

## UT521

### Operating Manual



### Digital Earth Tester

#### 1. Safety Information

This operation manual includes the safety information related to the operation of the tester, please read them carefully before using the tester.

- Before using the Tester, please read through and understand the operating manual.
- Please keep the Operating Manual properly for future use.
- Use the Tester as specified in the Operating Manual.
- Please understand in detail the Safety Information section of the manual.
- Strictly follow the Safety Information, otherwise it may cause personal injury or damage to the Tester.

Safety sign "△" has 3 meanings in this manual, the user has to pay attention to this sign "△" for operation.

Danger	— identifies conditions and actions that most likely pose hazard(s) to the user.
Warning	— identifies conditions and actions that may pose hazard(s) to the user.
Caution	— identifies conditions and actions that may cause minor injury or damage to the Tester.

##### △ Danger

- Do not use the Tester around explosive environment, which may cause fire and explosion.
- Do not make any connections when the Tester is wet or the operator's hands are wet.
- Do not apply any voltage beyond the rating or specified range of the Tester.
- 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 randomly. 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, clean it with dry soft cloth first.
- Make sure the Tester is turned off when changing battery or opening the battery compartment.

##### △ Caution

- Ensure test leads are inserted 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. No abrasive and solvent are allowed.
- Dry the tester before storing if it is wet.

Electrical Symbols are used on the Tester or in the manual:

△ danger, warning and caution icon	□ double or reinforced insulation
~ Alternating Current	⏏ Grounding
CE Conforms to Standards of European Union	

#### 2. Features

The Tester is designed with intelligent micro-controller chip and offers high accuracy and reliability. It can measure earth resistance of earth ground devices of electric power installations, electrical appliances, lightning protection systems, etc, and also measure earth voltage (It is highly recommended not to use the Tester under severe outdoor environments such as raining or thunder).

- Backlight LCD;
- Battery Check;
- Data Hold & Data Storage (up to 20 sets);
- Auto Power Off;
- Offer Precision Three-Wire & Simple Two-Wire Measurements;
- "----Ω" Indication for Bad Connection to C or E Terminal When Measuring Earth Ground Resistance;
- "OL" Overloaded Indication;
- Double-or Reinforced-Insulated structural Design.

#### 3. Technical Specifications

Measuring Range and Accuracy (under 20°C ± 5°C & ≤ 75%RH):

Range	Measure Range	Best Accuracy
Earth Voltage	0V~200V(50/60Hz)	± (1.0%+4)
Earth Resistance	20Ω	± (2.0%+10) (20Ω position)
	200Ω	± (2.0%+3) (200Ω or 2000Ω position)
	2000Ω	(Auxiliary earth resistance 500 Ω (accuracy ± 5%); earth voltage ≤ 10Vac)

##### Compliances:

IEC 61010-1 CAT III 600V Pollution Degree 2  
IEC 61557-1,5  
IEC 61010-2-31

##### Measure Modes:

- (1) Earth Voltage Measurement: average respond
- (2) Earth Resistance Measurement: Test signal frequency : around 820Hz, current: around 3.2mA at 20Ω range.

##### Measuring scope (Max. deviation: ±30%):

20Ω Range : 5.00Ω ~ 20.00Ω  
200Ω Range : 20.0Ω ~ 200.0Ω  
2000Ω Range : 200Ω ~ 2000Ω

##### Working condition:

Temperature: 5°C~40°C  
Relative humidity: ≤ 80%RH (no fog)  
Altitude: ≤ 2000 m

##### Storage condition:

Temperature: -20°C~60°C  
Relative humidity: ≤ 75%RH (no fog)

##### Power: [1.5V Alkaline Battery (AA)\*6]

##### Overload protection:

Earth Resistance ranges: 200 Vac (10 seconds)  
Earth Voltage: 400 Vac (30 seconds)

##### Insulation Impedance:

> 20MΩ between measure circuits and the casing.

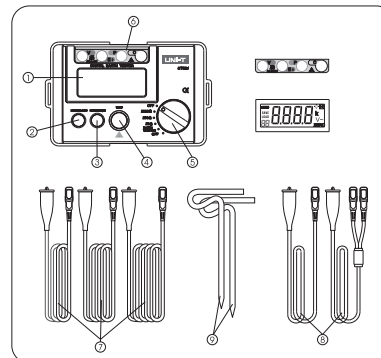
##### Product size: 160mmx70.5mmx100mm.

##### Product Weight: around 560g.

##### Accessories:

Green test lead (5 m)	1 pc
Yellow test lead (10 m)	1 pc
Red test lead (20 m)	1 pc
Auxiliary earth stakes	2 pcs
Simple test leads with alligator clips	1 set
1.5V Alkaline Battery (AA)	6 pcs
Carrying bag	1 set
English manual	1 pc

#### 4. Tester Structure & Accessories (Figure 1)



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

Figure 1

#### 5. Preparations before Measurement

**5.1 Battery check:** Set the rotary switch to earth voltage or earth ground resistance ranges, if "□" shows, it indicates the battery is very low and needs to be replaced timely, otherwise the Tester may be unable to work normally.

Battery sign	Battery Voltage
	≥ 8.2V
	7.8V~8.2V
	7.4V~7.8V
	7.0V~7.4V
□	≤ 7V

## 5.2 Test leads connection

Make sure all the test leads are firmly connected to the Tester input terminals; Poor connection will affect the measuring accuracy.

## 6. Making Measurements

### ⚠ Warning

The voltage up to 50Vac will be present between E and C input terminals during earth ground resistance measurement. To avoid any electric shock, do not touch exposed metal part of test leads and auxiliary earth stakes.

### 6.1 Precision Measurement (with use of standard test leads):

- place 2 ground stakes deep into the soil. Earth electrode(E), probe(P) and auxiliary earth (C) should be in a straight line and 5-10m apart from each other. See Figure 2 for the connection.  
( Caution: ensure the ground stakes in the damp soil. If the soil is too dry, it need to fill-in sufficient water. Stony or sandy soils also needs to be dampened before test. If the testing site is covered with concrete in the city area, which makes it impossible to insert the ground stakes, you can place 25cm X 25 cm two steel plates (or the existing ground stakes) horizontally on concrete surface, and cover with the towel dampened sufficiently with water, then measuring electrodes are produced and under general circumstances, the measurement can begin now.)

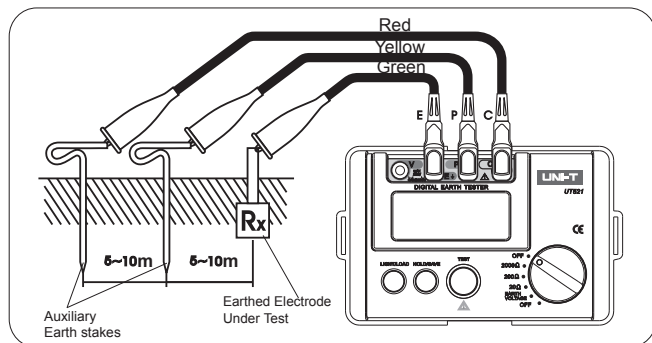


Figure2

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

### b. Measuring Earth Voltage:

- Set the rotary switch to EARTH VOLTAGE, LCD shows the Tester enters into earth voltage test status.
- Insert test leads into V and E terminals and then connect them to tested points. (Do not make any connection to other terminals)
- The measured earth voltage shows on LCD. If the measured voltage is  $> 10V$ , please switch off all related electrical equipments and wait until this voltage decreases before you makes any earth resistance measurement, otherwise it may affect the accuracy of earth resistance measurement.

#### ⚠ Warning:

Only V and E input terminals are used for earth voltage measurement, do not make any connection to C and P terminals. Otherwise, it will cause danger and damage the Tester.

### c. Measuring Earth Ground Resistance:

- Set the rotary switch to earth ground resistance 2000Ω range.
- Press "TEST" button, the button will be illuminated, indicating the instrument is under measurement status. And LCD shows the measured earth resistance value. If measured earth resistance:  $< 200\Omega$ , turn the rotary switch to 200Ω range;  $< 20\Omega$ , turn the rotary switch to 20Ω range;

Or you can select earth resistance range in an order you like, however, to obtain accurate value, make sure you have selected the best range for your measurement.

#### ⚠ Caution:

- If C or E input terminal is not well contacted, or auxiliary earth resistance or measured earth ground resistance is too large or input terminal are opened ( $> 14k\Omega$  at 20Ω range), the LCD will show "- - - Ω". Please check if the test leads are firmly connected or the soil is too dry or the auxiliary earth stake has been properly inserted into the earth.
- When measured earth resistance is out of range, and it is  $< 14k\Omega$  at 20Ω range or  $< 26k\Omega$  at 200Ω range or  $< 78k\Omega$  at 2000Ω range, LCD will show "OL" icon (Overloaded).
- The reading may be affected if auxiliary stakes are bent or in contact with other objects. So please clean the earth stakes before connecting the test leads, otherwise it may cause deviations to the readings if the auxiliary stake has a large resistance.
- Auto Power Off:** The Tester will automatically switch off to conserve the energy after the buttons and rotary switch keep inactive for 10 minutes (except under earth resistance test status.)
- Backlight:** When making measurements in dimly lighted sites, press "Light/Load" button to turn on the backlight, and its icon indicates on LCD accordingly. Press it again to turn off the backlight.
- Data Hold:** During the measurement, gently press "Hold/Save" to freeze the measured value, indicated by HOLD icon on LCD, press the button again to disable the function.
- Data Storage:**
  - Save Data:** Long press "Hold/Save" button for 2seconds to enable Data Save function and meanwhile save the data accordingly, then gently press the button again to save the second set of data, circulate so on and so forth. To cancel the function, long press "Hold/Save" for 2s to exit.
  - View Data:** Long press "Light/Load" for 2s to recall NO.01 data, then gently press the button to recall NO.02 data,... up to 20sets of data. To return to previous set, gently press "Hold/Save" button.(Under this status, "Hold/Save"

and "Light/Load"(gently press) buttons are used as Up and Down button). To exit the function, long press "Light/Load" button for 2s.

### 3. Clear Saved Data

Press and old "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 memory will be deleted no matter whether the memory is full or not.

### 6.2 Simple Measurement (with use of simple test leads):

This method is applied when auxiliary stake is impossible to use, which use an exposed object with low earth resistance as one electrode, such as metal water slot, pipe, common earth of power supply wiring, earth ground terminal of buildings, etc.(using E and P&C terminals).See Figure 3 for wire connection:

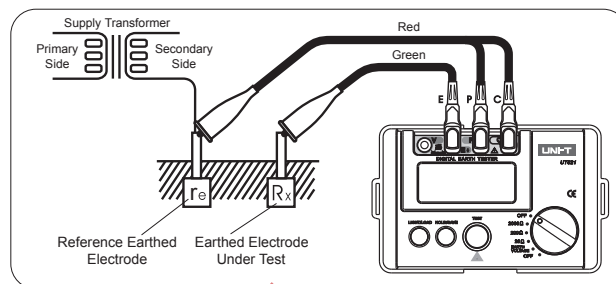


Figure 3

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

### ⚠ Danger

Please take extreme caution about the electric shock when using earth ground terminal of commercial power system as a reference test point.

## 7. Maintenance & Repair

### 7.1 Maintenance

#### 7.1.1 Replacing the Battery (See Figure 4)

Please replace the battery timely when low battery indicator shows. Follow the steps as below:

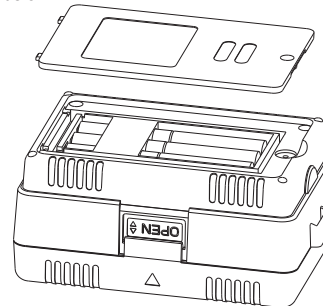


Figure 4

- switch-off the Tester and remove all the test leads.
- release the screw in bottom part, and open battery compartment.
- Replacing all old battery (6) with new battery.
- 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 as to 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, no solvent or alcoholic is allowed for it may damage 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 incidents happen:

- The Tester is being damage.
- LCD display abnormally.
- Unreasonable deviation when in normal use.
- Buttons do not function properly.

#### 7.2.2 when the Tester needs repair, please have it serviced by qualified professional personnel or authorized service center.

\*\*END\*\*

This operating manual is subject to change without notice.

**UNI-T**

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