4-WIRE EARTH RESISTANCE TESTER

BST-ET102

INSTRUCTION MANUAL

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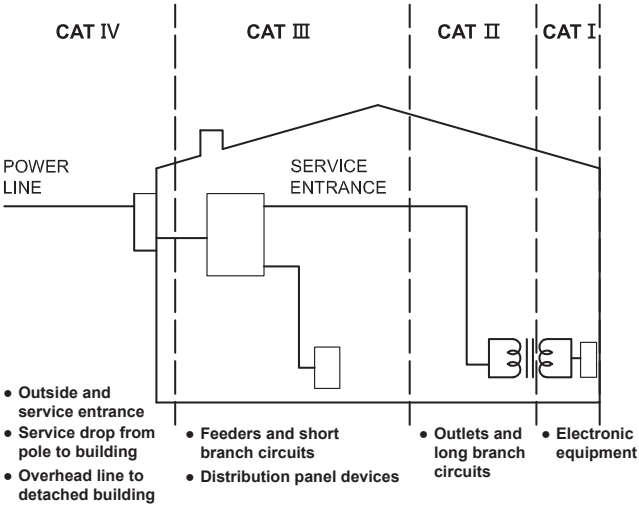
1. Introduction

This meter has been designed and tested according to CE safety requirements for Electronic Measuring Apparatus, EN 61010-1, EN 61326-1, EN 61557-1, EN 61557-5 and other safety standards. Follow all warnings to ensure safe operation.

- Application:
  Earth Resistance Tester is used to measure the ohms (Ω) of an earth grounding installation for buildings (residential, office, labs, hospitals), computer server rooms, military installations, cellular sites, radio and cable towers, etc. It is used to determine if the earth (or ground) is a good conductor of electricity.

- Purpose of Earth Grounding:
  (1) Avoid human and animal electrical shock.
  (2) Avoid unnecessary property and equipment damage.
  (3) Prevent fire or explosion.
  (4) Integrate electrical signal to attain proper operation or measuring purpose.
  (5) Provide a means of dissipation for power surges caused by lightning strikes, static charges, and other types of electrical interference.



CAT IV - **Is for measurements performed at the source of the low-voltage installation.**

CAT III - **Is for measurements performed in the building installation.**

CAT II - **Is for measurements performed on circuits directly connected to the low-voltage installation.**

CAT I - **Is for measurements performed on circuits not directly connected to Mains.**

2. Safety notes

- Read the following safety information carefully before attempting to operate or service the detector.
- 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 0~40°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

- Microprocessor controlled with advanced safety features
- LCM display
- Auto-Ranging
- Earth resistance testing at 0-2Ω/0-20Ω/0-200Ω/0-2kΩ
- Earth voltage measuring : 0-300Vac
- Automatic C spike check.
- Automatic P spike check.
- 2-wire test
- 3-wire test
- 4-wire test
- Auto power off
- Data hold
- Robust, compact and easy to carry.
- Safety standard : EN 61010-1 CAT IV 300V
  EN 61326-1
  EN 61557-1
  EN 61557-5

4. Specifications

Measuring Ranges	Earth Resistance 0-2Ω, 0-20Ω, 0-200Ω, 0-2kΩ Earth Voltage 0-300V AC
Accuracy	Earth Resistance ±2%rdg±3dgt Earth Voltage ±2%rdg±3dgt
Earth Resistance Resolution	0-2Ω : 0.01Ω 0-20Ω : 0.1Ω 0-200Ω : 1Ω 0-2kΩ : 0.01kΩ
Temperature & Humidity	Operating : 0ºC~50ºC ≤ 80%R.H. Storage : -10ºC~60ºC ≤ 80%R.H.
Power Source	1.5V(AA) x 8
Dimensions	250(L) x 190(W) x 110(D)mm
Weight	Approx. 1430g (battery included)
Accessories	Test leads(red-15m, black-10m, yellow-10m, green-5m) Auxiliary earth spikes Instruction manual Carrying case Batteries Fuse(0.1A/250V 5 x 20mm)

- 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.

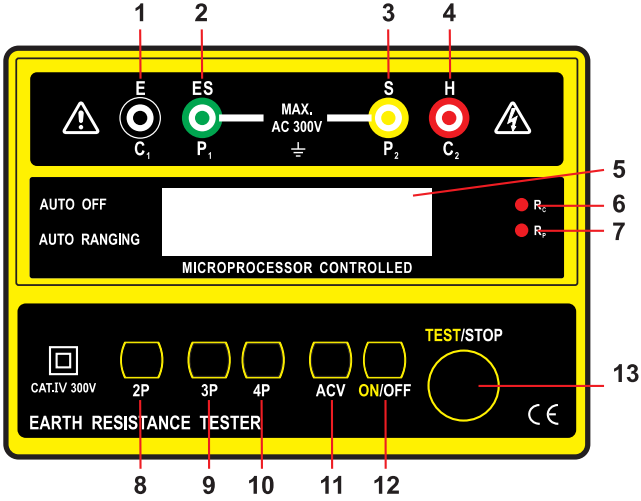
$$B=\pm(|A|+1.15\sqrt{E_2^2+E_3^2+E_4^2+E_5^2})$$

  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 (±30%) applies.
  20Ω Range : 5 ~ 19.99Ω
  200Ω Range : 20 ~ 199.9Ω
  2000Ω Range : 200 ~ 1999Ω

- Temperature & Humidity
  Operating : 0°C~50°C ≤ 80%R.H.
  Storage : -10°C~60°C ≤ 80%R.H.

5. Instrument layout



1. C1 terminal (Black test lead connection)
2. P1 terminal (Green test lead connection)
3. P2 terminal (Yellow test lead connection)
4. C2 terminal (Red test lead connection)
5. LCM display
6. Rc LED
7. Rp LED
8. 2 Wires type button
9. 3 Wires type button
10. 4 Wires type button
11. ACV button
12. Power button
13. TEST/STOP button

6. Measuring methods

1. Battery voltage check

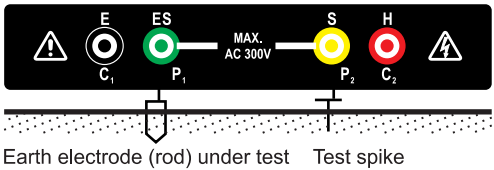
a. Before testing, press the "ON/OFF" button, when the "Battery : Low" appears on the display, replace with new batteries.

b. Prior to measuring, if "Battery : Low" appears on the display, replace with new batteries.

2. Earth voltage check

a. Test leads connection.

Earth Voltage measurement



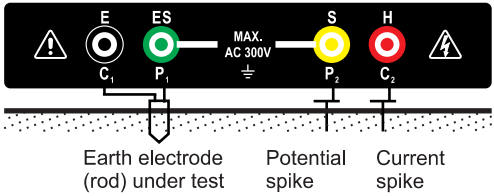
b. Press the "ON/OFF" button, "ACV" button and "TEST/STOP" button, earth voltage will be displayed on the LCM. When the earth voltage is more than 10V, it may result in errors in earth resistance measurement.Make sure that the indicated value is less than 10V.

3. Earth resistance measurement

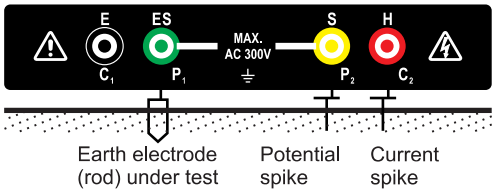
The measured results may be influenced by induction if measurements are made with the Test Leads twisted or connected each other. When connecting the Probes, they should be separated.

a. Test leads connection.

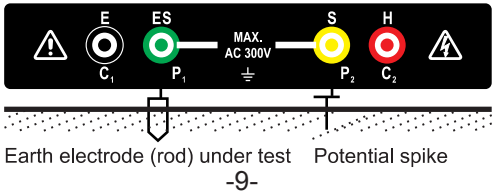
Four-terminal earth resistance measurement



Three-terminal earth resistance measurement



Two-terminal earth resistance measurement



b. Select testing type : "2P", "3P" or "4P" and press button.
c. Press "TEST/STOP" button to test and take a reading.

※ When you make the "4P measurement", LCD shows "Vp Error", short circuit C1(black) and P1(green).

※ Stick the three Auxiliary Earth Spikes into the ground deeply. The distance must be 5~10m between the Auxiliary Earth Spikes.

Notes :

Check the following prior to proceeding with measurement :

1. Checking if Auxiliary Earth Spikes connect correctly when the "Rc" LED lit.
2. Indication for "Rc" & "Rp"

   Rc : When the "Rc" LED lit, this means there is no test current output.
   Stop testing and check relevant testing point.

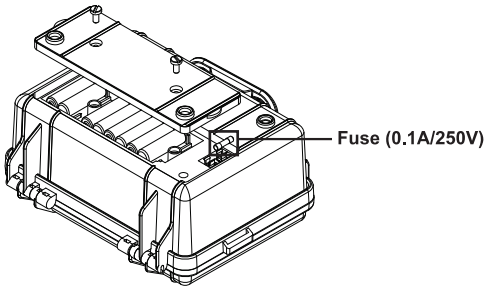
   Rp : When the "Rp" LED is lit, the "R" value on the LCD will displayed ">2kΩ", this means testing Earth Resistance value is over 2kΩ.

7. Fuse replacement

WARNING

Only replace with the same fuse specification

1. Disconnect the test leads from the instrument.
2. The fuse is located under the battery holder.
3. Open the battery cover. Then remove and replace the fuse with the new one.
4. Fix the cover after replacing a fuse and screw up the cover. Fuse Spec. 0.1A/250V, 5 x 20mm



8. Maintenance

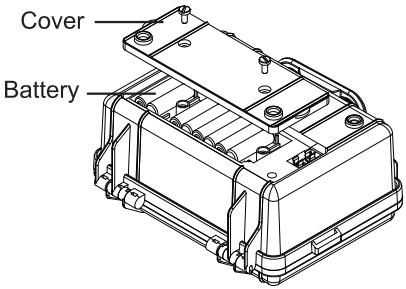
WARNING

Do not mix new and old batteries together.

- Battery replacement :

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

  1. Disconnect the test leads from the instrument and remove the battery cover and the batteries.
  2. The tester's battery is situated under the tester.
  3. Replace with eight 1.5V AA light batteries, taking care to observe correct polarity.
  4. Reinstall battery holder and the battery cover.



WARNING

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

- Cleaning And Storage :

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