SMART SENSOR®

MODEL：AR3126

High voltage insulation tester
User's Manual

Foreword

- Thank you for purchasing our company's high voltage insulation tester.
- This manual provides relative information on how to use this product and measurement functions of it as well as warnings on its use. To make the best use of this product's functions, read this manual thoroughly before use. Please keep this manual handy for ease of reference.
- Please do some test make sure the products is performing properly before measurement.

Maintenance and warranty

Maintenance:

1. Do not store or use the unit in following locations where the unit may be subject to:

a. Splashes of water or high levels of dust.
b. air with high salt or sulphur content.
c. Air with other gases or chemical materials.
d. High temperature or humidity (above 50°C, 90%,) or direct sunlight.

2.Do not disassemble the unit or attempt internal alterations.

3.Never use alcohol or thinner to clean the unit casing that will especially erode the LCD surface; just clean the unit lightly as needed with little clean water.

Warranty

1). About relative warranties please read warranty card.
2). We disclaim any liability due to: client's transportation damages; incorrect use or operation; manipulation, alterations or repair attempts; without warranty card, invoice.

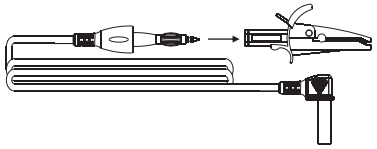
Statement

a. We reserve the rights of upgrading and amending the design of the product as well as the manual updating, and the product is subject to change without any further notification.
b. Dispose of battery should be in accordance with local laws and regulations.

Other items

Attentions:

1.The screen is vacant after turn the instrument:
Check whether the battery is installed correctly. Open the battery door, check the symbol + - on the battery must accord with symbol on the battery compartment..
2.If the battery voltage lower than 8.5v +- 0.2v and the LCD displays low battery indication, please replace the battery to avoid the in-correct reading.
Please read the page 11 of operation instruction for the battery replacement operation.
3.The connect way of test pin with alligator clip is like the following picture:



4.Remove the battery form the instrument if it is not required for extended periods of time in order to avoid damage to the battery compartment and the electrode resulting from a battery leakage.

Contents

1. Before use notice

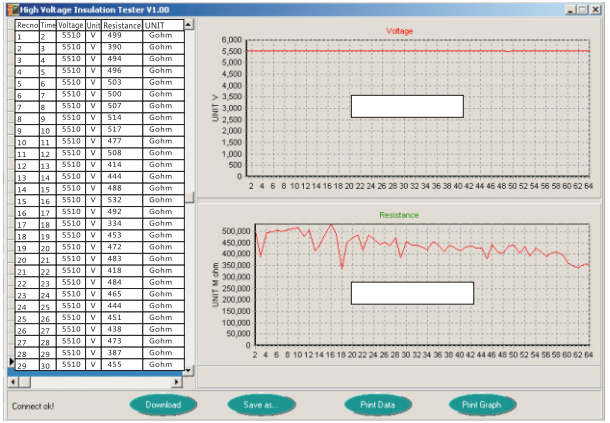
Check-up

Carefully unpack your kit and ensure that you have the following items. In case that any items is missing or if you find any mismatch or damage, promptly contact your dealer.

- High Voltage insulation tester 1pcs
- English user's manual 1pcs
- Warranty card 1pcs
- Alligator clip 2pcs
- Test wire 3pcs
- USB connection cable 1pcs
- Software CD 1pcs
- 1.5V C type alkaline battery 8pcs
- Aluminum packing box 1pcs

6). When USB transfer connects correctly, the software interface left side bottom corner will display “connect OK” . At the same time, the instrument will have a sound signal “di” to show connects success.

7).Click “Download” to start download data, Voltage and resistance's variation graph will create at the same time.

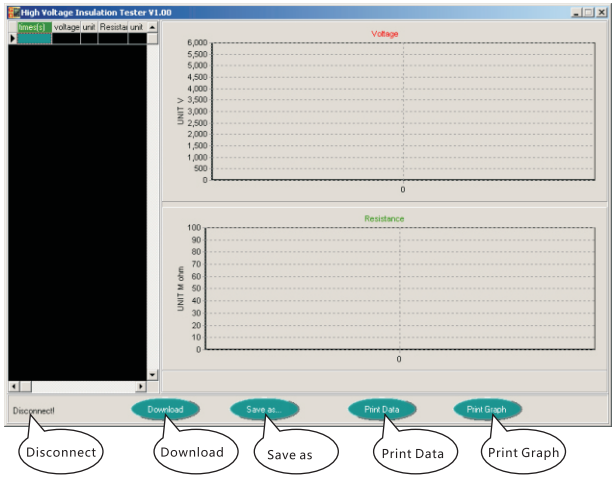


8).Save as: transfer the measured data to EXCEL file.
Print Data: Print out the measured data.
Print Graph: Print out the variation graph.

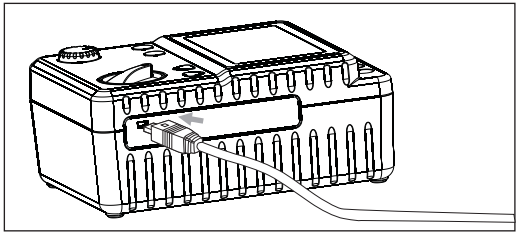
Caution:
The data shown in the operation instruction are merely a example to illustrate, please refer to the value obtained in your practice.

4.Software

➢Start the user desktop shorter link to start the software, (also, user can start through “Start => Program” , the operation interface as below:



5). Turn on the high voltage insulation tester, connect the other side of USB transfer wire to high voltage transmit port.



Safety warning

Designed to following safety standards:

- ➢ IEC 61010-1 CAT. III 600V pollution level: 2
  CAT. I 5000V pollution level: 2
- ➢ IEC 61010-031 (test wire)
- ➢ IEC 61326-1 (EMC)
- ➢ IEC 60529 (Ip40)

⚠ Waring:

Electricity is dangerous and can cause injury/ death.
For use the instrument correctly and safely, please read this manual carefully and follow the instructions.
If you not quite sure how to proceed, stop and take advice form qualified person..
This instruction manual contains warning and safety rules which user be observed by the user.

The symbol "⚠" in this manual have three meanings, please pay attentions with the operation with "⚠ " symbol.

⚠ Danger--That conditions/operations likely to cause serious or fatal injury.

⚠ Warning--That conditions/operations can cause serious or fatal injury.

⚠ Caution--That conditions/operations can cause a injury or instrument damage.

⚠Danger

- Do not measure if the voltage is above 600V.
- Do not test at flammable / explosive hazard.
- Do not measure if the unit or your hand is wet.
- Do not go beyond the range of the tester
- Do not open the battery door when you are measuring.
- Make sure to turn off the unit after measurement.

⚠ Warning

- The tester must be operated according to this manual by qualify person who have passed the training.
- Do not open the case while testing. If the tester not working properly, please return for repair.
- Do not replace the batteries in a humidity condition.
- Make sure the wire firmly connected to the tester.
- Make sure to turn of f the power before open the battery door.
- Check the tester regularly, do not operate if the tester is not normal(such as lead wire is cracked, the case broken etc.)
- Do not attempt any alterations. Please contacted your dealer if the tester need to be repaired.

Symbol:

⚠	Danger of possible electric shock
⧈	Instrument with double or reinforced insulation
⎓	DC
~	AC
⏚	Ground terminal

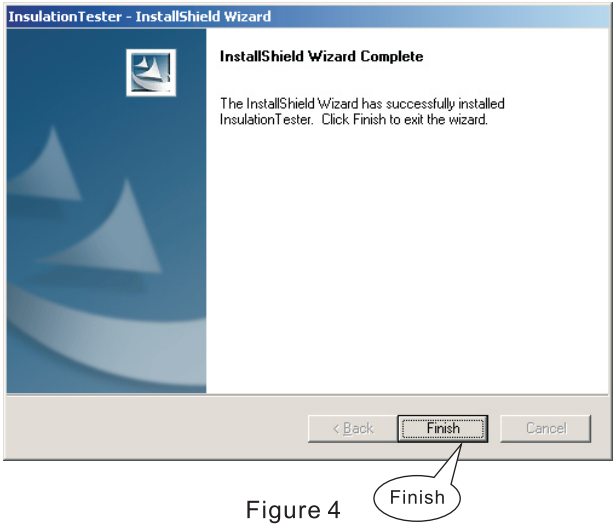


Figure 4

3). Use USB transfer wire connect the insulation tester to with PC spare port. Like the followed picture 5:

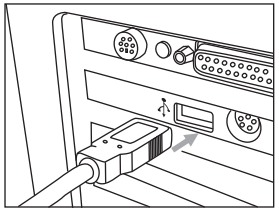


Figure 5

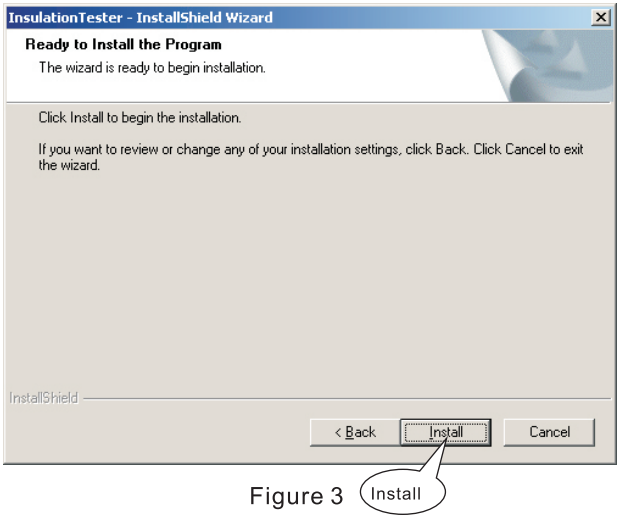


Figure 3

➢ Click "Finish" to complete the installation, the shortcuts will create on desktop automatically.

Caution:
If you want to uninstall this program, please open control panel, then open add/delete program, select "Insulation tester" in the list, and click "delete" button to remove the software.

Features and functions

- Auto- discharge function, the operation is simple.
- LCD Back-light.
- Bar graph to display tested result.
- Live circuit warning symbols with audio sounds.
- Auto- power off function (if there is no operation for 10 min)
- Timer measurement function (automatically performs during the set time)
- Low voltage indication
- PI measurement (Polarization index measurement)
- The polarization index can be measured by the automatic measurement function of the ratio of resistance in arbitrary two point time.
- USB port data transfer between instrument and PC.

Specifications:

1. Insulation resistance tester:

Rated voltage	500V	1000V	2500V	5000V
Test range	0.0~99.9MΩ 100~999MΩ	0.0~99.9 MΩ 100~999 MΩ 1.00~1.99GΩ	0.0~99.9 MΩ 100~999 MΩ 1.00~9.99GΩ 10.0~99.9GΩ	0.0~99.9 MΩ 100~999 MΩ 1.00~9.99GΩ 10.0~99.9GΩ 100~1000G
Open circuit voltage	DC 500V +30%, -0%	DC 1000V +20% -0%	DC 2500V +20% -0%	DC 5000V +20% -0%
Rated current	0.5MΩloading 1mA~1.2mA	1MΩloading 1mA~1.2mA	2.5MΩloading 1mA~1.2mA	5.0MΩloading 1mA~1.2mA
Short- circuit current	Approx. 1.3mA			
Accuracy	0~99.9GΩ: ±5%rdg±3dgt above100GΩ: ±20%			

2. Voltage tester:

30~600V (Resolution 1V)

	DV	AV
Measuring range	±30~±600V	30~600V (50/60Hz)
Resolution	1V	
Accuracy	±2%rdg±3dgt	

➢ Enter your user name and company and, click "Next" to enter next stop, as shown in picture 2:

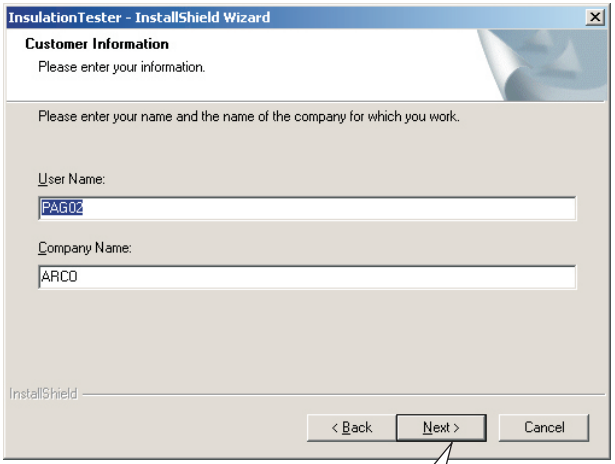


Figure 2

➢ Setup type selection, select the defaulted setup (complete) type, click NEXT to enter Next step, as shown in picture 3.

Connection with PC

1). System requirement of computer configuration:
CPU: Pentium III 600MHz or better;
One spare USB port.
Monitor resolution 800*600, real color or better.
8 Mb Ram spare spaces or larger.
50 Mb hard disk spare spaces or larger.
Operation System: Microsoft Windows 98/ ME/ 2000/ XP home/ XP Professional 32Bit.

2). Software installation.

➢ Place the software in your CD driver and double click the "Setup.exe" program icon. Enter the program install shield wizard interface, click "Next" to next step. Like the followed picture 1.

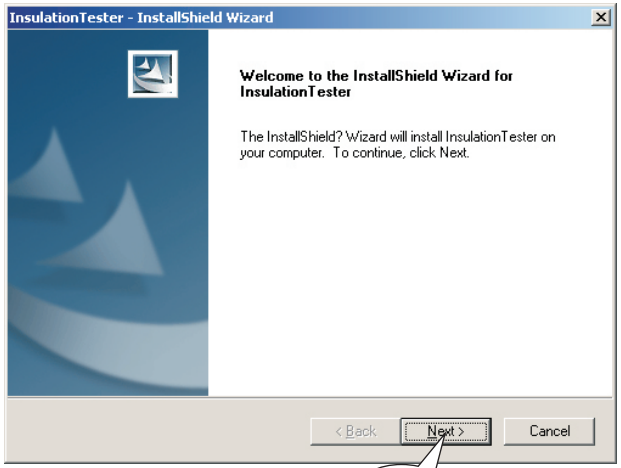
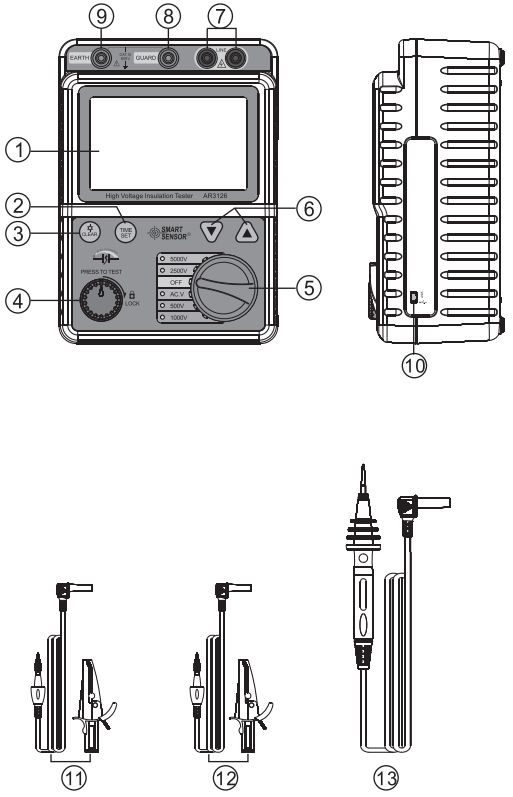


Figure 1

3.Technology parameter:

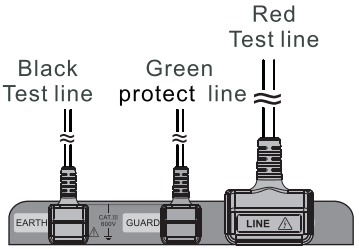
Technology parameter	Technology index
Display	Liquid crystals display Max. 999counts (1000 counts only at 1T is displayed) Bar graph/ max. 36 point.
Over range indication	OL mark appears on insulation resistance range. LO mark appears on voltage's range.
Auto- ranging	Range shifts to upper range: 1000 count Range shifts to lower range: 95 counts (merely on the insulation resistance range)
Sample rate	0.5~ 10 times/sec
Operable altitude	2000m or less above sea level (in door use)
Operation circumstance	Temperature 0~40C, humidity <= 85%
Storage circumstance	Temperature -20~ 60C, humidity <= 90%
Overload protection	Insulation resistance range: AC 1200V/ 10 second Voltage range: AC 720V/ 10 second.
Voltage resistance	AC8320 (50/60Hz)/ 5 second (between electrical circuit and enclosure)
Insulation resistance	1000M of more/ DC 1000V (between electrical circuit and enclosure)
Power supply	DC12V (8x1.5V LR14 battery)
Current consumption	Approx. 800mA (max)
Battery's life- span	Approx. 10 hours
Dimension	153x 213x 95mm
Weight	1027g (without batteries and test wires)

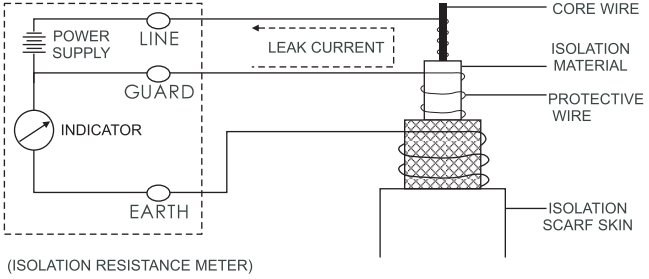
Diagram of the unit



The use of green protect- wire

Connect the green protect- wire to GUARD terminal. It only is used to measure the insulation resistance of cable. Nip the shield like during the measurement to reduce the effect of leakage current (please reference before test instruction to understand other operation).
Connect the wires like the followed picture:

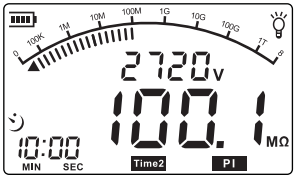




(ISOLATION RESISTANCE METER)

Operation Explanations

Press the "TIME SET" button at the second time: LCD will display the insulation resistance value of TIME2 like the followed picture:



Press the "TIME SET" button at the third time, LCD will display the Polarization index value.

7.Polarization index measurements usually set TIME 1 to 1 min. set TIME2 to10min.

$$\text{Polarization index} = \frac{\text{Resistance value in 10 min (TIME2)}}{\text{Resistance value in 1 min (TIME1)}}$$

Polarization index	4 or more	1- 1.5	1.5- 1.0	1.0 or les
Criteria	Very good	Good	Dubiouts	Unsatisfactory

Caution
The data shown in the operation instruction are merely a example to illustrate, please refer to the value obtained in your practice.

1.LCD display.

2. TIME SET :Time set button.

3 CLEAR :.Back light button and delete storage button.

4.Test button.

5.Functions button.

6. ▼ ▲ :Time choose button.

7.Red high voltage test wire sockets.

8.Green protect test wire sockets.

9.Black test wire sockets.

10.USB port: Use USB connection cable. Plug each side on instrument's port and to PC's USB port for Instrument data transfer.

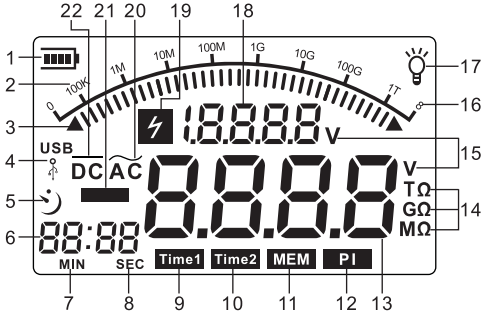
11.Black testing wire and alligator clip.

12.Green protective testing wire and alligator clip.

13.Red Hi- volt testing wire.

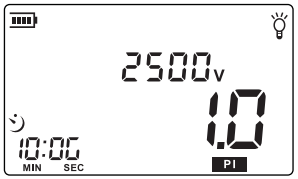
Caution
The data in the diagram of the unit is a simple instruction. Read the operation to get a detail operation guidance.

LCD Display

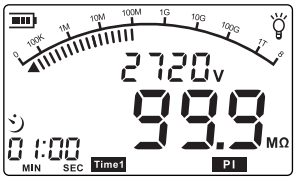


1. : Battery mark shows current residual battery power. Has following 5 grades:
   - :battery is sufficient
   - :battery is comparative sufficient
   - :battery is nearly deficient
   - :battery is nearly exhausted, need to have a replacement
   - :battery is exhausted completely
2. The symbol of the range of the insulation resistance
3. Dynamic bar graph display section of insulation resistance
4. USB :USB data transfer symbol
5. :Set time symbol
6. Timing display section

5. When the measurement is completed at TIME2, the high voltage light get off, the sound of the high voltage stop, turn test button back to the original position anticlockwise, the rate (insulation resistance of TIME2/ insulation resistance of TIME1) will be displayed like the followed picture:



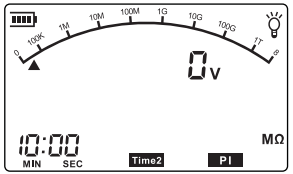
6. Press the " TIME SET " button at the first time: LCD will display the insulation resistance value of TIME1 like the followed picture:



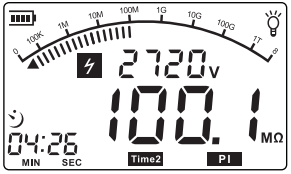
Polarization index measurement

1.Please check “INSULATION RESISTANCE” if you want to know the first and second procedure in detail.

2.Press the “ TIME SET ” button, TIME1 mark will displayed, and then press ▼ or ▲ button to set time, for example: 1 min;
Press the “ TIME SET ” button and TIME2 mark will displayed, then press ▼ or ▲ button to set time, for example: 10 min.
LCD will display like the followed picture:



4.Connect the test nip/clip to the insulation material under test, press and turn clockwise the test button clockwise to perform Polarization index measurement of insulation resistance, the buzzer will sound, the Time1 and PI will flash when measure insulation resistance at “Time1”, the Time2 and PI will flash when measure insulation resistance at “Time2”, LCD display like the followed picture during the measurement:



7. MIN :Minute symbo
8. SEC :Second symboll
9. Time1 :Timers 1
10. Time2 :Timers 2
11. MEM :Memory symbol
12. PI :Polarization index
13.Voltage/ insulation resistance display.
14.Resistance unit
15. V :The voltage unit
16. ∞ :Infinite resistance symbol.
17. :Backlight symbol.
18.Voltage display section
19. :High voltage warning symbol.
20. AC :Alternating current symbol.
21. :Minus symbol.
22. DC :Direct current symbol.

2.Operation instructions

Preparation before measurement

1.Checking the battery voltage & battery replacement:

a.Set the function switch to any position other than OFF.

b.When the battery mark shown at the upper left on the LCD is “ ▭ ”, the battery is almost exhausted. Replace the batteries to proceed to measurement. The instrument operates properly even if under such a low battery, and it may not affect on the accuracy. When battery mark is “ ▭ ”, the battery voltage is below the lower limit of the operating voltage. So the accuracy cannot be guaranteed.

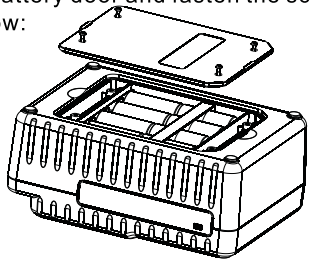
C.Battery replacement:

1.Replace all the test line after you turn off the instrument.

2.Uninstall four screws in the bottom and open the battery door.

3.Replace all old batteries with new batteries. Please note the polarity.

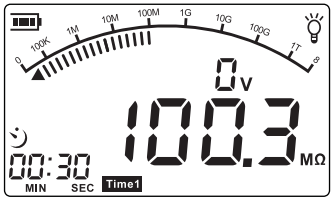
4.Install the battery door and fasten the screws. As the picture below:



Caution:

Remove the batteries if the tester is not required for a extended periods in order to avoid damage to the battery compartment and erosion resulting from a battery leakage.

5. Measurement is automatically finished at the set time, the high voltage light get off, the sound of the high voltage stop, turn test button back to the original position in anticlockwise, LCD will display like the followed picture:



Caution:

Press ▲ or ▼ button, time can be set at every 5sec form 00:00 to 01:00, after that rang time can be set at every 30sec.

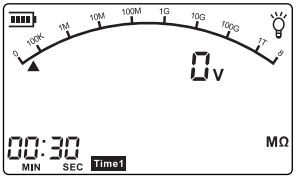
Timer measurement

This is a function to conduct a test automatically at any set time.

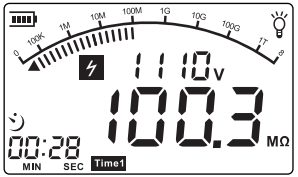
1.You can consult INSULATION RESISTANCE if you want to know th first and second procedure in detail.

2.Press the “ TIME SET ” button and TIME1 mark will be displayed.

3.Press ▲ or ▼ button to set up times, for example, 30 second. LCD will display like the followed picture at this time:



4.Press and turn the PRESS TO TEST button clockwise to perform a timer measurement of insulation resistance, the buzzer will sound and the “ Time1 ” will flash, LCD will display like the followed picture during the measurement:



2. Connecting test wires:

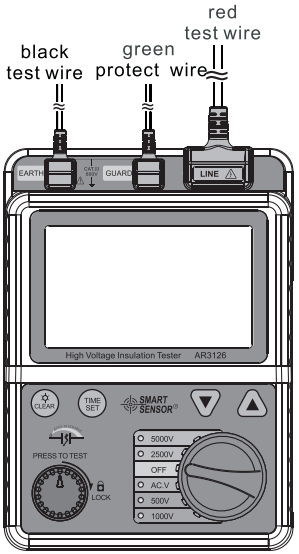
Insert the test wire firmly to the connector terminal on the instrument;

Connect the red test wire to “Line” terminal;

Connect the black tests wire to “Earth” terminal;

Connect the green guard wire to “Guard” terminal;

The connect method like the picture below:

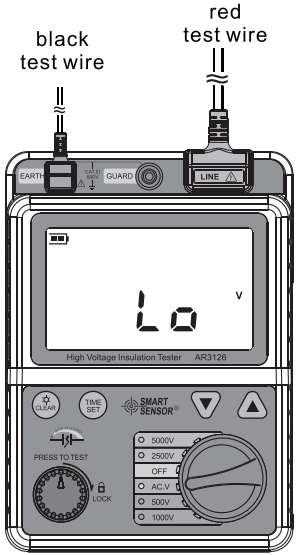


Voltage measurement

⚠ Danger

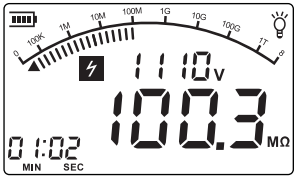
- Do not make measurement on a circuit above AC/ DC 600V
- The user maybe hazard when testing installation that has a large current capacity, please do not touch any bare wire at this time.
- Do not make measurement with the battery cover removed.

1.Connect the red test lead and black test lead to reciprocal terminal socket.
2.Setting the function switch to AC. V position, like the picture below:

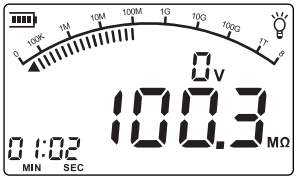


Continuous measurement

1.About the first and second procedure, please refer to INSULATION MEASUREMENT.
2.Connect the test pin/clip to the parts under test, press and turn the PRESS TO TEST button clockwise to perform a continuous measurement of insulation resistance. The buzzer will sound at this time. LCD will display like the picture below during the measurement:



After measurement, press the test button turn back to the original position in anticlockwise, the instrument will discharge the high voltage automatically, the high voltage light and sounds will stop. Remove the test wires only when LCD display 0V, LCD display like the follow picture:

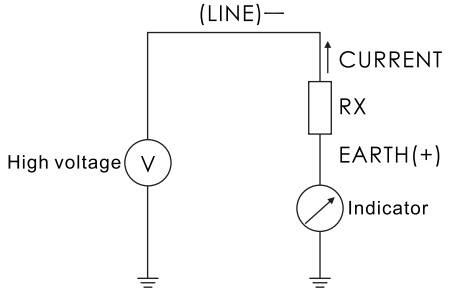


3.Remove the test wires firstly, and then set the function switch to OFF position.

⚠ Danger

- Do not touch the circuit under test immediately after testing. Capacitance stored in the circuit ma cause electric shock.

The test principle f the insulation resistance.. Resistance value can be obtained by applying a certain high voltage to the resistance and measure the following current.



Caution:

1.It will consume 40mA current when the function switch is at any position other than OFF (Auto- power - off: Approx 1uA). Set the function switch to OFF position when you do not use the instrument.

2.The test switch of this instrument have two test methods:

a.Instant measurement: press the TEST button and not rotate, it will produce high voltage to test insulation resistance. Release the button, the measurement will stop.

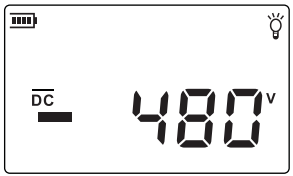
b.Continuous measurement: press the TEST button and turn to lock the switch to take measure continuously. Turn the TEST button to anti-clockwise and release it, the tester will stop measurement.

c.For measure and instrument safety, When the insulation resistance less than 50MV, please choose 500V level for measurement.

3.Connect the red or black test pin to the pole, if the beam is dim you can press the "CLEAR" button and open the back light. The LCD display have there in stance at this time:

Connect the red pin which test direct voltage to +, connect the black to -, the LCD displayed like the picture below:

Connect the red pin which test direct voltage to-, connect the black to +, the LCD displayed like the picture below:



The LCD displayed like the picture below when test AV:

4.Remove the test pin from the tested parts firstly after measurement, and then set the function switch to OFF position.

Insulation resistance measurement

⚠ DANGER

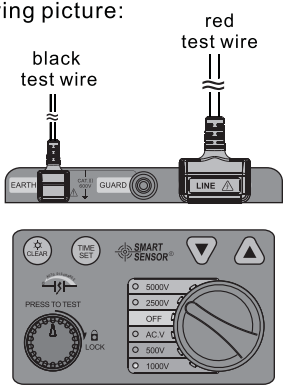
- Make sure to check with a high voltage detector that there is no electrical charge exists on the circuit under test.
- Be sure to put on a pair of insulated gloves for high voltage.
- Do not make measurement when thunder rumbling.
- Do not make the measurement with the battery cover removed.

⚠ Caution

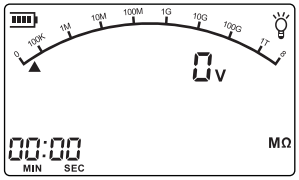
- Do not make measurement when the live circuit waring is active.

1.Connect the red test wire and black test wire to reciprocal terminal socket.

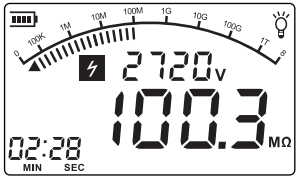
2.Setting the function switch to proper position according to the content of insulation material, (you can take a try follow the sequence 500V/ 1000V/ 2500V/5000V if you do not know the resistance range) for example, 2500V like the following picture:



After a full screen display, the LCD displayed as the followed picture:



3.Connect the test pin/clip to the unit under test, press the test button to measure, the buzzer will sound continuously and the high voltage light will be actived. LCD displayed like the followed picture during the testing:



3.Release the button, the instrument will discharge the high voltage automatically, and the high voltage light and the sound of the high voltage will stop.Only remove the test wires when LCD display oV. The LCD will display the tested time and insulation resistance as the picture below: