

## RENOGY Multimeter

RNG-TOOL-MM  
Palm Size Digital Multimeter



 **RENOGY**

2775 E. Philadelphia St., Ontario, CA 91761  
1-800-330-8678

Version 1.0

## **Important Safety Instructions**

Please save these instructions.

This manual contains important safety, and operating instructions for the Multimeter. The following symbols are used throughout the manual to indicate potentially dangerous conditions or important safety information.


 **WARNING:** Indicates a potentially dangerous condition. Use extreme caution when performing this task.

**CAUTION:** Indicates a critical procedure for safe and proper operation of the Multimeter

**NOTE:** Indicates a procedure or function that is important to the safe and proper operation of the Multimeter.

To avoid possible electric shock, personal injury, or death, read the safety instruction before using the meter.

- Use the meter only as specified in this manual, or the protection provided by the meter might be impaired or lost.
- Inspect the meter before using it. Do **NOT** use the meter if it appears damaged.
- Inspect the test leads before use. Do **NOT** use them if insulation is damaged or metal is exposed.
- Keep your fingers behind the finger guards when using the test leads.
- Do **NOT** apply more than 500V voltage between meter terminal and earth ground, preventing electric shock and meter damage.
- Be cautious when the tested voltage is above 60VDC or 42Vrms AC. These voltages pose a shock hazard.
- Remove test leads from the meter before opening the case
- **NEVER** remove the cover or open the case of the meter without first removing it from the main power source.
- **NEVER** use the meter with the cover removed or the case open.
- Do **NOT** apply more than the rated voltage or current.

- **NEVER** switch range positions during testing.
- Do **NOT** test the voltage when it's on amperage testing positions.
- Only use fast burning fuses with same nominal rating to replace the open fuse.
- Do **NOT** change the internal wire connections. It will damage the meter and pose hazard.
- When there is a “” symbol on the LCD display, replace the battery in time to keep the measurements accurate.
- Do **NOT** use the meter under high temperature or in the wet environment, especially NOT store the meter in the wet environment, which might impair its functions.
- For maintenance, use damp cloth and gentle detergent to clean the case. Do **NOT** use solvent or abrasive.










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## General Information

The RENOGY Digital Multimeter features high reliability and safety, complete functions, and handheld. The synchronous display function with ultra-large screen, digital and high-resolution analog pointer, full range overload protection, and unique appearance design let it become a new generation of practical electrician's measuring instrument with excellent performance.

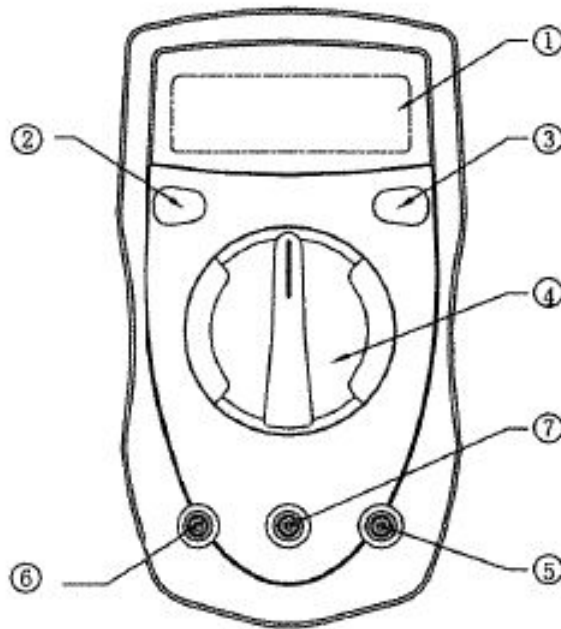
### Electrical Symbols

	Low battery capacity		Earth ground
	AC		DC
	Double Insulated		Fuse
	AC or DC		Important Safety Info
	Diode		

### General Specifications

Maximum input voltage (between terminals and earth ground)	500Vrms
 "10A" JACK	No fuse
 Fuse for mA JACK	Φ5x20-F 315mA/250v
Range selection	Manually
Backlight	Manually turn on & turn off
Maximum display	1999, update 2-3 times per second
Polarity indication	Auto display "-" for negative
Over range indication	Display "1" on the LCD
Hold measurement data	Display  on the top left corner of LCD
Low battery capacity	Display  icon on the LCD
Battery	9V NEDA1604 or 6F22 or 006P
Operation temperature	0°C-40°C (32° F-104° F)
Storage temperature	-10°C-50°C (14° F-122° F)
Dimension	130 x 73.5 x 35mm (5.12 x 2.89 x 1.38in)
Weight	156g (0.34lbs) including the battery

## Identification of Parts





### Key Parts

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1. **LCD Display (1.9 inch)**
2. **Hold measurement data button**—freeze the present reading in the display
3. **Backlight button**
4. **Function and range switch**—select the functions and desired ranges as well as to turn ON/OFF the meter
5. **“COM” JACK**—return terminal for all measurements, plug in connector for black (negative) test lead
6. **“10A” JACK**— Input for 200mA to 10A current. Plug in the red (positive) test lead.
7. **“VΩmA” JACK**—Input for voltage, resistance and current (up to 200mA). Plug in the red (positive) test load.

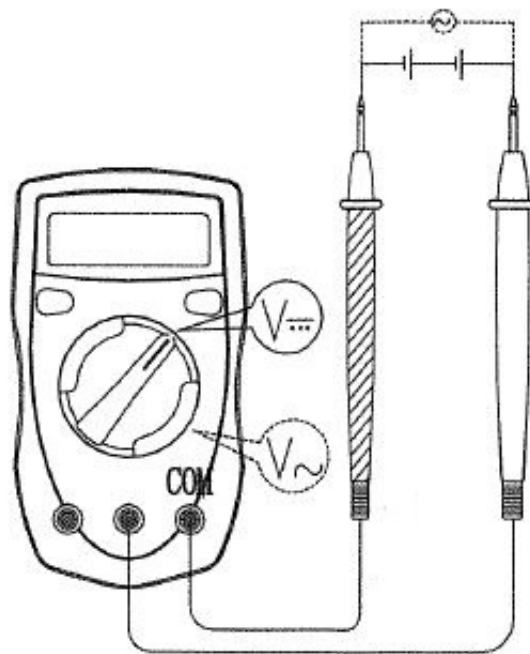
## Operation

Always check the battery before any measurements. Set the function and range switch on the desired range, the  icon appears on the LCD when the battery capacity is low.


Also, pay attention to the  icon besides the JACK for test leads. It indicates the maximum rating. Don't apply measurements more than that.

### DC voltage measurement

1. Connect the red test lead to the “**VΩmA**” jack and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired DC voltage range (V  $\overline{\text{---}}$ ).
3. Connect the test leads across the device or circuit to be measured. Read the voltage value on the LCD display along with the polarity.



Measure voltage

 **WARNING:** Do **NOT** test more than 500V voltage, which might damage the internal circuit and harm your safety. If the actual voltage to be tested is unknown before measurements, you should firstly set the meter at the highest range, and then gradually lower the range according to the reading. If the LCD only display “1”, it means the measured value exceeds the current range, you have to level up the range.

In each range, the input impedance is 10MΩ. Such load effect will result in measurement error when measuring the high impedance circuit. While if the

impedance of measured circuit was smaller than  $10M\Omega$ , the measurement error would be so tiny that could be neglected (0.1% or even smaller).

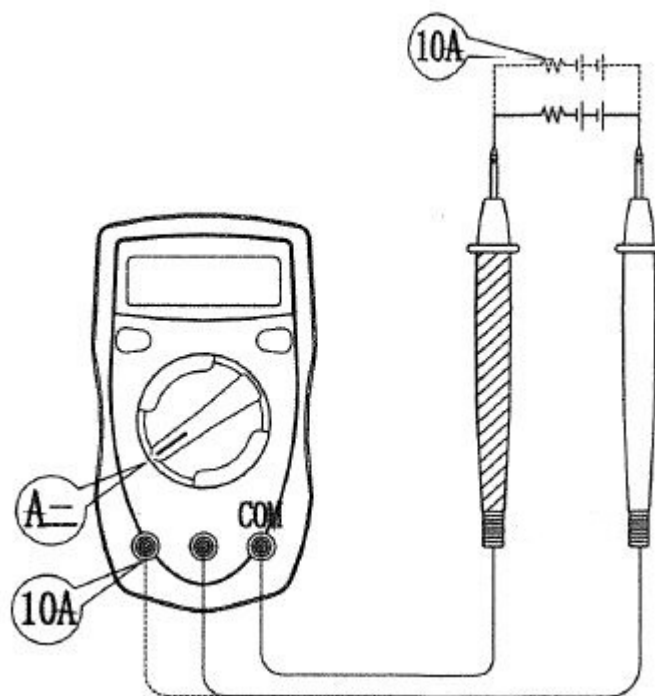
## AC voltage measurement

1. Connect the red test lead to the “**V $\Omega$ mA**” jack and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired AC voltage range (V~).
3. Connect the test leads across the device or circuit to be measured. Read the voltage value on the LCD display along with the polarity.

The measurement diagram and **WARNING** information are both the same as DC voltage measurement.

## DC current measurement

1. Connect the red test lead to the “**V $\Omega$ mA**” jack or “**10A**” jack, and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired DC current range (A  $\overline{\text{---}}$ ).
3. Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
4. Read the current value on the LCD display along with the polarity.



Measure current



**⚠ WARNING:** Even the meter has over voltage protection for measuring current up to 200mA, do **NOT** try to measure DC current when the voltage between input terminal and the earth ground is above 60V. Doing so might damage the meter or the equipment under test, and harm your safety. Such high voltage has the risk of electric shock.

Cut off the power supply before measurement, carefully check the input terminal and range, make sure they are in the correct position. Then reconnect the circuit and measure the current. If the actual current to be tested is unknown before measurements, you should firstly set the meter at the highest range, and then gradually lower the range according to the reading.

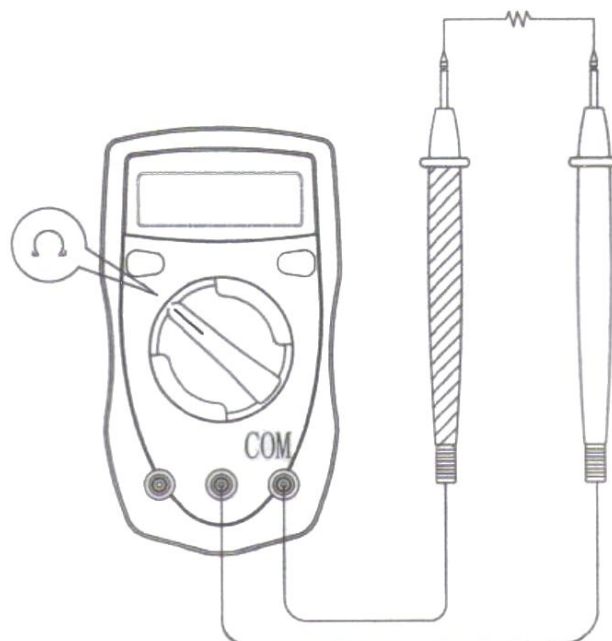
For the mA input jack, overload will open the built-in fuse. You must replace the fuse for future operation.

Dimension of fuse:  $\Phi 5 \times 20 \text{mm}$ ; Electrical specs: F 315mA/250v

There is no fuse for “10A” jack. To use safely, each measurement cannot last for more than 10 seconds, and the interval between each measurement must be more than 15 minutes.

## Resistance measurement

1. Connect the red test lead to the “**V $\Omega$ mA**” jack and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired resistance range ( $\Omega$ ).
3. Connect the test leads across the resistor to be measured and read the resistance value on the LCD display.



Measure resistance

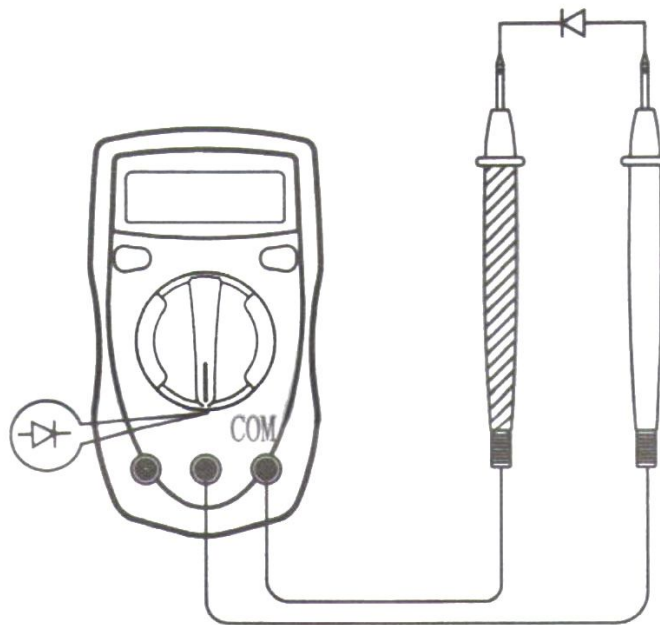
**CAUTION:** If the resistor to be measured is connected to a circuit, to avoid damage to the meter or to the equipment under test, disconnect circuit power and discharge all capacitors before measuring resistance.

When measuring resistance at 200 $\Omega$  range, the wires of test leads will add 0.1  $\Omega$  ~ 0.3  $\Omega$  of measurement error. To achieve accurate measurement, you may reduce the reading by the resistance of the leads. To test the leads, touch the probe tips together and read the resistance of the leads.

When the resistance to be measured was above 1M $\Omega$ , it would take several seconds for the meter to get a stable reading. This is a normal phenomenon.

## Diode measurement

1. Connect the red test lead to the “**V $\Omega$ mA**” jack and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired diode range ( $\rightarrow$ ).
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode.
4. Read the value on the LCD display.



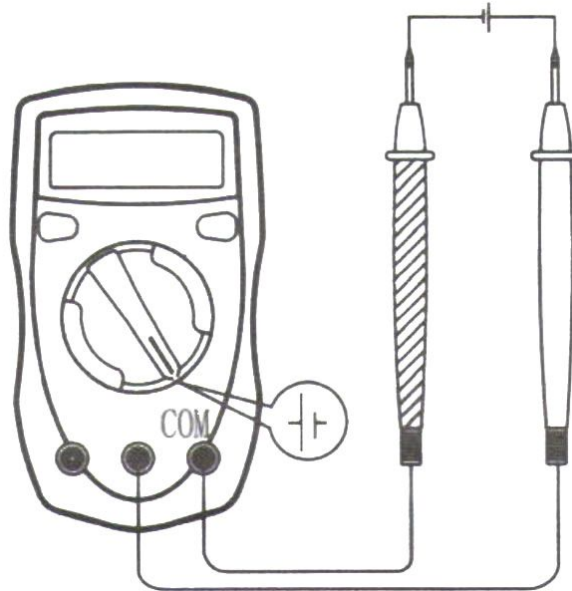
Measure diode

**CAUTION:** If the diode to be measured is connected to a circuit, to avoid damage to the meter or to the equipment under test, disconnect circuit power and discharge all capacitors before measuring diodes.

You could use the diode range to test the voltage drop of diodes or other semiconductor junction. A typical junction has forward voltage drop from 0.5V to 0.8V. If the connection is reversed (open circuit), only figure “1” will be displayed on the LCD.

## Battery measurement

1. Connect the red test lead to the “**VΩmA**” jack and the black test lead to the “**COM**” jack.
2. Set the range switch to the desired battery range ( $\frac{+}{-}$ ).
3. Connect the test leads to the two terminals of the battery to be measured.
4. Read the value on the LCD display.



Measure battery voltage

**CAUTION:** Do **NOT** input more than 60VDC or 30VAC voltage. It might damage the meter and harm your safety.

## Technical Specifications

Accuracy specifications:  $\pm$  ([% of reading] + [number of least significant digits])  
Accuracies are guaranteed for 1 year, at  $23 \pm 5$ , less than 75% relative humidity

### DC voltage

Range	Resolution	Accuracy
200mV	100 $\mu$ V	$\pm$ (0.5%+2)
2000mV	1mV	
20V	10mV	
200V	100mV	
500V	1V	$\pm$ (0.8%+2)

**NOTE:** Input impedance: 10M $\Omega$  for all ranges

Max. input voltage: 250V DC/AC for 200mV range, 500V DC/AC for the rest

## AC voltage

Range	Resolution	Accuracy
200V	100mV	$\pm (1.2\%+10)$
500V	1V	

**NOTE:** Input impedance: about 5M $\Omega$   
Frequency response: 40~400HZ  
Display: sine wave rms (average response)  
Max. input voltage: 500V DC/AC

## DC current

Range	Resolution	Accuracy
200 $\mu$ A	0.1 $\mu$ A	$\pm (1\%+2)$
500mA	100 $\mu$ A	$\pm (1.2\%+2)$
10A	10mA	$\pm (2\%+5)$

**NOTE:** Overload protection: F 315mA/250v fused.  
10A range unfused. To use safely, each measurement cannot last for more than 10 seconds, and the interval between each measurement must be more than 15 minutes.

## Resistance

Range	Resolution	Accuracy
200 $\Omega$	0.1 $\Omega$	$\pm (0.8\%+2)$
2000 $\Omega$	1 $\Omega$	
20K $\Omega$	10 $\Omega$	
200K $\Omega$	100 $\Omega$	
20M $\Omega$	10K $\Omega$	$\pm (1\%+5)$

**NOTE:** Over voltage protection: 250V DC/AC for all ranges.

## Battery measurement


Range	Resolution	Built-in load resistance
12V	10mV	240 $\Omega$
9V	10mV	1.8K $\Omega$
1.5V	10mV	30 $\Omega$

## Diode Test

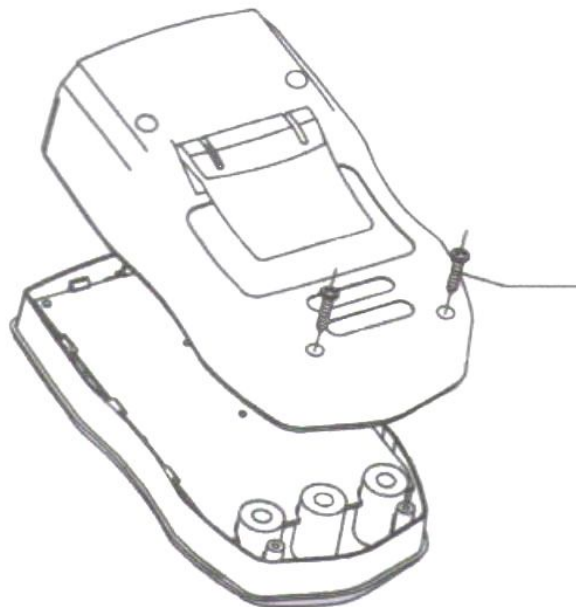
Range	Resolution	Notes
→+	1mV	Display approximate forward voltage drop

**NOTE:** Over voltage protection: 250V DC/AC

## Battery Replacement

If the sign “” appears on the LCD display, it indicates that the battery should be replaced. Please follow the instructions below:

1. Set the range switch at “OFF” position to turn the meter off.
2. Disconnect the test leads from the measured circuit and remove the test leads from the terminals.
3. Remove the back case by using a Phillips head screwdriver.
4. Replace the battery with a new 9V NEDA1604 or 6F22 or 006P battery.
5. Reinstall the back case and secure it.



Battery replacement

## Maintenance

### **CAUTION:**

1. Make sure the meter was turned off and the test leads were disconnected from the measured circuit before opening the back case.
2. Only use damp cloth and a little gentle detergent to clean the meter. **NEVER** use chemical solvent.