

Dear Client

Thank you for Purchasing our **HT5600 Earth Resistance Tester**. Please read the manual in detail prior to first use, which will help you use the equipment skillfully.



Our aim is to improve and perfect the company's products continually, so there may be slight differences between your purchase equipment and its instruction manual. You can find the changes in the appendix. Sorry for the inconvenience. If you have further questions, welcome to contact with our service department.



The input/output terminals and the test column may bring voltage, when you plug/draw the test wire or power outlet, they will cause electric spark. PLEASE

CAUTION RISK OF ELECTRICAL SHOCK!

Company Address:

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- ◆ Sales Hotline: 86-27- 87457960
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- ◆ Website: www.hvtest.cc

◆ **SERIOUS COMMITMENT**

All products of our company carry one year limited warranty from the date of shipment. If any such product proves defective during this warranty period we will maintain it for free. Meanwhile we implement lifetime service. Except otherwise agreed by contract.

◆ **SAFETY REQUIREMENTS**

Please read the following safety precautions carefully to avoid body injury and prevent the product or other relevant subassembly to damage. In order to avoid possible danger, this product can only be used within the prescribed scope.

Only qualified technician can carry out maintenance or repair work.

--To avoid fire and personal injury:

Use Proper Power Cord

Only use the power wire supplied by the product or meet the specification of this produce.

Connect and Disconnect Correctly

When the test wire is connected to the live terminal, please do not connect or disconnect the test wire.

Grounding

The product is grounded through the power wire; besides, the

ground pole of the shell must be grounded. To prevent electric shock, the grounding conductor must be connected to the ground.

Make sure the product has been grounded correctly before connecting with the input/output port.

Pay Attention to the Ratings of All Terminals

To prevent the fire hazard or electric shock, please be care of all ratings and labels/marks of this product. Before connecting, please read the instruction manual to acquire information about the ratings.

Do Not Operate without Covers

Do not operate this product when covers or panels removed.

Use Proper Fuse

Only use the fuse with type and rating specified for the product.

Avoid Touching Bare Circuit and Charged Metal

Do not touch the bare connection points and parts of energized equipment.

Do Not Operate with Suspicious Failures

If you encounter operating failure, do not continue. Please contact with our maintenance staff.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in Explosive Atmospheres.

Ensure Product Surfaces Clean and Dry.

— **Security Terms**

Warning: indicates that death or severe personal injury may result if proper precautions are not taken

Caution: indicates that property damage may result if proper precautions are not taken.

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I .Introduction

HT5600 Clamp Earth Resistance Tester with multi-function used in evaluation on ground resistance. Our company are experienced in designing and manufacturing ground tester.

Is hand portable and is equipped with the necessary attachments. It is easy to use. Operators can use it just following this instruction without participating in specialized training.

II .Overview

It is important for electricity, telecommunications, electrical equipment to ground. Grounding resistance is widely used in the judgment of the grounding quality of system. Accurate, rapid, simple, reliable grounding resistance measurement methods are important in the field of lightning protection grounding technology. ET3000 Multi-function dual-clamp grounding resistance tester is suitable in telecommunications, electricity, meteorology, computer room, power distribution lines, transmission line tower, gas stations, factories grounding grids, lightning and so on.

Can be used in traditional auxiliary electric pole grounding resistance measuring and also can be used without auxiliary electric-pole which can test the grounding resistance in duty without

contacting the grounding system and load. Auxiliary electric-pole test method can be used just in single-point grounding system or strong interference conditions.

III .Main Features

1. Dual-Clamp method & pile method:

Grounding for any place, multi-point or single point grounding;

2. Anti-interference ability:

Self-generated high frequency current can be used to filtered harmonic interference of industry power ,so it will measure accurately under 500KV substation;

3. Wide measuring range, high resolution:

Range from $0.01\Omega \sim 200\Omega$, resolution of 0.01Ω , grounding resistance lower than 0.7Ω can be measured accurately;

4. Great gag Design:

Gag diameter is 50mm (standard configuration) and it can meet with flat iron and steel wire ;special gag custom sizes can be customized;

5. Large-capacity data storage:

200 sets of measurements can be stored;

6. Easy to operate with single-person:

Chinese operation interface, small size, light weight, portable explosion-proof box, easy to carry for outdoor measurement.

IV. Main Technical Index

- 1、 Grounding resistance measuring range:
Two-clamp method: $0.01\Omega\sim 200\Omega$
Four-leads method: $0.01\Omega\sim 200\Omega$
- 2、 Error:
Two-clamp method: $\pm 3\%\pm 2d$
Four-leads method: $\pm 2\%\pm 2d$
- 3、 Minimum resolution: 0.01Ω
- 4、 Clamp size: $\Phi 50\text{mm}$
- 5、 Storage capacity: 200 group data
- 6、 Working temperature: $0^{\circ}\text{C} \sim + 50^{\circ}\text{C}$
- 7、 Power Supply: Eight 5 Ni-MH rechargeable batteries or regular AA batteries
- 8、 Weight: 0.8kg (including battery)
- 9、 Dimensions: $265\text{mm}\times 130\text{mm}\times 65\text{mm}$

V. Panel Features

1、 button features

The tester has total seven buttons, the following specific features:

“Power Supply”: if has opening, after five minutes without

any operation , it will be automatically shutdown.

“Two-clamp method▲”： In multi-point grounding of the grounding grid, to test this way; In addition, other functions, the key for the cursor up or increase the bond.

“Four-leads method▼”： Click here to play auxiliary keys used to pile measured grounding resistance, while, in other functions, the key for the cursor down or reduce the bond.

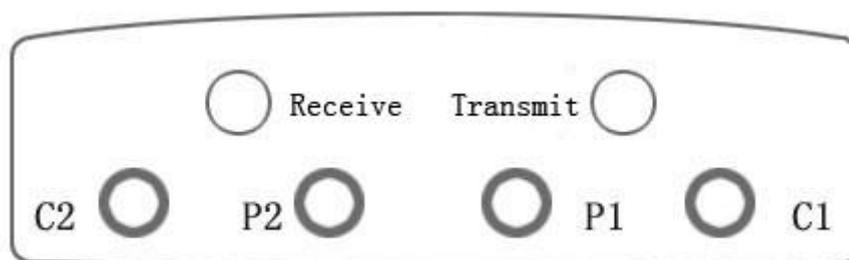
“◀”： The left cursor key

“▶”： The right cursor key

“Test”： When using the two-clamp method or four-leads method, this key to start measurement.

“Confirmed”： Click here to enter the selected function.

2、 Test port （refer to Figure 1）



(Figure 1: Terminal panel)

The instrument interfaces to connect with the outside world there are two groups: the two-clamp method use upper "Receive" and "Transmit" two jack; the four-leads method using the "C2", "P2", "P1" and "C1" four jack.

Charge jack located at the bottom left of the equipment, when the instrument displays the upper-left corner of the low battery

indicator, please use the company's charging instrument to charge. It's the smart charger for the battery charger. When the battery is full, that is, the charger indicator light to turn off automatically stop charging the battery, effectively preventing battery overcharge.

Note: if the instrument will not be used in long-term, you also should be carried out regularly charge the battery (such as two months) ,in order to avoid battery over-discharge damage. Do not charge the battery when use ordinary batteries.

VI. Measurement principle and application

(1) Two- clamp method

1、 The measuring principle

The method has many advantages. First, easy to operate. The test can be executed when the device is working. No measuring probes are needed and it is not necessary to separate the electrodes. The grounding resistance can be obtained by clamping the grounding conductor. Second, the method has high accuracy to 0.01Ω . Third, the method has high anti-interference ability and the line frequency harmonics can be filtered. Fourth, it can be a way to piling method. In many conditions (such as housing or regions covered with cement-intensive), it is difficult to adopt the way of piling to measure the grounding resistance. But it is not necessary for double clamp method. However there is shortage of this method too. And it can not measure the grounding resistance for a single point grounding system.

The measurement principle be summarized as follows: The

instrument is equipped with two shut up: voltage clamp and current clamp.

As shown in Figure 2, potential E in the voltage-clamp is excited in the measured and cause current I in the circuit. And the current in the clamp can be measured. Using Ohm's law: $R = E / I$, the value of R can be obtained.

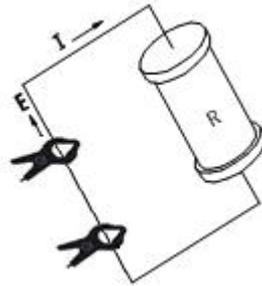


Figure 2 The measuring principle

2、 Multi-polar parallel grounding resistance measurement

Multi-point grounding system (such as the transmission tower grounding system, grounding cable communications system, certain buildings, etc.) grounds through the overhead ground wire (shield communications cable) connection, as shown in Figure 3:

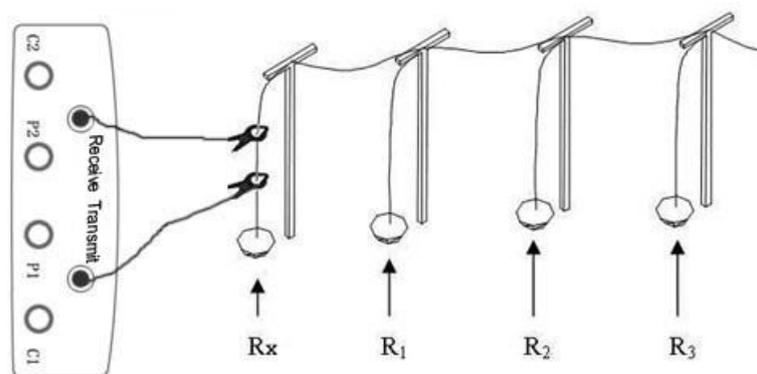


Figure 3

The two gaps of the clamps which are properly plugged in the jacks are clamped on the grounding wire with distance of 30cm. The two jacks are not interchangeable, the equivalent circuit shown

below.

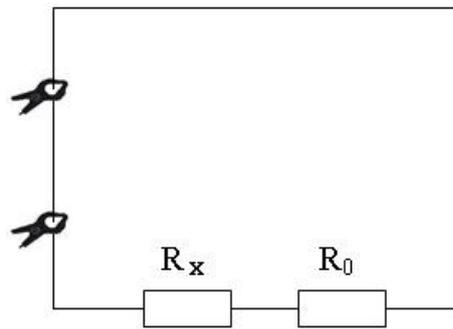


Figure 4

$$\text{Then } R_T = R_x + R_0$$

Of which:

R_T : the measured value;

R_x : grounding resistance;

R_0 : All other tower grounding resistance of the equivalent parallel resistance.

Although from a strictly theoretical, because of the so-called "mutual resistance" existence, R_0 is not the usual sense electrotechnics parallel value (it will larger than the value in electrotechnics), but because the grounding hemisphere is much less than their distance and number of the grounding points is big so R_0 will be much less than R_1 and we can assume $R_0 = 0$. Then $R_T \approx R_x$.

The theory is proved be true with many test under different environments comparing to traditional method.

Non-contact measurement method (i.e., double clamp) is an advanced measurement technology and it has many advantages. However, the measure resistance includes the he entire circuit grounding resistance. Care must be taken in analyzing the result.

Note: The clamps of charging and receiving are not interchangeable.

3 、 Two-clamp method measure the independent grounding objection

A . There must be an effective closed-loop for two-clamp method in the testing process The solution is to find an auxiliary electrode, and link the tested grounding objection with well grounding system (such as water pipes, etc.) Then clamp the two clamps on the wire with a distance of 30cm. Then enter the double clamp interface by pushing button “double clamp” and get the value by pushing “test” button. Different method can be chosen under different conditions in measuring independent grounding resistance.

B . The grounding resistance can be measured when the devices are in lower floors (the ground floor or second floor).

C. Devices in a higher floor can use "independent grounding" test method. The grounding resistance of water pipe is assumed to be zero of the theory. But it is not true. So the value R_A should be obtained with "independent grounding" test methods and then the resistance R_B of water pipe get measured with the same method and then been subtracted from R_A .

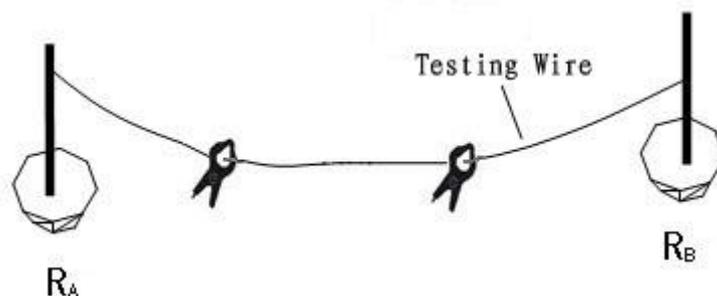


Figure 5

D、 During clamp method dual-resistance, if the measured value display overflow, then the measured resistance exceeds the measuring range of the instrument or description does not shut up any metal clamp around the conductor or the grounding line under test

(2) Four-leads method

Using the connection method as Figure 6. At this point click "Four-leads" button, enter the interface to the Four-leads method. And then "test" button can be measured more accurately measured grounding resistance of grounding.

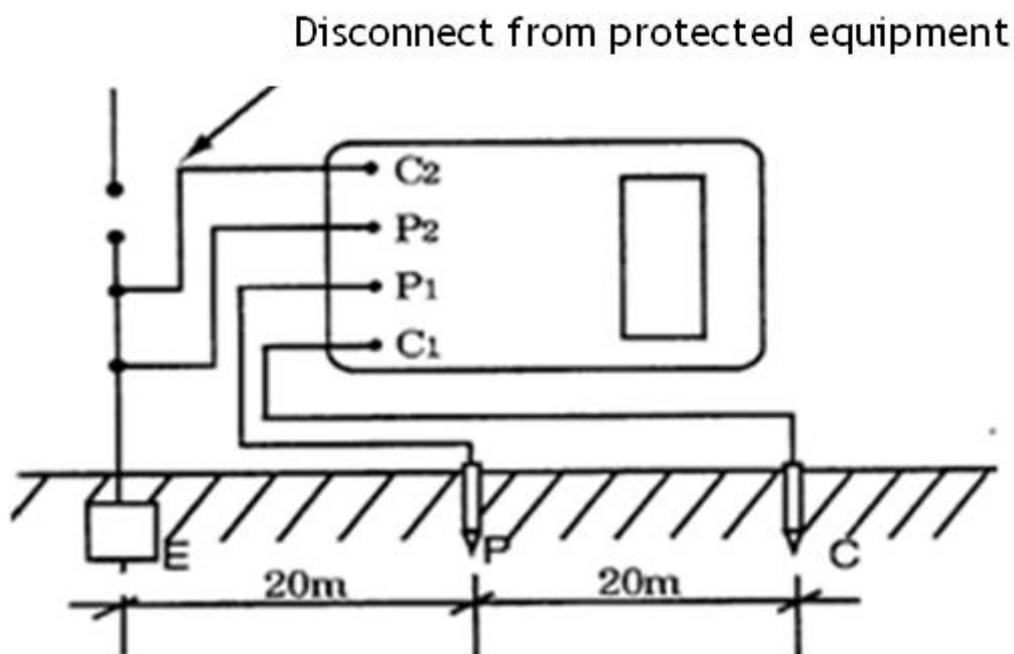


Figure 5 Four-Leads method

(3) Store

After each measurement, the measurement results can be

stored. Shifted right or left button , the cursor stop in the "Storage" and press the "confirm" key to enter the storage function. Enter the number, and then press "confirm" to store, for example, measurement data to be stored in Group 7, the number will be adjusted to 007, and then "confirm" key to confirm to complete the storage. If the number has data, then the original data is overwritten. Continue to test, press the "confirm" key to return to Test status. The machine can store 200 groups of data.

(4) View / Delete

In the two-clamp method and four-leads method interface, the cursor moved to the "Back" on, and click the "confirm" button, that is, the right to enter the main menu, then "▲" "▼" button, select "view of historical data" or "To delete the historical data." And then "confirm" button, enter the corresponding functions. By "◀" "▶" about the adjustment, press "▲", "▼" to adjust the number, press the "confirm" key to confirm, you can access stored value, or delete stored values.

(5) Keep

During the two-clamp method and four-leads methods testing process, because environmental and outside interference factors,

there may has a phenomenon of numerical instability. During testing, when the cursor stays in the "maintain" you can press the "confirm" key to lock the measurement values for the surveyor to record and read values. At this time screen "keep" change into "disarm", and then click "confirm" to unlock features.

VII. Notes

1、 Clamp and Main Frame for supporting the use of the factory with a good pre-required. In order to avoid measurement error, Clamp and Main Frame may not be used by other Main Frame.

2 、 Anytime should keep the clamp surface cleaning, the contaminated clamp instrument will reduce the accuracy of the measurement.

3、 Clamp must be clamped well in testing.

VIII. Accessories

- 1、 One main frame
- 2、 Two clamp
- 3、 One Check ring
- 4、 Two pillars
- 5、 Four measuring leads

One 40m wires for four-leads

One 20m wires for four-leads

Two 1.5m wires for four-leads

- 6、 One test certificate
- 7、 One operation manual
- 8、 One certification