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Statement

According to the international copyright laws, without permission and written consent, no content of this manual shall be copied in any form (including storage and retrieval or translation into languages of other countries or regions). Any change in future version of this manual will have no prior notice.

Caution



The “**Caution**” label indicates situation or operation which may damage instrument or equipment.

It requires to take caution when executing such operation, if any incorrect operation or violation of operation steps, it may cause damages to instrument or equipment. When such conditions are not met or not fully understood, do not proceed to execute any related operation specified by the “**Caution**” label.

Warning!



The “**Warning**” label indicates situation or operation which may cause danger to users.

It requires to take caution when executing such

any incorrect operation or violation of operation steps, it may cause human injury or loss of life. When such conditions are not met or not fully understood, do not proceed to execute any related operation specified by the **"Warning"** label.

Before using the instrument, please read the manual carefully and pay attention to related safety warning information.

General

This instrument is a portable laptop type digital multimeter. It is complete in function, stable in performance, high in precision and low in power consumption, with novel structure, safe and reliable, which is an idea measurement instrument for wide users.

Safety Notices

This instrument is designed and produced strictly according to safety standard IEC61010, and complies with dual insulation, over-voltage standard 300V CAT III , 600V CAT II and safety standard of pollution level 2.

Please use this instrument via strictly abiding by this manual, otherwise, protection function provided by the instrument may be weakened or invalid.

Safety operation specification

Warning!

In order to avoid possible electric shock or personal injury, please abide by the following specification:

- Before using the instrument, please read the manual carefully, and use the instrument strictly according to the manual, otherwise, protection ability provided by

the instrument may be weakened or invalid.

- Check the shell before using the instrument. Check whether there's any crack or damaged plastic part. Please check insulators near the input terminal.
- If the instrument cannot work normally or is damaged, do not use, and prohibit any use of the instrument.
- It is forbidden to touch any electrified body with voltage over 30V AC RMS, 42V AC peak value or 60V DC.
- Please use this instrument according to specified measurement category, voltage or current rated value.
- When the battery low indicator appears, please replace the battery timely, to avoid measurement error.
- Please comply with local and national safety codes. Wear personal protective equipment (such as recognized rubber gloves, mask and flame retardant clothing etc.), to avoid injuries caused by electric shock or electric arc due to exposed live conductors.
- Do not use the HOLD function to measure any unknown voltage. After HOLD is on, the display will not change when a different voltage is measured.

- Measure a known voltage, to confirm normal operation of the instrument.
- During measurement, it is required to use correct function gear and range gear.
- Do not use this instrument around explosive gas or steam or under humid environment.
- Do not use damaged pens. Before using, please check whether the insulation layer of the pen is damaged, whether there' s any exposed metal or sign of abrasion. Check connectivity of the pen.
- During measurement, please connect zero line or ground line first, and then connect the live line; when disconnect, please disconnect the live line first, and then disconnect the zero line and the ground line.
- During measurement, please hold the back of pen finger guard with your fingers.
- Before opening the back cover of the instrument, please disconnect the pens and the object being measured.
- Do not use the instrument in the case that the min. rated value of the individual component measurement category (CAT) of the instrument, pens or accessories is exceeded.

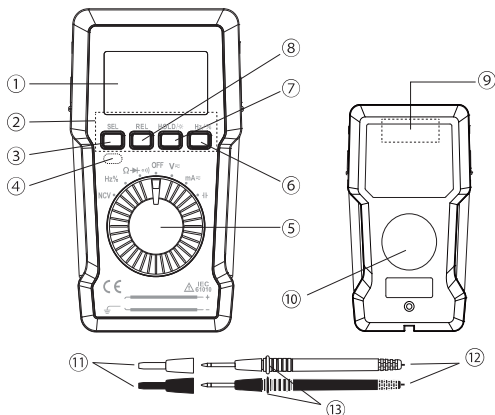
Electrical Symbols

	High voltage warning
	Alternating current (AC)
	Direct current (DC)
	AC or DC
	Warning, important safety sign, please read carefully
	Grounded
	Fuse
	The equipment is protected by dual insulation or enhanced insulation.
	Low battery
	It complies with European Union (EU) standards.
	It is not allowed to discard such electrical/electronic products into household waste.
CAT II	Category II measurement is applicable for testing and measuring circuits directly connected to electricity points of low-voltage power devices (sockets and similar points).

CAT III

Category III measurement is applicable for testing and measuring circuits connected to power distribution part of low-voltage power devices of buildings.

Instrument Instructions



- | | |
|--|---|
| 1 Display | 2 Function key |
| 3 Select key (SEL) | 4 LED (on-off indication) |
| 5 Knob switch | 6 Frequency/duty ratio |
| 7 Display hold key (HOLD)/backlight key | |
| 8 Relative measurement key (REL) | 9 NCV induction zone |
| 10 Magnet (built -in) | 11 Probe sleeve |
| 12 Pen line | 13 Finger protecting device position |

Measurement Methods

AC & DC voltage measurement

1. Rotate the knob switch to the $V\approx$ gear.
2. Parallely connect the pens to the circuit or power supply to be measured, and measure the voltage.
3. The instrument will automatically identify whether the tested voltage is DC or AC voltage.
4. Read measurement result from the display. When measuring DC voltage, the display will display voltage polarity of test point of the red pen.

Note: 1. ACV/DCV automatic identification.

2. The ACV min. identification voltage is 1V

Warning!



- Do not input a voltage higher than 600V, although it is possible to display a higher voltage, there's a risk of damaging the instrument.
- During measurement of high voltage, be careful, to avoid electric shock.

Frequency/duty ratio measurement

1. Rotate the knob switch to the HZ/% gear.

2. Parallely connect the pens to the circuit or power supply to be measured, and measure the frequency or duty ratio.
3. Press the "HZ/%" key to shift frequency/duty ratio display.
4. Read measurement result from the display.

Warning!



- During measurement of high voltage, be careful, to avoid electric shock.
- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

AC & DC current measurement

1. Rotate the knob switch to the **mA $\approx$** gear, and press the "SEL" key to shift to DC current or AC current function.
2. Cut off the power supply of the measured circuit. Discharge all high-voltage capacitors on the measured circuit.
3. Disconnect the circuit to be measured. Connect the black pen to lower voltage end of the disconnected circuit, and connect the red pen to higher voltage end of the disconnected circuit.

4. Power on the circuit, and then read the measurement result from the display, during measurement of DC current, the current polarity at test point of the red pen will also be displayed at the same time.
5. Cut off the power supply of the measured circuit. Remove the pens of the instrument and restore the circuit.

Warning!



- In order to prevent possible electric shock, fire or human injury, during measurement, disconnect the power supply of the circuit measured, and then connect the instrument to the circuit in series.
- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

Capacitance measurement

1. Rotate the knob switch to the capacitance $\text{||}\text{||}$ gear.
2. Parallel connect the pens to the capacitance to be measured, and measure the capacitance.
3. Read measurement result from the display.

Warning!



- In order to prevent possible electric shock, fire or

human injury, before measurement, disconnect the power supply of the circuit to be measured, and discharge all high-voltage capacitors.

- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

Resistance measurement

1. Rotate the knob switch to the resistance $\Omega \rightarrow \text{diode symbol}$ gear. Press the "SEL" key to shift to resistance measurement function
2. Parallely connect the pens to the circuit or resistance to be measured, and measure the resistance.
3. Read measurement result from the display.

Warning!



- In order to prevent possible electric shock, fire or human injury, before measurement, disconnect the power supply of the circuit to be measured, and discharge all high-voltage capacitors.
- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

Diode

1. Rotate the knob switch to the $\Omega \rightarrow \text{diode symbol}$ gear, and press

the "SEL" key to shift to diode function.

2. Connect the red pen to the positive pole of the diode to be measured, and connect the black pen to the negative pole of the diode to be measured, the reading on the display is an approximate value of forward voltage drop of the diode.

Warning!



- In order to prevent possible electric shock, fire or human injury, before measurement, disconnect the power supply of the circuit to be measured, and discharge all high-voltage capacitors.
- If the diode measured is open-circuited or with reversed polarity, the instrument will display overload.
- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

On-off test

1. Rotate the knob switch to the $\Omega \rightarrow \text{H} \rightarrow \text{OFF}$ gear, and press the "SEL" key to shift to on-off function.
2. When the pens are parallelly connected to both ends of the circuit or resistance to be measured, if the resistance

between both ends of the circuit measured is below 50Ω , the buzzer inside the instrument would sound, and the resistance at both ends of the circuit measured is show on the display.

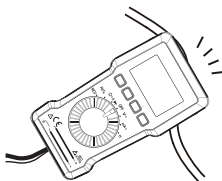
Warning!



- In order to prevent possible electric shock, fire or human injury, before measurement, disconnect the power supply of the circuit to be measured, and discharge all high-voltage capacitors.
- After all measurements are completed, it is required to disconnect the pens from the circuit measured.

Non-contact voltage (NCV) detection

1. Rotate the knob switch to the NCV gear.
2. As shown in the figure, close the NCV induction zone of the instrument to the wire to be measured gradually.
3. When instrument detects AC voltage, the buzzer will make a sound, while the LED light will turn on.



 Warning!

- Detection range: About 80V~600V AC, 50Hz or 60Hz.
- During use, even there's no sound or light alarm, voltage may still exist. The instrument may not induce the electric field due to impact from other factors (such as shielded wires/cables, insulation layer thickness, distance from voltage source, socket design difference etc.).

General Technical Indicators

- Use environmental conditions:
IEC/EN 61010-1 300V CAT III , 600V CAT II, pollution level 2
Altitude < 2000m.
- Working environment temperature and humidity: 0~40°C
(<80% RH, <10°C not considered).
- Storage environment temperature and humidity:
-10~60°C (<70% RH, with battery taken off).
- Temperature coefficient: 0.1 accuracy/°C
- Measure the maximum allowable voltage between the measurement end and the ground: 600V DC or AC RMS.
- Fuse protection: Fuse F 400mA/250V
- Sampling rate: About 3 times/second
- Automatic shutdown: About 30 minutes
- Display: Max. 3999
- Over range indication: Display "OL"
- Battery low voltage indication: When battery voltage is lower than normal operating voltage, "" will display on LCD
- Input polarity indication: It will display "-" automatically.
- Power supply: Button battery CR2032 (3V)
- Dimension: 127x70x12.5mm
- Weight: About 110g

Accuracy Indicators

Accuracy: $\pm$ (% reading + characters), warranty is one year.

Basic conditions: Ambient temperature is 18°C to 28°C, and relative humidity is no greater than 80%

DC voltage

Range	Resolution	Accuracy
4V	0.001V	$\pm(1.0\% \text{ reading} + 3 \text{ characters})$
40V	0.01V	
400V	0.1V	
600V	1V	

Input impedance: About 10M Ω ; max. measurement voltage: 600V DC or AC RMS.

AC voltage

Range	Resolution	Accuracy
4V	0.001V	$\pm(2.0\% \text{ reading} + 5 \text{ characters})$
40V	0.01V	
400V	0.1V	
600V	1V	

Input impedance: about 10M Ω .

Min. measurement voltage 1V

Max. measurement voltage: 600V DC or AC RMS; frequency range: 40Hz~400Hz

DC current

Range	Resolution	Accuracy
40mA	0.01mA	$\pm(2.0\% \text{ reading} + 5 \text{ characters})$
400mA	0.1mA	

Input protection: 400mA/250V fuse

AC current

Range	Resolution	Accuracy
40mA	0.01mA	$\pm(2.0\% \text{ reading} + 5 \text{ characters})$
400mA	0.1mA	

Input protection: 400mA/250V fuse; frequency range: 40Hz~400Hz

Resistance

Range	Resolution	Accuracy
400 Ω	0.1 Ω	$\pm(2.0\% \text{ reading} + 5 \text{ characters})$
4k Ω	0.001 k Ω	
40k Ω	0.01 k Ω	
400k Ω	0.1 k Ω	
4M Ω	0.001M Ω	
40M Ω	0.01 M Ω	

Input protection: Max. 600V DC or AC RMS.

Frequency

Range	Resolution	Accuracy
10Hz	0.001Hz	$\pm(2.0\% \text{ reading} + 5 \text{ characters})$
100Hz	0.01Hz	
1kHz	0.001kHz	
10kHz	0.01kHz	
100kHz	0.1kHz	

Input protection: 600V DC or AC RMS.

Sensitivity: 500mV RMS.

Capacitance

Range	Resolution	Accuracy
50nF	0.01nF	$\pm(5.0\% \text{ reading} + 5 \text{ characters})$
500nF	0.1nF	

5uF	0.001uF	±(5.0% reading + 5 characters)
50uF	0.01uF	
100uF	0.1uF	

Input protection: 600V DC or AC RMS.

Measurement range: 1nF~100uF

Diode

Function	Range	Resolution	Test Environment
Diode test ➔	1V	0.001V	Test current: About 1mA; open circuit voltage: About 2.5V. Display an approximate value of forward voltage drop of the diode.

Input protection: Max. 600V DC or AC RMS.

Connection/Disconnection

Function	Description	Test Environment
o))	When the built-in buzzer sounds, the measured resistance is not greater than 50Ω.	Test current: About 1mA; open circuit voltage: About 0.4V.

Input protection: Max. 250V DC or AC RMS.

Duty ratio

Function	Range	Accuracy
Duty ratio	5.0~95.0%	±(3.0% reading + 5 characters)

Input protection: Max. 600V DC or AC RMS.

Sensitivity: 500mV RMS Frequency range: 10Hz ~ 100Hz

Instrument Maintenance

Basic maintenance information provided in this section, includes instructions on the replacement of protective tube and the replacement of battery.

Unless otherwise you are an experienced maintenance person and possess related calibration, performance test and maintenance information, do not try to repair this instrument.

Warning!



In order to avoid possible electric shock, fire or human injury:

- When the shell is opened, do not conduct any measurement with the instrument.
- Remove input signals before cleaning the instrument.
- It is required to use specified replacement parts. Ask authorized technicians to repair the instrument.

General maintenance

Use wet cloth and a small amount of detergent to clean the instrument shell, and do not use any abrasive or chemical solvent.

Replace the protective tube and battery.

Warning!



- In order to avoid electric shock or personal injury caused by error reading, please replace the battery timely when the "" symbol appears on the display.
- In order to guarantee safety operation and maintenance of this product, when it is not used for a long term, please take out the battery, to avoid any damage to the product due to battery leakage.
- Only fuses with specified amperage, fusing rated value, voltage rated value and fusing speed could be used.
- In order to avoid electric shock or personal injury, before opening the back cover and replacing the battery, it is required to shut down and check to guarantee that the pens have been disconnected from the measured circuit.

Please replace battery or fuse according to the following steps:

1. Disconnect the power supply of the instrument.
2. Disconnect the pens from the circuit measured.
3. Unfasten the bolts on the back cover with a screwdriver,

and take down the back cover.

4. Take down the old battery or the damaged protective tube, and replace with a new battery or new protective tube.
5. Fasten the bolts after assembling the back cover.

