

**DIGITAL MULTIMETER**  
**OPERATION MANUAL**

## **I. SUMMARIZE**

It is a handheld small and safe digital multimeter with 3 1/2 digits, full function and high performance for measuring DCV, ACV, DCA, resistance, temperature, frequency, diode, continuity test, thus it is a portable and ideal tool for users. Please read the safety information and warning in this manual carefully, and strictly abide by it.

## **II. OPEN THE PACKAGE**

Open the box, take out the meter, and then check the items below to make sure if they are missing or damaging:

- |    |  |        |
|----|--|--------|
| 1. | Manual                                     | 1 pcs  |
| 2. | Test lead                                  | 1 pair |
| 3. | Type-K thermocouple probe<br>(-20°C~250°C) | 1 pcs  |
| 4. | 1.5V AAA LR03 Battery                      | 2 pcs  |
| 5. | Holster                                    | 1 pcs  |

Please contact with your supplier, if you find out any problems.


### **III. SAFETY NOTE**

Please pay attention to the warning which indicates a situation or action that poses a danger to the user and may cause damage to the instrument or the equipment under test. The instrument strictly follows GB4793.1 safety requirements for electric instruments and safety standard IEC61010 to design and produce, which is under the safety standards of double insulation, overvoltage standards (CAT II 1000V, CAT III 600V) and pollution level 2. Please read the operation manual carefully before operation, or the protection function will weakened or lost.

1. Please check whether the insulation surface of the test leads is intact before use it. If you found the insulation surface of











the test leads or the cover of the meter is obviously damaged, or you think it can't work anymore, please do not use the meter again.

2. When you using the test leads, your fingers should be put after the finger protective part.
3. When the voltage under tested is higher than DC 36V and AC 25V RMS, be careful to prevent electric shock.
4. Do not operate the meter if battery case and back cover is not fixed.
5. The signal under tested should not be over range, in case to avoid the electric shock.
6. It is forbidden to change the range by the range knob under measurement.
7. Do not test the voltage by connecting the current terminal or at the current range.
8. When replacing fuses, please use the same

- type and specification fuses.
9. Do not change the inner circuit of meter, to avoid damage of the meter.
  10. When the LCD displays  symbol, replace the batteries in time to ensure the measuring accuracy.
  11. Please comply with local and national safety regulations. Wearing personal protective equipment (such as approved rubber gloves, face masks, and flame-retardant clothing etc.) to prevent the injury from electric shock and arc when charged conductors are exposed.
  12. Do not store and operate the meter under the condition of high temperature, high humidity, combustible (flammable), explosive and strong magnetic place.
  13. Wipe the case with a damp cloth and detergent, do not use abrasives and


alcohol etc.

#### IV. ELECTRONIC SYMBOLS

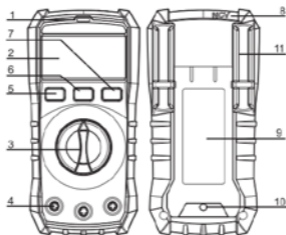
	WARNING!		DC
	EXISTS HIGH VOLTAGE !		AC
	GND		DC & AC
	DUAL INSULATION		CONFORMITE EUROPEENNE
	LOW BATTERY		FUSE

#### V. CHARACTERISTIC

- Display: LCD displaying.
- Max display: 1999 (3 1/2 digit) auto polarity indication.
- Measuring method: A/D conversion
- Exploit the technology of button calibrating

- Sampling rate: approx.3 times/second.
- Over range indication: the MSD displays “OL”
- Low battery indication: “” appears.
- Operation environment: (0~40) °C  
relative humidity < 75% R.H
- Storage environment: (-20~60) °C  
relative humidity < 85% R.H.
- Power: 2 \* AAA 1.5V LR03 batteries
- Size: (146\*72\*50) mm
- Weight: approx. 232g (including batteries)

## VI. EXTERNAL STRUCTURE






1. Sound alert indicator
2. LCD display
3. Function / range knob
4. Measuring input terminal
5. Function select
6. Data hold / Turn on/off the back light
7. Relative value measurement; Turn on/off the torch
8. NCV sensing area
9. Holder
10. Screws for fixing the battery box
11. Bracket for fixing the test leads

## VII. LCD DISPLAY






<b>APO</b>	Auto power off
<b>DC</b>	Direct current measurement
<b>H</b>	Data hold
	Battery low voltage
<b>REL</b>	Relative value measurement
	Diode/continuity test
<b>nFVVA</b>	Capacitance, voltage, current


<b>AUTO</b>	Auto range
<b>AC</b>	Alternating current measurement
<b>NCV</b>	Non-contact ACV measurement
<b>°C°F</b>	Celsius, Fahrenheit
	High voltage
<b>%</b>	Duty cycle
<b>MkΩHz</b>	Resistance, Frequency

## VIII. KEY DESCRIPTION

1. Data hold: Short press “HOLD” key, the



present value will keep on the LCD, press this key again to exit this function.

 Warning: to prevent electric shock, fire or personal injury, do not use the data hold function to measure the unknown voltage. When open the HOLD function, the LCD will keep original data when measuring a different voltage.

2. Backlight function: Long press the “HOLD B/L” key to turn on/off the backlight, it will be auto powered off after 15 seconds since the back light is on.
3. Turn on/off the "REL/ " function: Short press the "SELECT" key to switch the Celsius and Fahrenheit at the temperature range
4. Cancel the auto power off function: Press the REL key to turn on the meter, the “APO” symbol disappears, and then the

auto power off function closed.

## **IX. MEASUREMENT INSTRUCTIONS**

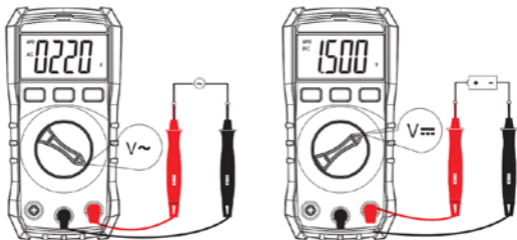
First of all, please check the battery, and turn the knob to the proper range that you need. If the battery is out of power, the "" symbol will appear on the LCD. Pay attention to the  symbol next to the jack for test leads. This is a warning that the voltage and current should not exceed the displaying value.

### **1. DCV and ACV measurement**

1-1. Set the range knob to a proper DCV/ACV range, if the range of voltage under tested is unsure beforehand, you should set the range knob to the highest range, then reduce it gradually until get the highest resolution readings.

1-2. Insert the black test lead to "COM" jack,

the red one to  $\text{V}\Omega\text{Hz}$   
 $\text{mA}\text{A}\text{(-)}$  jack.



1-3. Connect the test leads to the test point, the LCD displays the voltage value under tested. When measuring DCV, the polarity and the voltage value of this point which connects to the red test lead will display on the LCD.

**NOTE:**

(1). Do not measure voltage higher than 600V, although it is possible to get the reading, it will damage the inner circuit and hurt yourself. If the range of voltage under tested is unsure beforehand, please start

- from the highest range then find the proper range according to the reading.
- (2). If LCD displays “OL”, it means over range, you should set the range knob to a higher range. In each range, the input impedance of the meter is  $10\text{M}\Omega$ . This load effect will cause measuring error when measuring the high resistance circuit. If the impedance of the circuit under test is less than  $10\text{k}\Omega$ , the error can be ignored (0.1% or less than 0.1%)
  - (3). After completing all the measurement operation, please disconnect the test leads from the circuit under test.
  - (4). When measuring more than 24V AC/DC, the LCD will show high voltage symbol. Please wear personal protective equipment (such as approved rubber gloves, face masks, and flame-retardant

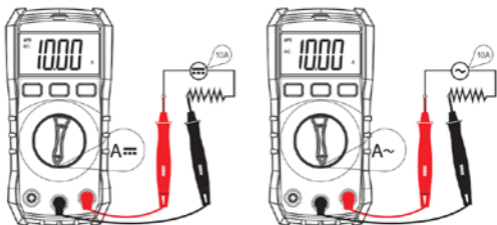
clothing etc.) to prevent the injury from electric shock and arc when charged conductors are exposed.

## 2. DCA measurement

2-1. Set the knob to a proper range, and then connecting the test leads to the circuit under test in series. When measuring DC value, the polarity and the current value of this point which connects to the red test lead will display on the LCD.

2-2. Insert the black test lead to “COM” jack,

the red one to “ $\overset{V\Omega\pm}{mA\rightarrow}$ ” or “10A” jack.




## **NOTE:**

- (1). Although for the current which is less than 200mA we have set the overvoltage protection, when the measured voltage between the input terminal and the ground exceeds 60V, do not try to measure the DCA value, to avoid damage to the instrument or the device under tested and hurt yourself. This kind of voltage will bring the risk of electric shock,
- (2). Be sure to cut off the power under tested before measurement, carefully check whether the input terminal and the range knob position are correct, then power on the meter and operate after confirming everything is no problems. If the range of current under tested is unsure beforehand, should set the range knob to

the highest range, and then reduce it gradually.

- (3). Input overload at the mA input jack will blow the built-in fuse, in this case the fuses should be replaced. The dimension of the fuse is  $\varnothing 5*20\text{mm}$ , and the electrical specification is 200mA / 250V. There's no built-in fuse for the 10A input jack, for safe use, each measuring time should be less than 10s, interval time should be more than 15 mins.

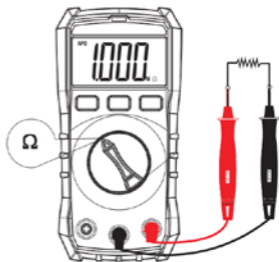
### **3. Resistance measurement**

- 3-1. Set the range knob to a proper resistance range, and connecting the test leads across to the resistance under measured.
- 3-2. Insert the black test lead to “COM” jack and the red one to “ ” jack.

**NOTE:**



(1).When measuring in-line resistance, be sure the circuit under tested has been switched off and all capacitors are fully discharged.




(2). At range 200  $\Omega$ , the test leads lead will cause 0.1~0.3 $\Omega$  resistance measuring error. In order to get the accurate result, short-circuit the test leads to measure the wire resistance, then subtracts it from the reading.

(3). When the resistance is over 1M $\Omega$ , the meter may take a few seconds to stabilize. This is normal for high resistance readings.

(4). Do not input any voltage at resistance range.

#### 4. Diode and continuity test

4-1. Insert the black test lead to “COM” jack,

and the red one to “” jack.

4-2. Set the range knob to the diode/continuity test range. (The range diode/continuity test is auto conversion) Connect the red test lead to the positive of the diode and the black one to the negative.

4-3. the reading on LCD is the diode positive voltage drop. If mistake the polarity, it will show “OL” on LCD.

4-4. Connect the test leads to two ends of the measured circuit, if the resistance is lower than approx.  $(50 \pm 20) \Omega$ , the buzzer sounds.

#### **Note:**

To avoid the damage of the meter, before measuring diode in-line, be sure the power

has been switched off and all capacitors are fully discharged.

The diode range can be measured the voltage drop of the diodes and other semiconductor

component. For a

normal structure of silicon semiconductor, the forward voltage drop should be  $0.5V \sim 0.8V$ .

If you mistake the test leads connection, it will display "OL" and means it is an open circuit. Now the black test lead connect to the "+", and the red one to "-".



## 5. Frequency measurement

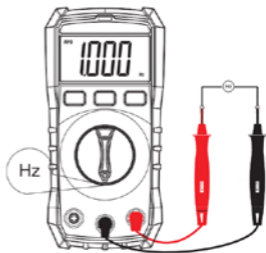
5-1. Turn the knob to frequency range, and connect the test leads or shielded cable across the signal source or the load under tested.

5-2. Insert the black test lead to the "COM" jack and the red one to the "  $V\Omega Hz mA \rightarrow (-)$  " socket

**Note:**

(1) When input 10Vrms, LCD can display readings, but it's not sure if the reading is accurate.

(2) It is preferable to use shielded cable for measuring small signal in noisy environment.



(3) Be careful when measuring high voltage (above AC/DC 24V). Please wear the personal protective equipment (such as approved rubber gloves, face masks, and flame-retardant clothing etc.) to prevent

the injury from electric shock and arc when charged conductors are exposed.

- (4) Do not input a voltage over DC 250V or AC peak value to avoid damage to the meter.
- (5) The range is 20k Hz (irrevocable range).

## **6. Temperature measurement**

6-1. When measuring temperature, insert the negative of the thermocouple sensor into the "COM" jack, and insert the positive

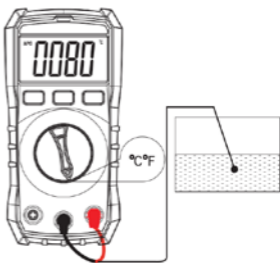
into the  jack;

6-2. Turn the knob to the temperature range, and put the sensing part of the temperature probe on or inside the tested object.

6-3. Read the value from the LCD and press "SELECT" key to switch between Celsius and Fahrenheit.

**Note:**

(1) There is a K-type thermocouple along with the meter when you buy this product, and the limit temperature of this kind of thermocouple is  $250^{\circ}\text{C}$ . If you want to measure higher temperature, you



need to buy other type of temperature probe

- (2) When the temperature probe is moved away from the jack of the meter, the value on LCD is the inner temperature of the meter.
- (3) Do not input a voltage higher than DC 60V or AC 30V to avoid the damage of the instrument and hurting yourself.

## **7. Non-contact voltage sensing measurement NCV**

7-1. Set the knob to NCV range

7-2. The NCV sensing voltage range is 48V~220V. Put the upper part of the meter close to the AC power line under test. When sensing the voltage of AC line, the red indicator will flash on the upper part of the meter and the buzzer will sound. The closer the AC power line is, the stronger the voltage of AC line shows, the faster the indicator flashes and buzzer sounds.

## **8. Auto power off**

In order to save the battery energy, auto power off function already set by default when you turn on the meter, if you have no any operation in 14 minutes, the meter will beep for three times to hint, if there's still

no any operation, the meter will long sound and auto power off after one min..

## X. TECHNICAL CHARACTERISTIC

Accuracy:  $\pm(a\% \times \text{rdg} + d)$  at  $(23 \pm 5)^\circ\text{C}$ ,

R.H. <75%

### 1. DCV

Range	Accuracy	Resolution	Overload protection
200mV	$\pm(0.5\%+5)$	0.1mV	250V DV/AC RMS
2V	$\pm(0.5\%+3)$	0.001V	600V DV/AC RMS
20V		0.01V	
200V		0.1V	
600V	$\pm(1.0\%+10)$	1V	

Input impedance: About  $10\text{M}\Omega$



## 2. ACV True RMS measurement

Range	Accuracy	Resolution	Overload protection
200V	$\pm(1.2\%+10)$	0.1V	600V
600V		1V	DV/AC RMS

 Input impedance: About 10M $\Omega$

Measuring scope of accuracy: 10% - 100% of the range; Frequency response: 40Hz-1kHz

Measuring way (sine wave): True RMS

Crest factor:  $CF \leq 3$ , when  $CF \geq 2$ , add an additional error of 1% of the reading

## 3. DCA

Range	Accuracy	Resolution	Load voltage
200 $\mu$ A	$\pm(1.0\%+10)$	0.1 $\mu$ A	0.1mV/ $\mu$ A
200mA	$\pm(1.2\%+8)$	0.1mA	3.64mV/mA
10A	$\pm(2.0\%+5)$	0.01A	16.3mV/A

⚠ Max. Input current: 10A ( less than 10 seconds)

Overload protection: 200mA/250V fast-melt fuse, no fuse at the 10A range.

Measuring time: Should be less than 10 seconds; Interval time: Should be more than 15 minutes

#### 4. Resistance ( $\Omega$ )

Range	Accuracy	Resolution	Short-circuit current
200 $\Omega$	$\pm(0.8\%+5)$	0.1 $\Omega$	About 0.3mA
2k $\Omega$	$\pm(0.8\%+3)$	0.001k $\Omega$	About 0.3mA
20k $\Omega$		0.01k $\Omega$	About 80uA
200k $\Omega$		0.1k $\Omega$	About 10uA
20M $\Omega$	$\pm(1.0\%+5)$	0.01M $\Omega$	About 0.1uA

⚠ Measuring error does not include lead resistance

Open-circuit voltage: About 1V

Overload protection: 250V DV/AC rms


## 5. Frequency


Range	Accuracy	Resolution	Overload protection
20kHz	$\pm(1.0\%+10)$	0.01kHz	250V DV/AC rms

⚠ Note: The reading will be zero for the signal which is less than 3Hz; Input sensitivity: 1V RMS.

## 6. Diode and continuity test

Range	Displaying value	Test condition
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	Positive voltage drop of diode	Measuring current: about 0.4 mA Open circuit voltage: about 2V
	Buzzer sounds long, the resistance of two points is less than $(50 \pm 20)\Omega$	Measuring current: approx. 0.2mA

 Warning: Do not input any voltage at this range.

Overload protection: 250V DV/AC rms

Error: 5%


## 7. Temperature

Range	Accuracy	Resolution
-20°C~1000°C	$< 400^{\circ}\text{C} \quad \pm$ (1.0%+5) $\geq 400^{\circ}\text{C} \quad \pm$ (1.5%+15)	1°C
-4°F~1832°F	$< 752^{\circ}\text{F} \quad \pm$ (1.0%+5) $\geq 752^{\circ}\text{F} \quad \pm$ (1.5%+15)	1°F

 Sensor: Type-K thermocouple (NiCr – NiSi)  
probe


Overload protection: 250V DV/AC rms

## **XI. BATTERIES AND FUSE EPLACEMENT**

If the " " symbol displays on the LCD, it means the battery needs to be replaced, please follow below steps:

1. Move the test leads from the circuit under test, pull out the test lead from the input jack, and turn the range knob to "OFF".
2. Use a screwdriver to twist off the screws on the battery cover, and remove the battery cover and bracket.
3. Take out the old battery or the broken fuse, then replace with a new battery or a new fuse.
4. Close the battery cover and use a screwdriver to tighten the screws on the battery cover.
5. Battery specifications: 1. 5V \* 2 AAA LR03.
6. Fuse specifications: mA input fuse

"FS1":  $\varnothing 5 * 20\text{mm}$  200mA/ 250V

7. Note: When the low voltage "  " symbol displays on the LCD, the battery should be replaced immediately, otherwise the measuring accuracy will be affected.

## **XII. MAINTENANCE AND CARE**


It is an accurate meter. Do not try to modify the electric circuit.

8. Beware of waterproof, dust-proof and shockproof.
9. Do not operate and store the meter in the circumstance of high temperature, high humidity, and flammability, explosive and strong magnetic field.
10. Use the damp cloth and soft solvent to clean the meter, do not use abrasive and alcohol.

11. If you do not operate it for a long time, you should take out the battery.
12. When replacing the fuses, please use the fuse with the same type and specification.

### **XIII. Troubles**

If the meter does not work properly, check the meter as following:

Condition	Solutions
No reading on LCD	<ul style="list-style-type: none"> <li>● Turn on the meter</li> <li>● Replace battery</li> </ul>
 symbol displays	<ul style="list-style-type: none"> <li>● Replace battery</li> </ul>
No current input	<ul style="list-style-type: none"> <li>● Replace fuse</li> </ul>
Error value	<ul style="list-style-type: none"> <li>● Replace battery</li> </ul>
Dark displaying	<ul style="list-style-type: none"> <li>● Replace battery</li> </ul>



This user's manual is subject to any change without further notice.

The content in this user's manual is deemed correct; if you find any mistake, omission, etc, please contact the manufacturer.

We will not be held liable for any accidents or harms caused due to your wrong operations.

The functions set forth in this user's manual shall not be regarded as reasons for applying this product for special purposes.

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