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1.Safety Instructions

This operation manual includes the user guidance and safety instruction when using the tester, please read it before using.

- Before using the Tester, please read and understand the operating manual including the content.
- Keep the operating manual properly, and let it easy to get it for reference during the process of testing.
- When using the Tester, user must follow the testing procedure as mentioned in the operating manual.
- Careful reading the operating manual regarding the safety information and it is content.
- Must be followed all the related safety instructions, otherwise it may cause accidents or damage the Tester.

Safety sign " ⚠ "has 3 meaning in this manual, user has to pay attention to this sign" ⚠ "for operation.

Danger — identifies conditions and actions that most likely pose hazard(s) or die.

Warning — identifies conditions and actions that will pose hazard(s) or die.

Caution — identifies conditions and actions that will pose hazard(s) or damage the Tester.

⚠ Danger

- Do not use the Tester around explosive environment, which may cause fire and explosion.
- Do not use the Tester in wet environment or do not make any connection work when your fingers are wet.
- Do not apply the load more than the Tester capacity or range.
- Do not open battery compartment while testing.

Warning

- Do not use the Tester if it is damaged or metal part is exposed.
- Do not disassemble the tester un-intentionally. If it needs repair, please contact our after-sales services or our agents.
- Do not change battery or open battery compartment when the Tester is wet. Soft cloth should be used to dry it first, and then carry on.
- Make sure the Tester is turned off when changing battery or opening the battery compartment.

Caution

- Ensure test lead probe insert into the corresponding port before measurement.
- Take the battery out from the Tester if it is not used for a long time.
- Do not expose the Tester in extreme temperature and wet environment.
- Soft cloth and mild detergent should be used to clean the surface of the Tester
- when servicing. No abrasive and solvent should be used
- Dry the tester before storing if it is wet.

This Tester has the follow signs, please pay attention to the content when using:

-  identifies danger, warning, caution
-  identifies double or reinforced insulation
-  identifies AC[AC]
-  Grounding
-  Conforms to Standards of European Union

2.Characteristics

The Tester is using micro controller with high accuracy and reliability; it can measure every electric wire, electric installation, anti-thunder equipment's earth resistance value of those earth system. Also, it can carry earth voltage measurement. (Note: the Tester should not be used outdoor hazard environment, like raining, thunder etc.)

- 2.1 With backlight display and battery check function.
- 2.2 Data logging for 20 sets of data.
- 2.3 With auto switch-off save energy function.
- 2.4 Precision 3-Wires Testing and Simple 2-Wires Testing.
- 2.5 During earth voltage testing, if C port or E port don't contact properly, LCD display will show"- - - Ω"indication.
- 2.6 Over-range Display"OL"indication.
- 2.7 Double insulation or reinforced insulation safety manufacturing.

3.General Specifications

3.1 Operating temperature and Relative humidity($20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ & $\leq 75\% \text{RH}$):

Range		Measure Range	Best Accuracy
Earth Voltage		0V~200V(50/60Hz)	$\pm (1.0\%+4)$
Earth Resistance	20 Ω	0.00 Ω ~20.00 Ω	$\pm (2.0\%+10)$ (20 Ω position)
	200 Ω	0.0 Ω ~200.0 Ω	$\pm (2.0\%+3)$ (200 Ω or 2000 Ω position)
	2000 Ω	0 Ω ~2000 Ω	(Auxiliary earth resistance 500 Ω (accuracy $\pm 5\%$); earth voltage $\leq 10\text{Vac}$)

3.2 Application standard:

IEC 61010-1 CATIII 600V Polluting Grading: Grade II
 IEC 61557-1,5
 IEC 61010-2-31

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3.3 Measure methods:

- (1) Earth Voltage Testing: average respond
- (2) Earth Resistance Testing : testing signal frequency : around 820Hz, current :
20Ω position around 3.2mA

3.4 Maximum operating accuracy:

Maximum operating accuracy within measure range:($\pm 30\%$)

20Ω : 5.00Ω ~20.00Ω

200Ω: 20.0Ω ~200.0Ω

2000Ω : 200Ω ~2000Ω

3.5 Working condition:

Temperature: 5°C~40°C

Relative humidity: $\leq 80\%$ RH(no fog)

Height above Sea Level: ≤ 2000 meters

3.6 Storage condition:

Temperature: -20°C~60°C

Relative humidity: $\leq 75\%$ RH(no fog)

3.7 Power source:[1.5V Alkaline Battery (AA)*6]

3.8 Overload protection:

Earth Resistance:200 Vac (10 seconds)

Earth Voltage:400 Vac (30 seconds)

3.9 Insulation Resistance:The insulation impedance between measure circuit and housing is not less than 20MΩ .

3.10 Product size:160mmx70.5mmx100mm.

3.11 Product Weight:around 560g.

3.12 Accessories:

Green test lead 5 meter	1 piece
Yellow test lead 10 meter	1 piece
Red test lead 20 meter	1 piece
Auxiliary earth stakes	2 pieces
One plug test lead with alligator clip	1 set
1.5V Alkaline Battery (AA)	6 pieces
Carrying Bag	1 set
English manual	1 piece

4. Product outlook & accessories:(figure 1)

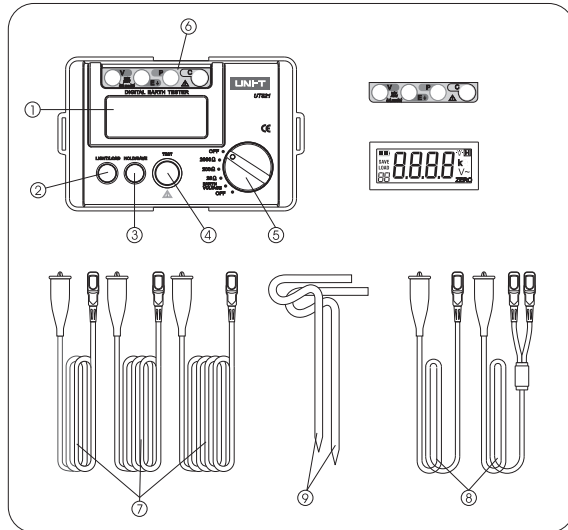








figure 1

- ① LCD Display
- ② LIGHT/LOAD button
- ③ HOLD/SAVE button
- ④ TEST button
- ⑤ ON/OFF function
- ⑥ Input terminals
- ⑦ Standard 3-Wires test leads
- ⑧ Simple 2-Wires test leads
- ⑨ Auxiliary earth stakes

5. Preparation before measurement

5.1 Battery Voltage check: Select function from OFF to EARTH VOLTAGE or EARTH RESISTANCE, LCD Display will show battery indicator : "  " which show lowest battery status, and need to change battery, otherwise the Tester cannot work properly.

Battery sign	Battery Voltage
	$\geq 8.2V$
	7.8V~8.2V
	7.4V~7.8V
	7.0V~7.4V
	$\leq 7V$

5.2 Test leads connection

Make sure all the test leads are firmly connected to the Tester input terminals; test leads do not firmly connect will affect the accuracy of measuring value.

6. Measure method

 **Warning**

When the Tester carry out earth resistance testing, the distance between E and C have the maximum voltage around 50V~volt. Do not touch the external part of test leads and auxiliary earth stake in order to avoid shock hazard.

6.1 Precision Measurement (using standard test leads for measurement):

- a. place 2 ground stakes in earth/dirt. Minimum distance between earth electrode(E), probe(P) and auxiliary earth (C) should be 5-10 meter apart, as below connection figure 2:

(Attention:ensure the ground stakes in the moisture soil. If the soil is too dry, it need to fill-in sufficient water. Rock or sand also needs moisture before testing. If the testing site is inside the urban city with concrete cover which is hard to put in the ground stakes, it can use 25cm X 25 cm two steel plates (or using the existing ground stakes) place horizontally in concrete surface, and cover by moisture towel with sufficient water, replace measurement earth, it still can make measurement in general situation.)

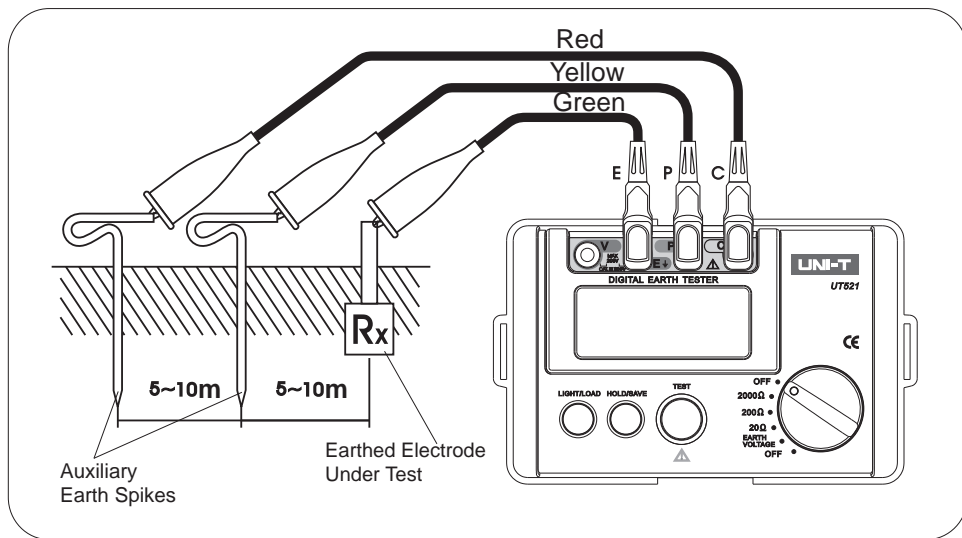


figure2

C: auxiliary electrode P: potential electrode E: earth electrode

- b. Earth Voltage Testing: Select function OFF to EARTH VOLTAGE, LCD display will show voltage, connect test leads in V and E, then connect to the testing point, LCD display will show earth voltage value (Attention: measure earth voltage does not need to press TEST button). If the measuring value $>10V$, then it need to switch-off all the related voltage equipment. Wait until the earth voltage decrease, and then do it again. Otherwise, it will affect the accuracy of earth resistance.

⚠ Warning:

Earth voltage testing only work in V and E, C and P connecting cable must be separated. Otherwise, it will cause danger and damage the Tester.

- c. Earth Resistance Testing: Select function OFF to EARTH RESISTANCE 2000 Ω (Maximum), press "TEST" button, LCD display will show earth resistance value. If the resistance value $<200\Omega$, then select function from OFF to earth resistance 200 Ω , LCD display will show earth resistance value. If the resistance value $<20\Omega$, then select function from OFF to earth resistance 20 Ω , LCD display will show earth resistance value; Of course, you can follow the other selecting order for testing. In summary, you need to select the best measurement position to measure for getting the best accuracy.

press "TEST" button, the button's light will be on, which shows the Tester is in measurement.

(Note: when C or E does not connect properly, auxiliary earth resistance or earth resistance excess the load (like 20Ω excess around $14K\Omega$), or testing terminal open circuit, LCD display will show "- - - Ω ", then it needs to double check the connection parts, whether soil is too dry, whether auxiliary earth stakes is close to earth.)

When the earth resistance testing point over the selected measuring range, meanwhile the selected 20Ω position less than around $14K\Omega$, or 200Ω position less than around $26K\Omega$, or 2000Ω position less than around $78K\Omega$, LCD display will show "OL" (overload). Warning: If the auxiliary earth stake is banning or touch the other materials, it will affect the reading. When connect the test leads, it must clean the auxiliary earth stake. If the auxiliary earth stake value is too large, it also cause the deviation in reading.

- d. The tester should be switch - on when press the button and select the function key. Auto switch off after around 10 minutes for power save (except earth resistance testing function on).
- e. Backlight on: while testing in poorly lighted area, it needs backlight press "Light/Load" button, backlight function will be on and LCD display the corresponding sign. Press "Light/Load" button again, then it will switch-off backlight function.

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- f. Hold function: while testing, press slightly "Hold/Save" button, save data function will be on, the corresponding testing value will be saved and LCD display the corresponding sign. Press slightly "Hold/Save" button again, then it will cancel this function.
- g. Storage function:
1. storage data press "Hold/Save" button for around 2 seconds. Storage function will be on and save the corresponding data. Press "Hold/Save" button once again to save the 2nd data; press "Hold/Save" button again to save the 3rd data..., For switch-off this function, press "Hold/Save" button for around 2 seconds.
 2. Read data press "Light/Load" button for around 2 seconds, it will show address serial number 01 saved data. Press "Light/Load" button once again to show the address serial number 02 saved data...until the 20th saved data. If you want to return back the previous saved data, press "Hold/ Save" once; (In the situation "Hold/ Save" button "Light/Load" button (slightly press) is working like up and down button). For switch-off this function, press "Light/Load" button for around 2 seconds.
 3. Clear saved data
press "Hold/Save" button and "Light/Load" button simultaneously, then switch-on the Tester, LCD display will show "C L .",
Meanwhile, all the data in the storage will be deleted (20 sets of data or part of data can be deleted).

- 6.2 Simple measurement (use simple 2-Wires test leads for measurement):
 This method will be used when the auxiliary earth stake cannot be used. Use the exposed earth resistance object from the ground as earth, like metal water bath, water pile, wire ground, building earth, also can use 2-wires test leads method (E and P&C terminals). Connection as figure 3:

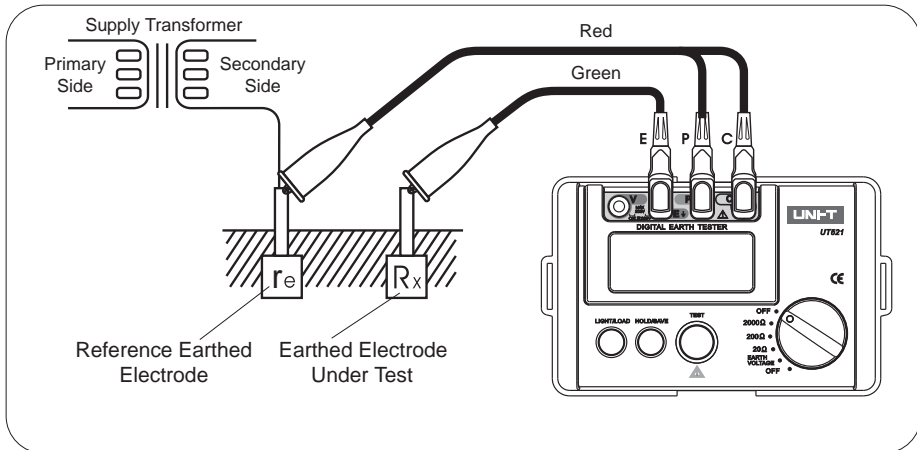


figure 3

When using this method, P and C have already connected together.

 **Danger**

When using commercial electricity power system's grounding point as a reference testing point, please be careful for voltage pose a shock hazard

7. Maintenance & Repair

7.1 Maintenance

7.1.1 Replacing battery and repair(please see figure 4) After low battery indicator show, replacing battery immediately as follows:

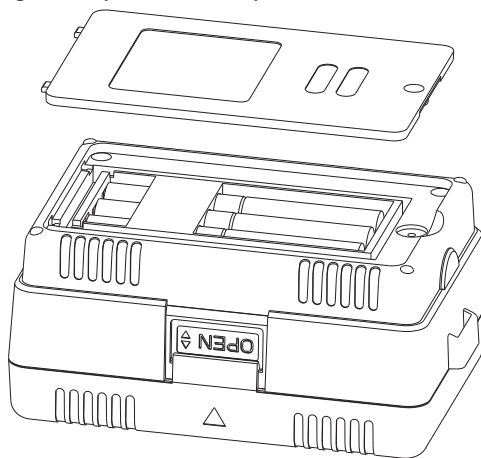


figure 4

- a. switch-off the Tester and remove all the test leads.
- b. release the screw in bottom part, and open battery compartment.
- c. Replacing all old battery (6) with new battery.
- d. After replacing the battery, rejoin the battery compartment and firmly screw.
Remove all the batteries if the Tester do not use for a long time, so that it avoid the leakage and corrosion in the battery compartment.

7.1.2 Cleaning the Tester

Soft cloth and mild detergent should be used to clean the surface of the Tester, because solvent will corrosive the display.

7.1.3 Must be avoiding moisture.

7.2 Repair

7.2.1 Contact our after-sales service department or agents when the following thing happens:

- a. The Tester is being damage.
- b. LCD display abnormal.
- c. Unreasonable deviation when in normal use.
- d. Buttons do not function properly and confusion.

7.2.2 when the Tester needs repair, please bring it to the professional technician or authorized repair department for repair.

****END****

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Manufacturer:

Uni-Trend Technology (Dongguan) Limited
Dong Fang Da Dao
Bei Shan Dong Fang Industrial Development District
Hu Men Town, Dongguan City
Guang Dong Province
China
Postal Code: 523 925

Headquarters:

Uni-Trend Group Limited
Rm901, 9/F, Nanyang Plaza
57 Hung To Road
Kwun Tong
Kowloon, Hong Kong
Tel: (852) 2950 9168
Fax: (852) 2950 9303
Email: info@uni-trend.com
<http://www.uni-trend.com>