



# TR-4190

## Digital Earth Resistance Tester


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### A. General Introduction

Digital Earth Resistance Tester is a new generation tester which is developed by our company in recent years. The circuit, structure and technique compare with traditional earth resistance tester have been improved. This one has more complete functions, higher accuracy, more convenient and reliable for operation, more suitable for outdoor use with dust and wet proof structure. It can measure earth resistance of various earth systems including power systems, electric equipments, thunder proof equipment, AC voltage can also be measured.

## B. Safety Rules

1. Please read this manual carefully before use.
2. To avoid risk of electric shock, it should not be used before the back cover has not fixed .
3. Please do not touch wire terminal when measuring.
4. Please make sure the selector setting at the proper range .
5. Make sure the coupler plug of wires inserted into the terminal tightly.
6. Do not use it or replace battery when the tester is wet.
7. Please do not turn the selector during measuring.
8. Please do not measure in flammable places since sparkles may cause explosion.
9. Please stop use when metal is exposed due to breakage of casing or testing wires. Make sure the skin of testing leads is good before measuring.
10. Please make sure the testing wires has been removed from testing terminal and the selector is at “OFF” position before replacing battery.
11. Please make sure the range selector is at “OFF” position after measuring.
12. In order to ensure testing accuracy, replace batteries when “  ” shown on tester LCD, Please take out the batteries if it don't use for long time.

## C. Features

1. Measuring range of earth resistance: 0-2000  $\Omega$  。
2. Measuring range of earth voltage: 0-30V 。
3. 3<sup>1</sup>/<sub>2</sub> digit LCD display, maximum reading 1999 。
4. “  ” on LCD indicates low battery.
5. LCD with back-light.
6. Response time: measure earth resistance, about 5 seconds. Measure earth voltage, about 2 seconds.

7. Withstand voltage: AC 1500V, 1 minute between circuit and outer casing.

8. Overload protection: Earth voltage range, can withstand 300V AC (1 minute). Earth resistance range, can withstand 200V AC (10 seconds).

9. Power supply, R6P(AA)(1.5V)×8 batteries.

10. Size: 190×155×75 mm.

11. Weight: approx. 900g (including batteries).

12. Working environment:

Working temperature: 0°C–40°C relative humidity < 80%

Storage temperature: -10°C–50°C relative humidity < 85%

Ensure accurate temperature: 23°C ±5°C relative humidity < 75%

## D. Electrical Specification

### Earth resistance

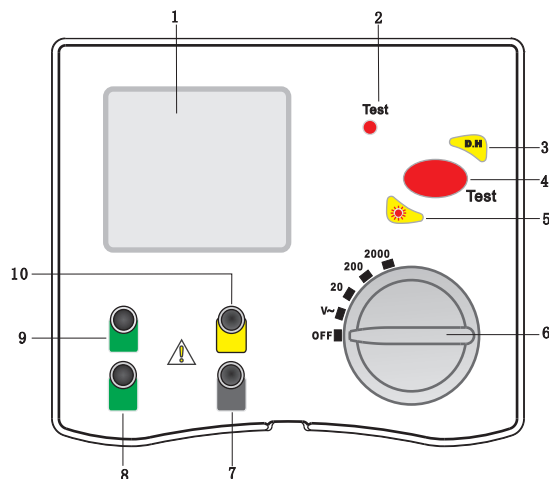
Range	Accuracy	Resolution	Test current
20 Ω	±2%+0.1 Ω	0.01 Ω	approx. 3mA
200 Ω	± (2%+3dgt)	0.1 Ω	approx. 2mA
2000 Ω		1 Ω	approx. 1mA

Measuring frequency: 820Hz

### Earth voltage

Range	Accuracy	Resolution	Frequency respond
30V	± (3%+5dgt)	0.1V	40-400Hz

## E. Front Panel




- ① LCD display
- ② Test indicator light (red)
- ③ “HOLD” data holding button
- ④ “TEST” testing button
- ⑤ Black light button
- ⑥ Function selector
- ⑦ “V” port (voltage pole) .
- ⑧ “C” port (current pole)
- ⑨ “E” port (earth electrode)
- ⑩ “P” port (electric potential pole)

## F. Operating Instruction

### a. Check battery voltage

No “” symbol on LCD indicates sufficient battery.

### b. Routine method for testing earth resistance

Risk:  Maximum 50V voltage may be generated between E-C or E-P terminals when testing earth resistance!

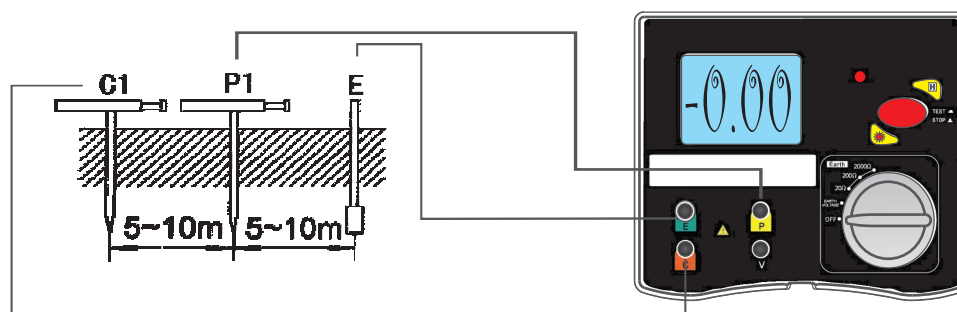
Please do not touch testing wires to avoid electric shock. Please make sure testing wires plug insert into testing terminal thoroughly before measuring since loose connection may cause error in testing result.

### 1) Connecting testing wire

As shown in picture below, punch auxiliary earth spike P1 and C1 into earth, 5 to 10 meters distant from unknown earth resistance; connect green wire to terminal “E”, yellow wire to terminal “P” and red wire to terminal “C”.

Note: please place auxiliary earth spike in wateriness land. You need add water in dry land, sand land or land containing crushed stones to maintain humidity of spike inserting position .

Lie earth spike flat and add water when meeting cement ground and cover wet towel on earth spike before testing.



In the picture, E connects earth electrode port

P connects electric potential pole port

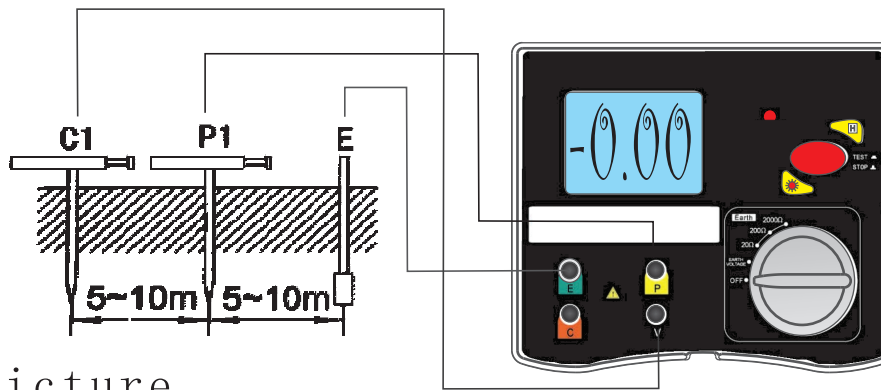
C connects current pole port

### 2) Working power and connecting wire check

Press “Test/Stop” , the wire connecting is good if “OK” indicates on LCD, earth resistance of auxiliary earth is within permitted range. If “OK” is off, check the wire connecting “P” and “C” terminals or change the position of earth spike, or water the land to lower auxiliary earth resistance to a proper level. Check breakage by short circuit of spring clamps of red and yellow wire ends

### 3) Measuring earth voltage

Please turn the range selector to earth voltage, the green wire plug move to “V” socket. The reading is earth voltage if voltage exist.



In the picture,

E connects earth electrode port

P connects electric potential pole port

C connects current pole port

V connects voltage pole port

#### 4) Measuring earth resistance

**Notice:** Make sure the voltage value below 10V, otherwise error may occur to measuring value of earth resistance if the voltage value above 10V. The power supply of equipment which be measured must shut off.

##### a. 3 wires measuring method of earth resistance

First beginning from 2000 Ω before press “Test/Stop” button. If the reading is too small, set the selector to 200 Ω or 20 Ω and the reading here is the earth resistance value.

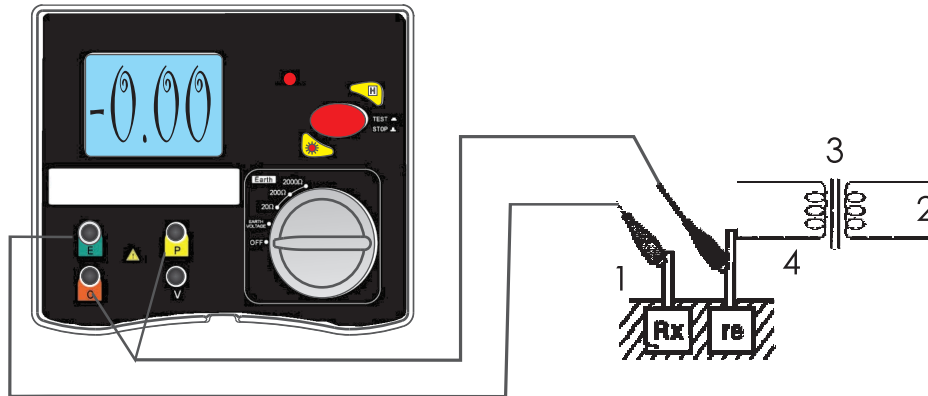
**Notice:** Make sure connecting wires separated during wire connecting, testing wires wind with each other would affect reading. The auxiliary earth resistance value is too big error may occur. Make sure auxiliary earth spike “P” and “C” into wet land and complete contact of connecting parts.

##### b. 2 wires measuring method of earth resistance

The method is designed for places where auxiliary earth spikes cannot be punched. Use a earth electrode with small earth resistance like metal water pipe, common earth electrode of commercial electric power system, earth end of building, etc to substitute auxiliary earth spike “P” and “C”.

##### 1) Connecting testing wires.

Please connect simple testing wires (“P” and “C” be short together ) according to picture below.



1 earth electrode 2 secondary 3 transformer 4 elementary

Risk: be careful of electric shock when using commercial electric system earth. Please do not use this tester to measure supply voltage.

## 2) Measuring earth voltage

Please turn the selector to earth voltage. Make sure the voltage value below 10V since error may occur to measuring value of earth voltage if the voltage value above 10V.

## 3) Measuring earth resistance

First beginning from 2000 Ω before press “Test/Stop” button. If the reading is too small, set the selector to 200 Ω or 20 Ω and the reading here is the earth resistance value.

**Notice:** The RCD cannot be taken action because of measuring current is less than 3mA. Calculate the real earth voltage value RX by equation below:

$$RX = RE - re$$

re: earth resistance of common earth electrode of commercial electric power system, etc.

Re: reading value of instrument earth resistance.

## G. Replacing Battery

- 1) Do not open the battery cover if the outer casing is wet.
- 2) Please do not replace the battery during measuring.
- 3) Please set the selector to “OFF” and remove testing wires, earth spikes, etc before replacing the battery to avoid electric shock.
- 4) Loosen the screw on battery cover at the bottom of the unit and open the battery cover.
- 5) Replace new batteries, put battery cover back and tighten the screw.

## H. Accessories

- |  |        |
|--|--------|
| 1) Auxiliary earth spikes  | 2 bars |
| 2) testing wires   | 1 set  |
| (including red testing wire 15 meters each, yellow testing wire 10 meters each and green testing wire 5 meters each) |        |
| 3) simple testing wire   | 1 set  |
| (including: red testing wire 1.6 meters each and green testing wire 1.6 meters each)                                 |        |
| 4) R6P (AA)(1.5V)  | 8pcs   |
| 5) instruction manual  | 1pcs   |

### Revision Notice:

“OK” has been indicated on LCD instead of “OK” LED on panel.