the fuse with new one. (0.5A/500V 5x20mm)
4. After replacing the fuse, reattach the cover and secure with the screws.



- Cleaning and Storage

WARNING

To avoid electrical shock or damage to the meter, do not get water inside the case.

Periodically wipe the case with a damp cloth and detergent: do not use abrasives or solvents.

