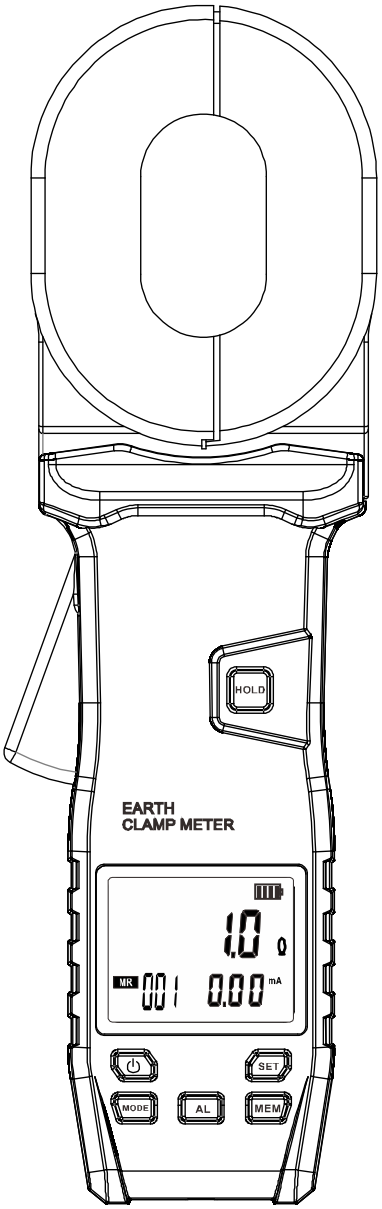
Clamp Ground Resistance Tester



UT272+
UT273+
UT275+

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1. Safety rules and precautions

Thank you for purchasing our company's **clamp-on ground resistance tester**. Before you use this instrument for the first time, to avoid possible electric shock or personal injury , please be sure to: **read in detail and strictly abide by the safety rules and precautions listed in this manual. . In any case, special attention should be paid to safety when using this instrument.**

✧ This instrument is designed, produced, and inspected in accordance with IEC61010 safety standards.

✧ In any case, special attention should be paid to safety when using this instrument.

✧ When measuring, please do not use high-frequency signal generators such as mobile phones next to the meter to avoid errors.

✧ Pay attention to the text and symbols on the label on the instrument body.

✧ Before use, make sure that the instrument and accessories are in good condition.

✧ Before starting the machine, squeeze the trigger once or twice to make sure the jaws are closed properly.

✧ Do not measure in flammable places. Sparks may cause an explosion.

✧ **When turning on the machine, do not press the trigger or clamp any wires.**

✧ After normal startup and the "OL Ω" symbol is displayed, the object under test can be clamped.

✧ Do not place or store the instrument in places with high temperature, humidity, condensation, or direct sunlight for a long time.

✧ When replacing the battery of the meter, please make sure that the meter is turned off.

✧ The meter displays the low battery voltage symbol "▭", the battery should be replaced in time, otherwise it will cause ground error.

✧ The contact surface of the jaws must be kept clean and cannot be wiped with corrosive agents or rough objects.

✧ When opening the trigger, avoid impact on the clamp, especially on the jaw joint surface.

✧ The clamp head of this clamp meter will make a slight noise when measuring resistance. This is normal.
Pay attention to the "beep--beep--beep--" sound of the alarm.

✧ Pay attention to the specified measurement range and usage environment of this instrument.

✧ Do not measure the wire current exceeding the upper limit of this clamp meter.

✧ The use, disassembly, calibration and maintenance of this instrument must be performed by authorized personnel.

✧ If continued use of this instrument may cause danger, stop using it

immediately and seal it immediately.
Deposits shall be handled by authorized institutions.

✧ The "⚠" safety warning signs in the instrument and manual must be strictly followed by the user.
allow for safe operation.

2. Introduction

Clamp-type ground resistance tester, also known as **loop resistance tester**, is used to test ground resistance. This instrument uses a new black luxurious screen design, resistance and current are displayed on the same screen, and it also has real-time clock, data storage, data review, alarm, automatic shutdown and other functions. The whole machine is beautiful and high-end, with wide measuring range, high resolution, convenient operation, easy to carry, accurate, reliable, stable performance and strong anti-interference ability. It has a shockproof, dust proof and moisture-proof structure and is a commonly used and indispensable instrument in telecommunications, electric power, meteorology, machine rooms, oil fields, mechanical and electrical installation and maintenance, and industrial enterprise departments that use electricity as industrial power or energy. It is suitable for measuring the ground resistance of various telecommunications, electric power, meteorology, computer rooms, oil fields, power distribution lines, tower transmission lines, gas stations, factory grounding grids, lightning rods, etc.

The clamp-type ground resistance tester is controlled by a microprocessor and can accurately detect ground resistance. It uses fast filtering technology to minimize interference. Simultaneous data storage and data upload functions.

3. Model Differences

Model	Resistance range	Current range	Bluetooth APP
UT272+	0.010-200Ω	--	--
UT273+	0.01 0-600Ω	0.00mA-20.0A	--
UT275+	0.010-1000Ω	0.00mA-20.0A	**Bluetooth**

4. Measuring range and accuracy

Measuremen	Measuring range	resolution	Accuracy
Resistance	0.010Ω-0.199Ω	0.001Ω	±（1%＋0.02Ω）
	0.20Ω-1.99Ω	0.01Ω	±(1%+0.05Ω)
	2.0Ω-49.9Ω	0.1Ω	±(1%+0.5Ω)
	50.0Ω-99.5Ω	0.5Ω	±(1.5%+1Ω)
	100Ω-199Ω	1Ω	±(2%+2Ω)
	200Ω-395Ω	5Ω	±(5%+5Ω)
	400-590Ω	10Ω	±(10%+10Ω)
	600Ω-880Ω	20Ω	±(20%+20Ω)
	900Ω-1000Ω	30Ω	±(25%+30Ω)
Current	1.00mA -9.99mA	0.05mA	±(2.5%+1mA)
	10.0mA -99.9mA	0.1mA	±(2.5%+5mA)
	100mA -999mA	1mA	±(2.5%+10mA)
	1.00A-9.99A	0.01A	±(2.5%+0.2A)
	10.0A-20.0A	0.1A	±(2.5%+0.5A)

Note: 1. Add test accuracy ×0.1/ ° C within the operating temperature range (outside 18 ° C ~ 28 ° C).

2. The ambient temperature change rate should be less than 0.5° C per minute.

5. Technical specifications

Function	Ground resistance test, loop resistance test, leakage current test
ambient temperature	23℃±5℃, below 75%rh

humidity	
power supply	DC 6V (4 AA dry batteries)
measurement method	Mutual induction method
Resistance resolution	0.001Ω
Current **resolution①**	0.01mA
Jaw size	55mm×32mm
clock function	have
Ω + A synchronized display	Ω + A same screen display
display mode	4-digit LCD display, black screen design
LCD size	46mm×36mm
Instrument size	Length, width and height: 285mm×85mm×58mm
measure time	1 time/second
USB interface	With USB interface, the stored data can be uploaded to the computer, saved and printed.
Bluetooth②	have
communication line	1 USB communication line
data storage	500 groups, "MEM" storage indication, flashing "MEM" symbol indicates the storage is full.
Data review	The "MR" symbol indicates when looking up data
overflow display	"OL" symbol indicates when over-range overflows
interference test	Automatically identify interference signals, and indicate

	"NOISE" symbol when the interference current is large
Alarm function	An alarm prompt will be issued when the measured value exceeds the alarm set value.
battery voltage	Real-time display of battery power
Automatic shut-down	It can be set to 5, 10, 15, 20 minutes, or OFF. OFF means canceling automatic shutdown. The default is 5 minutes.
Power consumption	115mA Max
quality	Instrument: 1180g (including battery)
Working temperature and humidity	-10℃～40℃; below 80%rh
Storage temperature and humidity	-20℃～60℃; below 70%rh
Insulation resistance	20MΩ or more (500V between circuit and case)
Pressure resistant	AC 3700V/rms (between circuit and enclosure)
external magnetic field	<40A/m
external electric field	<1V/m
Suitable for safety regulations	IEC61010-1 (CAT III 300V, CAT IV 150V, pollution degree 2); IEC61010-031; IEC61557-1 (ground resistance);

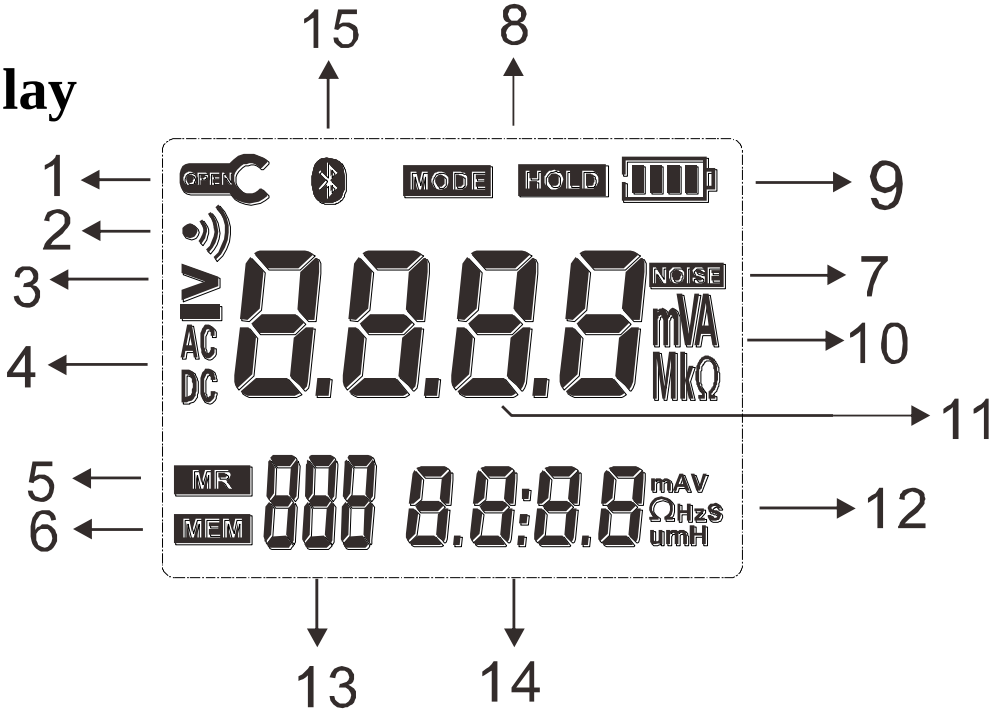
Note ① : The current function is only available on UT273+ and UT275+.

Note ② : The Bluetooth function is only available on UT275+.

6. Instrument structure

1. Plier head 2. Jaw opening and closing trigger 3. **LCD** display
4. Power **button** 5. MODE **mode** key 6. **AL** alarm button
7. **MEM** storage key 8. **SET** setting key 9. **HOLD** key
10. Calibration loop 1Ω loop 11. Calibration loop 10 Ω loop

7. LCD Display



1. Clamp head open symbol 2. Alarm indicator symbol 3. greater than sign
4. AC and DC indicator symbols 5. Data review symbol 6. data storage symbol
7. Noise indicator symbols 8. Data lock symbol 9. Battery level indicator
10. Unit instructions 11. Four-digit resistance data 12. Unit instructions
13. Number of storage groups 14. Four digits indicate current,clock
15,Bluetooth indicator

Special symbol description:

(1). Jaw opening symbol, this symbol is displayed when the jaws are open. At this time, the trigger may be pressed artificially; or the jaws may be seriously contaminated and measurement cannot be continued.

(2). Low battery voltage symbol. When the battery power is too low, this symbol is displayed. At this time, the accuracy of the measurement cannot be guaranteed, and the battery should be replaced.

(3). The "OL Ω" symbol indicates that the resistance being measured exceeds the upper limit of the clamp meter.

(4). The "LO.01Ω" symbol indicates that the resistance being measured exceeds the lower limit of the clamp meter.

(5).. The "OL A" symbol indicates that the measured current exceeds the upper limit of the clamp meter.

(6). Alarm symbol. When the measured value is greater than the set alarm threshold, the symbol flashes and displays, and at the same time, the instrument emits an intermittent "beep--beep--beep--" sound.

(7). The MEM data storage symbol flashes when saving data.

(8). The MR query data symbol is displayed when querying data, and the number of the stored data is also displayed.

(9). NOISE symbol. When the ground circuit under test has a large interference current, this symbol flashes and displays, and the meter emits a "beep--beep--beep--" prompt sound. The accuracy of the test cannot be guaranteed at this time.

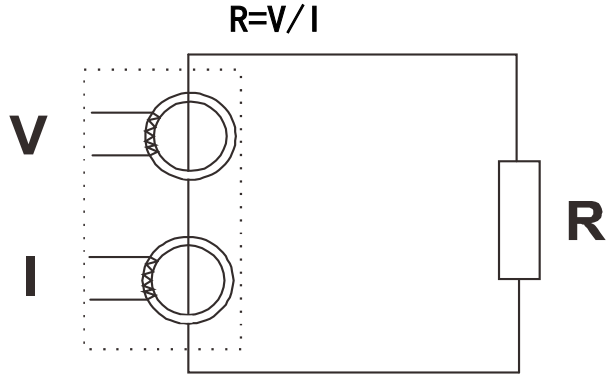
⑩. The "Er" power-on error symbol may be that the trigger is pressed, something is clamped, or the jaws are opened when powering on.

8. Measurement Principle

The basic principle of measuring ground resistance with a clamp-type ground resistance meter is to measure loop resistance. See below. clamp meter clamp

The mouth part is composed of voltage coil and current coil. The voltage coil provides an excitation signal and induces a potential V on the loop under test. Under the action of potential V, a current I will be generated in the circuit under test. The clamp meter measures V and I, and the measured

resistance R can be obtained through the following formula.



$$R = V / I$$

9. Operation Method

9.1 . Switching on and off the machine

⚠	When turning on the machine, you cannot press the trigger, open the jaws, or clamp any wires.
	After the power-on is completed and "OLΩ" is displayed, the trigger can be pressed, the jaws opened, and the wire under test can be clamped.
	Before starting the machine, squeeze the trigger once or twice to ensure that the jaws are closed properly
	When starting up, keep the clamp meter in its natural resting state. Do not turn the clamp meter over or apply external force to the jaws. Otherwise, the accuracy of the measurement cannot be guaranteed.

Press the power button to turn on and off the device. The meter automatically calibrates when the power is turned on. After the power-on is completed, it displays ″ OLΩ ″ and automatically enters the resistance measurement mode. If there is no normal power-on self-calibration, the meter will display the ″ Er ″ symbol, indicating a power-on error. Common reasons for power-on errors include the jaws not being closed properly, Clamp in wires etc. when turning on the machine.

After powering on, it will automatically shut down after reaching the set shutdown time. The meter will flash and display for 30 seconds before automatically shutting down. Pressing the power button again will delay the shutdown time.

9.2 . Battery voltage check

After turning on, if the LCD displays the low battery voltage symbol ″ ″, ″ ″ means the battery is low. Please replace the battery. If the symbol ″ ″ flashes, it means it is about to shut down. Only when the battery power is sufficient can the accuracy of measurement be ensured.

9.3. Resistance And Current Test

⚠	**When the user thinks that the grounded value does not conform to the norm, he or she can use the supplied calibration ring to check whether the clamp meter is normal. The calibration loop has two resistance values of 1Ω and 10Ω.**

After the power-on self-test is completed, the large number in the middle displays " OLΩ ", and the resistance measurement can be performed. At this time, press the trigger, open the jaws, clamp the circuit to be measured, and read the resistance value.

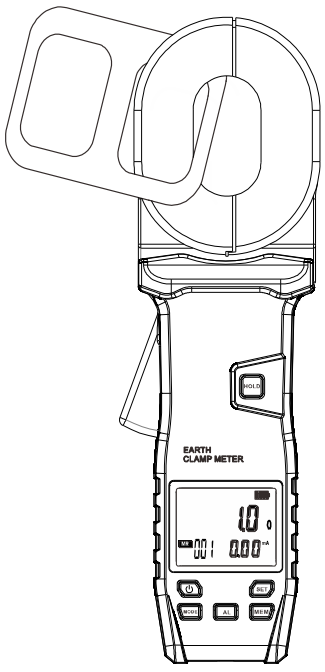
Resistance and ground leakage can be measured at the same time. After powering on, press the " MODE " key to switch between "resistance + current" and "resistance + clock" modes.

The big number in the middle displays " OLΩ ", indicating that the resistance being measured exceeds the upper limit of the clamp meter.

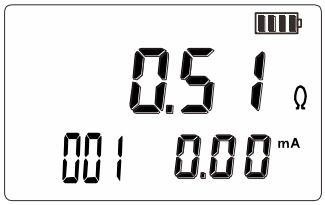
The big number in the middle displays " L0.01Ω ", indicating that the resistance being measured exceeds the lower limit of the clamp meter.

In the "resistance + current" mode, the current value is displayed on the lower right side of the display, such as " 0.00mA ". If you need to measure the current, switch to this mode and read the current value directly.

In the "resistance + clock" mode, the ground voltage value is displayed on the lower right side of the display, such as " 12:00 ". If you need to read the current time, switch to this mode and read the time directly. Reset the time after replacing the battery. .

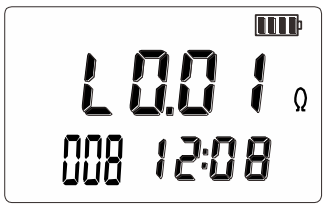


Resistor + current mode:



The measured resistance value is 0.51Ω,
The number of saved groups is 1, and the measured loop current is 0.00mA.

Resistor+clock mode:



The resistance circuit under test exceeds
The lower limit.The number of saved groups is 8,
And the current time is 12:08

9.4. Clock And Shutdown Time Settings

After turning on the phone, long press the " SET " button to enter the setting mode. The number in the lower left corner of the screen is the shutdown time setting. Short press the " HOLD " button to modify the shutdown time, which are 5 minutes, 10 minutes, 15 minutes, 20 minutes and OFF. No shutdown option.

The flashing numbers in the lower right corner of the screen are the time settings of the clock. Short press the " SET " key to switch to the setting interface of year, month and day, hour and minute respectively. Then short press the " MODE " key to switch to select the digit to be modified. The digit will flash and display. Then press the " MEM " key or " AL " key to increase or decrease the corresponding data, and then press and hold the " SET " key to save and exit.

Figure 1 2020

Figure 2 December 18

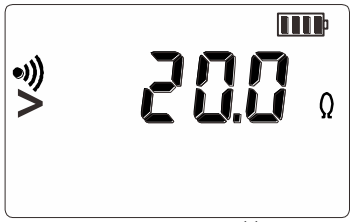
Figure 3 12:08

9.5. Alarm settings

After powering on, short press the " AL " key to turn on or off the alarm function.

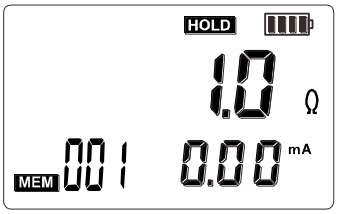
Long press the " AL " key to set the resistance and current alarm value. Short press the " HOLD " key to switch to select the digital digit to be modified. The digital digit will flash and display. Then short press the " SET " key and " MEM " key to increase or decrease the corresponding data. , short press the " MODE " key to switch the alarm mode, and then long press the " AL " key to save and exit.

When the measured resistance value is greater than the alarm critical setting value and the alarm function is turned on, the instrument flashes the " " symbol and emits a "beep--beep--beep--" alarm sound. As shown below:



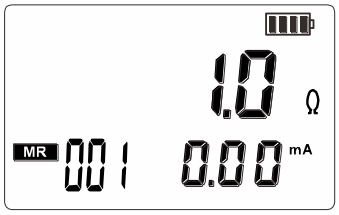
9.6. Data locking/storage

After powering on, after the measurement is stable, short press the " **HOLD** " key to lock the currently displayed data and automatically save the data. The " **MEM** " symbol flashes once and is automatically numbered. If the storage is full, the instrument flashes the " **MEM** " symbol. Press " **HOLD " again.** " key to exit lock mode. As shown in the figure below, the " **MEM** " symbol flashes when data is stored, and the " **HOLD** " symbol indicates that the current data is locked:

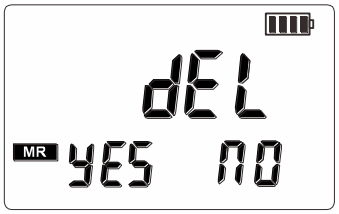


9.7. Data Review/Deletion

After powering on, after measuring and saving the data, short press the " **MEM " key to enter the data review, and the " MR " symbol will be displayed on** the stored data reading interface . Short press the " **SET** " or " **AL** " key to select the data corresponding to the array number by increasing or decreasing the step value by 1, or long press the "SET" or "AL" key to select the data corresponding to the array number by increasing or decreasing the step value by 10. . Then press the " **MEM " key** briefly to exit the search. The figure below shows the data query mode. The current query group number is 1.



In the data review state, long press the " **MEM** " key to enter the data deletion state, short press the " **AL** " key to delete the stored data , and short press the " **SET** " key to cancel deletion.



10. Battery Description

When the battery voltage is too low, the battery symbol “ ▭ ” will be

▭

displayed, please replace the battery immediately. The flashing battery symbol “ ” indicates that the instrument is about to shut down. Low battery voltage will affect the measurement accuracy.

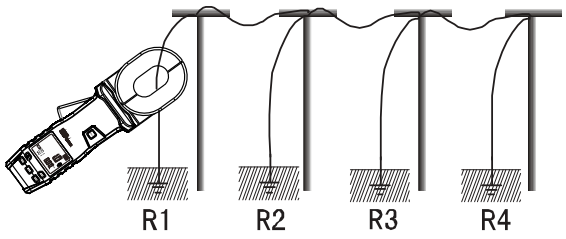
11. Instructions For Using the Mobile App

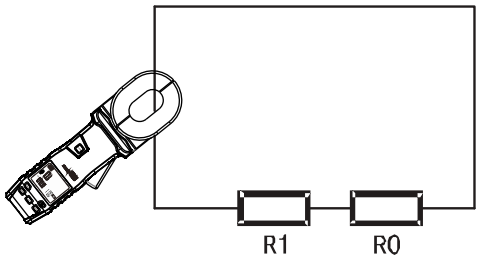
1) After turning on the instrument, long press the "MODE" button to turn on the Bluetooth function, and the Bluetooth symbol will be displayed on the screen.
2) After installing the "UT275+.apk" APP in the CD, open the APP and search for the Bluetooth device named "UT275+" (this function can only be used by instruments with Bluetooth), click it and wait for the connection to succeed (the Bluetooth PIN code: 123456 is required for the first connection).
3) After successful connection, you can perform online testing and display, browse historical storage data, automatically update instrument time, and set alarm values.

12. Field Application

12.1. Multi-Point Grounding System

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





Among them: R1 is the predicted ground resistance.

R0 is the equivalent resistance of the parallel connection of the ground resistances of all other towers.

Although, from a strict grounding theory, due to the existence of the so-called ″mutual resistance″, R0 is not a parallel value in the usual electrical sense (it will be slightly larger than the parallel value in the electrical sense), but, Since the grounded hemisphere of each tower is much smaller than the distance between towers, and after all, there are a large number of grounding points, R0 is much smaller than R1. Therefore, it can be reasonably assumed from an engineering perspective that R0=0. In this way, the resistance we measured should be R1.

Multiple comparative tests with traditional methods in different environments and occasions have proven that the above assumption is

completely reasonable.

12.2. Limited Point grounding System

This situation is also relatively common. For example, some towers have five towers connected to each other through overhead ground wires; another example is that the grounding of some buildings is not an independent grounding grid, 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 results.

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

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

$$R_2 + \frac{1}{\frac{1}{R_1} + \frac{1}{R_3} + ... + \frac{1}{R_N}} = R_{2T}$$

.

.

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

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

R1T, R2T,...RNT are the resistances measured at each grounding branch using a clamp meter.

This is a nonlinear system of equations with N unknowns and N equations. It has a definite solution, but it is very difficult to solve it manually, and even impossible when N is large.

For this purpose, please purchase our company's finite point grounding system solution program software, and users can use an office computer or laptop to perform machine solution.

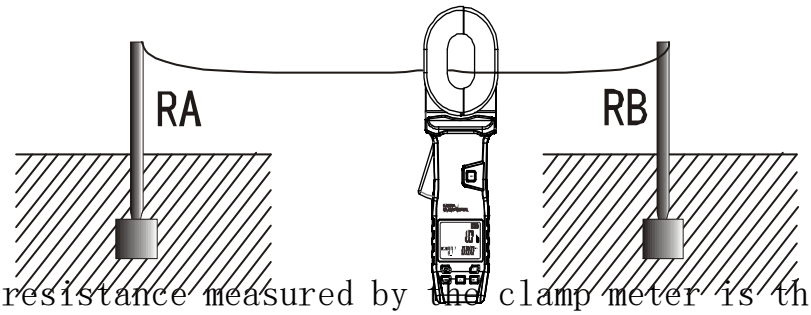
In principle, except for ignoring mutual resistance, this method does not have the measurement error caused by ignoring R0. However, users need to pay attention to this: In your grounding system, if there are several grounding bodies connected to each other, the same number of test values must be measured for the program to calculate, not more or less. The program also outputs the same number of ground resistance values.

12.3. Single point grounding system

From the testing principle, the clamp meter can only measure the loop resistance and 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 of measuring single-point grounding with a clamp meter. This method can be used in situations where the traditional voltage-current method cannot be tested.

(1). two point method

See the picture below, find an independent grounding body RB with good grounding near the grounding body RA under test (such as a nearby water pipe, building, etc.). Connect RA and RB with a test lead.



Because the resistance measured by the clamp meter is the series value of the two ground resistors and the resistance of the test wire.

RT=RA+RB+RL

Among them: RT is the resistance value measured by the clamp meter.

RL is the resistance of the test line.

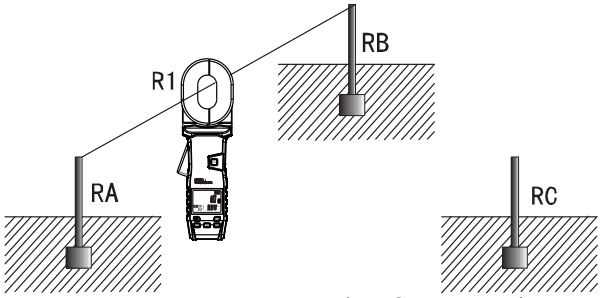
Connect the test leads end to end and use a clamp meter to measure the resistance RL.

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

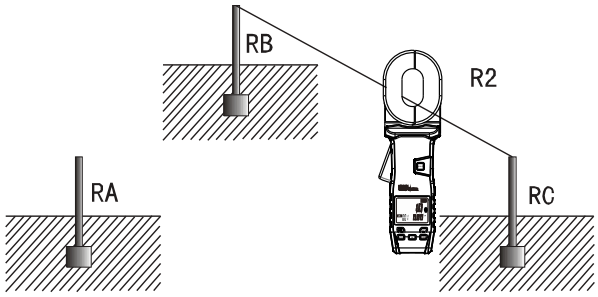
(2). Three point method

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

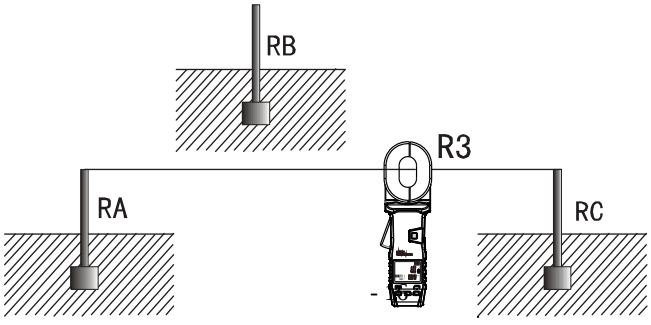
The first step is to connect RA and RB with a test line, as shown in the picture below. Use the clamp meter to read the first data R1.



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 reading measured in each step is the series value of the two ground resistances. This way, each ground resistance value can be easily calculated:

Since: R1=RA+RB R2=RB+RC R3=RC+RA

So: RA=(R1+R3-R2)÷2

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

The grounding resistance values of the other two grounding bodies used as reference objects are:

RB=R1-RA RC=R3-RA

13. Packing list

Tester	1 PCS
Battery	1.5V AA * 4 PCS
Check ring	1PCS
USB communication cable	1 PCS
manual	1 PCS
Warranty certificate/certificate	1 PCS

of conformity	
Instrument box	1PCS

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