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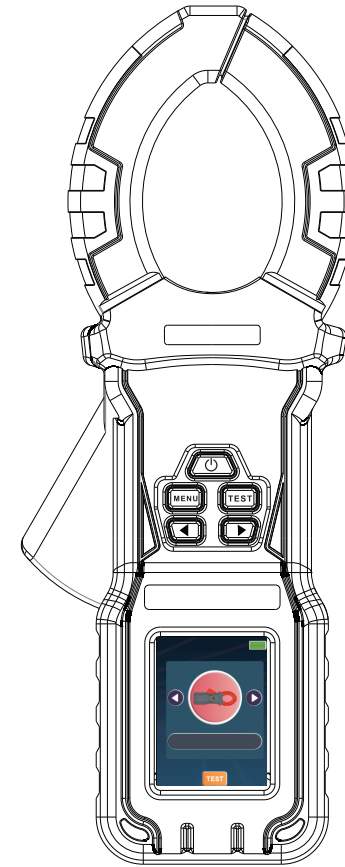


**UNI-T**<sup>®</sup>

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**Ground pile clamp earth  
resistance tester**

**UT278 serial  
Operating Manual**





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## I. Safety rules and precautions

Thank you for purchasing our product. For better use of the tester, please be sure to:

- Read the user manual carefully.
- Observe the “Safety Information” in the user manual.

- ✧ The tester is designed, manufactured and inspected in accordance with IEC61010 Safety Specifications.
- ✧ Pay special attention to the safety when using the tester.
- ✧ To avoid measurement error, please do not use the tester near high-frequency signal generator such as mobile phone.
- ✧ Pay attention to the label and symbol on the tester.
- ✧ Make sure the tester and accessories are in good condition before use.
- ✧ Before starting up, press the trigger once or twice to make sure the jaws are well closed.
- ✧ Do not use this product in flammable and explosive places, sparks may cause an explosion.
- ✧ **When starting up, do not press the trigger or clamp any wires.**
- ✧ Power on, after the “OL” symbol is displayed during the clamp method measurement, then the measured objects can be clamped. In normal power-on condition, only when the “OL” symbol is displayed can measured objects be clamped through the clamping method.
- ✧ Do not place or store the tester for a long time in a place with high temperature, humidity, condensation, or under direct sunlight.
- ✧ Turn off the meter before replacing the battery.
- ✧ Please replace the battery when low battery symbol “” is displayed, otherwise, errors may occur.
- ✧ Keep the contact surface of the jaws clean, do not wipe the surface with corrosive agents and rough materials.
- ✧ When opening the trigger, please avoid impact on the clamp meter, particularly for the joint surface of the jaws.
- ✧ The clamp will make a slight noise when measuring resistance. This is normal. Note the “beep-beep-beep-” sound to distinguish the alarm. It is normal that the tester makes slight sounds when performing resistance measurement. Note: The tester will make “beep-beep-beep-” sound if it alarms.
- ✧ Pay attention to the measurement range and use environment specified of this instrument. Use the tester with specified measurement range in specific environment.
- ✧ The measured lead current should not exceed the upper limit of the clamp meter.
- ✧ Use, disassembly, calibration and maintenance of this instrument must be operated by authorized personnel.
- ✧ Please stop using and sealing up the tester immediately if it may causes hazard during use, and then send it to authorized personnel for maintenance.
- ✧ The warning signs “  ” on the tester and in the user manual must be strictly followed by the user.

## II. Introduction

Ground pile clamp earth resistance tester, also named Loop resistance tester, is used for grounding resistance test.

The tester is designed with 2.4-inch color screen, featuring clamping measurement and three-/four-wire measurement, it has multiple functions such as data storage/access/upload, alarming, auto power off and more. The tester is characterized by aesthetic appearance, wide range, high resolution, easy to carry and operate, accurate, reliable, stable performance, strong anti-interference ability. Its shock-proof, dust-proof, and moisture-proof structure makes it an ideal meter in multiple fields such as telecommunication, electric power, meteorology, oil fields, etc. This tester is mainly used to measure ground resistance of power distribution lines, gas

stations, grounding grid, lightning rods, and other. It is controlled by microprocessor, which enables it to detect ground resistance accurately. Interference is minimized by employing the fast filtering technology.

### III. Range and accuracy

Measurement mode	Range	Resolution	Accuracy
Clamp method	0.02Ω-9.99Ω	0.01Ω	±2%rdg±0.1Ω
	10.0Ω-99.9Ω	0.5Ω	±3%rdg±0.5Ω
	100Ω-199Ω	1Ω	±5%rdg±1Ω
	200Ω-299Ω	5Ω	±10%rdg±5Ω
	300-699Ω	10Ω	±15%rdg±10Ω
	700Ω-999Ω	20Ω	±20%rdg±20Ω
	1.00KΩ-1.19KΩ	30Ω	±25%rdg±30Ω
	1.20KΩ-2.00KΩ	50Ω	±35%rdg±50Ω
3- or 4-wire method	0.01Ω-9.99Ω	0.01Ω	±2%rdg±0.2Ω
	10.0Ω-99.9Ω	0.1Ω	±2%rdg±1Ω
	100Ω-999Ω	1Ω	±2% rdg±15Ω
	1.00KΩ-9.99KΩ	0.01KΩ	±2% rdg±0.1KΩ
	10.0KΩ-30.0KΩ	0.1KΩ	±3% rdg±0.5KΩ
AC current	0.100mA -0.999mA	0.001mA	±2.5% rdg±0.1mA
	1.00mA -9.99mA	0.01mA	±2.5% rdg±0.5mA
	10.0mA -99.9mA	0.1mA	±2.5% rdg±1mA
	0.100A-0.999A	0.001A	±2.5% rdg±0.1A
	1.00A-9.99A	0.01A	±2.5% rdg±0.5A
	10.0A-60.0A	0.1A	±2.5% rdg±1A
Ground voltage	1.00V-9.99V	0.01V	±2.5% rdg±0.1V
	10.0V-99.9V	0.1V	±2.5% rdg±1V
	100V-600V	1V	±2.5% rdg±5V
Selection method	0.30Ω-9.99Ω	0.01Ω	±2% rdg±0.3Ω
	10.0Ω-99.9Ω	0.1Ω	±2% rdg±1Ω
	100Ω-999Ω	1Ω	±2.5% rdg±15Ω
	1.00KΩ-3.00KΩ	0.01KΩ	±3% rdg±0.1KΩ
Soil resistivity(ρ)	0.00Ωm~99.99Ωm	0.01Ωm	ρ=2πaR (note1)
	100.0Ωm~999.9Ωm	0.1Ωm	
	1000Ωm~9999Ωm	1Ωm	
	10.00kΩm~99.99kΩm	10Ωm	
	100.0kΩm~999.9kΩm	100Ωm	
	1000kΩm~9999kΩm	1kΩm	

Note:

1: R depends on the measurement accuracy of the three-four-wire method,  $\pi=3.14$ , a: 1 m~100m;

2: Within the operating temperature range plus test accuracy  $\times 0.1/^{\circ}\text{C}$  (except: 18 $^{\circ}\text{C}$ ~28 $^{\circ}\text{C}$ ).

#### IV. Model of Series

Model	UT278B	UT278C	UT278D
Clamp resistance Range	0.00Ω-1500Ω	0.00Ω-1800Ω	0.00Ω-2000Ω
Leakage current range	0.000mA-40A	0.000mA-50A	0.000mA-60A
Current resolution	1uA	1uA	1uA
Three-four-wire method range	0.00Ω-3000Ω	0.00Ω-30kΩ	0.00Ω-30kΩ
Soil resistivity range	○	0.00Ω-9999kΩm	0.00Ω-9999kΩm
Ground voltage range	600V	600V	600V
Built-in rechargeable battery	●	●	●
TFT Color display	●	●	●
USB Data upload function	●	●	●
Data storage	●	●	●
Real-time battery power indicator	●	●	●
Backlight	●	●	●
Alarm function	●	●	●
Low battery voltage indication	●	●	●
Overload protection	●	●	●
○ No ● Yes			

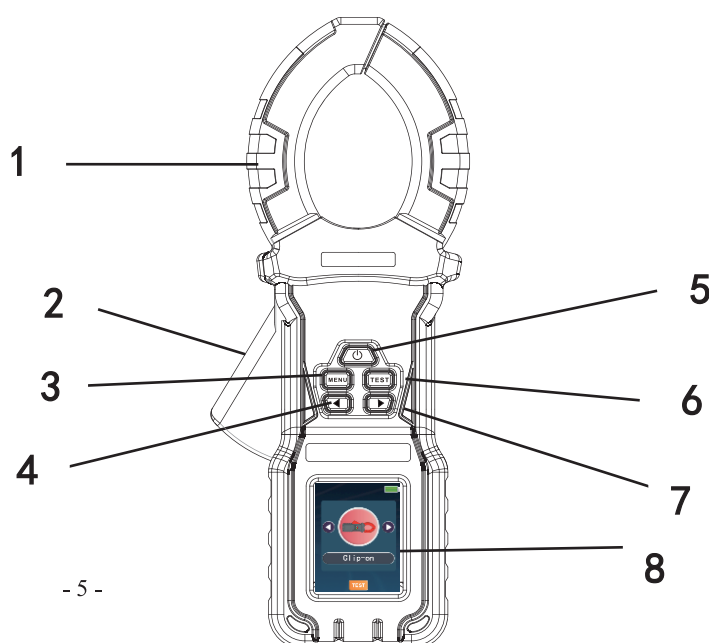
#### V. Technical Specification

Function	Ground resistance test, loop resistance test, AC current test, AC voltage test
Temperature and humidity	23°C±5°C, below 75%rh
Power Supply	DC 3.7V Lithium battery
Resistance resolution	0.01Ω
Current resolution	0.001mA
Voltage resolution	0.01V
Clamp Size	68mm

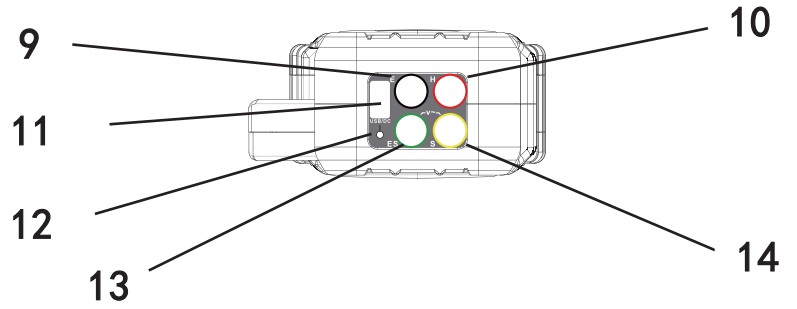
<b>Display</b>	2.4 inch color LCD screen
<b>LCD Size</b>	46mm×29mm
<b>Dimensions</b>	273mm×106mm×53mm
<b>Measurement time</b>	1 time/sec
<b>USB</b>	With USB interface. Storage data can be uploaded and saved to computer, and can be printed out.
<b>Communication line</b>	1pcs
<b>Data storage</b>	Maximum 500 groups of data. The tester displays the symbol "FULL" to indicate full storage.
<b>Overflow display</b>	"OL"
<b>Alarm function</b>	When the measured value exceeds the alarm configuration, the alarm will be triggered.
<b>Battery voltage</b>	Real-time display of battery power. The tester will indicate charging in time for low battery.
<b>Auto power off</b>	The tester powers off automatically after 15 minutes of startup.
<b>Power consumption</b>	750mA MAX
<b>Weight</b>	Meter: 975g (including battery)
<b>Operating temperature and humidity</b>	-10℃~50℃; Below 80%rh
<b>Storage Temperature and Humidity</b>	-10℃~60℃; below 70%rh
<b>Insulation Resistance</b>	20Ω or more (500V between circuit and casing)
<b>Pressure Resistance</b>	AC 3700V/rms (between circuit and casing)
<b>External magnetic field</b>	<40A/m
<b>External electric field</b>	<1V/m
<b>Applicable safety Regulations</b>	IEC61010-1 (CAT III 300V, CAT IV 600V, Pollution Degree 2); IEC61010-031; IEC61557-1 (Ground resistance)

## VI. Structure

1. Clamp jaw
2. Trigger
3. MENU button
4. ▲ button
5. Power button
6. TEST button
7. ▼ button
8. Display screen



- 9. E terminal
- 10. H terminal
- 11. USB interface
- 12. Charging indicator
- 13. ES terminal
- 14. S terminal

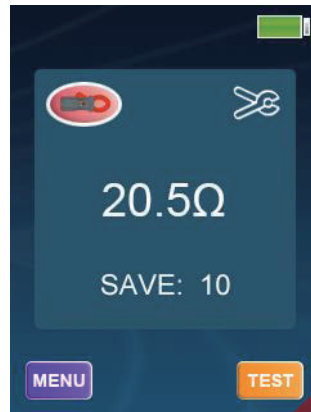


## VII. Interface display

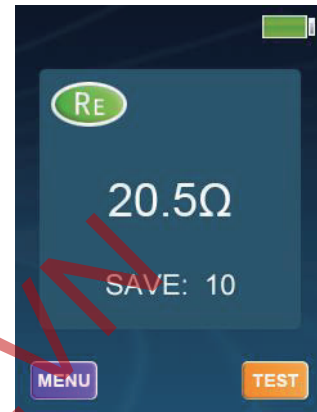
### 7.1 Interface



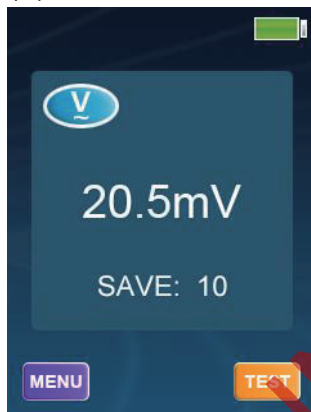
(1) Main interface



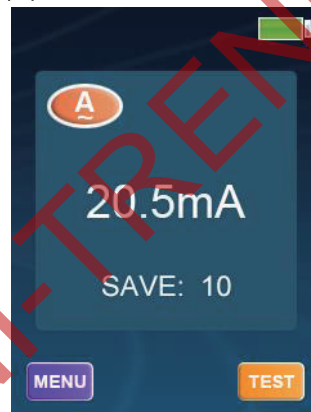
(2) Pincer



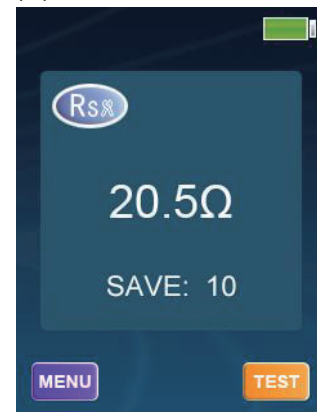
(3) Three/four wires



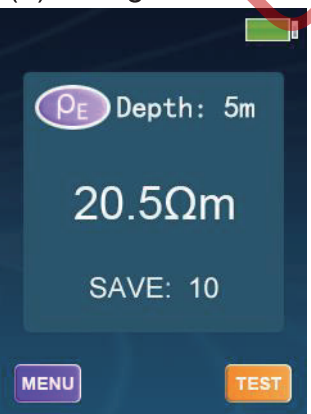
(4) Voltage measurement



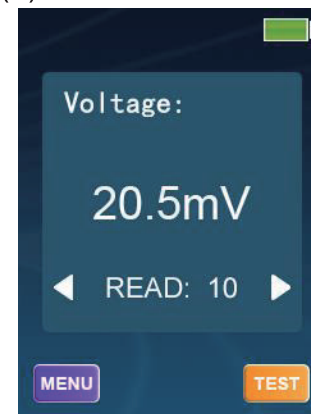
(5) Current measurement



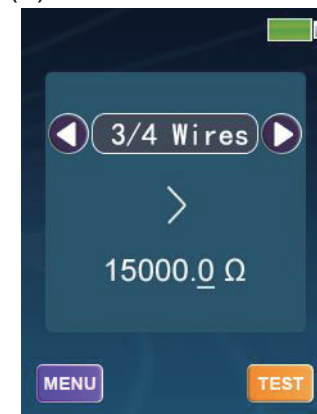
(6) Selection method



(7) Soil resistivity measurement



(8) Data query












(9) Alarm function



(10) Brightness setting

## 7.2 Symbol descriptions

- (1). : This symbol will be displayed when the jaw is opened. In such condition, the trigger may be pressed manually, or the jaws have been contaminated severely, please stop measurement.
- (2). : This symbol will be displayed if the battery voltage is too low. The measurement accuracy cannot be guaranteed in such condition. Please charge the battery in time.
- (3). The "OL" symbol indicates that the measured value exceeds the measurement range of the clamp meter.
- (4). : This symbol indicates that the alarm is started. When the measured value is greater than or less than the set alarm threshold, the meter will make an intermittent "beep--beep--beep--" sound.
- (5). : This indicates clamp measurement.
- (6). : This indicates three- or four-wire measurement.
- (7). : This indicates ground voltage measurement.
- (8). : This indicates AC current measurement.
- (9). : This indicates selection measurement.
- (10). : This indicates soil resistivity measurement.
- (11). **HOLD**: This indicates that the current data is held and saved.

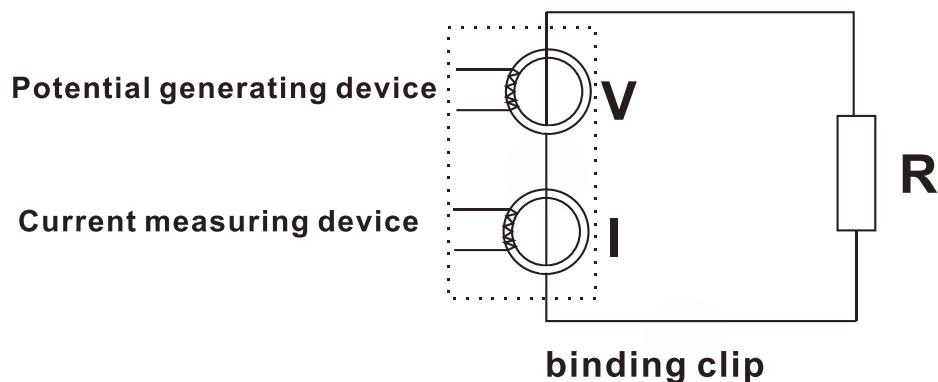
## VIII. Measuring Principle

### 8.1 Clamping Measurement

The basic principle of clamping measurement is measuring loop resistance. The jaw is composed of voltage coil and current coil. The voltage coil provides an excitation signal and induces electric potential "V" in the measured circuit. Under the action of the electric potential V,

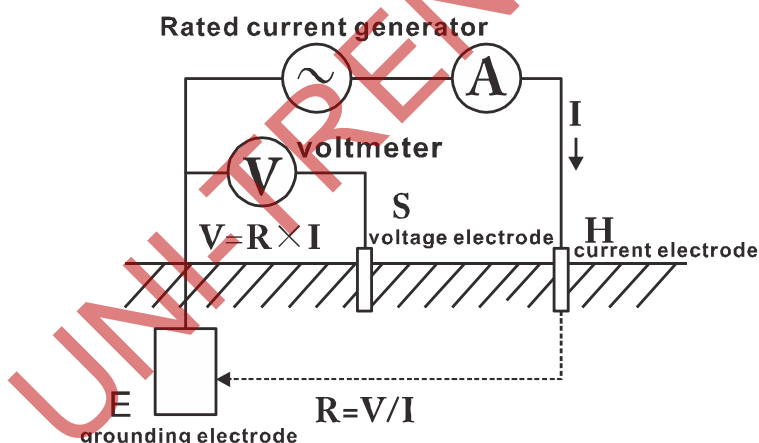


the current “I” will be generated in the measured circuit. The clamp meter measures I and calculates the measured resistance R.



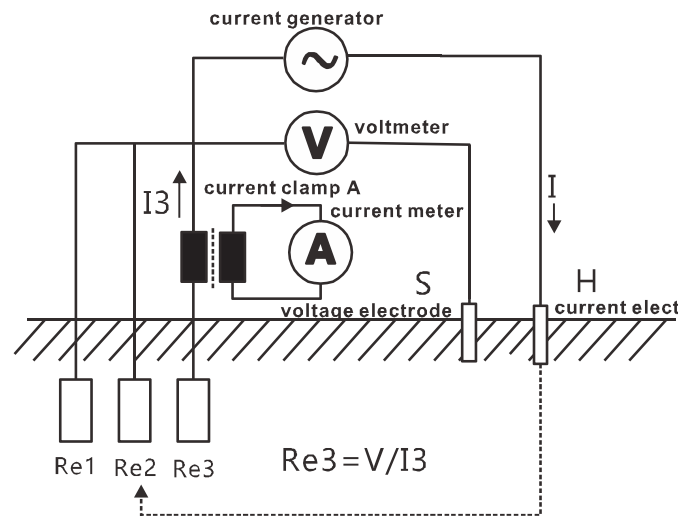
### 8.2 Three- or four-wire measurement

The three- or four-wire measurement is suitable for accurate measurement of single-point grounding systems, that is, the AC rated current I flows between the measuring object E ground electrode and the H current electrode, the potential difference V between the E ground electrode and the S voltage electrode is calculated, and the ground resistance value R is calculated according to the formula  $R=V/I$ . To ensure measurement accuracy, the 4-wire method is adopted and the ES auxiliary ground electrode is added. In the actual test, ES and E are clamped on the same point of the grounding body.



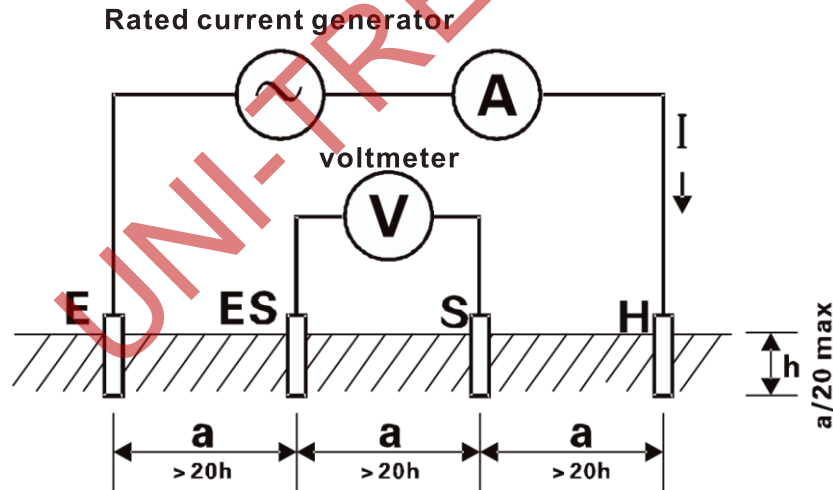
### 8.3 Selection measurement

The selection method is used to measure the grounding resistance, which is suitable for measuring the grounding resistance of one of the parallel grounding systems without tripping. An alternating current I is applied between the ground electrode of Re1 Re2 Re3 and the current electrode of H, the current I3 flowing through Re3 is measured by the current clamp A, and the potential difference V between the ground electrode of Re3 and the voltage electrode of S is measured at the same time, and according to the formula  $Re3= V/I3$  calculates the grounding resistance value Re3. To ensure measurement accuracy, the 4-wire method is adopted and the ES auxiliary ground electrode is added. In the actual test, ES and E are clamped on the same point of the grounding body.



### 8.4 Soil Resistivity Measurement

The soil resistivity ( $\rho$ ) is measured by the **4-pole method (Winner method)**: The alternating current  $I$  flows between the **E** ground electrode and the **H** current electrode, find the potential difference  $V$  between the **S** voltage electrode and the **ES** auxiliary ground electrode, The potential difference  $V$  is divided by the alternating current  $I$  to get the resistance value  $R$  at the middle two points, the electrode spacing distance is  $a$ (m), according to the formula  $\rho = 2\pi a R$ ( $\Omega m$ ) to get the value of soil resistivity, the distance between **HS** and **S-ES** When equal (both are  $a$ ), it is Winner's method. For the convenience of calculation, please make the electrode spacing  $a$  far greater than the buried depth  $h$ . Generally,  $a > 20h$  should be satisfied, as shown in the figure below.



### 8.5 Working error

Among the above methods, the working error (**B**) is the error obtained within the rated working conditions, which is calculated from the inherent error (**A**) and variable error (**E<sub>i</sub>**) of the instrument.

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

**A**: Inherent error

**E<sub>2</sub>**: Changes caused by changes in power supply voltage

**E<sub>3</sub>**: Changes caused by temperature changes

**E<sub>4</sub>**: Changes caused by interference voltage changes

**E<sub>5</sub>**: Change in resistance of contact electrode

## 8.6 AC current measurement


True RMS measurement

## 8.7 Ground voltage measurement

Average measurement.

# IX. Operation Method

## 9.1 Boot up

	<b>Before starting up, press the trigger once or twice to make sure the jaws are well closed.</b>
	<b>Do not apply external force to the jaws, otherwise the accuracy of the measurement cannot be guaranteed.</b>

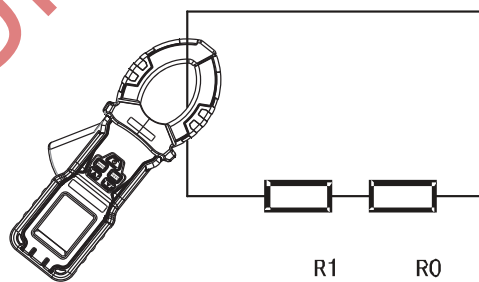
Press the power button to turn on/off the tester. The tester will automatically shut down after 15 minutes of startup. Pressing any key will extend another 15 minutes.

## 9.2 Function selection

After the meter is turned on, it automatically enters the main menu interface, you can short press the ▲ or ▼ key to switch to the corresponding function, then short press the **TEST** key to enter the menu selection item, short press the **MENU** key to return to the main menu interface.

## 9.3 Clamp measurement

- 1) In the menu selection, select the **"clamp method"** function and press the **TEST** key to enter.
- 2) Check whether the meter displays "OL", then resistance measurement can be performed. Otherwise, you need to check whether the clamp head is tight.
- 3) Open the clamp head and clamp into the resistance circuit (make sure the clamp head is closed to ensure accuracy, otherwise you need to check whether the clamp head is closed.). Wait for the value to stabilize and read the displayed resistance value.
- 4) Short press the **TEST** key to keep the data and save it, the screen displays the **"HOLD"** icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 5) Short press the **MENU** button to return to the main menu.



## 9.4 Three- or four-wire measurement

- 1) In the menu selection, select the "three-four-line" function and press the **TEST** key to enter.
- 2) Insert the test wire into the bottom port of the meter according to the color, as shown in the figure below. Wait for the value to stabilize, read the displayed resistance value.
- 3) Short press the **TEST** key to keep the data and save it, the screen displays the "HOLD" icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 4) Press the **MENU** key to return to the main menu.

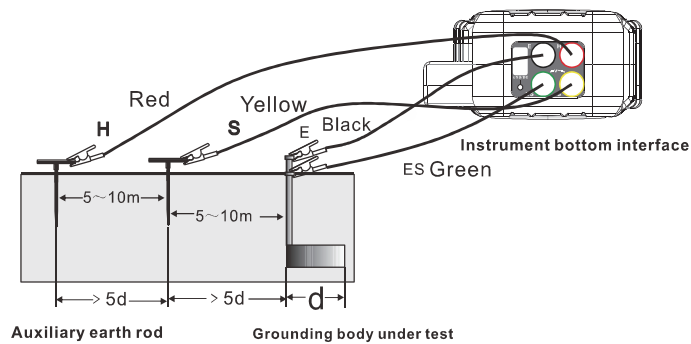


Fig. 8.4-2 Schematic diagram of four-wire measurement wiring

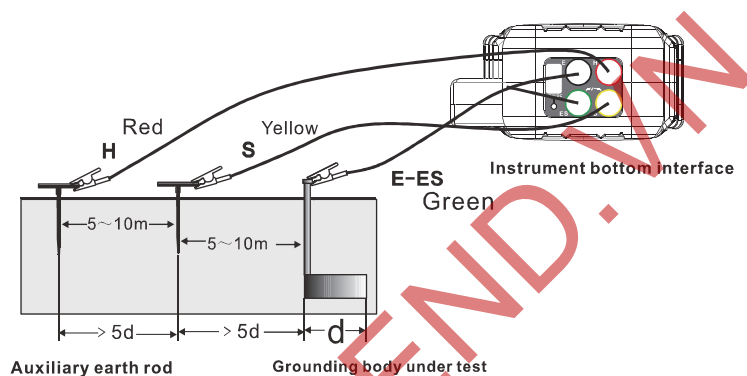
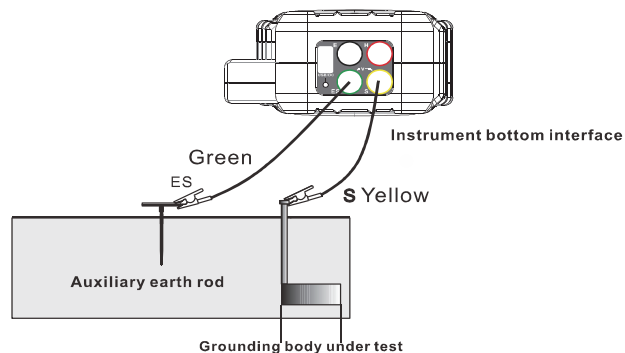


Fig. 8.4-2 Schematic diagram of three-wire measurement wiring

## 9.5 Ground voltage measurement

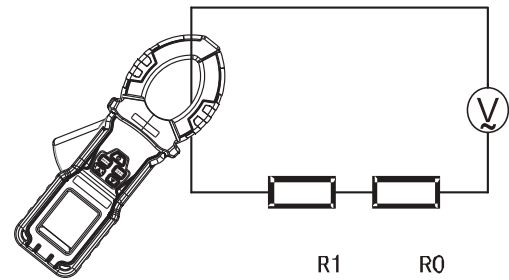
- 1) In the menu selection, select the "voltage measurement" function and press the **TEST** to enter.
- 2) Insert the test wire into the **S** and **ES** ports at the bottom of the meter, as shown in the figure below. Wait for the value to stabilize and read the displayed voltage value.
- 3) Press the **TEST** key to keep the data and save it, the screen displays the "HOLD" icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 4) Press the **MENU** key to return to the main menu.



## 9.6 AC current measurement

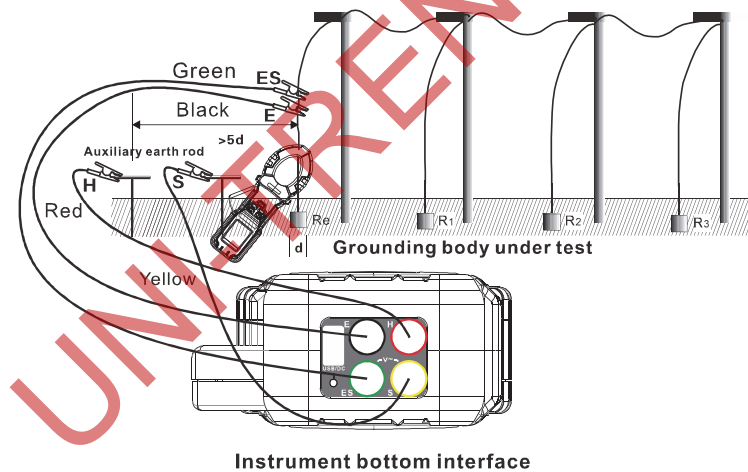
- 1) In the menu selection, select the "current measurement" function, press the **TEST** key to enter.

- 2) Open the clamp head and clamp the wire under test. Wait for the value to stabilize and read the displayed current value.
- 3) Short press the **TEST** key to keep the data and save it, the screen displays the "HOLD" icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 4) Press the **MENU** key to return to the main menu.



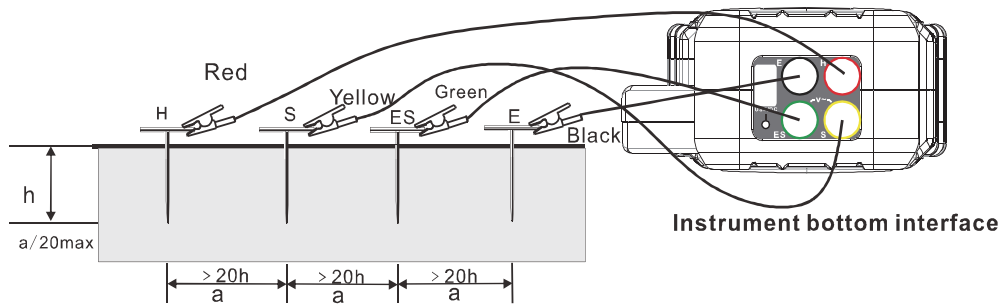
### 9.7 Selection method

- 1) In the menu selection, select the "selection method" function and press the **TEST** key to enter.
- 2) Insert the test wire into the bottom port of the meter according to the color, as shown in the figure below. Then open the clamp head and clamp into the resistance circuit. Wait for the value to stabilize and read the displayed current value.
- 3) Press the **TEST** key to keep the data and save it, the screen displays the "HOLD" icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 4) Press the **MENU** key to return to the main menu.



### 9.8 Soil resistivity measurement

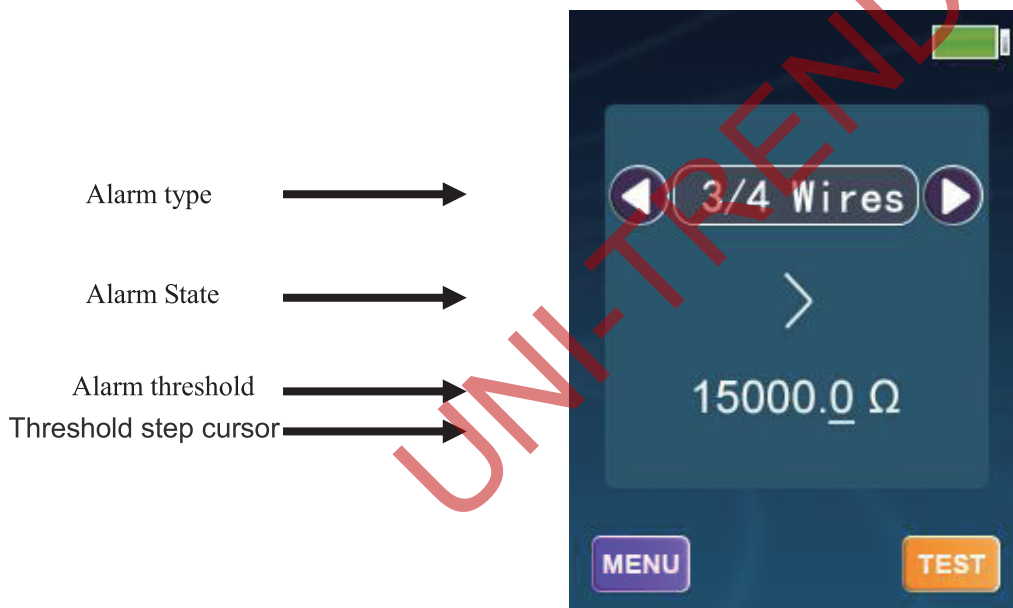
- 1) In the menu selection, select the "Soil resistivity measurement" function and press the **TEST** to enter.
- 2) After entering the soil resistivity test interface, the upper right corner of the LCD displays the current depth value. The depth value can be modified by short pressing the ▲ key to decrease 1 or short pressing the ▼ key to increase 1 step. Or long press ▲ key to decrease 10 or long press ▼ key to increase 10 steps to modify the depth value. The depth value range can only be 1m~100m.
- 3) Insert the test wire into the bottom port of the meter according to the color, as shown in the figure below. Wait for the value to stabilize and read the displayed resistance value.
- 4) Press the **TEST** key to keep the data and save it, the screen displays the "HOLD" icon, short press the **TEST** key again to cancel the hold state, the screen does not display the "HOLD" icon.
- 5) Press the **MENU** key to return to the main menu.



## 9.8 Data query and deletion

- 1) In the menu selection, select the "Data query" function and press the **TEST** to enter.
- 2) The stored data can be viewed in steps by pressing the **▲** key to subtract 1 or short pressing the **▼** key to increase 1 step.
- 3) Or by long pressing the **▲** key to decrease 10 or long pressing the **▼** key to increase 10 steps to view the stored data.
- 4) Press the **TEST** key to enter the delete mode, then press the **▲** key to confirm the deletion of the data, or press the **▼** key to cancel the deletion of the data.
- 5) Press the **MENU** key to return to the main menu.



## 9.9 Alarm Settings



- 1) In the menu selection, select the "alarm function" function, press the **TEST** key to enter
- 2) The alarm thresholds for four measurement functions can be set.
- 3) After entering the alarm function interface, you can switch the set alarm type by short pressing the **▲** key or the **▼** key.
- 4) After confirming the alarm type, short press the **TEST** key to enter the alarm state selection, and then short press the **▲** key or the **▼** key to switch between setting greater than alarm (>) or less than alarm (<).
- 5) After confirming the alarm status, you can short press the **TEST** key to enter the alarm threshold modification status, short press the **▲** key to decrease the step or short press the **▼** key to increase the step to modify the threshold.
- 6) Long press the **▲** key to move the threshold step cursor to the right, and long press the **▼** key to move the threshold step cursor to the left.
- 7) Short press the **TEST** key again to save the current settings and exit.

- 8) Or short press the **MENU** key to return to the previous layer, short press the MENU key in the layer where the alarm type is selected to return to the menu interface.
- 9) Long press the MENU button on any interface to enable or disable the alarm function.

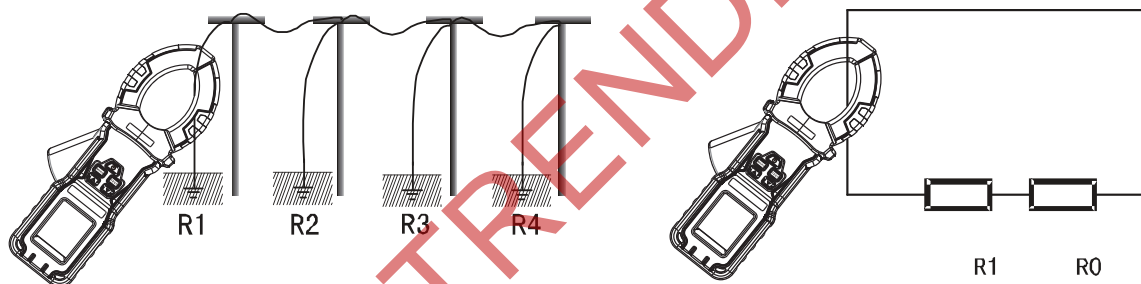
## X. Battery Instructions

- 1) When the battery voltage is too low, the battery symbol "" is displayed, please charge it in time.
- 2) Low battery voltage affects measurement accuracy.
- 3) When the boot screen flashes, the screen goes black. It may be that the battery power is not enough to boot. Please charge it fully before starting measurement.
- 4) The battery symbol "" flashes to indicate that it is about to be shut down, and the test cannot be performed at this time. Please fully charge the battery and start the test again.

## XI. Field Application

### 1. Multi-point grounding system

For multi-point grounding systems (such as power transmission system tower grounding, communication cable grounding systems, certain buildings, etc.), they are connected by overhead ground wires (the shielding layer of communication cables) to form a grounding system. See below. When measuring with a clamp meter, its equivalent circuit is as follows:



$R_1$  is the predicted grounding resistance.

$R_0$  is the equivalent resistance of the grounding resistance of all other towers in parallel.

Although, from the strict grounding theory, due to the existence of the so-called "mutual resistance",  $R_0$  is not a parallel value in the usual electronic technical sense (it will be slightly larger than the parallel value in the electronic technical sense), but, Since the grounding hemisphere of each tower is much smaller than the distance between the towers, and after all, the number of grounding points is large,  $R_0$  is much smaller than  $R_1$ . Therefore, it is reasonable to assume  $R_0=0$  from an engineering perspective. In this way, the resistance we measured should be  $R_1$ .

Several comparative experiments with traditional methods under different environments and different occasions prove that the above assumptions are completely reasonable.

### 2. Limited point grounding system

This situation is also more common. For example, some poles and towers are connected to each other by overhead ground wires; for example, the grounding of some buildings is not an independent grounding network, but several grounding bodies are connected to each other through wires.

In this case, if R0 in the above figure is regarded as 0, it will bring a large error to the measurement result.

For the same reason as above, we ignore the influence of mutual resistance, and calculate the equivalent resistance after the parallel connection of the grounding resistance in the usual sense. In this way, for a grounding system with N (N is small, but greater than 2) grounding bodies, N equations can be listed:

$$R_1 + \frac{1}{\frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_N}} = R_{1T}$$

$$R_1 + \frac{1}{\frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_N}} = R_{1T}$$

$$R_N + \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_{(N-1)}}} = R_{NT}$$

R1, R2,...RN are the grounding resistances of N grounding bodies we require.

R1T, R2T,...RNT are the resistances measured on each grounding branch with clamp meter. This is a nonlinear equation system with N unknowns and N equations. It has a definite solution, but it is very difficult to solve it manually, even impossible when N is large. To this end, please purchase our company's limited point grounding system solution program software, and users can use office computers or laptop computers for machine solution. In principle, in addition to ignoring the mutual resistance, this method does not have the measurement error caused by ignoring R0. However, the user needs to pay attention to: In your grounding system, if there are several grounding bodies connected to each other, you must measure the same number of test values for the program to solve, not more or less. The program also outputs the same number of ground resistance values

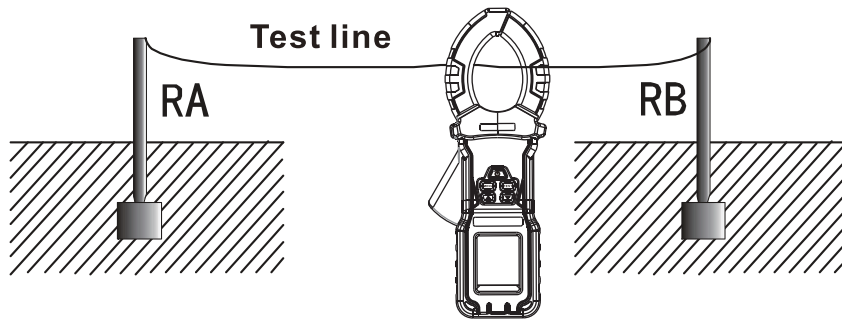
## 2. Single point grounding system

From the principle of testing, the clamp meter can only measure loop resistance, but cannot measure single-point grounding. However, users can use a test wire and a ground electrode near the grounding system to artificially create a loop for testing. The following introduces two methods for measuring single-point grounding with a clamp meter. This method can be applied to occasions where the traditional voltage-current method cannot be tested.

### (1). Two-point method

As shown in the figure below, find an independent grounding body RB with good grounding near the tested grounding body RA (such as nearby water pipes, buildings, etc.). Connect RA and RB with a test wire.





Because the resistance measured by the clamp meter is the series value of two grounding resistances and the resistance of the test line.

$$R_T = R_A + R_B + R_L$$

$R_T$  is the resistance measured by the clamp meter.

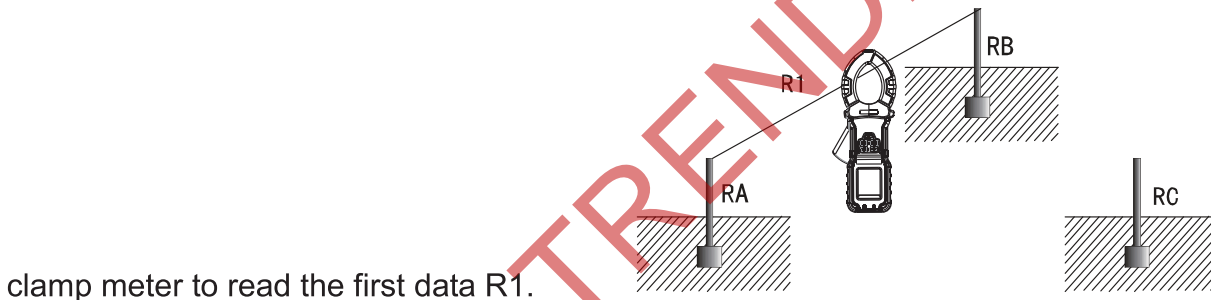
$R_L$  is the resistance of the test line

Therefore, if the measured value of the clamp meter is less than the allowable value of grounding resistance, then the grounding resistance of the two grounding bodies is qualified.

### (2). Three-point method

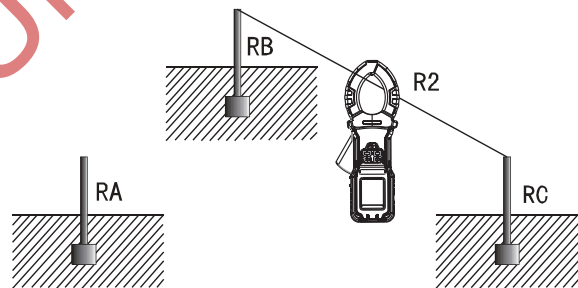
As shown in the figure below, find two independent grounding bodies RB and RC near the tested grounding body RA.

The first step is to connect RA and RB with a test line, as shown in the figure below. Use the

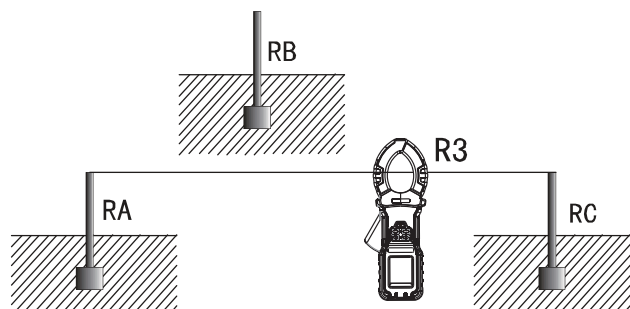


clamp meter to read the first data R1.

The second step is to connect RB and RC, as shown in the figure below. Use the clamp meter to read the second data R2.



The third step is to connect RC and RA, as shown in the figure below. Use the clamp meter to read the third data R3.



In the above three steps, the readings measured in each step are the series value of two grounding resistances. In this way, you can easily calculate each ground resistance value:

Because of:  $R_1 = R_A + R_B$      $R_2 = R_B + R_C$      $R_3 = R_C + R_A$

So:  $R_A = (R_1 + R_3 - R_2) \div 2$

This is the ground resistance value of the grounding body  $R_A$ . In order to facilitate the memorization of the above formula, the three grounding bodies can be regarded as a triangle, and the measured resistance is equal to the adjacent side resistance plus the opposite side resistance divided by 2.

The ground resistance values of the other two grounding bodies as reference objects:  
 $R_B = R_1 - R_A$      $R_C = R_3 - R_A$

## XII. Accessories

<b>Meter</b>	1 pcs
<b>Test cable</b>	4 pcs
<b>Ground rod</b>	4 pcs
<b>Verify ring</b>	1 pcs
<b>Simple test line</b>	2 pcs
<b>USB communication line</b>	1 pcs
<b>Power adapter</b>	1 pcs
<b>Manual</b>	1 pcs
<b>Instrument box</b>	1 pcs

Note: The monitoring software can be downloaded from the Uni-Trend official website.

- The content of this user manual cannot be used as a reason for using the product for special purposes.
- The company is not responsible for other losses caused by use.
- The company reserves the right to modify the contents of the user manual. If there are changes, no further notice will be given.