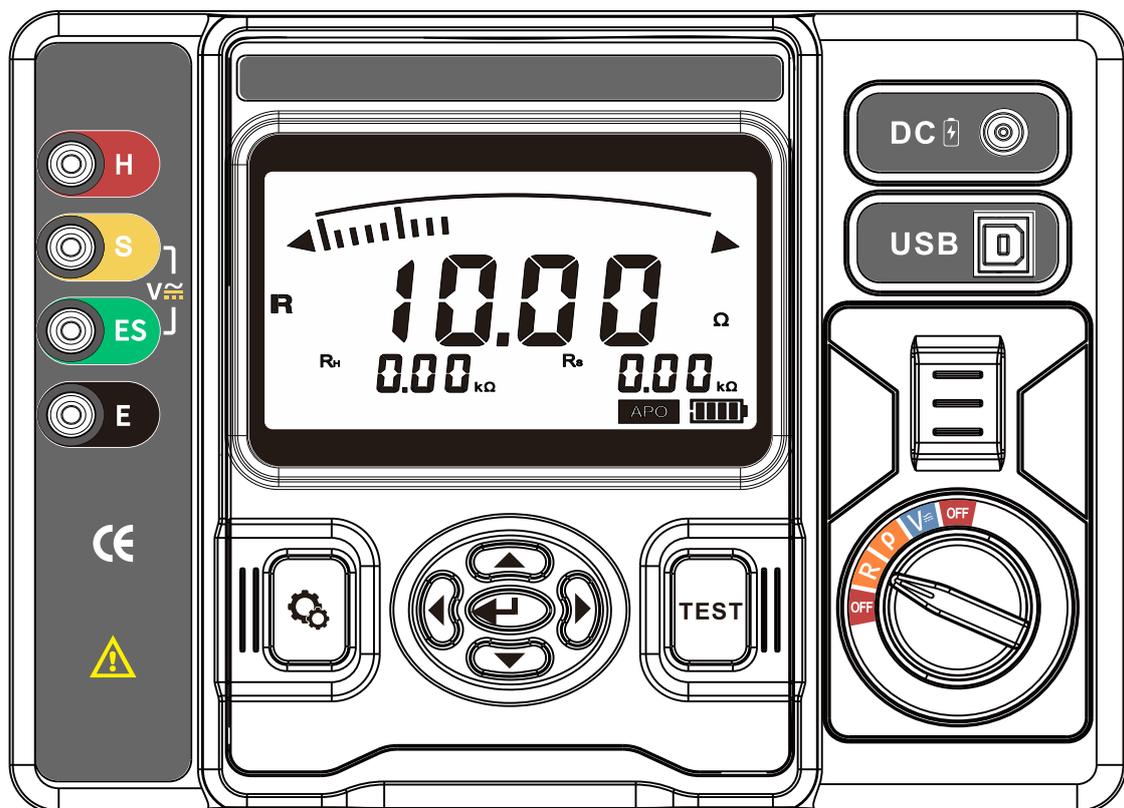


Multi-function Earth Resistance Tester



ES3001P

Instruction Manual

.....
Guang Zhou Zheng Neng Electronic Technology Co.,Ltd.

Catalogue

I. Safety rules and precautions.....	1
II. Brief Introduction.....	2
III. Range and accuracy.....	3
IV. Structure.....	7
V. Measuring principle.....	8
VI. Method of operation.....	10
1. Startup & Shutdown.....	10
2. Check battery voltage.....	10
3. Fourth Wired method precision test grounding resistance	10
4. Test the grounding resistance of the three wired method.....	13
5. Simple grounding resistance test for the two wired method	13
6. Soil resistivity test.....	15
7. Ground voltage test / ACV.....	16
8. DC voltage test / DCV.....	17
9. Backlight control.....	18
10. Power-off time Settings.....	18
11. Alarm value setting.....	19
12. Data locking/storage.....	19
13. Data lookup/deletion.....	20
14. Data upload.....	21
XII. Maintenance and service.....	21
XIII. Packing list.....	23

I. Safety rules and precautions

Thank you for purchasing our multi-functional grounding resistance tester. Before you use the instrument for the first time, in order to avoid possible electric shock or personal injury, please be sure to: read and strictly follow the safety rules and precautions listed in this manual.

In any case, the use of this instrument should pay special attention to safety.

- ◆ This instrument is designed, produced and inspected according to IEC61010 safety specifications.
- ◆ In any case, the use of this instrument should pay special attention to safety.
- ◆ When measuring, do not use high frequency signal generators such as mobile phones near the instrument to avoid errors.
- ◆ Pay attention to the label text and symbols on the instrument body.
- ◆ Before use, confirm that the instrument and accessories are in good condition, and that the insulation layer of the instrument and test line is not damaged or exposed
- ◆ Use only when the wire is not broken.
- ◆ During the measurement process, it is forbidden to contact the exposed conductor and the circuit under measurement.
- ◆ Make sure that the connecting plug of the wire is tightly inserted into the instrument interface.
- ◆ Do not apply AC or DC voltage greater than 100V between the test end and the interface, otherwise, May damage instrument.
- ◆ Do not measure in flammable places, sparks may cause explosion.
- ◆ When the instrument is in use, if the housing or test cables breaks and exposes metal, please stop using it.
- ◆ Do not place and store the instrument in high temperature, humidity, condensation and direct sunlight for a long time.
- ◆ When charging the battery, make sure that the test cable has been removed from the meter and the meter is in a shutdown state.
- ◆ The instrument displays a low battery voltage symbol “”, Charge when necessary.
- ◆ Pay attention to the measurement range and operating environment specified by this instrument.
- ◆ The use, disassembly, calibration and maintenance of this instrument must be operated by authorized personnel.
- ◆ If the instrument continues to be used for safety reasons, it should be

stopped immediately and sealed. It shall be kept by an authorized institution.

- ◆ In the instrument and manual “” Safety warning signs, users must strictly follow the contents of this manual for safe operation.

II. Brief Introduction

The multifunction grounding resistance tester, also known as the grounding resistance tester, is an advanced device that integrates multiple measurement methods. It measures grounding resistance through precise four-wire, three-wire, and simple two-wire methods. It is widely used in telecommunications, power, meteorology, server rooms, oil fields, power distribution lines, transmission towers, gas stations, factory grounding grids, lightning rods, and more. The instrument boasts features such as accurate testing, speed, simplicity, and stability.

The multifunctional grounding resistance tester is controlled by a microprocessor and can accurately measure grounding resistance, soil resistivity, ground voltage, and DC voltage. It employs fast filtering technology to minimize interference. The screen displays the resistance value of auxiliary electrodes, making it easy to identify measurement errors caused by environmental factors, thus facilitating more accurate measurement of the actual grounding resistance. It can store up to 500 sets of data and connect via Bluetooth to a mobile APP or USB to a computer for remote measurement, historical data reading, report generation, and analysis. The device features unique functions such as value retention and intelligent alarm prompts.

The multifunction grounding resistance tester consists of the main unit, upper computer software, mobile APP software, test line, USB line, charger and grounding needle.

Model

Model	Functions
ES3001P	2, 3 and 4 line AC grounding resistance, soil resistivity, Alternating voltage, DC voltage

III. Range and accuracy

1. Table of range, accuracy and resolution of each mode

Measure function	Measuring Range	Precision	resolution ratio
Measurement of Ground Resistance (Re) by two, three and four wire method	0.00 Ω ~ 19.99 Ω	$\pm 1.5\%rdg \pm 7dgt$	0.01 Ω
	20.0 Ω ~ 199.9 Ω		0.1 Ω
	200 Ω ~ 1999 Ω		1 Ω
	2.00k Ω ~ 19.99k Ω		10 Ω
	20.0k Ω ~ 200.0k Ω		100 Ω
Soil resistivity (ρ)	0.00 Ωm ~ 99.99 Ωm	$\rho = 2 \pi aR$ (注 2)	0.01 Ωm
	100.0 Ωm ~ 999.9 Ωm		0.1 Ωm
	1000 Ωm ~ 9999 Ωm		1 Ωm
	10.00k Ωm ~ 99.99k Ωm		10 Ωm
	100.0k Ωm ~ 999.9k Ωm		100 Ωm
	1000k Ωm ~ 9999k Ωm		1k Ωm
AC voltage	0.000 ~ 9.999V	$\pm 1.5\%rdg \pm 50dgt$	0.001V
	10.00 ~ 99.99V		0.01V
	100.0 ~ 750.0V		0.1V
DC voltage	0.000 ~ 9.999V	$\pm 1.5\%rdg \pm 50dgt$	0.001V
	10.00 ~ 99.99V		0.01V
	100.0 ~ 999.9V		0.1V

Temperature characteristic	<p>Temperature characteristics: Add the test accuracy $\times 0.1/^{\circ}\text{C}$ to the operating temperature range (except for 18°C to 28°C)</p> <p>For example, at 8°C: $\pm 0.2\% \text{rdg} \pm 10 \text{dgt}$ (basic accuracy) $+0.1 \times 10$ (temperature difference) $\times (0.2\% \text{rdg} + 10 \text{dgt}) = \pm 0.4\% \text{rdg} \pm 20 \text{dgt}$</p>
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Note: 1. Baseline condition: accuracy at $R_h R_s < 100 \Omega$.

Working conditions: $R_h \text{ max} = 3\text{k} \Omega + 100R < 50\text{k} \Omega$; $R_s \text{ max} = 3\text{k} \Omega + 100R < 50\text{k} \Omega$

It depends on the measurement accuracy of R , $\pi = 3.14$, $a: 0.1 \text{ m} \sim 100.0 \text{ m}$;

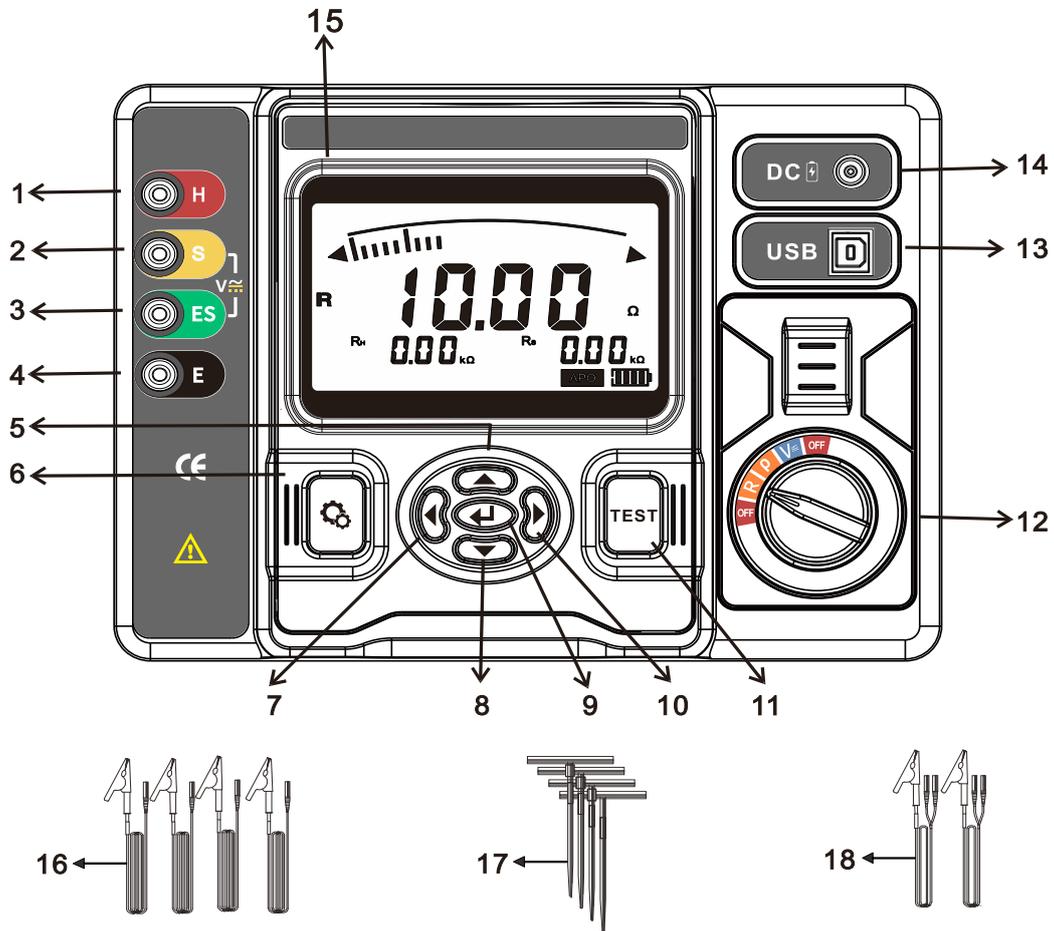
2. General specification

Environmental temperature and humidity	$23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 75%rh 以下
Interference voltage	$< 20\text{V}$ (should be avoided)
Interference current	$< 2\text{A}$ (should be avoided)
Measure the electrode spacing at R	$a > 5d$
Measure the electrode spacing at ρ	$a > 20h$
Power supply	11.1V Lithium battery (built-in) can be measured continuously for more than 1000 times in AC resistance mode when fully charged
Backlight	Controllable backlight, suitable for use in dim places
Measurement method	Precision four wire, three wire method measurement, simple two wire measurement ground resistance
Measuring Method	Two, three and four wire method measurement: pole change method, measuring current 42.0 mA Max Soil resistivity: quadrupole method Ground voltage: Average rectified (between S-ES)

	interface) Dc voltage: Average rectified (between S-ES interface)
Test voltage waveform	Sine wave
Test frequency	128Hz
Test the voltage of the circuit	AC 30.0V Max
Electrode spacing range	0.1m~100.0m
Display mode	Large size HD segment LCD screen
Instrument size	length, width and height: 277.2mm×227.5mm×153mm
Test leads	4pcs: 15m red, 15m black, 10m yellow and 10m green each one pcs
Simple test leads	2pcs: 1.5m red and 1.5m green each
Auxiliary grounding rod	4 roots: ϕ 10mm x 200mm
Test time	Ground voltage: about 3 times per second Ground resistance, soil resistivity: about 10 seconds/time
USB interface	It has a USB interface, and the stored data can be uploaded to the computer through software
Bluetooth connection	Yes, it can be used for real-time monitoring of mobile phones and data reading
USB cable	One USB communication cable, 1.5m long
Data storage	500 groups, "MEM" storage indicates that the symbol "FULL" indicates that the storage is full
Data lookup	The "MR" symbol indicates when data is read
Overflow is displayed	The "OL" symbol indicates when the overflow exceeds the range
Auxiliary grounding test	It has the function of auxiliary grounding resistance value test, 0.00 Ω ~200.0k Ω
Alarm function	An alarm is issued when the measured value exceeds the alarm set value
Auto shut off	The "APO" indicates that the device will automatically shut down after 15 minutes (default) of operation
Power dissipation	Standby: 80mA Max (backlight off) 90mA Max (backlight on)

	Measure: 120mA Max (backlight off) 130mA Max (backlight on)
Quality	Instrument: 1880g (including battery)
	Test leads: 1300g (including simple test line)
	Auxiliary grounding rod: 850g (4 pieces)
Working temperature and humidity	-10°C~40°C; below 80%rh
Store temperature and humidity	-20°C~60°C; below 70%rh
Overload protection	Measure the grounding resistance: AC 280V/3 seconds between ports H-E and S-ES
Insulation resistance	Above 20MΩ (500V between circuit and housing)
Withstand voltage	AC 3700V/rms (Between the circuit and the shell)
Electromagnetic characteristics	IEC61326 (EMC)
Suitable for safety	IEC61010-1 (CAT III 300V、CAT IV 150V、pollution level 2); IEC61010-031; IEC61557-1 (ground resistance); IEC61557-5 (soil resistivity);

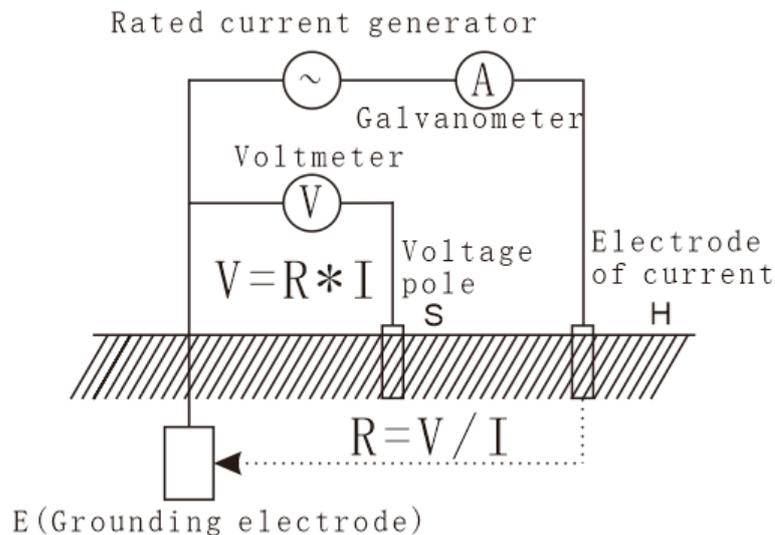
IV. Structure



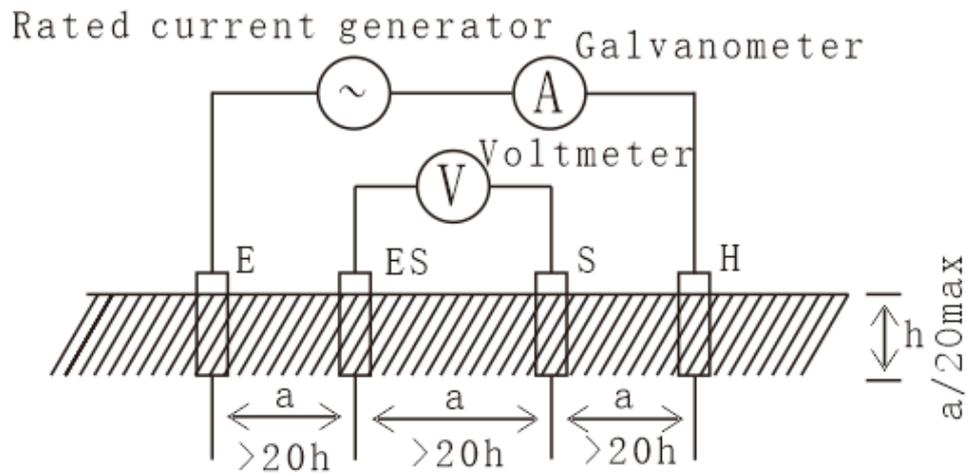
- | | |
|--|--------------------------------|
| 1.H interface (current pole) | 2.S interface (voltage pole) |
| 2.ES interface (auxiliary ground pole) | 4.E interface (grounding pole) |
| 5.Up button | 6.Set button |
| 7.Left arrow key | 8.Down button |
| 9.Identify the key | 10.Right arrow key |
| 11.Test buttons | 12.Turntable control keys |
| 13.USB interface | 14.DC Plug-in socket |
| 15.LCD | 16.Test leads |
| 17.Auxiliary grounding rod | 18.Simple test lead |

V. Measuring principle

1. The three-wire and four-wire methods for measuring ground resistance use the rated current method (suitable for accurately measuring single-point grounding systems). This involves passing an alternating rated current I between the E grounding electrode and the H current electrode, then calculating the potential difference V between the E grounding electrode and the S voltage electrode. The ground resistance value R is calculated using the formula $R=V / I$. To ensure accuracy in testing, the four-wire method is used, adding an ES auxiliary ground electrode. In actual testing, ES and E are clamped at the same point on the grounding body.



2. Soil resistivity (ρ) measurement using the four-point method (Wenner method): AC current I flows between the E ground electrode and the H current electrode, the potential difference V between the S voltage electrode and the ES auxiliary ground electrode is measured, and the resistance value R between the two points is obtained by dividing the potential difference V by the AC current I . The distance between electrodes is a (m). According to the formula $\rho = 2 \pi a R$ (Ωm), the soil resistivity value can be calculated. When the distance between H and S is equal to the distance between S and ES (both being a), it is known as the Wenner method. For ease of calculation, please ensure that the electrode spacing a is much greater than the burial depth h , generally satisfying $a > 20h$, as shown in the figure below.



3. In the above methods, the working error (B) is the error obtained within the rated working conditions, which is calculated by the inherent error (A) and the variable error (Ei) of the instrument used.

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

A: Inherent error

E2: Changes caused by changes in the power supply voltage

E3: Changes caused by temperature changes

E4: Interference with voltage changes

E5: Changes in contact electrode resistance

4. The average rectification method is used for ground voltage measurement.

5. The average rectification method is used for DC voltage measurement.

VI. Method of operation

1. Startup & Shutdown

Rotate the turntable to turn the turntable to the non- "OFF" mode to start up, and to the "OFF" mode to shut down. The instrument will automatically shut down after 15 minutes (default) after starting up.

2. Check battery voltage

1、 After the machine is turned on, if the screen shows a low battery voltage symbol “”, It means that the battery is low. Please charge it in time. Only when the battery is sufficient can the accuracy of measurement be guaranteed.

2、 The power consumption during the test is higher than the standby. If the screen shows a low battery voltage symbol during the test “”, It means that the battery is about to run out of power. Please charge it in time to ensure the accuracy during testing.

3、 If the power is insufficient to support the test, it will automatically shut down. Please charge it again before testing.

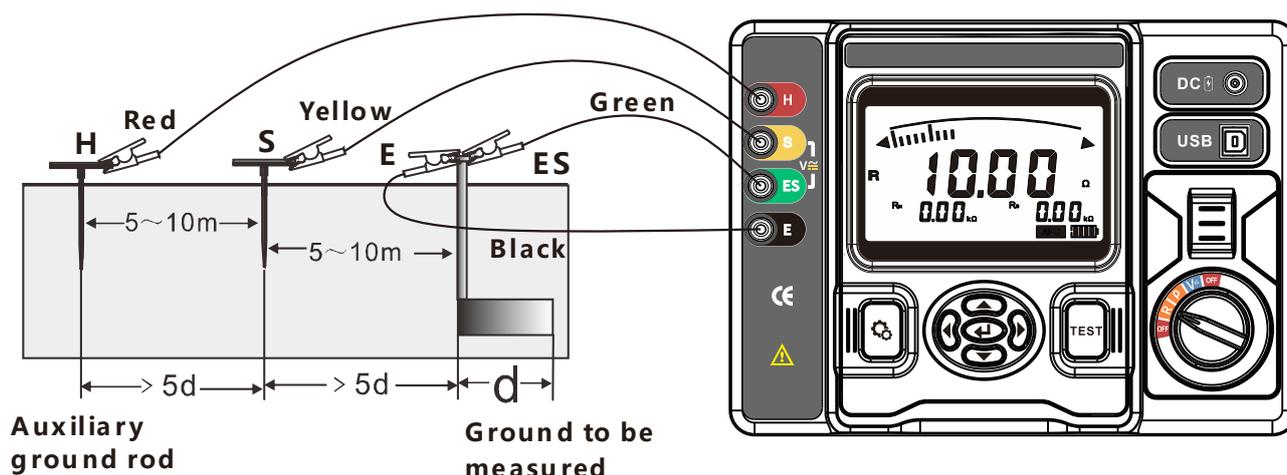
3. Fourth Wired method precision test grounding resistance

	<p>When testing the grounding resistance, first confirm the ground voltage value of the grounding wire, that is, the voltage value between H and E or S and ES must be below 20V. If the ground voltage is above 5V, the instrument will display the NOISE symbol, which may cause errors in the measurement of the grounding resistance. In this case, disconnect the power supply of the equipment to be tested first, reduce the ground voltage, and then proceed with the grounding resistance test.</p>
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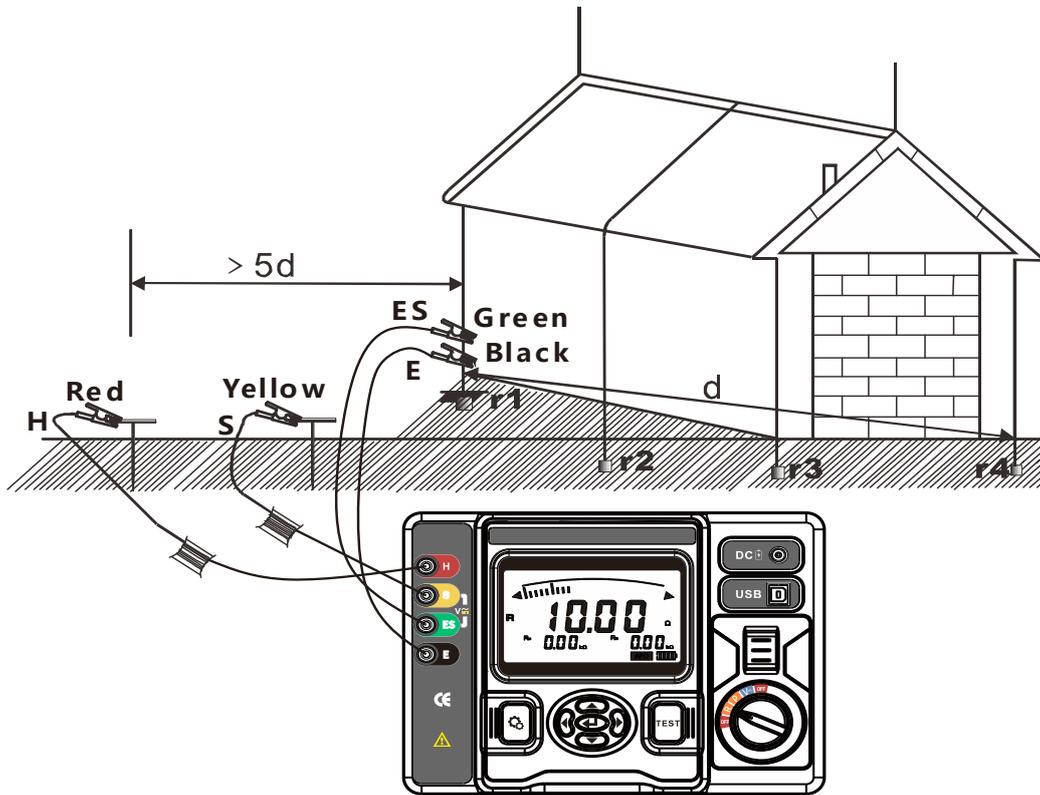
Four-wire test: Four-line test can eliminate the influence of contact resistance between the measured grounding body, auxiliary grounding rod, test clamp and instrument input interface (usually dirty or rusty) surface on the measurement, and can eliminate the influence of line resistance change on the measurement, which is better than three-line test.

As shown in the figure below: from the object under test, S and H auxiliary grounding rods are buried in a straight line into the ground, and the grounding test lines (black, green, yellow, red) are connected to the corresponding E, ES, S and H interfaces of the instrument to the grounding electrode E, auxiliary voltage electrode S and auxiliary current electrode H of the object under test.

	<p>The distance between the measured grounding body E and the current pole H should be at least 5 times of the depth (h) of the measured grounding body buried underground or 5 times of the length (d) of the measured grounding body buried underground electrode.</p>
	<p>Measure the total grounding resistance of a complex grounding system, where d is the distance from the maximum diagonal of the grounding system.</p>
	<p>During testing, the test lines should not be entangled with each other, otherwise the test accuracy may be affected.</p>



For multi-point independent grounding systems or larger ground networks, a test line of 50m or longer can be selected for testing, as shown in the figure below:



$R=r_1 // r_2 // r_3 // r_4 // r_5 // r_6 // \dots // r_n$ (They are independent grounding points)

R ——meter reading

$r_1 \dots r_n$ ——They are independent grounding points

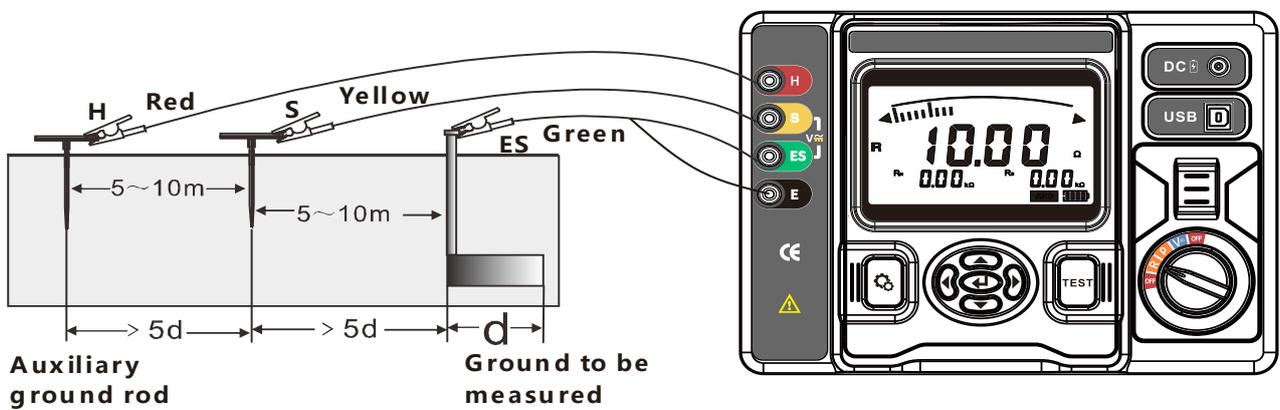
r_H ——Auxiliary current electrode H to ground resistance

r_S ——The earth resistance of the auxiliary voltage pole S

After connecting the test line, turn the turntable to "RE" and enter the grounding resistance test mode. Press once "TEST" The key starts to test. During the test, there is a countdown indicator. After the test is completed, stable data is displayed, that is, the grounding resistance value R of the tested grounding body and the grounding resistance values R_H and R_S of the auxiliary current pole H and auxiliary voltage pole S. Long press "▲" The resistance of the test line can be eliminated.

4. Test the grounding resistance of the three wired method

Three-wire Test: As shown in the figure below, short-circuit the ES and E interfaces of the instrument, which is known as a three-wire test. The operation of the instrument is the same as that for a four-wire test. A three-wire test cannot eliminate the impact of changes in line resistance on measurements, nor can it eliminate the impact of contact resistance variations between the instrument and the test lines, or between the test lines and auxiliary grounding rods. During measurement, the oxide layer on the surface of the grounded object must also be removed.



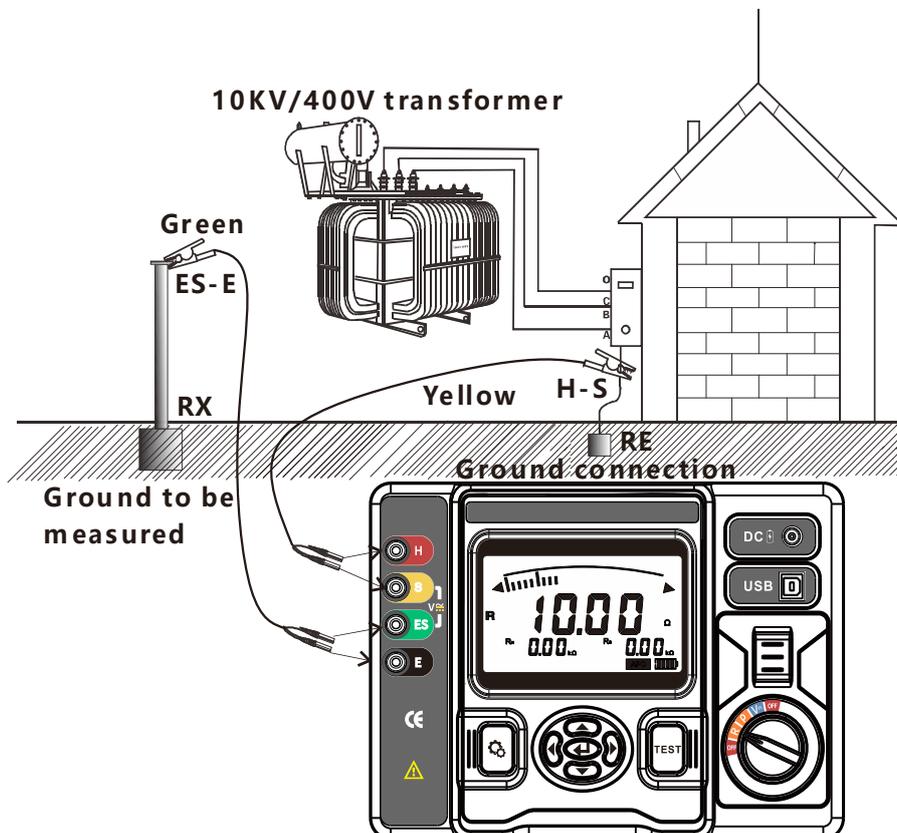
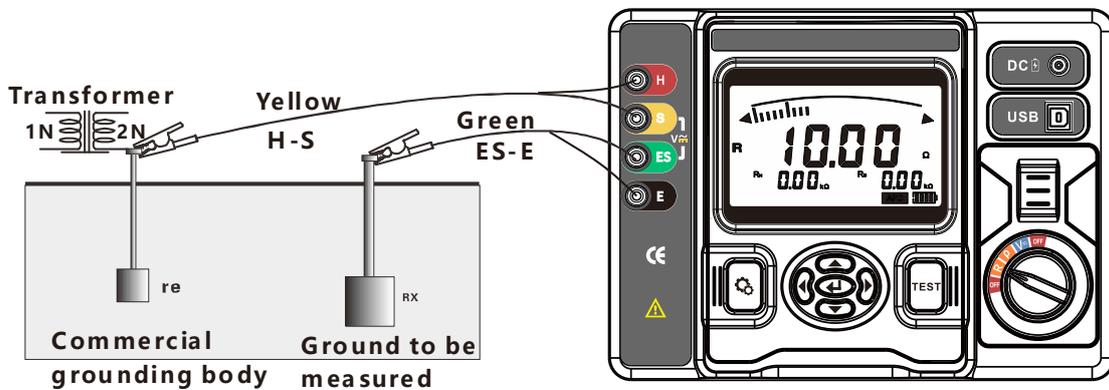
5. Simple grounding resistance test for the two wired method

Secondary Testing: This method is a simple measurement technique that does not use an auxiliary grounding rod. It utilizes the ground electrode with the lowest existing ground resistance as the auxiliary grounding electrode, connected using two simple test lines (i.e., shorting the H-S interface and E-Es interface). Metal pipes, fire hydrants, or other metal embedded objects, common grounding of commercial power systems, or lightning protection grounding electrodes of buildings can be used to replace the auxiliary grounding rods H and S. When measuring, ensure to remove the oxide layer from the connection points of the selected metal auxiliary grounding bodies. The wiring is shown in the figure below, and the instrument operation is the same as for the four-wire test.



When using the commercial power system grounding as an auxiliary grounding pole measurement, it must be confirmed that it is the commercial power system grounding pole first, otherwise the circuit breaker may start, which is dangerous.

The simple two-line method is used to measure the grounding resistance, and the grounding body with a small re value should be selected as the auxiliary grounding electrode as far as possible, so that the instrument reading is closer to the true value. When measuring, please give priority to metal water pipe and metal fire hydrant as the auxiliary grounding electrode.



The simple method to measure the grounding resistance, the meter reading is the sum of the grounding resistance value of the tested grounding body and the grounding resistance value of the commercial grounding body, namely:

$$R = R_X + r_e$$

Where: **R**: is the instrument reading value;

R_X: is the grounding resistance value of the measured grounding body;

R_e: is the grounding resistance value of a common grounding body such as a commercial power system.

Then, the grounding resistance value of the measured grounding body is:

$$R_X = R - r_e$$

6. Soil resistivity test

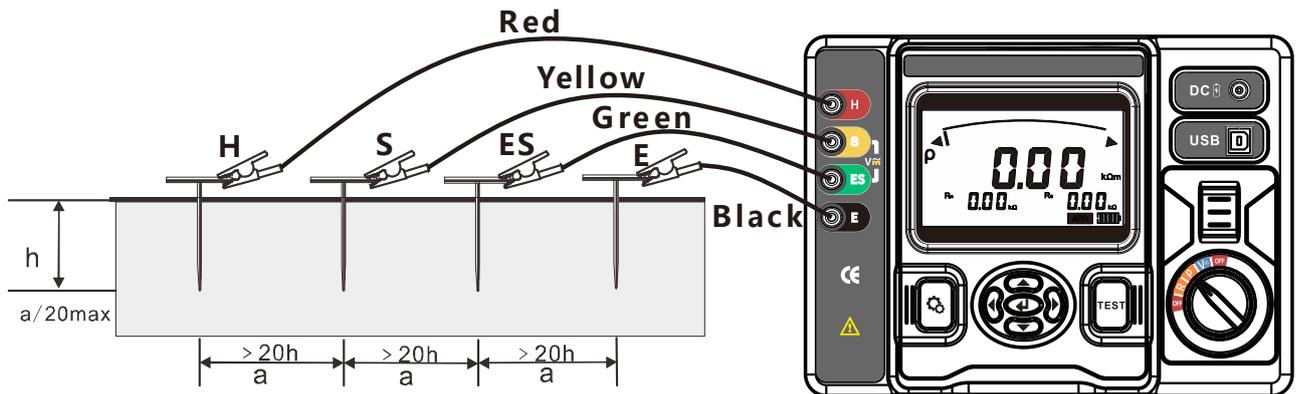
Soil resistivity ρ is a critical factor in determining the grounding resistance of a grounding body. Different types of soil naturally have different resistivities; even the same type of soil can experience significant variations in resistivity due to differences in temperature and moisture content. Therefore, to ensure that the design of grounding systems is based on accurate information and better meets the actual needs of work, it is essential to measure soil resistivity.

The soil resistivity was measured by four-pole method (Wenner method). The soil resistivity ρ is calculated by the formula $\rho = 2\pi aR$ (Ωm), and the unit is Ωm :

a——electrode spacing

R——**S-ES**The resistance of the soil between the electrodes

Four-pole method (Wenner method): Connect the test lines as shown in the figure, paying attention to the spacing and burial depth between the auxiliary grounding rods. Place the H, S, ES, and E auxiliary grounding rods in a straight line and bury them deep into the ground. Connect the test lines (red, yellow, green, black) from the H, S, ES, and E interfaces of the instrument to the corresponding H, S, ES, and E auxiliary grounding rods of the device.



According to the Wenner method, the measured value of soil resistivity is about the soil resistivity at a depth between two grounding rods. The soil homogeneity can be checked by changing the value of a, so as to design an appropriate grounding electrode.

Spacing setting of auxiliary grounding rods: After connecting the test line, turn the turntable to the "PE" position, enter the soil resistance measurement mode, briefly press the "⚙️" key to enter the alarm settings, briefly press the "▲" key to switch to the electrode spacing setting mode (there are a maximum of three setting modes, namely alarm value setting, shutdown time setting (displaying the "APO" icon), and electrode spacing setting (specific to soil resistance measurement, with the unit displayed as "m"). The method to distinguish the modes can be seen from the units), then briefly press "▼" to move the cursor, press "◀️" or "▶️" to change the current number size (the value range of a is: 0.1m to 100.0m), then press the long "↩️" key or briefly press the "⚙️" key to save the set a value and return to the soil resistance measurement mode.



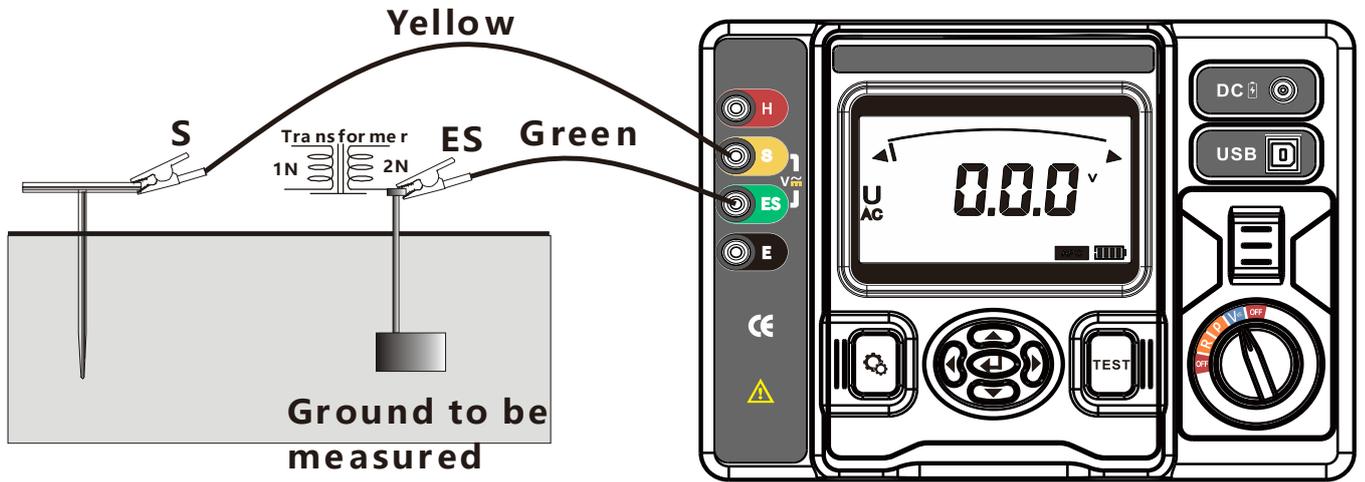
After setting the value of a, press in soil resistivity test mode "TEST" key starts the test, and the countdown shows the progress of the test. After the test is completed, it shows the stable soil resistivity value.

7. Ground voltage test / ACV

	<p>An auxiliary grounding rod is required for ground voltage testing.</p> <p>As long as the instrument is connected to the earth through the test line and auxiliary grounding rod, other test lines of the instrument interface cannot be connected to the L and N lines of the commercial power supply, otherwise it will cause leakage and the circuit breaker may start, which is dangerous.</p>
	<p>Ground voltage test should not exceed 750V.</p>

Ground voltage: that is, when an electrical equipment has a ground fault, the potential difference between the casing of the grounding equipment, the grounding wire and the grounding body and the zero potential point. The ground voltage is the potential difference with the earth as the reference point, and the earth is the zero potential point.

When testing the ground voltage, you need to use an auxiliary grounding rod. Note the difference between this and commercial AC voltage testing. See the following figure: After the instrument, auxiliary grounding rod, and test line are connected, turn the dial to the "V" position and click "◀" or "▶" mutual switching of AC and DC voltage can be carried out, and the test voltage can be displayed in real time.

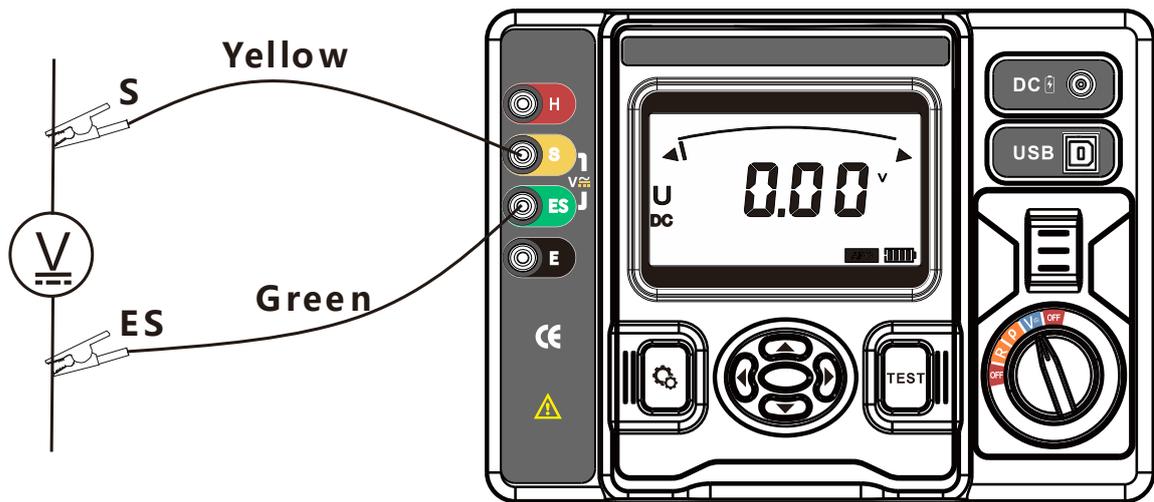


8. DC voltage test / DCV

	<p>The DC voltage test can be used as a supplement to the ground voltage test to measure the DC component.</p>
	<p>As long as the instrument is connected to the earth through the test line and auxiliary grounding rod, other test lines of the instrument interface cannot be connected to the L and N lines of the commercial power supply, otherwise leakage will occur and the circuit breaker may start, which is dangerous.</p>
	<p>The DC voltage test should not exceed 1000V.</p>

DC voltage: that is, when an electrical equipment has a ground fault, the potential difference between the casing of the grounded equipment, the grounding wire and the grounding body and the zero potential point. The DC component potential difference can be measured with the earth as the reference point, and the earth is the zero potential point.

The wiring method for DC ground voltage test is the same as that for AC ground voltage test. Turn the dial to the "V" position and click "◀" or "▶" mutual switching of AC and DC voltage can be carried out, and the test voltage can be displayed in real time.



9. Backlight control

After turning on the device, long-pressing the "▼" key can turn on or off the backlight. The backlight function is suitable for dimly lit areas. By default, the backlight is turned off upon each startup.

10. Power-off time Settings

Short press the "⚙️" key to enter the alarm settings, and then short press "▲" to switch the setting mode (there are a maximum of three setting modes, namely alarm value setting, shutdown time setting (displaying the "APO" icon), electrode spacing setting (specific to soil resistivity)). The mode distinction method can be seen in the units). Short press "▼" to move the cursor, press "◀" or "▶" to change the current number size, and then by long pressing "⏪" or short pressing "⚙️", you can save the set values and return to the previous mode. The maximum value can be set to 30 minutes, and 0 minutes represents disabling the timed shutdown function.



11. Alarm value setting

After turning on the device, long press the "⚙️" key to enable or disable the alarm function. The screen will display "🔔". Press the "⚙️" key briefly to enter the alarm settings, and then press the "▲" key again to select other setting modes (there are a maximum of three setting modes, namely alarm value setting, shutdown time setting (with the "APO" icon displayed), and electrode spacing setting (specific to soil resistivity). The mode distinction method can be seen in the unit). Press the "▼" key briefly to move the cursor, press the "◀️" or "▶️" key to change the current number size, and then by long pressing the "⏪" key or pressing the "⚙️" key briefly, you can save the set values and return to the previous mode.

The instrument is flashing "🔔" symbol is sent out and the alarm sound "dud-dud-dud" is issued. The maximum value of the grounding voltage alarm is set to 750V, the maximum value of the DC voltage is set to 999V, and the maximum value of the grounding resistance and soil resistivity alarm is set to 9999 Ω.



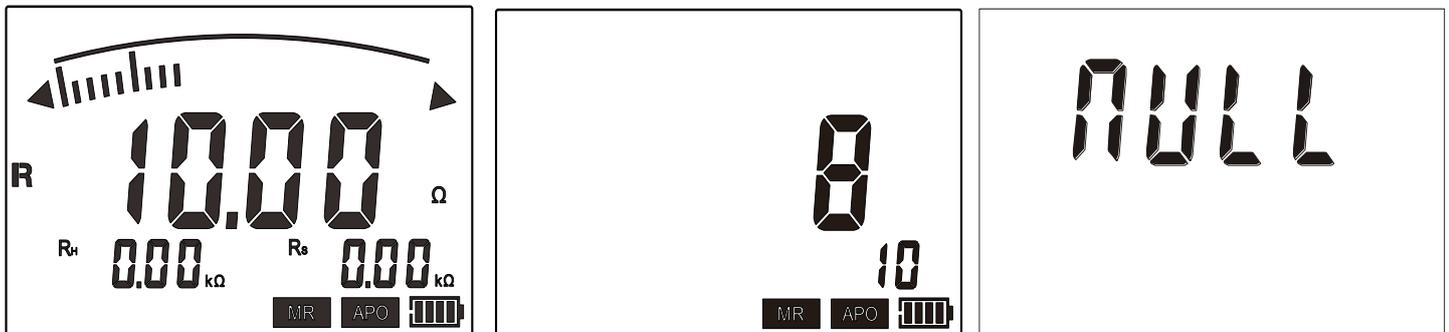
12. Data locking/storage

After the machine is turned on, measure is completed and press short "⏪" The key saves the current displayed data and automatically numbers the storage. If the storage is full, the instrument displays the "FULL" symbol as shown in the figure below: The measured data is 10.00 Ω.

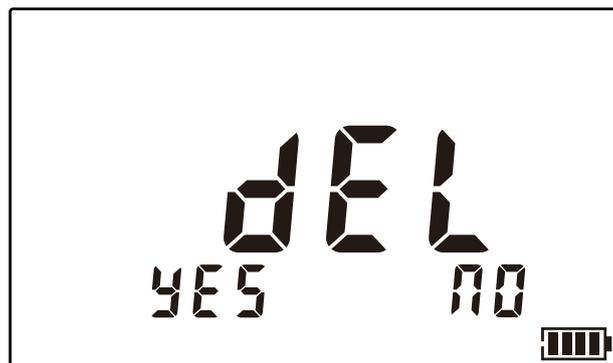


13. Data lookup/deletion

After the boot or measurement is completed, long press “” Key (more than 3 seconds) to enter the data viewing, storage data interface and storage data group number are displayed in sequence. Press “” or “” The key selects the array number and corresponding data with a step value of 1, and presses “” or “” key selects the array number and corresponding data with a step value of 10, and then long press the key “” Key out for viewing. When viewing, the number 8 in the figure below is the current group number, and 10 is the total group number. If there is no stored data, LCD displays “NULL”, as shown in the figure below.



In data viewing mode, short press “” Key to enter data deletion, press “” or “” key Select “YES” or “NO”. Select “NO” to not delete the data, select “YES” to delete the stored data, as shown in the figure below.



14. Data upload



Do not connect a computer to read data while various tests are being carried out, otherwise the ground voltage may damage the computer Or instruments.

(Note: the driver and upper computer need to be installed before connection)

upper monitor : Connect the USB communication line between the computer and the instrument, turn on the instrument, run the monitoring software. If the USB connection is successful, there is a switching mode test function, save the measurement data, so that you can read the stored historical data, upload to the computer and save it.

(Note: Install the APP before connecting)

Bluetooth APP: Start the instrument, in any interface, long press “▶” Key, Turn on Bluetooth or turn off Bluetooth. Open the APP installed on your phone, find the Bluetooth device with the name “RSS” in the interface, and click on the name to connect to the device.

XII. Maintenance and service

1. Batteries

1、 When the battery voltage is too low, the battery symbol is displayed “”, At this time, timely charging should be done to ensure the accuracy of measurement.

2、 It takes about 4 hours to charge the battery from empty to full. Whether the battery is full or not depends on the DC indicator light of the charger. The red light indicates that the battery is charging, and the green light indicates that the battery is full.

3、 When the battery is fully charged, it can be continuously measured for more than 1000 in AC grounding resistance mode. The screen brightness and different load power consumption are also different;

4、 The screen flashes and then goes black. It may be that the battery power is not enough to start the machine. Please charge it fully before starting the measurement.

5、 The battery life of the new instrument can be charged and discharged

about 500 times. When the battery is not durable, contact the instrument dealer for replacement. Do not replace it by yourself.

2.Repair, inspection and cleaning

⚠ Warn

Customers are not allowed to modify, dismantle or repair the product. The responsibility may cause fire, electric shock or personal injury. If you dismantle or modify the product by yourself, you will be deemed to have abandoned the one-year free warranty service.

1. Revise

The correction cycle varies according to the customer's use or environment. It is recommended to determine the correction cycle according to the customer's use or environment and entrust our company to carry out regular corrections.

2. Cleaning

When cleaning the instrument, please use a soft cloth dipped in a small amount of water or neutral detergent and gently wipe. Please use a dry soft cloth to gently wipe the display area. Do not use gasoline, alcohol, acetone, ether, methanol, diluents, or detergents containing gasoline. Otherwise, it may cause deformation and discoloration of the instrument.

3. Transport

To avoid secondary damage caused by impact during transportation, please be sure to double pack. We do not guarantee any damage caused by transportation. When returning for repair, please write down the fault content and return address, contact person, phone number and other necessary information on paper and send it back with the instrument.

XIII. Packing list

Items	specifications	quantity
instrument	*	1 unit (built-in battery)
Instrument bag	*	1pcs
Auxiliary grounding rod	*	4rods
Monitor software CD	*	1pcs
USB Communication lines	1.5m	1pcs
Test leads	Red , yellow , green , black	4pcs
Simple test cable	yellow , green	2pcs
charger	12.6V/1A/ The line length is 1.1m	1pcs
User manual warranty	*	1set

The contents of this user manual are not intended to justify the use of the product for special purposes.

The company shall not be liable for any other loss caused by the use.

The company reserves the right to modify the contents of the user manual.

If there is any modification, no further notice will be given.



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