MarMonix

Promote your assessment

Product Datasheet

User Manual

MarMonix®

Double Clamp Multifunction EarthResistance Tester

MEG925

CONTENT

Precaution For Use

Thanks for your purchase our product **MEG925 Double Clamp Multi-function Earth Resistance Tester**. In order to better for use of the product, please be certain:

---Read this user manual in details.

---Comply with the operating cautions in this manual.

- The tester is according IEC61010 safety requirements to design, production and test.
- Under any circumstance, shall pay special attention on safety in using this tester.
- The USB interface of the instrument and the internal circuit are non-isolated interfaces. It is strictly forbidden to connect the computer when the voltage is tested. Otherwise, the instrument may be burned out or an electric shock accident may occur. The voltage test line must be unplugged from the meter before the USB data cable can be connected to the computer and read the data.
- Pay attention about words and symbols stick on the tester.
- Pay attention to the direction of current of the clamp when earth resistance measurement test.
- It shall make sure that tester and accessories are in good condition before use; it can be used only there is no damaged, naked or broken part on testing wires and insulation layer.
- During measurement, it is forbidden to touch bare conductors and circuit under measurement.
- Before measurement, please confirm **FUNCTION** rotary switch position.
- Confirm that connector plug of lead has been inserted in the tester interface closely.
- Please don't supply over 100V grounding voltage between testing device and interface. Otherwise, it may damage the tester.
- Please don't measure in an inflammable environment. The flame sparkle may cause explosion.
- During usage , please stop to using when exposed metal is caused by outside shell or testing wires broken.
- Do not place and store the tester for a long time under high-temperature and humidity, condensation and direct sunlight.
- If the instrument is wet, please store after drying.
- To replacing battery, please make sure test leads have moved away from the meter, and **FUNCTION** rotary switch is in "**OFF**" position.
- Please put the used batteries that are not in use in designated collection place.
- When the meter displays battery low voltage symbol , should replace the battery

in time.

- If the tester is not going to be used for a long period, please remove the battery.
- Pay attention to measuring range and usage environment stipulated for the Tester.
- Use, disassembly, calibration, and repair of this tester must be performed by authorized personnel.
- Due to the reason of this instrument, if it is dangerous to continue using, should stopped and sealed immediately ,and handled by an authorized institution.
- The safety warning signs in "⚠" the manual must be safely operated by the user in strict accordance with these manual contents.

1. Introduction

MEG925 Double Clamp Multi-function Earth Resistance Tester is specially designed and manufactured for on-site measurement of grounding resistance, soil resistivity, grounding voltage, grounding line leakage current, AC current and DC resistance. Apply digital processing technology, precision 4-wire method, 3-wire method and simple 2-wire method, selection method, double-clamp method to measure grounding resistance;

Large caliber clamp design can measure the grounding system which using large grounding down lead, and can flexibly and accurately measure any grounding resistance value of various complex grounding conditions such as single point and mesh grounding. It is not necessary to disconnect any parallel grounding pole to measurement, maximize the convenience of measurement.

Import FFT (Fast Fourier Transform) technology, AFC (Automatic Frequency Control) technology, with unique anti-interference ability and environmental adaptability, high repeated test consistency, ensuring high precision, high stability and high reliability for long-term measurement.

Widely used in power, telecommunications, meteorology, oil fields, construction, lightning protection and industrial electrical equipment, such as grounding resistance, soil resistivity, grounding voltage, alternating current, leakage current measurement.

MEG925 Double Clamp Multi-function Earth Resistance Tester is composed of host machine, data software, test wires, auxiliary ground rod, and communication wires and so on. The large LCD display of host machine with white backlight and bar graph indication that can be seen clearly. At the same time, it can store 2000 sets of data, and the data software can realize the functions of reading, checking, saving, reporting and printing of historical data.

2. Technical specification

2.1. Base Conditions and Working Conditions

Influence Quantity	Base Condition	Working Conditions	Remark

Ambient Temp	23□±1□	-10□-40□	----
Ambient Humidity	40%-60%	＜80%	----
Working Voltage	9V±0.1V	9V±1.5V	----
Auxiliary Earth Resistance	＜100Ω	＜5kΩ	
Interference Voltage	Should avoid	＜20V	
Interference Current	Should avoid	＜2A	
Electrode Distance when measuring R	a＞5d	a＞5d	
Electrode Distance when measuring ρ	a＞20h	a＞20h	

2.2. General specification

Function	Measure grounding resistance, soil resistivity; DC resistance, earth voltage, alternating current , leakage current
Power Supply	DC 9V Alkaline dry cell LR14 1.5V*6PCS, continues standby 300 hours
Backlight	Controllable screen backlight, suitable for dim places
Measuring Mode	Precise4-pole measurement, 3-pole measurement, simple 2-pole measurement, selection method, double clamp method measure grounding resistance
Measuring Method	2/3/4 pole measurement method: Change-pole method Selection measurement method: Change-pole method Double clamp measurement method: Non-connect mutual inductance method Soil Resistivity: 4-pole measurement (Wenner method) DC resistance: Change-pole method AC current: Mutual inductance method(clamp) Earth Voltage: Average rectification(between P(S)-ES)
Test Voltage Wave	Sine wave
Test Frequency	128Hz/111Hz/105Hz/94Hz(AFC)
Test Current	> 20mA (sine wave)
Open-circuit Test Current	AC 15V max
Electrode Distance Range	1m-100m
Display Mode	4-digital large LCD display, with screen backlight
Measuring Indicator	During measurement, LED flash indicator, LCD countdown display
LCD Frame Dimension	128mm×75mm

LCD Display area	124mm×67mm
Meter Dimension	215mm(L)×178mm(W)×83mm(H)
CT Size	200mm(L)X105mm(W)X39mm(H)
Test Wire	4 wires: each for red 20m, black 20m, yellow 10m, and green 10m
Simple Test Wire	2 wires: each for red 1.6m and black 1.6m
Auxiliary Grounding Rod	4PCS: Φ9mm×230mm
Current Clamp	2PCS :1 blue-black plug and 1 red-black plug
Clamp Caliber	Φ50mm
Clamp Turn Ratio	1000 :1
Clamp Lead Wire	2m
Measuring Rate	AC current: about 2 times/second
	Earth Voltage: about 2 times/second
	Earth resistance: about 7 seconds/time
Measuring Times	Over 5000 times (Short-circuit test, interval time should be at least 30seconds)
Line Voltage	Measurement below AC 600V
Communication Interface	USB interface, storage data can be uploaded to computer, saved or printed.
Communication Wire	USB communication wireX1PCS, length 1.5m
Data Hold	Data hold function: "**HOLD**" symbol display
Data Storage	2000 groups, "**MEM**" storage indicator, "**FULL**" symbol flash display storage is full
Data Access	Data read function: "**READ**" symbol display
Overflow Display	Exceed measuring range overflow function: "**OL**" symbol display
Low current direction of clamp	Measurement with select method or double clamp , the current signal received by CT2 is lower than 0.5mA,will display" **C⊢**", and should check the clamping direction of the CT2 current clamp
Interference Test	Automatic identification of interference signals, "**NOISE**" symbol indication when the interference voltage is higher than 5V
Auxiliary Grounding Test	With auxiliary grounding resistance test function, 0.00KΩ-30kΩ(100**R+rC**<50kΩ, 100**R+rP**<50kΩ)
Alarm Function	Measuring value exceeds alarm setting value, will "Toot-toot-toot" alarm hint
Battery Voltage	While battery voltage decreases to around 7.5V, will display battery voltage low symbol" ▭ ", and reminding to replace the battery
Automatic Shut	Automatically shut down after 15 minutes start up

Down	
Power Consumption	Backlight: 25mA Max(only backlight power consumption)
	Standby:25mA Max(Backlight off after power on)
	Measurement:150mA Max(Backlight shut off)
Weight	Total Weight: 5.8KG
	Meter: 1.22kg
	Current Clamp:0.96 kg(2pcs)
	Test wires: 1.56kg(include the simple test wires)
	Auxiliary grounding rods: 0.935kg(4pcs)
Working Temperature & Humidity	-10□-40□, below 80%rh
Storage temperature & humidity	-20□-60□, below 70%rh
Protection Level	IP65(close the case)
Overload Protection	Measure earth resistance: between each interfaces of **C(H)-E**、**P(S)-ES**,AC 280V/3 seconds
Insulation Resistance	Over 20MΩ(between circuit and outside shell is 500V)
Withstand Voltage	AC 3700V/rms. (Between circuit and outside shell)
Electromagnetic Features	IEC61326(EMC)
Protection Type	IEC61010-1(CAT □ 300V、CAT IV 150V、Pollution 2); IEC61010-031; IEC61557-1(Earth resistance); IEC61557-5(Soil resistivity); JJG 366-2004(Grounding resistance meter) JJG 1054-2009(Clamp grounding resistance meter)

2.3. Intrinsic error and performance indicators under base conditions

Measurement Function	Measurement Range	Accuracy	Resolution
2/3/4 wire method measure earth resistance(Re) DC resistance(R-)	0.00Ω-29.99Ω	±2%rdg±5dgt	0.01Ω
	30.0Ω-299.9Ω	±2%rdg±3dgt	0.1Ω
	300Ω-2999Ω	±2%rdg±3dgt	1Ω
	3.00kΩ-30.00kΩ	±4%rdg±3dgt	10Ω
Selection method measure	0.00Ω-29.99Ω	±2%rdg±5dgt	0.01Ω
	30.0Ω-299.9Ω	±2%rdg±3dgt	0.1Ω

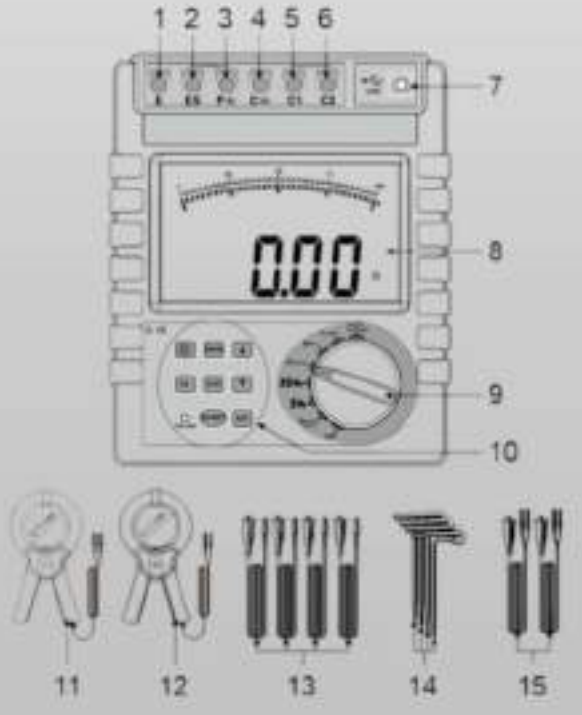
grounding resistance(Re)	300Ω-3000Ω	±2%rdg±3dgt	1Ω
Double clamp method measure grounding resistance(Re)	0.01Ω-0.99Ω	±10%rdg±5dgt	0.01Ω
	1.0Ω-29.9Ω		0.1Ω
	30Ω-100Ω		1Ω
Soil Resistivity(ρ)	0.00Ωm-99.99Ωm	According to the measurement accuracy of R(ρ=2πaR a:1 m～100m; π=3.14)	0.01Ωm
	100.0Ωm-999.9Ωm		0.1Ωm
	1000Ωm-9999Ωm		1Ωm
	10.00kΩm-99.99kΩm		10Ωm
	100.0kΩm-999.9kΩm		100Ωm
	1000kΩm-9000kΩm		1kΩm
Earth Voltage (50Hz/60Hz)	AC 0.0-100V	±2%rdg±3dgt	0.1V
AC current(50Hz/60Hz)	0.0mA-600.0A	±2%rdg±3dgt	0.01mA

Note: 1.rC max or rPmax: additive error≤±5%rdg±5dgt

(rC max: 4kΩ+100R＜50kΩ, rP max: 4kΩ+100R＜50kΩ)

2. when interference by 5V voltage, the additive error ≤±5%rdg±5dgt

3. Instrument Structure



3.1.E interface (grounding pole)
3.2. ES interface (Auxiliary grounding pole)
3.3.P(s) interface (voltage pole)
3.4.C (H) interface (current pole)
3.5.C_1 interface (same as CT2)
3.6.C_1 interface (same as CT2)
3.7.USB interface
3.8. LCD
3.9. Rotary switch for selecting function
3.10.Function Button area
3.11.Stimulant current clamp CT1
3.12.Receive clamp CT2
3.13. Test wires
3.14.Auxiliary grounding rod
3.15. Simple test wires
3.16.Receive clamp CT2

Button Function

START	Test button	SET	Set button
▲	Up button	▼	Down button
CLR	Delete button	AL	Alarm button
MEM	Record button	☼	Backlight button

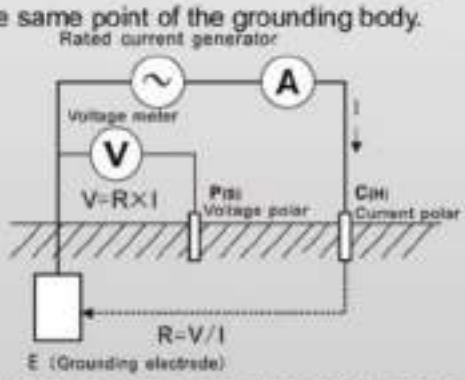
4. LCD Display

4.1. Over voltage indicator(it will display when the voltage to be measure is over 30V, sarety warning)
4.2. Alarm indicator symbol (Displayed when the alarm function is activated, flashing when the alarm threshold is exceeded)
4.3. AC indicator
4.4. Signal interference indicator (interference voltage is over 5V will display)
4.5. Data hold indicator (press MEM and keep the data hold to display)
4.6. Data read indicator (press MEM 3 second to read the data to display)

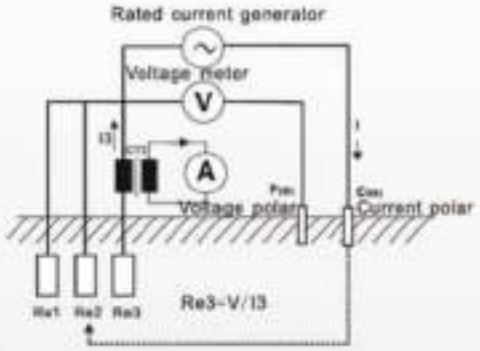
4.7. Test data display
4.8. Low voltage indicator (battery voltage below 7.2V will display)
4.9. Bar graph of testing process(dynamically display the process of measurement)
4.10. The current signal received by current clamp CT2 too low indicator (the current signal received by CT2 is lower than 0.5mA will display the symbol, CT2 current clamp may clamp opposite direction)
4.11. Interference pole indicator (the pole interfered will display)
4.12. Stored data sets indicator
4.13. Voltage unit symbol
4.14. Resistance, soil resistivity, current, length unit symbol

5. Principle Of Measurement

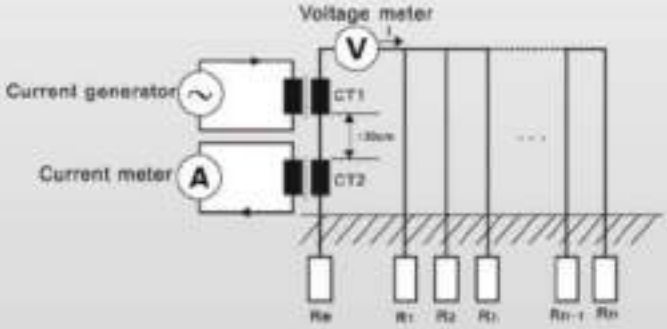
5.1. The 3-wires and 4-wires method measures the grounding resistance value measurement by the rated current pole-changing method (suitable for accurate measurement of single-point grounding system), that is, the AC rated current **I** flows between the measuring object **E** grounding pole and the **C (H)** current pole, The potential difference **V** between the grounding pole of the **E** and the voltage of the **P(S)** voltage, and the grounding resistance value **R** is calculated according to the formula **R=V/I.** In order to ensure the accuracy of the test, the 4-wire method is used to increase the **ES**-assisted ground pole. In actual test, the **ES** and **E** are clamped at the same point of the grounding body.



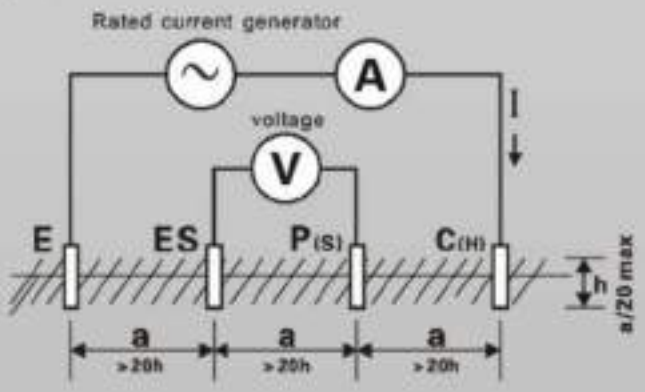
5.2. The selection method measure grounding resistance by current change-pole method (applicable to measure one of earth screen grounding resistance of parallel connection grounding system not split any circuit grounding wires), and applying an alternating current between the **Re1 Re2 Re3** grounding pole and the **C(H)** current pole **I**, the current **I3** flowing through **Re3** is measured by CT2, and the potential difference **V** between the **Re3** grounding pole and the **P(S)** voltage pole is measured, and the grounding resistance value **Re3** is calculated according to the formula **Re3=V/I3**.In order to ensure the accuracy of the test, the 4-wire method is used to increase the **ES**-assisted ground pole. In actual test, the **ES** and **E** are clamped at the same point of the grounding body.



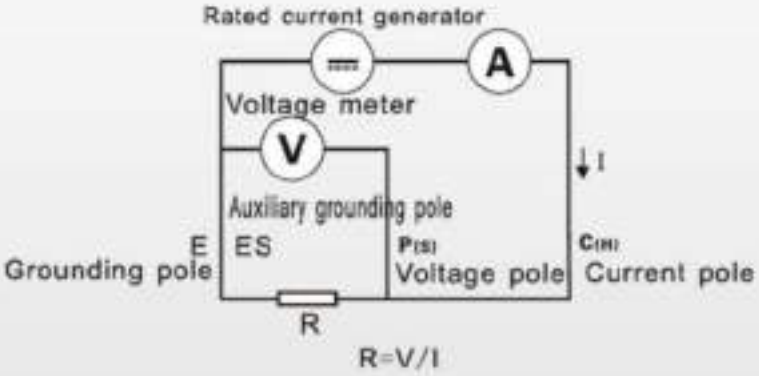
5.3. The double clamp method measure grounding resistance (applicable to multi-independent point parallel grounding system without auxiliary pile measurement), generates an alternating electromotive force **V** through the excitation clamp CT1, and generates a current **I** in the loop under the alternating electromotive force V, and then through CT2 detects the feedback current **I**, and calculates the resistance value according to the formula **R=V/I**. In the figure below, **R=Re+R1//R2//R3//⋯Rn-1//Rn**, if **Re+R1//R2//R3//⋯Rn-1//Rn** (resistance of multiple grounding point connect in parallel) is much less than **Re**, then **R=Re.**



5.4. The Soil resistivity (ρ) measure by 4-pole method (wenner method):the AC current **I** flows between grounding electrode **E** and current electrode **C(H)**, get the potential difference **V** between **P(S)** voltage electrode and **ES** auxiliary grounding electrode, the potential difference **V** divided by AC current **I** to get the middle of two resistance value **R**, the electrode distance is **a(m)**, then soil resistivity is got according to formula **ρ=2πaR(Ωm)**. If the electrode distance of **C(H)-P(S)** is equal to **P(S)-ES** (both a) is Wenner method. In order to convenience the calculation, please make electrode distance **a** far more than embedding depth **h**, generally should meet **a>20h**, as shown below.



5.5.The 2/3/4 wires DC resistance measurement adopt rated current change-pole method(suitable for measurement test of the equipotential bonding resistance), that is, the DC rated current **I** flows between the measuring objects R, get the potential difference **V** of both ends of **R,** calculate the resistance value of **R** according to formula **R=V/I**. In order to ensure the accuracy of the test, the 4-wire method is used to increase the **ES**-assisted ground pole. In actual test, the **ES** and **E** are clamped at the same point of the grounding body.



5.6. In 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 variation error **(Ei)** of the tester.

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

A: Inherent error **E2:** Variation due to power supply voltage
E3: Variation due to temperature change; **E4:** Variation due to interference voltage change
E5: Variation due to contact electrode resistance

5.7. AC current leakage current measurement by average rectification method
5.8. Ground voltage measurement by average rectification method

6. Operation Methods

6.1. Switch On/Off

Rotate **FUNCTION** rotary switch to turn the machine on and off. Rotary switch button displays "**OFF**" to shut down. The tester will automatically shut down after power on15 minutes. After the power is turned off, turn the function knob to the "**OFF**" position and turn it back on.

6.2. Battery Voltage Check

After power on, if the LCD displays the battery voltage low symbol "▭" indicating that the battery is low, please follow the instructions to replace the battery. The battery power is sufficient to ensure the accuracy of the measurement.

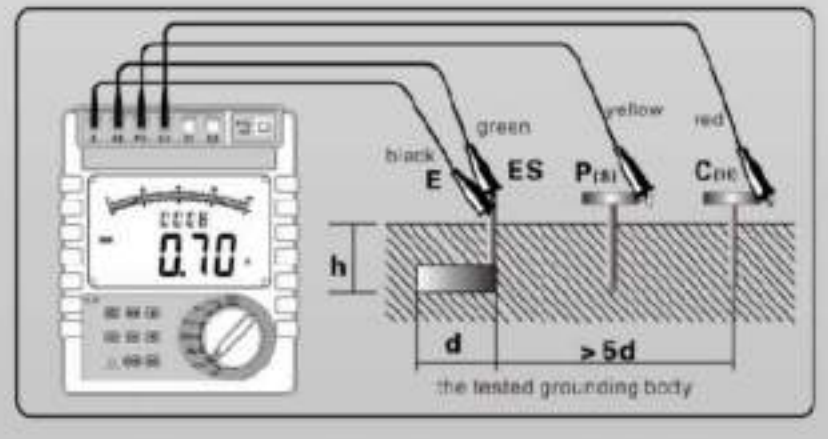
6.3.4-wires Precise Earth Resistance Measurement

⚠	In the testing of the grounding resistance, firstly confirm the grounding voltage value of the grounding wire, that is, the voltage value of C(H) and E or P(S) and ES must be below 20V. If the grounding voltage is higher than 5V, the meter displays the NOISE symbol, and the measurement of the grounding resistance may cause an error. At this time, the grounding device be tested should powered off, ensure the grounding voltage is lowered and then test the grounding resistance again

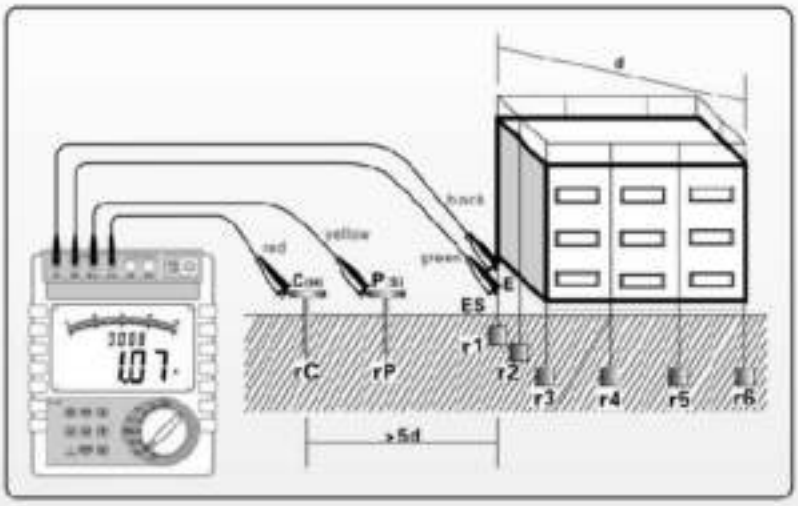
4-wires test: The 4-wire test eliminates the influence of the contact resistance between the surface of the grounded body, the auxiliary grounding rod, the test clamp, and the instrument input interface (usually with dirt or rust) on the measurement, and eliminates the effect of the line resistance change on the measurement. Better than the 3-wire test.

As shown in the figure below: Begin the object is measured, the **P(H)** and **C(H)** auxiliary grounding rods are buried in the ground in a straight line, and the grounding test lines (black, green, yellow, red) from the **E , ES,P(S)** and **C(H)** of the tester interface corresponding connect to be tested of the grounded electrode **E** , the auxiliary voltage pole **P(S)**, and the auxiliary current pole **C(H)**.

⚠	The distance between the grounding body E to the current pole C(H) should be at least 5 times the subsurface depth (h) of the tested grounded body, or the buried ground electrode length (d) of the grounded body to be tested 5 times.
	Measure the total grounding resistance of a complex grounding system with a distance d should be the distance from the largest diagonal of the grounding system.
	The test leads cannot be entangled with each other in testing; otherwise the test accuracy may be affected.



For multi-point independent grounding systems or larger grounding grids, test cables of 50m or longer can be selected for testing, as shown below:



R=r1□r2□r3□r4□r5□r6□...□rn(r1...rn are all independent grounding points)

R——The reading value on meter

r1...m——All are independent grounding points

rC——The earth resistance of auxiliary current electrode **C(H)**.

rP——The earth resistance of auxiliary voltage electrode **P(S)**.

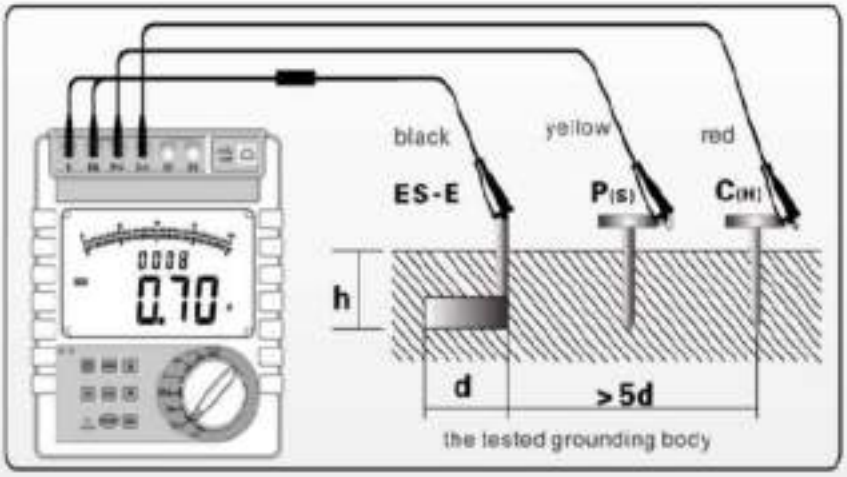
After wires connection, firstly rotate **FUNCTION** rotary switch to "**REARTH**" and enter the grounding resistance test mode, press "**START**" button to start testing. During the test, there is a countdown indication and a test progress bar graph indication. After the test is completed and display stable data which is the grounding resistance value **R** of the grounded body to be tested.

After testing, Press "**SET**" button again to check the grounding resistance value rC, rP, rC, rP of the auxiliary current pole C(H) and the auxiliary voltage pole P(S), automatic return and display the ground resistance value R.

As shown below, The tested grounding resistance value is 2.05Ω, the tester has stored 8 sets of data; the auxiliary current pole C(H) of grounding resistance value rC is 0.36kΩ; the auxiliary voltage pole P(S) of grounding resistance value rP is 0.27kΩ.

6.4.3-Wires Earth Resistance Measurement

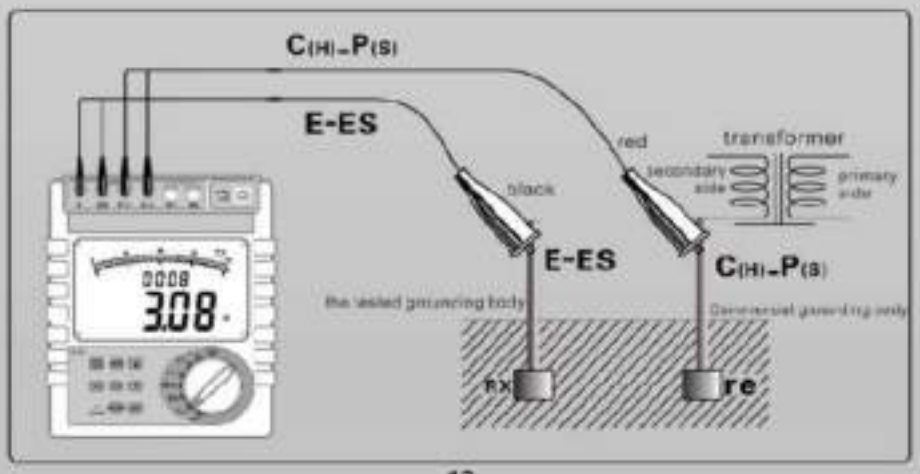
3-wires measurement: As shown below, short-circuit connected with **ES** and **E** interface, that is 3-wires measurement test. The 3-wire test cannot eliminate the influence of the line resistance change on the measurement, nor can eliminate the influence of the contact resistance change between the meter and the test line, the test line and the auxiliary ground rod on the measurement. The oxide layer on the surface of the tested grounded body needs to be removed in the measurement.

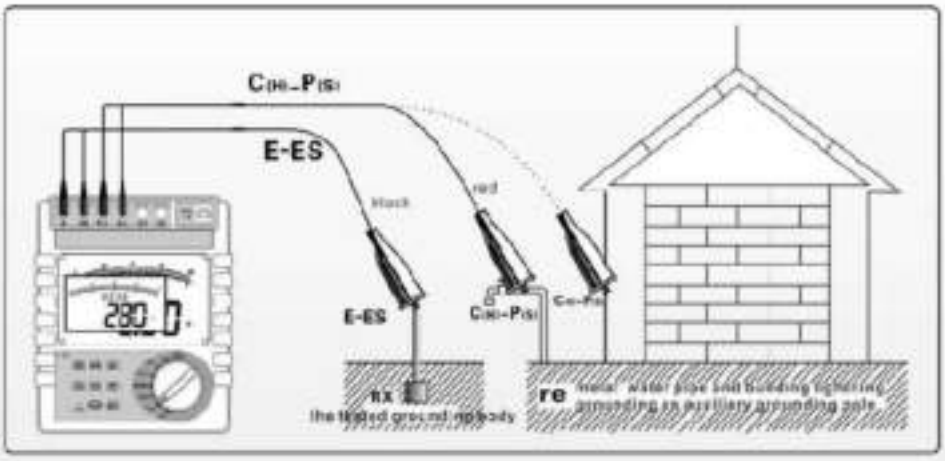


6.5.2-Wires Simple Measurement

2-wires method measurement test: This method is a simple measurement method without using an auxiliary grounding rod. The existing grounding electrode with the lowest grounding resistance value is used as the auxiliary grounding pole, and two simple test leads are connected (i.e., the **C(H)-P(S)** interface connect shorted. , **E-ES** interface connect shorted). Used the metal ground pipe, fire hydrant and other metal burial materials, the common grounding of the commercial power system or the lightning protection grounding pole of the building to instead of the auxiliary grounding rods **C(H)** and **P(S)**, and oxide layer of the selected metal auxiliary grounding body connection point should be removed during the measurement. Wire connection is as following figure, and refers to 4-wires measurement for other operations.

⚠	Using the commercial power system grounding as the auxiliary grounding pole measurement, it must be confirmed that the grounding pole of the commercial power system. Otherwise, the circuit breaker may start and dangerous.
	The grounding resistance is measured by the simple 2-wire method. Try to select the grounding body with a small **Re** value as the auxiliary grounding pole, so that the meter reading is closer to the true value. In measuring, please choose metal water pipe and metal fire hydrant as auxiliary grounding pole.





The 2-wire simple method measures the grounding resistance, the meter reading is the sum of the grounding resistance of the grounded body to be measured and the grounding resistance of the commercial grounding body.

R=RX + re

R --- The tester reading value;

RX ---The grounding resistance value of measured grounding object;

re--- the grounding resistance value of a common grounding body such as a commercial power system.

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

RX=R - re

6.6.4- wires selection method measure the grounding resistance

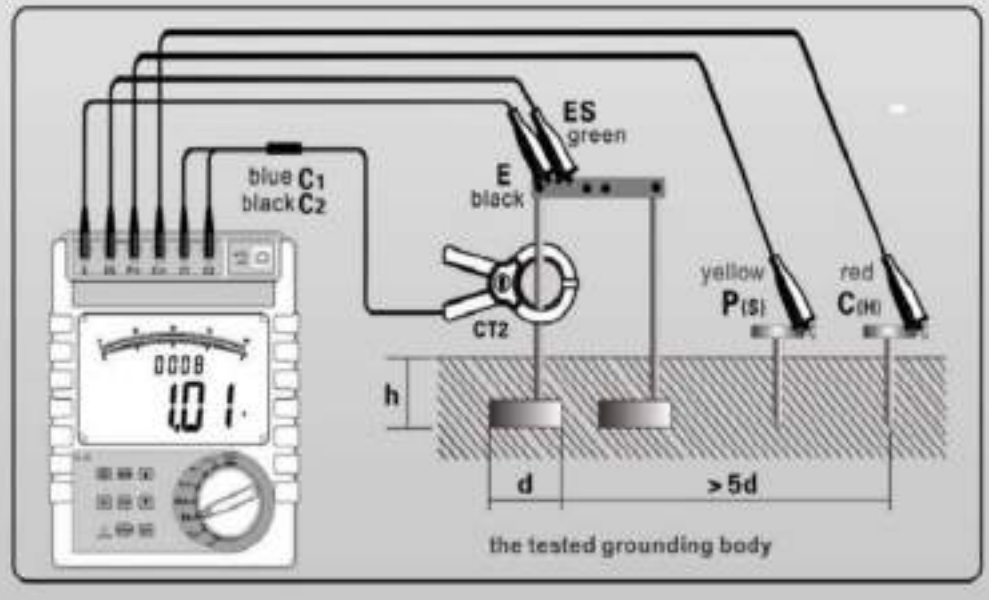
⚠	In the testing of the grounding resistance, firstly confirm the grounding voltage value of the grounding wire, that is, the voltage value of C(H) and E or P(S) and ES must be below 20V. If the grounding voltage is higher than 5V, the meter displays the NOISE symbol, and the measurement of the grounding resistance may cause an error. At this time, the grounding device be tested is powered off, ensure the grounding voltage is lowered and then test the grounding resistance again

The 4-wire selection method can accurately measure the grounding resistance of one of the grounding bodies without disconnecting the ground wire and device, The 4-wire test eliminates the influence of the contact resistance between the surface of the grounded body, the auxiliary grounding rod, the test clamp, and the instrument input interface (usually with dirt or rust) on the measurement, and eliminates the effect of the line resistance change on the measurement. Better than the 3-wire test.

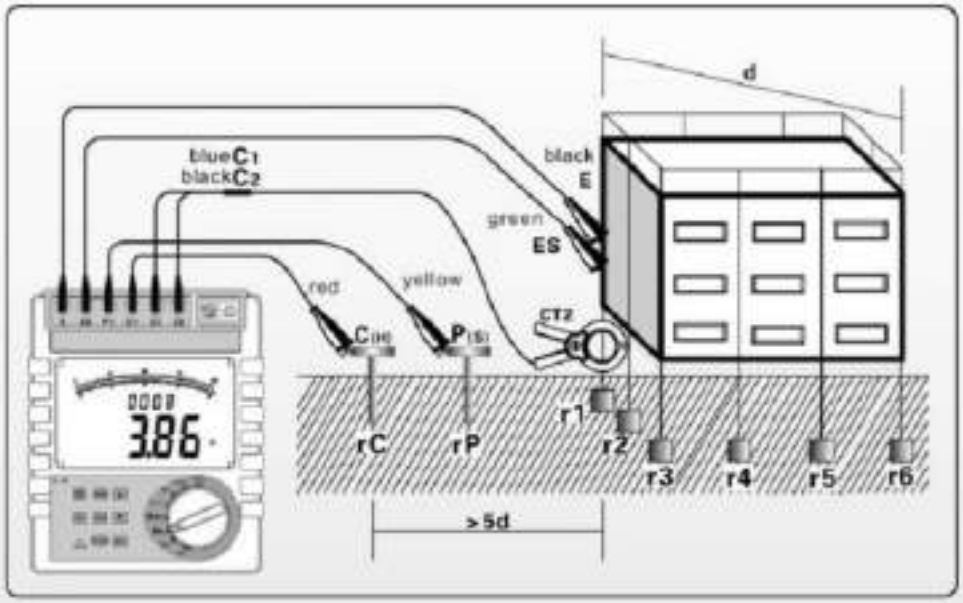
As shown below: Begin the object is measured, the **P(H)** and **C(H)** auxiliary grounding rods are buried in the ground in a straight line, and the grounding test lines (black, green, yellow, red) from the **E , ES,P(S)** and **C(H)** of the tester interface corresponding connect to be tested of the grounded electrode **E** , the auxiliary voltage pole **P(S)**, and the auxiliary current pole **C(H)**, Insert the blue plug of one end of the CT2 current clamp into C1 interface ,and insert the black plug

into the C2 interface of the tester, and clamp the current clamp into the down leads of the tested grounding body. Pay attention to the direction of the current clamp. The current must flow from the positive direction of the current clamp to ensure the measurement accuracy

⚠	In testing the grounding resistance, first confirm the leakage current of the grounding lead. If the grounding wire current is below 2A and greater than 100mA, the measured value of the grounding resistance may cause an error. At this time, the grounding device be tested should powered off, ensure the leakage current of grounding lead is lowered and then test the grounding resistance again. And in the selection method test, must make sure the current must flow into the current clamp from the positive direction of the current clamp. Otherwise, the ground resistance value cannot be tested normally. When the meter displays the "⊂⊃" symbol, indicates that the current signal received by the CT2 current clamp is too small. should be checked whether the CT2 is clamped correct or the clamp is reversed, the direction of the current clamp CT2 is correct or not, and the auxiliary pile poor contact etc.
	The direction of the current signal received by CT2 flows from the underground to the ground. The positive direction of CT2 is the current inflow direction, mean that clamp the ground wire with makeable side by CT2

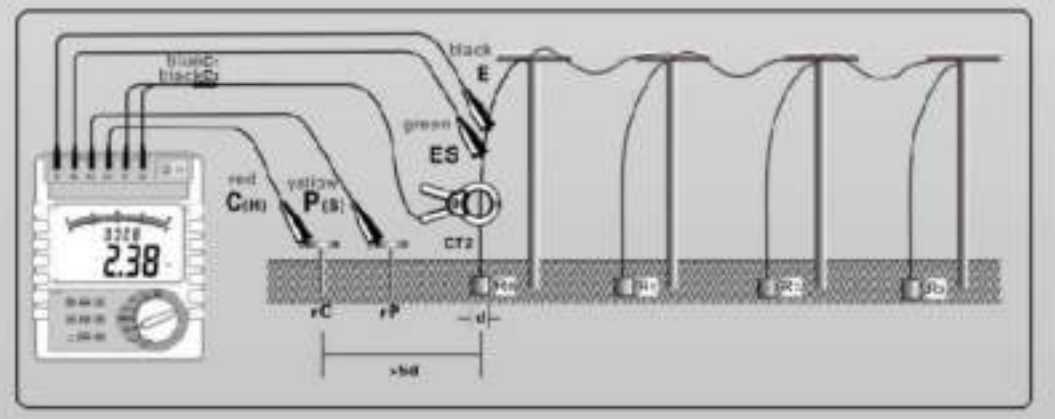


After wires connection, firstly rotate **FUNCTION** rotary switch to "Rs" press "**START**" button to enter grounding resistance test mode. During the test, there is a countdown indication and a test progress bar graph indication. After the test is completed and display stable data which is the grounding resistance value **R** of the grounded body to be tested.



For multi-point independent grounding systems or larger grounding grids, test cables of 50m or longer can be selected for testing, as shown below: the result is grounding resistance value of **Re,** not affected by the ground resistance values of r1, r2, r3, r4, r5...

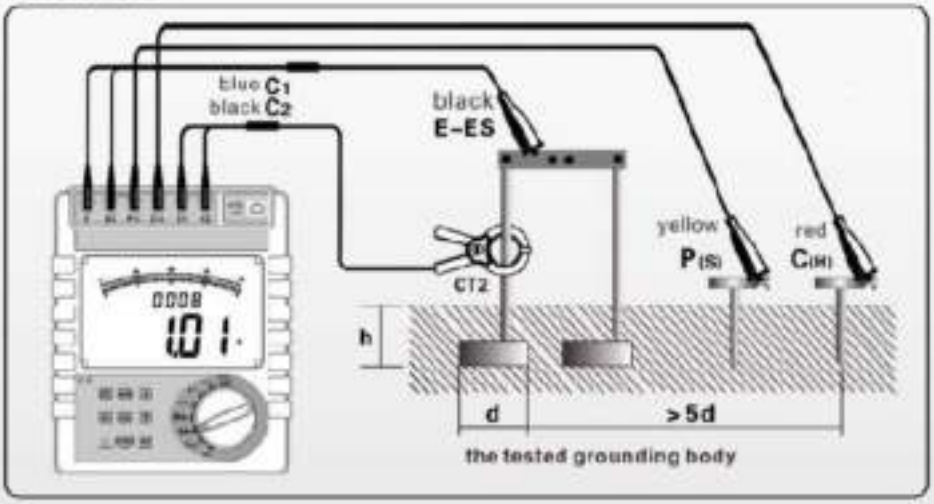
As shown below: In measuring the grounding resistance of the tower, the grounding resistance value Re of the tower to be tested can be accurately measured by the 4-wire selection method without disconnecting the ground wire and device. The resistance value which measured by the traditional 3-wire or 4-wire method without disconnecting the ground wire and device. is that resistance value of Re and R1, R2, R3 in parallel, if Re has fault and parallel connected with R1, R2, R3 which the resistance is small, it is difficult to find the fault point of Re with the traditional 3/4-wire four method, and easy be ignored.



6.7.3-wires selection method measure grounding resistance

3-wires selection method measurement test as show below: 3 wires selection method means short circuit connection with the interface **ES**, **E** of meter, the tester operation is the same as 4-wires measurement test method. The 3-wire test cannot eliminate the influence of the line resistance change on the measurement, nor can eliminate the influence of the contact resistance

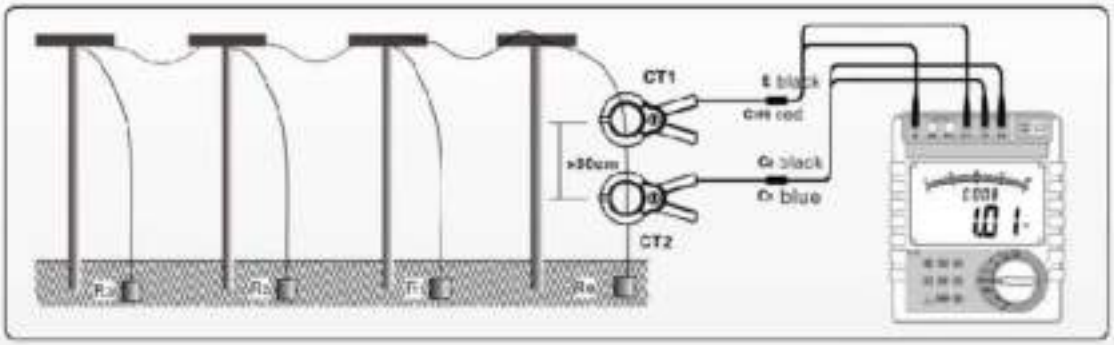
change between the meter and the test line , the test line and the auxiliary ground rod on the measurement. The oxide layer on the surface of the tested grounded body needs to be removed in the measurement.



6.8. Double clamp method measure grounding resistance

The double clamp method is suitable for measuring the situation of independent multi-points grounding system, which is no need to make the auxiliary pile to measure the grounding resistance. As show below; Insert the red plug of the CT1 current clamp into the tester C (H) interface, and insert the black plug into tester E interface, insert the blue plug of the CT2 current clamp into tester C1 interface, insert the black plug into tester C2 interface, and clamp the two current clamps into the tested circuit, pay attention to the direction of the two current clamps and keep the spacing more than 30cm, the two current clamps could not interchanged, otherwise it will happen errors.

⚠	In testing the grounding resistance, first confirm the leakage current of the grounding wire. If the grounding wire current is higher than 100mA, the measured value of the grounding resistance may cause an error. At this time, the grounding device be tested should powered off, ensure the leakage current of grounding lead is lowered and then test the grounding resistance again. And in the selection method test, must make sure the current must flow into the current clamp from the positive direction of the current clamp. Otherwise, the ground resistance value cannot be tested normally. When the meter displays the " " syr ⊂⊃ l, indicates that the current signal received by the CT2 current clamp is too small, should be checked whether the CT2 is clamped correct or the clamp is reversed, the direction of the current clamp CT2 is correct or not, measuring loop resistance is too large or does not form a loop. Make sure the space distance is larger than 30cm between the current clamps, or will happen error.



After wires connection, firstly rotate **FUNCTION** rotary switch to "Rᴇ", press "**START**" button to enter grounding resistance measurement test mode. During the test, there is a countdown indication and a test progress bar graph indication. After the test is completed and display stable data which is grounding resistance value of the tested grounding body **R=Re+R1//R2//R3**, if **Re+R1//R2//R3<<Re**, **R** can be regarding as **Re**: **R≈Re**

6.9. Soil Resistivity Measurement

Soil resistivity **ρ** is a determining factor of grounding resistance of grounding body. Different soil properties with different soil resistivity, as the same soil, and the soil resistivity will change significantly due to differences in temperature and water content. Therefore, in order to have a correct basis for the grounding device, the designed grounding device can better meet the needs of actual work, soil resistivity measurement is very essential.

Soil resistivity measured by 4-pole method (Wenner method)

According to formula **ρ=2πaR(Ωm)**calculating soil resistivity **ρ**, unit is **Ωm**:

a——electrode distance

R——soil resistivity between electrode **P(S)-ES**

4-pole method (Wenner method): Connect testing wires as shown below: pay attention to the distance and the embedding depth between auxiliary grounding rods. Respectively **C(H)**,**P(S)**, **ES**, **E** auxiliary grounding rods deep into the earth as a straight line, and then the test wires (red, yellow, green, black) which lead from the tester **C(H)**, **P(S)**, **ES**, **E** interface are corresponding connect to **C(H)**, **P(S)**, **ES**, **E** of the measured auxiliary grounding rods.