

USER'S MANUAL

DIGIAL MULTIMETER

Statement

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Safety Statement

⚠ Caution mark refers to the condition and operation which may cause damage to the instrument or equipment.

It requires that you must be careful during the execution of the operation. If incorrectly perform the operation or do not follow the procedure, it may damage the instrument or equipment. In the circumstances that such conditions are not met or not fully understood, please do not continue to perform any operation indicated by the caution mark.

⚠ Warning mark indicates the condition and operation which may cause danger to users.

It requires that you must pay attention during the execution of this operation. If incorrectly perform the operation or do not follow the procedure, it may result in personal injury or casualties. In the circumstances that such conditions are not met or not fully understood, please do not continue to perform any operation indicated by the warning mark.

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Safety Symbols

	High voltage warning
	AC (Alternating current)
	DC (Direct current)
	AC or DC
	Warning, important safety signs
	Ground
	Fuse
	Equipment with double insulation/reinforced insulation protection
	Low voltage (Battery)
	Product complies with all relevant European laws
	The additional product label shows that do not discard this electrical/electronic product into household garbage.
CAT. II	Class II measurements are suitable for testing and measuring circuits directly connected to power points (sockets and similarities) of low voltage power installations.
CAT. III	Class III measurement is suitable for testing and measuring circuits connected to the distribution part of low voltage power supply devices in buildings.
CAT. IV	Class IV measurements are suitable for testing and measuring circuits connected to the power supply of low voltage power installations in buildings.

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Safety Instructions

The instrument is designed according to the requirements of the international electrical safety standard IEC61010-1 for the safety requirements of the electronic testing instruments. The design and manufacture of instruments strictly comply with the requirements of IEC61010-1 CAT.IV 600V, CAT.III 1000V over voltage safety standards and pollution level 2.

Safety Operation Specifications

⚠ Warning

In order to avoid possible electric shock or personal injury and other safety accidents, please abide by the following specifications:

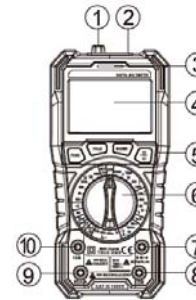
- Please read this manual carefully before using the instrument, and pay special attention to safety warning information.
- Strictly observe the operation of this manual and use this instrument. Otherwise, the protection function of the instrument may be damaged or weakened.
- Please be careful if the measurement exceeds DC60V, AC30V RMS or 42V peak value. There may be danger of electric shock at this kind of voltage.
- Do not measure voltages larger than rated between terminals or between terminals and ground.

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Overview

This is a new generation of high performance auto range digital multimeter with analog bars and True RMS. The new display and function layout show clearer and better user experience. It has the functions of high voltage light alarm and input terminal light prompt. Professional electrician, It is the best choice for professional electricians, enthusiasts or families.

Instrument panel description



- ① NCV probe
- ② Flashlight
- ③ Red / green light

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- By measuring the known voltage to check whether the meter is working normally, if it is not normal or damaged, do not use it again.
- Before using the instrument, please check whether there is any crack or plastic damage in the instrument case. If you do, do not use it again.
- Before using the instrument, please check whether the probes cracked or damaged. If so, please replace the same type and the same electrical specifications.
- The instrument shall be used in accordance with the specified measurement category, voltage or current rating.
- Please comply with local and national safety code. Wear personal protection equipment (such as approved rubber gloves, masks and flame retardant clothes, etc.) to prevent being damaged by electric shock and electric arc due to exposed hazardous live conductor
- When it shows low battery indicator, please replace the battery in time in case of any measurement error.
- Do not use the instrument around explosive gas, steam or in wet environment.
- When using the probe, please put your fingers behind the finger protector of the probe.
- When measuring, please connect the zero line or the ground line firstly, then connect the live wire; but when disconnecting,

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please disconnect the live wire firstly, then disconnect the zero line and ground line.

- Before opening the outer cabinet or battery cover, please remove the probe on the instrument. Do not use the instrument in the circumstances that the instrument is taken apart or battery cover is opened.
- It only meets the safety standards when the instrument is used together with the supplied probe. If the probe is damaged and needs to replace, the probe with same model number and same electrical specifications must be used for replacement.

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- ④ LCD display (Dual color backlight)
- ⑤ Function keys
- ⑥ Function knob
- ⑦ Other measurement input socket
- ⑧ COM Input socket
- ⑨ mA, uA Input socket
- ⑩ 10A Input socket

FUNC.

When there are multiple measuring functions on a range, the FUNC. key switch function is adopted.

Data hold

Press the "HOLD" key, enter/cancel data hold mode.


Max./Min. measurement

Press the MAX/MIN key to enter the maximum measurement, and then press it again to convert to the minimum value measurement.


Press and hold for more than 2 seconds to cancel the maximum/minimum measurement mode.

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Backlight

Press "" key, turn on backlight/turn off backlight. For about 10 seconds after it will automatically shut down.

Flashlight

Press "" key, and keep more than 2 seconds to turn on the flashlight / turnoff flashlight.

Auto power off

- The instrument will turn off automatically to save battery energy if there is no operation in 15 minutes. After automatic shutdown, press any key to restore the working state of the instrument.
- If you press the "FUNC." button and turn on the meter power, the automatic shutdown function will be cancelled. After turning off the meter, the meter is reopened to restore the automatic shutdown function.

Input terminal indication function

When power on or function switching, the corresponding input light flashes to prompt the user to insert the correct input port with the probe.

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instrument may be damaged or suffer electric shock.

2. Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.
3. Test the known current with the meter before use; confirm the instrument function is intact.

Note: The orange backlight lights up when the measured current is greater than 1A.

 **Caution:**

To avoid damaging the instrument or equipment, check the fuse before measuring and ensure that the measured current does not exceed the rated maximum current; use the correct input terminal.

Resistance measurement

- 1) Turn the knob to a suitable resistance range and make sure that the power of the measured circuit is disconnected.
- 2) Insert the red probe in " V/Ω " socket, insert the black probe in "COM" socket.
- 3) Contact the probe to both ends of the measured circuit or resistance.
- 4) Read the measurement result on the screen

 **WARNING**

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High voltage prompt function

When the measuring voltage is greater than 80V or the measuring current is greater than 1A, the orange backlight will light up, prompting the users to be careful.

Measurement operation

DC/AC voltage measurement

- 1) Turn the knob to " \overline{V} " or " $\sim V$ " range.
- 2) Insert the red probe to "V" socket, insert the black probe in "COM" socket.
- 3) Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel) for measuring.
- 4) Read the measurement result on the screen, when measuring DC voltage, it will show the polarity of the voltage connected to the red test lead.

 **WARNING**

1. The voltage above DC1000V or AC750V can't be measured; otherwise the instrument may be damaged or suffer electric shock.
2. Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.


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When measuring resistance on the line, disconnect the power supply and discharge all the high-voltage capacitors. Otherwise, the instrument may be damaged or suffer electric shocks.

Note: When measuring resistance on the line, the reading is affected by other paths between the test leads.

Capacitance measurement

- 1) Turn the knob to " \overline{C} ".
- 2) Insert the red probe in " \overline{C} " socket, insert the black probe in "COM" socket.
- 3) Contact the probe to the measured both ends of Capacitance.
- 4) Read the measurement result on the screen after the reading stabilizes.

 **WARNING**

When measuring Capacitance on the line, disconnect the power supply and discharge all the high-voltage capacitors. Otherwise, the instrument may be damaged or suffer electric shocks.

Note: When measuring Capacitance on the line, the reading is affected by other paths between the test leads.

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3. Test the known voltage with the meter before use it, confirm the instrument function is intact.

Note:

1. When you measuring AC voltage, press FUNC. key to check the frequency.
2. At the range of 600mV or 6V, even if there is no input value or no test leads are inserted, there may be a numerical display, it is normal, and the short-circuited input terminal can be reset to zero.
3. When the voltage is greater than 80V, the orange backlight will light up.

Frequency/Duty measurement

- 1) Turn the knob to "Hz%" and Switching Frequency or duty function by "FUNC." key (It can also be measured at AC voltage or AC current range)
- 2) Insert the red probe in "V" socket, insert the black probe in "COM" socket.
- 3) Contact the probe to the measured circuit (connect to the measured power supply or circuit in parallel), measure the frequency and duty.

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Continuity measurement

- 1) Turn the knob to " $\overline{\text{buzzer}}$ " and Switching to Continuity function by "FUNC." key and make sure that the power of the measured circuit is disconnected.
- 2) Insert the red probe in "V" socket, insert the black probe in "COM" socket.
- 3) Contact the probe to both ends of the measured circuit or resistance.
- 4) If the resistance or circuit of the measured resistance is less than 30 Ω , the buzzer will on and the green indicator lights up at the same time; when the resistance is about between 30 Ω to 60 Ω , the red indicator lights up; LCD displays the resistance value of the measured circuit.

 **WARNING**

When measuring Continuity on the line, disconnect the power supply and discharge all the high-voltage capacitors. Otherwise, the instrument may be damaged or suffer electric shocks.

Note:


1. When measuring the continuity of the line, the reading is affected by other paths between the test leads.
2. If the Continuity function and the diode function are separated, it is not need to switch by FUNC. key.

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4) Read the measurement result on the screen.

 **WARNING**

1. The voltage above 10V can't be measured; otherwise the instrument may be damaged or suffer electric shock.
2. Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.
3. Test the known voltage with the meter before use it, confirm the instrument function is intact.

 **Caution:**

To avoid damaging instruments or equipment, do not enter frequency or duty cycle signal greater than 10V valid value.

DC/AC current measurement

- 1) Turn the knob to the suitable AC or DC current range according to the value of measuring current by "FUNC." Key.
- 2) Insert the red probe to "mA" socket or "10A" Socket, insert the black probe to "COM" socket.
- 3) Disconnect the power of the tested circuit; connect the meter to the circuit under test, then turn on the circuit power supply.
- 4) Read the measurement result on the screen.

 **WARNING**

1. The voltage above 250V can't be measured; otherwise the

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Diode measurement

- 1) Turn the knob to " $\overline{\text{diode}}$ " range and Switch to diode measurement function by "FUNC." Key and make sure that the power of the measured circuit is disconnected.
- 2) Insert the red probe in "V" socket, insert the black probe in "COM" socket.
- 3) Touch the measured diode anode with the red probe, the black probe contacts the diode cathode.
- 4) Read the measurement result on the screen.
- 5) If the polarity of the test leads is opposite to the diode, the meter displays "OL" to distinguish the anode and cathode of the diode.

 **WARNING**

When measuring diode on the line, disconnect the power supply and discharge all the high-voltage capacitors. Otherwise, the instrument may be damaged or suffer electric shocks.

Note 1: When measuring diodes on the line, the reading is affected by other paths between the test leads.

Note 2: If the Continuity function and the diode function are separated, it is not need to switch by FUNC. key.

Note 3: The forward bias voltage of the test diode generally in the range of 0.3V to 1.5V.

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NCV test

- 1) Turn the knob to the ^{NCV} "Live", and Switch to NCV test function by "FUNC." key. Meter will display "NCV".
- 2) Then NCV probe gradually approaches the detected point.
- 3) When the meter senses weak AC signals, the green indicator lights up, at the same time, the beeps send out slow dips.
- 4) When the meter senses strong AC signals, the red indicator lights up, at same time, the beeps send out fast dips.

⚠ WARNING

In order to avoid possible accidents such as electric shock or personal injury, please follow the safety regulations.

LIVE test

- 1) Turn the knob to the ^{NCV} "Live", and Switch to live test function by "FUNC." key. Meter will display "LIVE".
- 2) Insert the red probe in "V" socket, then the probe contact to the tested point.
- 3) When the meter senses weak AC signals, the green indicator lights up, at same time, the beeps send out slow dips.
- 4) When the meter senses strong AC signals, it shows "LIVE"

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and the red indicator and orange backlight lights up at same time, and the beeps send out fast dips.

⚠ WARNING

In order to avoid possible accidents such as electric shock or personal injury, please follow the safety regulations.

BATTERY Measurement

- 1) Turn the knob to the corresponding battery test range.
- 2) Insert the red test lead to the "mA" input terminal, and the black test lead to the "COM" input terminal.
- 3) The red test lead is connected to the positive pole of the battery, the black test lead is connected to the negative pole of the battery, then connect the two test leads to the battery in parallel for measurement.
- 4) Read the battery voltage value from the display screen.

Note:

1.5V range load resistance: 30 Ω ;

9V range load resistance: 300 Ω

General Technical Specifications

- Environment condition of using:
CAT. IV 600V; CAT. III 1000V;

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60μA	0.01μA	±(1.2% reading+3)
60mA	0.01mA	
600mA	0.1mA	
10A	0.01A	

Overload protection: μA/mA: F600mA/250V fuse
10A: F10A/250V fuse

Maximum input current: μA/mA: 600mA; A: 10A

When measuring large current, continuous measurement time should be no longer than 15 seconds

AC current

Range	Resolution	Accuracy
60mA	0.01mA	±(1.5% reading+3)
600mA	0.1mA	
10A	0.01A	

Overload protection: μA/mA: F600mA/250V fuse
A: F10A/250V fuse

Maximum input current: μA/mA: 600mA; A: 10A

Frequency Response: 10Hz ~ 1kHz; True RMS

When measuring large current, continuous measurement time should be no longer than 15 seconds

Resistance

Range	Resolution	Accuracy
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600Ω	0.1Ω	±(1.0% reading+3)
6kΩ	0.001kΩ	
60kΩ	0.01kΩ	
600kΩ	0.1kΩ	
6MΩ	0.001MΩ	±(1.5% reading+3)
60MΩ	0.01MΩ	

Overload protection: 250V

Capacitance

Range	Resolution	Accuracy
10nF	0.001nF	±(4.0% reading+5)
100nF	0.01nF	
1000nF	0.1nF	
10μF	0.001μF	
100μF	0.01μF	
1000μF	0.1μF	
10mF	0.001mF	
100mF	0.01mF	±(5.0% reading+5)

Overload protection: 250V

Note: the parameters do not include errors caused by the capacitance of the test leads and the base value of the capacitor.

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Pollution level2, Altitude < 2000m

Working temperature and humidity:


0~40°C (<80% RH, <10°C non condensing)

Storage temperature and humidity:

-10~60°C (<70% RH, remove the battery)

- MAX. Voltage between terminals and earth ground:
DC1000V/AC750V

- Fuse protection: mA: F600mA/250V fuse
10A: F10A/250V fuse

- Sampling rate: about 3 times/second.
- Display: 6000 counter readout. Automatically display the unit symbols according to the shift of the measurement function.
- Over range indication: Display "OL".
- Low battery indication: when the battery voltage is lower than the normal working voltage,  will be displayed.
- Input polarity indication: automatically display "-".
- Power requirement: 2 x 1.5V AAA batteries.

Accuracy Specifications

The accuracy applies within one year after the calibration.

Reference condition: the environment temperature 18°C to 28°C, the relative humidity is no more than 80%.

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Frequency/Duty

Range	Resolution	Accuracy
10Hz	0.001Hz	±(1.0% reading+3)
100Hz	0.01Hz	
1000Hz	0.1Hz	
10kHz	0.001kHz	
100kHz	0.01kHz	
1000kHz	0.1kHz	
10MHz	0.001MHz	
1~99%	0.1%	±(3.0% reading+3)

Hz:

- 1) Range: 0 ~ 10MHz
- 2) Voltage range: 0.2~10V AC (If the measured frequency is higher, the voltage should increase accordingly)
- 3) Overload protection: 250V

V:

- 1) Range: 0 ~ 100 kHz
- 2) Voltage range: 0.5~600V AC (If the measured frequency is higher, the voltage should increase accordingly)
- 3) Overload protection: 250V

μA、mA、A:

- 1) Range: 0 ~ 100 kHz
- 2) Signal range: ≥ 1/4Full range (If the measured frequency is

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accuracy: ± (% reading + digit)

DC voltage

Range	Resolution	Accuracy
600mV	0.1mV	±(0.5% reading+3)
6V	0.001V	
60V	0.01V	
600V	0.1V	
1000V	1V	

Input impedance: 10MΩ; Maximum input voltage: 1000V DC

Overload protection: 1000V DC or 750V AC;

AC voltage

Range	Resolution	Accuracy
6V	0.001V	±(0.8% reading+5)
60V	0.01V	
600V	0.1V	
750V	1V	

Input impedance: 10MΩ; Maximum input voltage: 750V AC

Overload protection: 1000V DC or 750V AC;

Frequency Response: 10Hz ~ 1kHz; True RMS

DC current


Range	Resolution	Accuracy
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higher, the voltage should increase accordingly)

- 3) Input protection: μA/mA: F600mA/250V fuse;
A: F10A/250V fuse

Diode test

	Function	
	It displays the approximate forward voltage value of the diode.	Forward DC current is about 2.5mA Reverse DC voltage is about 3V Overload protection:250V

Continuity test

	Function	
	The resistance is <30Ω, the buzzer will sound and the indicator light is green. When the resistance >30Ω and <60Ω, the buzz does not ring, the indicator light is red.	Reverse DC voltage is about 1V Overload protection:250V

Maintenance

Clean

If there's dust on the terminal or the terminal is wet, it may cause measurement error. Please clean the instrument according to the steps below:

- 1) Switch off the power supply of the instrument, and remove

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the test probe.

- 2) Turn over the instrument and shake out the dust accumulated in the input socket. Wipe the outer cabinet with a damp cloth and mild detergent, do not use abrasive or solvent. Wipe contacts in each input socket with a clean cotton swab soaked in alcohol.

 **WARNING**

Please always keep the inside of the instrument clean and dry to avoid electric shock or instrument damage.

Replace Battery and Fuse

Replace Battery:

- 1) Turn off the power supply of the instrument, and remove the probe on the instrument.
- 2) Use screwdriver to unscrew screws fixing the battery cover, remove the battery cover.
- 3) Remove old batteries, replace with new batteries of the same specifications. Please note the polarity of the battery according to the positive and negative polarity marks inside of the battery cover.
- 4) Install the battery cover to its original position, fix and lock the battery cover with screws.

 **WARNING**

To prevent electric shock or personal injury which caused by error reading, please replace the battery

promptly when the battery power is low. Please do not make battery short circuit or reverse battery polarity to discharge the batteries.



To ensure safety operation and product maintenance, when the instrument will not be used for an extended period of time, please remove the batteries away to avoid any product damage caused by battery leakage.

Replace Fuse

- 1) Turn off the power supply of the instrument, and remove the probe on the instrument.
- 2) Use screwdriver to unscrew the screws of the back cover, and remove the back cover.
- 3) Remove the burnt fuse, replace with new fuse of the same specifications, and ensure that the fuse is clamped in the safety clip.
- 4) Install the back cover, fix and lock it with screws.

 **WARNING**

To avoid possible electric shock, personal injury or instrument damage, please use the fuse with same specifications or specified specifications.