

# 4100

## Digital Earth Resistance Tester

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### A. General Introduction

Digital Earth Resistance Tester is a new generation tester for electrician practice which is developed by our company in recent years. The circuit, structure and technique of traditional earth resistance tester have been improved and the new design is both fine-looking and practical. This one has more complete functions, higher accuracy, more convenient and reliable for operation and more suitable for outdoor use with dust and wet proof structure. It can test earth resistance of various earth systems including power systems, electric equipments, lightning conductors as well as resistance value of low resistance conductor and AC voltage test.

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LED red lighting off indicates deficiency of 1.5V battery.

6. Response time: measure earth resistance, about 5 seconds. Measure earth voltage, about 2 seconds.

7. Withstand voltage: AC 500V, 1 minute between circuit and outer casing.

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

9. Power supply, six 1.5V AA batteries, one 12V battery (23A).

10. Dimensions: 150×100×70mm.

11. Weight: about 680g (including battery).

12. Working environment:

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

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

Ensured accurate temperature: 23°C±5°C  
relative humidity < 80%

### D. Technical Specification

#### Earth Resistance

| Range  | accuracy    | resolution |
|--------|-------------|------------|
| 20 Ω   | 2%rdg+0.1Ω  | 0.01Ω      |
| 200 Ω  | ±2%rdg+3dgt | 0.1Ω       |
| 2000 Ω |             | 1Ω         |

Please note that measurement difference created by auxiliary earth resistance is  $0-10\Omega \leq 2k\Omega$

#### Earth Voltage(AC)

| Range | accuracy    | resolution |
|-------|-------------|------------|
| 30V   | ±3%rdg+5dgt | 0.1V       |

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### B. Safety Rules

1. Please read this manual carefully before use.
2. It should not be used before placing the back cover back to avoid risk of electric shock.
3. Please do not touch lead terminal and circuit under test to avoid electric shock.
4. Please make sure the range select switch setting within the proper range before test.
5. Make sure the coupler plug of lead inserted in the terminal tightly.
6. When the tester is wet, do not use it or replace battery.
7. Please do not turn the switch during test.
8. Please do not test in flammable places since sparkles may cause explosion.
9. Please stop use when metal is exposed due to breakage of casing or testing wire. Make sure the isolation skin of testing wire is intact before use.
10. Please make sure the testing wire has been removed from testing terminal and the range select switch is on off position before replacing battery.
11. Please make sure the range select switch is on off position after use.
12. Replace battery when  shown on tester or the battery indicator light is off to ensure testing accuracy. Please remove the battery if not use it for long time.

### C. Performance Features

1. Measuring range of earth resistance: 0-2000 Ω.
2. Measuring range of earth voltage: 0-30V.
3. LED green light indicates normal operating mode.
4. 3 1/2 digit LCD display for more direct and convenient reading.
5.  on LCD indicates deficiency of 12V battery.

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### E. Panel Description



- ① LCD display
- ② "E" port (earth electrode)
- ③ "P" port (electric potential pole)
- ④ "C" port (current pole)
- ⑤ "V" port (voltage pole)
- ⑥ Function switch.
- ⑦ HOLD data holding switch
- ⑧ TEST testing button
- ⑨ POWER power indicator light (red)
- ⑩ OK operation indicator light (green)

### F. Operation Instruction

#### a. Battery Voltage Inspection

No  symbol on LCD indicates 12V battery is good.

 symbol on LCD means 12V battery is required to replace.

#### b. 3-wire Earth Resistance Test

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

Please do not touch testing lead to avoid electric shock.

Please make sure testing wire plug insert in testing terminal thoroughly before testing since loose connection may cause error in testing result.

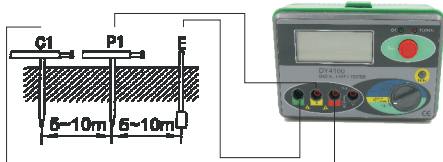
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### 1) Testing Wire Connection

As shown in picture below, punch assistant earth bar P1 and C1 in earth 5 to 10 meters distant from tested earth substance; connect green wire to terminal E, yellow wire to terminal P and red wire to terminal C.

Note: please place assistant earth bar in land with high water content. You need add water in dry land, sand land or land containing crushed stones to maintain humidity of inserting position of earth bar.

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



In the picture, E connects earth electrode port  
P connects electric potential pole port  
C connects current pole port  
V connects voltage pole port

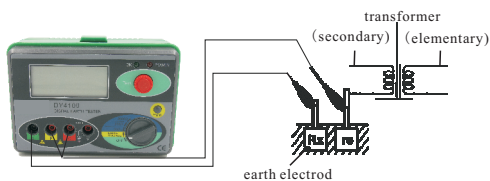
### 2) Inspection of Power Supply and Wire Connection

Press “Test/Stop”, “POWER” light off indicates insufficient 1.5V battery. Please replace it. “OK” light on indicates normal connecting of lead and E, C terminals, and auxiliary earth resistance is within permitted range. If light is off, check the lead connecting E and C terminals or change the position of earth bar, or water the land to lower auxiliary earth resistance to a proper level. Check breakage by short circuit of spring clamps of red and green lead.

### 3) Earth Voltage Measurement

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

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**NOTE:** be careful of electric shock when using commercial electric system earth method for test. Please do not use this tester to measure supply voltage.

### 2) Earth Voltage Measurement

Please turn the range select switch 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. At this point, one can break the power supply of tested earth electrode equipment to lower earth voltage and then measure the value.

### 3) Earth Resistance Measurement

First please press “Test/Stop” beginning from 2000 Ω. If the shown value is too low, switch to 200 Ω to do the test and the reading here is the tested earth resistance value.

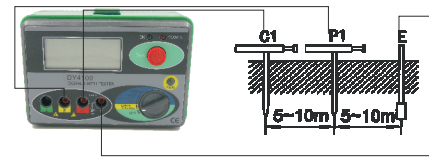
Note: Since measuring current is low to about 2mA, the circuit breaker will not take effect even being connected. Calculate the real earth voltage value RX by equation below:

$$RX = RE - re$$

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

Re: reading value of instrument earth resistance.

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In the picture,

E connects earth electrode port  
P connects electric potential pole port  
C connects current pole port  
V connects voltage pole port

value above 10V. At this point, one can break the power supply of tested earth electrode equipment to lower earth voltage and then measure the value.

### 4) Earth Resistance Measurement

First please press “Test/Stop” beginning from 2000 Ω. If the shown value is too small, switch to 200 Ω/20Ω and the shown value here is namely the tested earth resistance value.

Note: make sure connecting wires separated during wire connecting since testing when testing leads wind about with each other may encounter mutual inductance to affect reading. The auxiliary earth resistance value may be too big and error may occur to show value. Make sure auxiliary earth bar P and C into wet land and complete contact of connecting parts.

### c. Simple Earth Resistance Measurement

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

### 1) Testing Wire Connection

Please connect simple testing wires according to picture below.

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## G. Replacing Battery

1) Do not open the battery cover if the outer casing is wet.

2) Please do not replace the battery during test. Please turn the range switch to off and remove testing leads, control bar, etc before replacing the battery to avoid electric shock.

Undo the screw on battery cover at the bottom of the unit and open the battery cover.

Replace new batteries, put battery cover back and tighten the screw.

## H. Accessories

- |                                                                                         |   |
|-----------------------------------------------------------------------------------------|---|
| 1) auxiliary earth bar                                                                  | 2 |
| 2) testing wire                                                                         | 1 |
| (red 15-meter testing wire / yellow 10-meter testing wire / green 5-meter testing wire) |   |
| 3) simple testing wire                                                                  | 1 |
| (red 1.6-meter testing wire / green 1.6-meter testing wire)                             |   |
| 4) 1.5V(R6AA) battery                                                                   | 6 |
| 5) 12V(23A) battery                                                                     | 1 |
| 6) instruction manual                                                                   | 1 |
| 7) tool bag                                                                             | 1 |

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