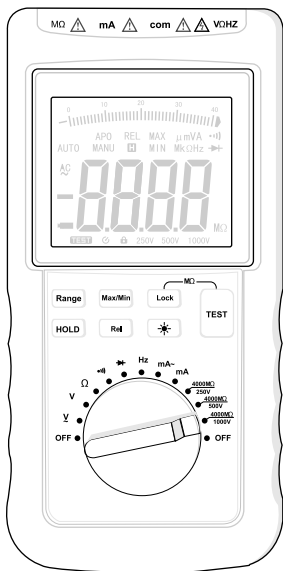


DIGITAL INSULATION MULTIMETER

INSTRUCTION MANUAL



580A

Read this owners manual thoroughly before use

WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as batteries or fuses. If the defect has been caused by a misuse or abnormal operating conditions, the repair will be billed at a nominal cost.

GENERAL DESCRIPTION

This autorange digital meter is a battery-powered multimeter with insulation measurement. It has a 4000-count large display.

It can be used to measure :

1. DC and AC voltage
2. DC and AC current
3. Resistance
4. Insulation resistance
5. Frequency
6. Diode
7. Continuity

SAFETY INFORMATION


This meter has been designed according to IEC-61010 concerning electronic measuring instruments with a measurement category (CAT III 600V) and pollution degree 2.

Warning

To avoid possible electric shock or personal injury, follow these guidelines:

- a. Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors.
- b. Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- c. Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- d. Do not operate the meter around explosive gas, vapor, or dust.
- e. Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- f. Before use, verify the meter's operation by measuring a known voltage.
- g. When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place the meter in series with the circuit.
- h. When servicing the meter, use only specified replacement parts.
- i. Use caution when working above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- j. When using the probes, keep your fingers behind the finger guards on the probes.
- k. When making connections, connect the common test lead before you

connect the live test lead. When you disconnect test leads, disconnect the live test lead first.

- l. Remove the test leads from the meter before you open the battery cover or the case.
- m. Do not operate the meter with the battery cover or portions of the case removed or loosened.
- n. To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator ("  ") appears.
- o. When in Relative Mode or in MIN mode, the symbol "REL" or "MIN" is displayed. Caution must be used because hazardous voltage may be present.
- p. Before you perform insulation resistance test, make sure that the object to be tested is without power.
- q. To avoid electric shock, do not touch the object under test and any naked conductor with your hand or skin. Comply with local and national safety requirements when you work in hazardous locations.
- r. Use correct protective equipment, as required by local or national authorities when you work in hazardous areas.
- s. Do not work alone.
- t. Do not use the meter in a manner not specified by this manual or the safety features of the meter may be impaired.
- u. Remaining endangerment:
When an input terminal is connected to dangerous live potential it is to be noted that this potential at all other terminals can occur!
- v. CAT III equipment is designed to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
Do not use the meter for measurements within CAT IV.

Caution

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:

- Disconnect circuit power and discharge all capacitors before testing resistance, diode, continuity and insulation resistance.
- Use the proper terminals, function, and range for your measurements.
- Before measuring current, check the meter's fuse and turn off the power to the circuit before connecting the meter to the circuit.
- Before rotating the range switch to change functions, disconnect test leads from the circuit under test.
- Remove test leads from the meter before opening the meter case or the battery cover.

Symbols

- ~ AC (Alternating Current)
- ≡ DC (Direct Current)
- ⚠ Important safety information. Refer to the manual.
- ⚡ Dangerous voltage may be present. Be cautious.
- ⊥ Earth ground
- ⊞ Fuse
- CE Conforms to European Union directives
- ⊞ Double insulated
- 🔋 Low battery
- ➔ Diode

INSTRUCTION

Function/Range Switch

Turn on the meter by selecting a measurement function. The meter provides a standard display for the function (range, measurement units, etc.). Use the relevant buttons to select other functions, such as Data Hold, range selection, Relative mode and so on.

For more detailed information about the function/range switch, see Figure 1 and Table 1.

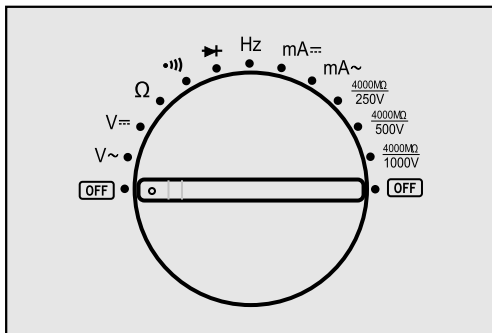




Figure 1

Function/Range Switch Instruction

Table 1

Switch Position	Measurement Function
V~	AC voltage from 0V to 600V.
V=	DC voltage from 0V to 600V.
Ω	Ohms from 0 Ω to 40M Ω .
	Diode test. Displays "0L" above 2V.
	Continuity test. Buzzer turns on at <30 Ω and turns off at >50 Ω .
Hz	Frequency from 1Hz to 100kHz
mA=	DC mA from 0mA to 400mA.
mA~	AC mA from 0mA to 400mA.
$\frac{4000M\Omega}{250V}$	MegOhms from 0.1M Ω to 4000M Ω , and test voltage is 250V.
$\frac{4000M\Omega}{500V}$	MegOhms from 0.1M Ω to 4000M Ω , and test voltage is 500V.
$\frac{4000M\Omega}{1000V}$	MegOhms from 0.1M Ω to 4000M Ω , and test voltage is 1000V.

Input Terminal Instruction

The terminals are indicated in Figure 2, and explained in Table 2.

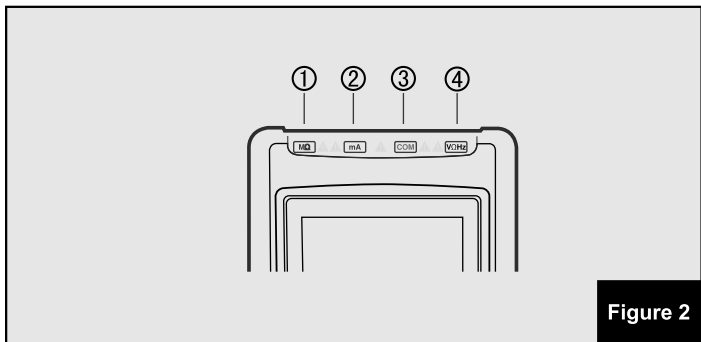


Figure 2

Table 2

Item	Description
①	Test voltage output terminal in insulation test.
②	Test current input terminal in insulation test. Input terminal for current measurements < 400mA.
③	An optional shield terminal in insulation test. Common (return) terminal for all measurements except insulation test.
④	Input terminal for voltage, continuity, resistance, diode and frequency measurements.

Button Instruction

The meter's buttons are shown in Figure 3 and described in Table 3.

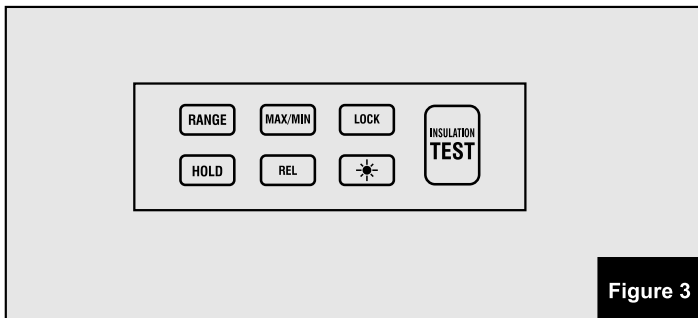


Figure 3

Table 3








Button	Description
	Changes the meter from autorange mode (default) to manual range mode. Press and hold to return to autorange mode.
	Press the button, the display shows the symbol "MAX" and the maximum reading. Press the button again, the display shows the symbol "MIN" and the minimum reading. Press the button once more, the display shows the flickering "MAX" and "MIN" along with the present reading. Press and hold down for more than 1 second to exit the MAX MIN mode, the display shows the present reading.

Table 3 (Continued)

	<p>Press to freeze the present reading, it means the meter stays in Data Hold mode. Press again to release the display.</p> <p>In MIN, MAX or REL mode, this button functions normally.</p> <p>In Data Hold mode, the "REL" and "MAX/MIN" buttons are disabled.</p>
	<p>Turns the backlight on and off. The backlight goes off automatically after about 1 minute.</p>
	<p>Starts or stops an insulation test when the rotary switch is in the insulation test position $\left(\frac{4000M\Omega}{250V}, \frac{4000M\Omega}{500V}, \text{ or } \frac{4000M\Omega}{1000V} \right)$.</p> <p>Causes the meter to output a high voltage and measure insulation resistance.</p>
	<p>After you press "TEST" button to start insulation test, you can press "LOCK" button to lock the insulation test.</p> <p>Locking the test means that the meter outputs continuous test voltage and performs continuous insulation test.</p> <p>To exit the locking state, just press "TEST" button again.</p>
	<p>Press this button, the meter enters the Relative mode and store the present reading as a reference for subsequent measurements, "REL" appears on the display, the display reads zero.</p> <p>Press this button again, "REL" flickers, and the display shows the reference.</p> <p>Press and hold down this button for 1 second, the meter exits the Relative mode.</p>

LCD Display

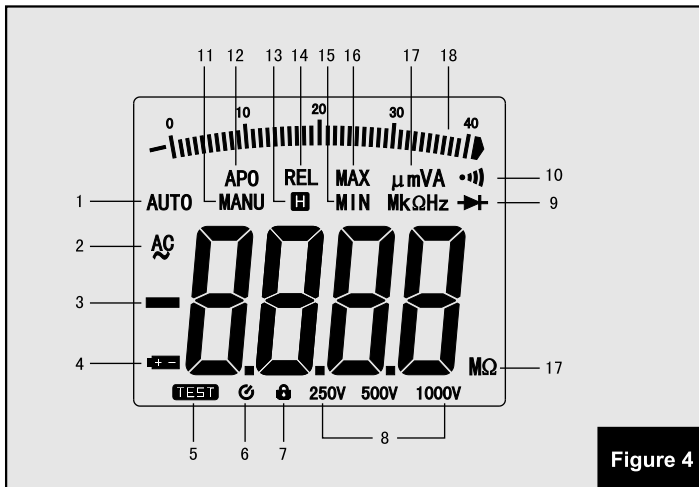


Figure 4

Table 4







	Indicator	Description
1	AUTO	Autorange mode is selected
2	AC	AC
3	—	Negativie sign
4		<p>Battery is low and should be replaced immediately.</p> <p>Warning To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as this low battery indicator appears.</p>
5	TEST	<p>Insulation test indicator. It appears when insulation test voltage is present.</p> <p>Note: The " MΩ " terminal outputs high voltage. Be cautious.</p>
6		Insulation test is in Fixed Time Test mode.
7		Insulation test is locked so that you can perform the test continuously for a long time.
8	250V 500V 1000V	<p>250V—Insulation test voltage is 250V. 500V—Insulation test voltage is 500V. 1000V—Insulation test voltage is 1000V.</p>
9		Diode test is selected.
10		Continuity test is selected.

Table 4 (Continued)



	Indicator	Description
11	MANU	Manual range mode is selected.
12	APO	Automatic power-off is enabled.
13		Data Hold is enabled.
14	REL	Relative mode is active.
15	MIN	Minimum reading is being displayed.
16	MAX	Maximum reading is being displayed.

17. Units on the LCD

Table 5

mV、V	Voltage unit mV: Millivolt ; V: Volt; $1V=10^3mV$
μA 、mA、A	Current unit μA : Microamp; mA: Milliamp; A: Ampere; $1A=10^3mA=10^6\mu A$
Ω 、k Ω 、M Ω	Resistance unit Ω : Ohm; k Ω : Kilohm; M Ω : Megohm; $1M\Omega=10^3k\Omega=10^6\Omega$
Hz、kHz、MHz	Frequency unit Hz:Hertz; kHz:Kilohertz; MHz:Megahertz; $1MHz=10^3kHz=10^6Hz$

18. Analog Bar Graph

The length of its lit segments is proportional to the present reading on the LCD. The bar graph is like the needle on an analog meter. It has an overload indicator (“”) on its right and a negative polarity indicator (“”) on its left. Because the bar graph updates 10 times faster than the digital display, the bar graph is useful for making peak and null adjustments and for observing rapidly changing inputs.

The number of lit segments indicates the measured value and is relative to the full-scale value of the selected range. In the 400V range, for example, the major divisions on the scale represent 0V, 100V, 200V, 300V and 400V. An input of -100V lights the negative sign and the segments up to the “10” on the scale.

GENERAL SPECIFICATION

Maximum Voltage between

any Terminal and Earth Ground: 600V dc or ac rms

Fuse Protection for "mA" Jack Inputs : 500mA, 1000V, FAST,
Min. Interrupt Rating 20000A

Display: 3 3/4-digit LCD, with a max. reading of 3999

Overrange Indication: “OL” shown on the LCD.

Negative Polarity Indication: “-” displayed automatically

Sampling Rate: 2~3 times/sec

Operating Temperature: 0°C~40°C, <75%RH

Storage Temperature: -30°C~60°C, <85%RH

Operating Altitude: 0 to 2000 meters

Battery: 6X1.5V, AA or equivalent

Low Battery Indication: “” shown on the display

Dimensions: 200X100X56mm

Weight: about 620g (including battery)

SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C, with relative humidity < 75%. Accuracy specifications take the form of: \pm ([% of Reading]+[number of Least Significant Digits])

DC Voltage

Range	Resolution	Accuracy
400mV	0.1mV	\pm (1.0% + 5)
4V	0.001V	\pm (0.8% + 3)
40V	0.01V	
400V	0.1V	
600V	1V	\pm (1.0% + 5)

Input Impedance: 400mV range: >1000M Ω
the other ranges: 10M Ω

AC Voltage

Range	Resolution	Accuracy
400mV	0.1mV	\pm (1.5% + 5)
4V	0.001V	\pm (1.0% + 5)
40V	0.01V	
400V	0.1V	
600V	1V	\pm (1.2% + 5)

Input Impedance: 400mV range: >1000M Ω
the other ranges: 10M Ω

Frequency Range: 40Hz ~ 400Hz

Response: Average, calibrated in rms of sine wave.

DC Current

Range	Resolution	Accuracy
40mA	0.01mA	$\pm (1.2\%+3)$
400mA	0.1mA	

Max. Permitted Input: 400mA

Voltage Drop: 5mV/mA

Overload Protection: Fuse, 500mA/1000V, fast action,

AC Current

Range	Resolution	Accuracy
40mA	0.01mA	$\pm (1.5\%+5)$
400mA	0.1mA	

Max. Permitted Input: 400mA

Frequency Range: 40Hz ~ 400Hz

Response: Average, calibrated in rms of sine wave.

Voltage Drop: 5mV/mA

Overload Protection: Fuse, 500mA/1000V, fast action,

Resistance

Range	Resolution	Accuracy
400 Ω	0.1 Ω	$\pm (1.0\%+5)$
4k Ω	0.001k Ω	$\pm (1.0\%+3)$
40k Ω	0.01k Ω	
400k Ω	0.1k Ω	
4M Ω	0.001M Ω	
40M Ω	0.01M Ω	$\pm (1.8\%+5)$



Open Circuit Voltage: 400 Ω range: about -1.2Vdc
the other ranges: about -0.45Vdc

Frequency

Range	Resolution	Accuracy
4kHz	0.001kHz	$\pm (0.8\%+3)$
40kHz	0.01kHz	
100kHz	10kHz	

Measurement Range: 500mV rms ~ 20V rms

Diode and Continuity

Range	Introduction	Test Condition
	The approx. forward voltage drop will be displayed.	Open Circuit Voltage: about 3V
	The built-in buzzer will sound if the resistance is less than about 30Ω.	Open Circuit Voltage: about -1.2V

Insulation Test

Measurement Range: 0.1MΩ to 4000MΩ

Test Voltages: 250V, 500V, 1000V

Test Voltage Accuracy: +20%, -0%

Nominal Test Current (1kΩ/V): 1mA

Test Alarm: For insulation test, the built-in buzzer will sound when the resistance is less than 5MΩ .

Test Voltage	Display Range	Resolution	Test Current	Accuracy
250V (0% to +20%)	0.1 to 400.0MΩ	0.1MΩ	1mA @ 250kΩ	± (5%+5)
	400 to 1000.0MΩ	1MΩ		± (10%+5)
	1000.0 to 4000.0MΩ			
500V (0% to +20%)	0.1 to 400.0MΩ	0.1MΩ	1mA @ 500kΩ	± (5%+5)
	400 to 1000.0MΩ	1MΩ		± (10%+5)
	1000.0 to 4000.0MΩ			
1000V (0% to +20%)	0.1 to 400.0MΩ	0.1MΩ	1mA @ 1MΩ	± (5%+5)
	400 to 1000.0MΩ	1MΩ		± (10%+5)
	1000.0 to 4000.0MΩ			

OPERATION INTRODUCTION

Using Relative Mode

Selecting relative mode causes the meter to store the present reading as a reference for subsequent measurements.

1. Press **REL** button, the meter enters the Relative mode and store the present reading as a reference for subsequent measurements, and "REL" appears on the display as an indicator. The display reads zero.
2. The display shows the difference between the reference and a new measurement.

TIP: Press **REL** button again, "REL" flickers on the display, the display shows the reference.

Press **REL** button once more, the meter returns to Relative mode.

3. Press and hold down **REL** button for more than 1 second, the meter exits the Relative mode.

Data Hold Mode

After pressing the "**HOLD**" button, the present reading is held on the display, meanwhile "**H**" is displayed on the display as an indicator. To exit the Data Hold mode, press the button again and the indicator "**H**" disappears.

MIN MAX Recording Mode

The MIN MAX mode records minimum and maximum values of all input values since this mode is activated.

When the inputs go below the recorded minimum value or above the recorded maximum value, the meter records the new value.

To use MIN MAX recording :

1. Make sure the meter is in the desired function and range.
2. Press the "**MAX/MIN**" button to activate the MIN MAX mode and the display shows the maximum reading, meanwhile "MAX" appears as an indicator.
3. Press the "**MAX/MIN**" button to step through the minimum reading ("MIN" appears), and the present reading ("MAX" and "MIN" flicker), and the maximum reading ("MAX" appears), and so on.
4. To exit and erase stored readings, press and hold down the "**MAX/MIN**" button for more than 1 second or turn the range switch.

Manual Ranging and Autoranging

The meter defaults to autorange mode in measurement functions which have both autorange mode and manual range mode. When the meter is in autorange mode, "AUTO" is displayed.

1. To enter the manual range mode, press "**RANGE**" button, the meter enters the manual range mode, "AUTO" turns off, "MANU" turns on. Each press of the "**RANGE**" button increases the range. When the highest range is reached, the meter wraps to the lowest range.
2. To exit the manual range mode, press and hold down the "**RANGE**" button for about 2 seconds. The meter returns to the autorange mode.

Measuring Voltage

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩHz" jack.
2. Set the range switch to the desired $V_{\text{---}}$ or V_{\sim} range (The $V_{\text{---}}$ range is for dc voltage measurements, the V_{\sim} range is for ac voltage measurements,).
3. If you use manual range mode and don't know the magnitude of the voltage to be measured beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.
4. Connect the test leads across the load to be measured.
5. Read LCD display. For dc voltage measurement, the polarity of red lead connection will be indicated as well.

Note:

To avoid electric shock to you or damages to the meter, do not attempt to measure dc voltage higher than 600V or ac voltage higher than 600V rms although readings may be obtained.

Measuring Current

Warning

To avoid personal injury or damage to the meter:

- Never attempt to perform an in-circuit current measurement when the open circuit potential to earth is more than 600V.
- Use the proper terminals, switch position, and range for your measurement.
- Don't use the meter to measure currents above 400mA.
- Never place the probes in parallel with a circuit or component when the

test leads are plugged into the current terminals.

- Check the meter's fuse before measuring.
1. Set the range switch to desired "mA=" or "mA~" range. If you select manual range mode and don't know the magnitude of the current to be measured beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.
 2. Connect the black test lead to the "COM" jack, and the red test lead to the "mA" jack.
 3. Turn off power to the circuit which you will measured.
Discharge all capacitors.
 4. Break the circuit path to be measured, connect the test leads in series with the circuit.
 5. Turn on power to the circuit, then read the display.
For dc current measurement, the polarity of the red test lead connection will be indicated as well.

Measuring Resistance

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩHz" jack (Note:The polarity of the red lead is positive "+").
2. Set the range switch to Ω range.
3. Connect test leads across the load to be measured.
4. Read the reading on the display.

Note:

1. For resistance above $1\text{M}\Omega$, the meter may take a few seconds to stabilize reading. This is normal for high resistance measurements.
2. When the input is not connected, i.e. at open circuit, "OL" will be displayed for the overrange condition.
3. Before measuring in-circuit resistance, make sure that the circuit under test has all power removed and all capacitors are fully discharged.

Continuity Test

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩHz" jack (Note:The polarity of the red lead is positive "+").
2. Set the range switch to •))) position.
3. Connect the test leads to the circuit to be measured.
4. If the circuit resistance is less than about 30Ω , the built-in buzzer will sound.

Note:

Before performing in-circuit continuity test, make sure that the circuit under test has all power removed and all capacitors are fully discharged.

Measuring Frequency

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩHz" jack .
2. Set the range switch to **Hz** position.
3. Connect the test leads across the source or load to be measured.
4. Read the reading.

Note:

The voltage of the input signal should be between 500mV rms and 20V rms. If the voltage exceeds 20V rms, the accuracy of the reading may be out of the specified accuracy range.

Diode

1. Connect the black test lead to the "COM" jack and the red test lead to the "VΩHz" jack (Note:The polarity of the red lead is positive "+").
2. Set the range switch to **▶▶** position.
3. Connect the red test lead to the anode of the diode to be tested, and the black test lead to the cathode.
4. The display will show the approximate forward voltage of the diode. If the connection is reversed, "OL" will be shown on the display.

Measuring Insulation Resistance

Note

1. Before you perform insulation resistance test, make sure that the object to be tested is without power.
2. To avoid electric shock, be cautious.
After you finish insulation resistance test, discharge the tested object fully.
3. To avoid electric shock, do not touch the object under test with your hand or skin, and do not touch any naked conductor of the meter (including test leads) with your hand or skin.
Always place your fingers behind the finger guards on the test leads when using the probes.
4. Before test, make sure that the meter's fuse is good.

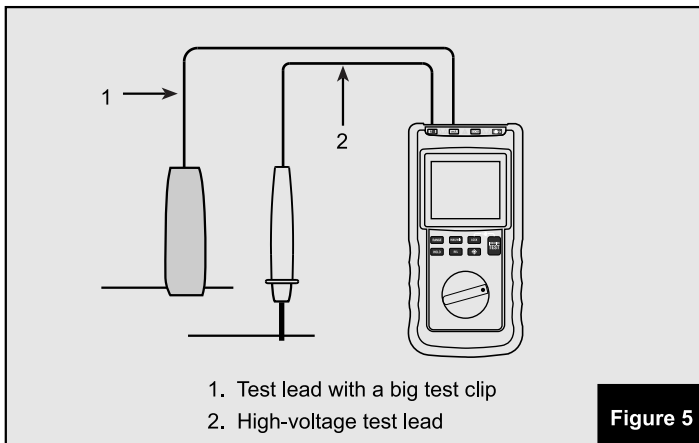


Figure 5

1. Refer to Figure 5 and the section of "**Identifying Test Leads**", insert the plug of the high-voltage test lead into "MΩ" jack, then insert the plug of the test lead which has a big test clip into "mA" jack.
2. The test lead from "mA" jack is a ground line.
The test lead from "MΩ" jack is a live line.
Set the range switch to **OFF** position, then connect the big test clip to the test point of the object to be measured.
3. Choose desired rated voltage:
To choose the desired rated voltage, set the range switch to corresponding voltage position (" $\frac{4000M\Omega}{250V}$ ", " $\frac{4000M\Omega}{500V}$ " or " $\frac{4000M\Omega}{1000V}$ ").
4. Touch the probe of the high-voltage test lead to another test point of the object.
Press **TEST** button, the display shows "**TEST**" as an indicator, the meter starts insulation resistance test, and high voltage is being outputted through the terminals.
Read the reading on the display.
When the insulation resistance is less than $5M\Omega$, the built-in buzzer will sound.
5. Stopping the Measurement
In the step 4, after you press **TEST** button, the display shows "**TEST**", it means high voltage is being outputted.
About 30 seconds later, "**TEST**" turns off, it means the high voltage output stops, meanwhile the measurement stops automatically.
If you want to perform measurement continuously, you should press **LOCK** key before "**TEST**" turns off.
At any time, you can press **TEST** button to stop the measurement.
6. Discharging the Tested Object
The tested object discharges through the meter.
Keep the probes on the test points until the object is completely discharged.

7. If necessary you can use shielding to avoid the disturbance caused by the leakage current. To do it, just plug a normal test lead to the "COM" jack, and connect this test lead's probe (or alligator clip) to the outside surface of the object to be tested before performing insulation resistance test.

Identifying Test Leads

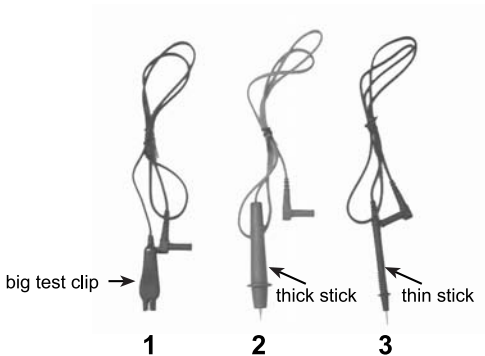


Figure 6

- 1-----Test lead with a big test clip.
2-----High-voltage test lead.
3-----Normal test lead (you can connect an alligator clip to its probe for easy use if necessary).

Auto Power Off

After the meter is turned on, it defaults to automatic power-off mode and the symbol "APO" appears as an indicator. The display will blank and the meter will go into "Sleep" mode if you do not operate the meter about 30 minutes. To turn on the meter again, set the range switch to the "OFF" position and then set it to desired range position.

To disable the automatic power-off feature, turn on the meter while pressing and holding down any button except the "HOLD", "TEST" and "LOCK" buttons.

MAINTENANCE

Warning

Except replacing batteries and fuses, never attempt to repair or service the meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

The meter should be stored in dry place.

General Maintenance

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.


Dirt or moisture in the terminals can affect readings.

Clean the terminals as follows:

1. Set the range switch to **OFF** position and remove the test leads from the meter.
2. Shake out any dirt which may exist in the terminals.
3. Soak a new swab with alcohol.
4. Work the swab around in every terminal.

Replacing the Battery and Fuse

Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator (“”) appears.

To prevent damage or injury, install only replacement fuse of the same ratings.

Remove test leads from the meter before opening the back cover or the battery cover.

To replace the batteries, remove the screws on the battery cover, remove the battery cover, replace the exhausted batteries with new batteries of the same type (AA or equivalent). Reinstall the battery cover and the screws.

This meter uses one fuse:

500mA, 1000V, Fast, Min. Interrupt Rating 20000A

To replace the fuse, remove the screws on the back cover, remove the back cover, replace the fuse with a new one of the same ratings. Rejoin the back cover and reinstall the screws.

ACCESSORIES

Owners manual : 1 piece

Insulation-test lead : 1 set

Test lead : 1 set

NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The content of this manual can not be used as the reason to use the meter for any special application.

DISPOSAL OF THIS ARTICLE

Dear Customer,

If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.

