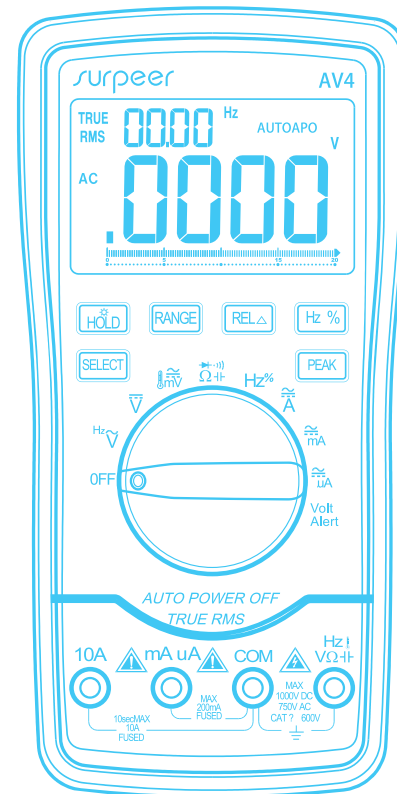


surpeer

4 $\frac{1}{2}$ DIGITAL MULTIMETER

INSTRUCTIONS



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1 OVERVIEW

SURPEER AV4 is a 20000 4 1/2 digital instrument with high precision, stable performance, battery-driven high reliability and high accuracy. The instrument has a large LCD screen with 21mm x-letter so that you can read the value clearly. It has a function of keeping peak value and can also be used to measure DC voltage and AC voltage, DC current and AC current, resistance, capacitor, diode, temperature, continuity, electric field induction testing, frequency and other parameters. The whole machine uses double integral A / D conversion, a perfect choice for laboratories, factories, radio enthusiasts and home use.

2 SAFETY PRECAUTIONS

The multimeter is designed in accordance with IEC1010 (the safety standards issued by International Electrotechnical Commission). Please read safety precautions first before use.

- 1. When measuring the voltage, do not input more than 1000V DC or AC 750V RMS voltage;
- 2. Voltage below 36V is the safety voltage, measured at 36V DC, 25V AC voltage, you need to check whether the testing lead is reliable, whether it has correct connections, whether the insulation is good to avoid electric shock;
- 3. When converting mode and range, please make sure testing lead leave the test point;
- 4. You should select the correct function and range, and beware of misuse. The instrument have full range of protection, but for safety reasons, please pay more attention;
- 5. When measuring the current, do not input more than 10A current;
- 6. The meaning of safety symbols:



means there is dangerous voltage,



means connection with ground,



means double insulation,




means the operator must refer to the instructions,



means low voltage.

3 CHARACTERISTICS

- 1.General characteristics
 - 1-1 Display: LCD display;
 - 1-2 Maximum display: 20000 (4 1/2) bit automatic polarity display;
 - 1-3 Measurement method: double integral A / D conversion;
 - 1-4 Sampling rate: about 3 times per second;
 - 1-5 Overrange display: the highest bit was "OL";
 - 1-6 Low voltage display:  symbol appears;
 - 1-7 Working environment: (0 ~ 40) °C , relative humidity <8 0%;
 - 1-8 Power: 9V (NEDA1604 / 6F22);
 - 1-9 Volume (size): 184 *90 *46mm (length ,width and height);
 - 1-10 Weight: about 320g (including 9V battery);
 - 1-11 Accessories: a manual, a warranty card, a pair of probes, thermocouple and 9V (NEDA1604 / 6F22 or equivalent models)

● 2. Technical characteristics

2-1 Accuracy: (a% + minimum number of digits), ambient temperature: (23.5) °C, relative humidity <75%, calibration guarantee: one year from the day it leaves the factory.

2-2 Performance

- DC Voltage
- AC Voltage
- A/DC Current uA
- A/DC Current 10A
- Resistors Diodes and Continuity
- Capacitors, C
- Frequency, f
- Temperature °C/ °F
- Auto-off
- Back Light Display
- Unit Symbol Display
- RMS Value Testing
- Electric Field Testing

2-3 Technical indicators (note ★ means that the equipment doesn't have this range)

2-3-1 DC voltage (DCV)

Range \ Accuracy	AV4	Resolution ratio
200mV	(0.05%+5)	0.01mV
2V		0.0001V
20V		0.001V
200V		0.01V
1000V	(0.08%+10)	0.1V

Input impedance: 10M Ω ;
 Overload protection: 200mV range of 550V DC or AC peak; the remaining 1000V DC or 750V AC peak.

2-3-2 AC voltage True RMS (ACV)

Range \ Accuracy	AV4	Resolution ratio
200mV	(0.06%+25)	0.01mV
2V		0.0001V
20V		0.001V
200V		0.01V
750V	(0.8%+15)	0.1V

Input impedance: 10M Ω ;
 Standard sine wave and triangular wave frequency response of 40Hz-1kHz;
 Other waveform frequency response 40Hz-200Hz;

2-3-3 DC

Range \ Accuracy	AV4	Resolution ratio
200uA	(0.5%+4)	0.01uA
2000uA		0.000mA
20mA	(0.8%+6)	0.001A
200mA		0.01A
10A	(1.0%+6)	0.1A

Maximum measurement pressure drop: 200mV; Maximum input current of 10A;
 Overload protection: 200mA/250V glass instant fuse, 10A / 250V ceramic instant fuse (10A continuous measurement <10 seconds).

2-3-4 AC

Range \ Accuracy	AV4	Resolution ratio
200uA	(0.5%+4)	0.01uA
2000uA		0.000mA
20mA	(0.8%+6)	0.001A
200mA		0.01A
10A	(1.0%+6)	0.1A

Maximum measurement pressure drop: 200mV; Maximum input current of 10A;
 Overload protection: 200mA/250V;
 Glass instant fuse, 10A / 250V ceramic instant fuse (10A continuous measurement <10 seconds)
 When measuring the AC voltage, the frequency shows only when the threshold voltage of the sub-display is greater than 12mV.
 Frequency response: sine wave and triangular wave is 40Hz-1Kz, other waveform is 40Hz-200Hz;
 Display: True RMS.

2-3-5 Resistor (Ω)

Range \ Accuracy	AV4	Resolution ratio
200 Ω	(0.3%+10)	0.01 Ω
2kΩ	(0.3%+5)	0.1Ω
20kΩ		1Ω
200k Ω		10Ω
2MΩ		100Ω
20MΩ	(1.2%+25)	1K Ω

Open circuit voltage: below 3V; Overload protection: 550VDC or AC peak value;

Note:

A: When you use the range of 6 00 , you should short the testing pencil first, you will get the wire resistor , then subtract the value in the real testing;

B: When you test the resistor over 1M ,it is normal that the reading value will display slowly, you should read the value after the value is steady.

2-3-6 NCV testing (only AV4)

When converting to NCV function , the instrument is near the electric field.The buzzing sound will go in line with the intensity of electric field.

2-3-7 Capacitor

Range	Accuracy	AV4	Resolution ratio
20nF		(3.0%+20)	1pF
200nF			10pF
2uF			0.1pF
20uF			1pF
200uF		(5.0%+10)	10pF
2000uF			100pF

Overload protection: 550V DC or AC peak value.

2-3-8 Frequency (f)

Range	Accuracy	AV4	Resolution ratio
10Hz		(0.01%+3)	0.001 Hz
100Hz			0.01 Hz
1k Hz			0.1 Hz
10k Hz			1 Hz
100k Hz			1 0Hz
1M Hz/20M Hz		(0.8%+15)	100Hz/1k Hz

Input sensitivity: 1.5V RMS; Overload protection: 550V DC or AC peak value (not over 10 second) .

2-3-8 Temperature

Range	Accuracy	AV4	Resolution ratio
(-20-100) °C		(1.0%+5)<400°C (1.5%+15)≥400°C	1°C
(0-1832) °F		(0.75%+5)<750°C (1.5%+15)≥750°C	1°F

2-3-9 Diode and continuity test

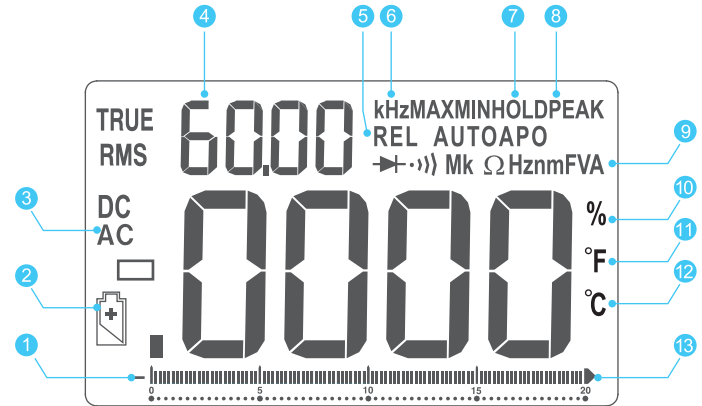
Range	Display value	Resolution ratio
(-20-100)	Positive diode Voltage drop	Positive DC current about 1mA, Open circuit voltage about 3V.
(0-1832)	Buzzer with long buzzing Sound The resistance of 2 testing point below (50±2.0) Ω	Open circuit voltage about 3V Press "SELECT"can convert the 2 function

Overload protection: 550V DC or AC peak value;

Warning: For safety reason, please do not input a voltage value!

4 USING METHOD

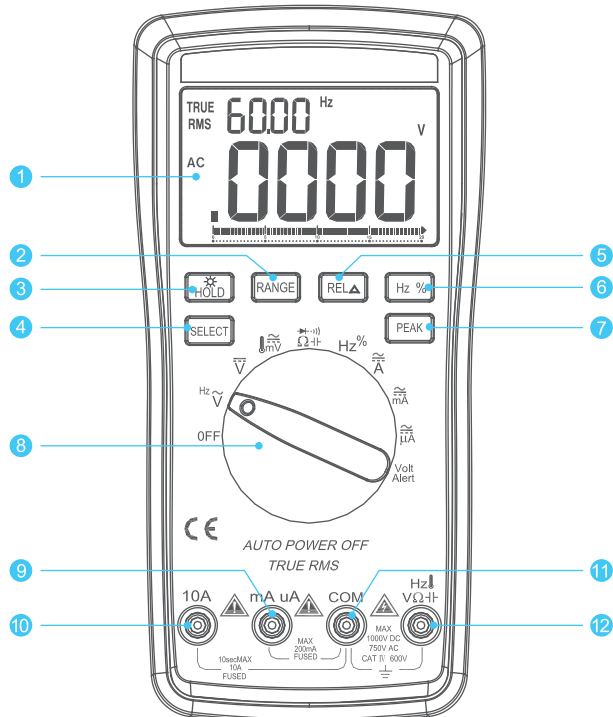
- 1. Display screen (See picture 1)



(Picture 1)

- | | |
|--|-------------------------------|
| ① Negative polarity display | ⑦ Enable "keep reading value" |
| ② Battery has insufficient electricity should change at once | ⑧ Enable "keep peak value" |
| ③ AC symbol | ⑨ Current symbol |
| ④ Secondary display | ⑩ Percentage |
| ⑤ Enable relative value testing | ⑪ Fahrenheit |
| ⑥ Secondary display frequency indication | ⑫ Celsius |
| | ⑬ Simulated bar indication |

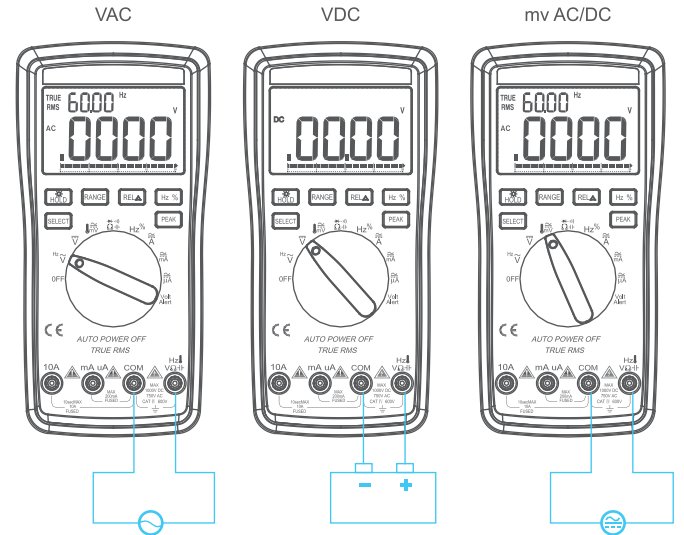
• 2. Operation panel (See picture 2)



(Picture 2)

- | | |
|--|---|
| 1 LCD display | 7 "PEAK" is peak value key |
| 2 Range converter | 8 Function converting button |
| 3 Keep reading value, Long press 3 seconds to convert to backlight model | 9 "mA""+"input hole |
| 4 Function selection key | 10 "10A""+"input hole |
| 5 REL relative testing value key | 11 COM input point, negative input point, input hole |
| 6 Frequency percentage convert key | 12 Voltage, resistance, diode, apacitor, frequency, ctemperature, "+"input hole |

• 3.AC voltage and DC voltage measurement (See picture 3)



(Picture 3)

- 1 Convert the rotary switch to DC/AC voltage. " ∇ ∇ ∇ ∇ " "
- 2 Pressing "SELECT" could convert between mVDC and mVAC voltage.
- 3 Connect red wire to " ∇ ∇ ∇ ∇ " "
- 4 In order to test the voltage, use test lead connect to correct testing point, in picture 3.
- 5 Read the voltage value on the screen.

3-1 DC voltage measurement

1. Insert the black test lead into the "COM" jack and the red test lead into the jack of " ∇ ∇ ∇ ∇ " "
2. Switch to " ∇ ∇ " or " ∇ ∇ " , when the measured value is less than DC600mV, select the gear " ∇ ∇ " , trigger "SELECT" key to switch between DCMV / ACMV.
3. The test meter pen can be selected to touch the test point, the screen shows the measured voltage value, for the red pen connect the voltage polarity of the point.

Note:

1. Do not exceed the input voltage of DC1000V or AC750 V, otherwise there would be risks of damage to the instrument circuit.
2. When measuring high voltage circuit, pay special attention to avoid electric shock.
3. After completing all the measurement operations, disconnect the test leads from the circuit under test.

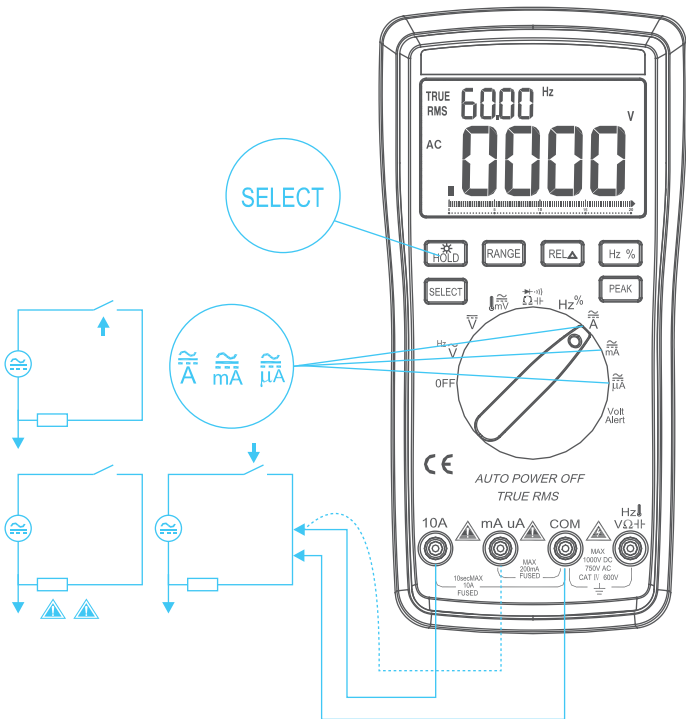
3-2 AC voltage measurement

1. Insert the black test lead into the "COM" jack and insert the red pen into the jack of " $\sqrt{\Omega}$ Hz ".
2. Turn the range switch to " \sqrt{V} or \sqrt{mV} ", when the measured value is less than AC6 0 0mV, select the gear of " \sqrt{A} ", trigger "SELECT" key, select measurement function of ACmV.

Notice:

1. There are some residual numbers in each range before the test, but it does not affect the measurement accuracy;
2. The input voltage should not exceed 750Vrms, otherwise there may be risks of damage to the instrument circuit;
3. When measuring high voltage circuit, pay special attention to avoid electric shock;
4. After completing all the measurement operations, disconnect the test leads from the circuit under test.

4.AC current and DC current measurement (See Figure 4)



(Figure 4)

Measuring AC current or DC current

 warning:

To prevent possible electric shock, fire or personal injury, while measuring Current, firstly disconnect power supply circuit, and then connect the meter to the circuit, the product will be connected in series with the circuit.

- 4-1 Turn the rotary switch to the current gear of " \sqrt{A} \sqrt{mA} \sqrt{uA} ".
- 4-2 Press the "SELECT" key to switch between AC and DC current.
- 4-3 Connect the red test leads to the A or mA, uA terminals, and connect the black test leads to the COM terminal according to the current to be measured. As shown in Figure 4
- 4-4 Disconnect the circuit path to be tested. The test leads are then disconnected and the power supply is applied
- 4-5 Read the measured fluid on the display.

(1) DC current measurement

1. Insert the black test lead into the "COM" jack and insert the red test lead into the "mA" or "uA" jack (up to 20mA), or the red test lead

Insert "10A" (maximum 1 0A): the current default is the DC current, "SELECT" for the AC and DC current conversion key.

2. Turn the range switch to the corresponding current range, and then string the meter into the circuit to be tested. The current value of the measured current and the current polarity of the red pen will be displayed on the screen at the same time.

Note:

1. Before the instrument is connected in series with the circuit to be tested, turn off the power in the circuit;
2. If you have no idea what the measured current range is in advance, the range switch should be transferred to the highest gear, and then switch to corresponding gear according to the display value. If the screen was "0L", it indicates that the range has exceeded. The range switch should be transferred to the corresponding gear position;
3. The maximum input current is 200mA or 10A (depending on the red pen insertion position), too much current will damage the mA fuse file, pls pay attention when measuring 10A range, each measurement time shall not be over 10 seconds, too much current will heat the circuit and even damage the instrument;
4. When the test leads are inserted in the current input port, do not put the test leads in parallel to any circuit, otherwise it will damage the fuses and instruments;
5. After completing all the measurement operations, you should first turn off the power and then disconnect the test pen and test circuit, the measurement of high current is more important;
6. Do not input voltage larger than 36V DC, 2.5V AC in the current jack and the "COM" jack.

(2) AC current measurement

1. Insert the black test lead into the "COM" jack and insert the red test lead into the "mA" or "uA" jack (max. 200mA) or the red pen into "10A" (up to 10A): the current default is DC current, "SELECT" is the conversion key for AC/DC current.
2. Turn the range switch to the corresponding current range, and then string the instrument into the test circuit. The current polarity of the measured current value and the red pen point will be displayed on the screen at the same time.

Note:

1. Before the instrument is connected in series with the circuit to be tested, turn off the power in the circuit.
2. If you don't know what measured current is in advance, the range switch should be transferred to the highest gear, and then switch to corresponding gear according to the display value. If the screen was "OL", it indicates that the range has exceeded, the range switch should be transferred to the corresponding gear position.
3. The maximum input current is 200mA or 10A (depending on the red pen insertion position may be), too much current will damage the mA fuse file, pls pay attention while measuring 10A range, each measurement time shall not be over 10 seconds, too much current will heat the circuit, and even damage the instrument.
4. When the test leads are inserted in the current input port, do not put the test leads in parallel to any circuit, otherwise it will damage the fuses and instruments.
5. After completing all the measurement operations, you should first turn off the power and then disconnect the test pen and test circuit, the measurement of high current is more important.
Do not input voltage larger than 36V DC, 2.5V AC in the current jack and the "COM" jack.

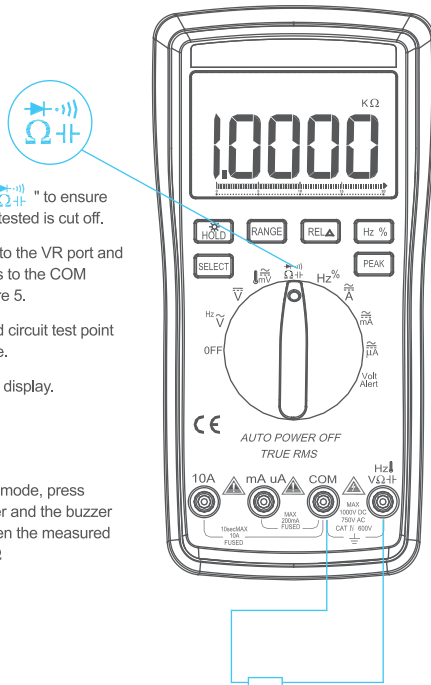
• 5. Resistance Measurement (See Figure 5)

- 5-1 Turn the rotary switch to " Ω " to ensure that the power circuit to be tested is cut off.
- 5-2 Connect the red test leads to the VR port and connect the black test leads to the COM terminals as shown in Figure 5.
- 5-3 Put the probe in the desired circuit test point and measure the resistance.
- 5-4 Read the resistance on the display.

Continuity test

To test continuity

After selecting the resistive mode, press SELECT to enter the buzzer and the buzzer will sound continuously when the measured resistance is less than 50 Ω



(Figure 5)

• 6. Resistance Operation

- 6-1 Insert the black test lead into the "COM" jack and insert the red pen into the jack of " $V\Omega Hz$ "
- 6-2. Switch to " Ω " , press "SELECT" button and select the resistance gear.
- 6-3. Connect the two test leads to both ends of measured resistance.

Note:

1. If the measured resistance is open circuit or the resistance exceeds the selected range value, the screen will display "OL". When the measured resistance value exceeds 1M or more, the reading takes a few seconds to stabilize, which is normal when measuring the high resistance;
2. When measuring low resistance, the meter pen contains internal resistance. In order to obtain accurate reading, you can record short-circuit value of the test pen, then subtract the value in the measurement reading;
3. When measuring the on-line resistance, it is necessary to turn off all the power of the circuit under test and discharge all the capacitors completely to ensure the accuracy of measured values;
4. Do not input voltage in the resistance range, which is absolutely prohibited.

• 7. Capacitance Measurement

- 7-1 .Insert the black test lead into the "COM" jack and insert the red pen into the jack of " $V\Omega Hz$ "
- 7-2 Turn to gear " Ω " , trigger " Select " button, select the automatic measurement of the capacitor
- 7-3 Then put the test pens on the measured capacitance at both ends.

Notice:


1. When measuring capacitance with 20nF, the screen display value may have residual reading. This number is the distributed capacitance of the test pen. In order to measure precisely, you can subtract this value after the measurement.
2. Large capacitance measurement with serious leakage or breakdown of the capacitor will show some unstable numerical; when measuring large capacitors, the reading takes a few seconds to stabilize, which is normal.
3. Before testing capacitor capacity, the capacitor should be fully discharged to prevent damage to the fuse and the instrument.

Unit: 1 F=1000mF ImF=1000 uF luF=1000nF 1 nF=1000pF

• 8. Diode and continuity test

- 8-1 Insert the black test lead into the "COM" jack and insert the red pen into the jack of " $V\Omega Hz$ " (note that the red pen has a polarity of "+");
- 8-2 Switch to " Ω " to trigger the "SELECT" key. Select the diode measurement, and connect the test leads to the diode. The reading is an approximation of the forward voltage drop of the diode. For silicon PN junctions, 500mV ~ 8 0mm confirmed as normal; If the measured diode open or reverse polarity, then display "OL";
- 8-3 Trigger "SELECT" key, select the buzzer measurement, connect the test leads to the two points of the line to be measured. If the built-in buzzer sounds and the on-off alarm indicator is on, the resistance between the two points is less than about 50 Ω

Note :

Do not enter the voltage in the "  " gear, in case of causing damage to the instrument.

● 9. Frequency Measurement

9-1 Insert the test leads or shielded cables into the "COM" and jack of " VΩHz "

9-2 Turn the range switch to the frequency gear and connect the test leads or cables to the source of signal or to the load under test.

Note:

1. When the input exceeds 10Vrms, it can be read, but it may be out of tolerance;
2. In a noisy environment, it is best to use a shielded cable when measuring small signals;
3. When measuring high voltage circuit, pay particular attention to avoid electric shock;
4. Do not input voltage more than 250V DC or AC peak, in case of damaging the instrument.

● 10.Data hold / on and off of backlight

Press the "HOLD" key to keep the data, long press" HOLD "for 3 seconds, the backlight is on, long press for 3 seconds, the backlight is off automatically.

● 11. Automatic on/off machine

When the instrument remains unused for about 15 minutes later, it will automatically turn off into the dormant state; if you need to restart the power, switch to OFF gear and turn the knob to other gears. Press and hold the "SELECT" button, and turn on the power switch, the screen "APO" symbol disappears, it will cancel the automatic shutdown function.

5 TROUBLESHOOTING

If your instrument does not work properly, the following methods will allow you to quickly solve the general problem. If you still cannot solve problems, please contact the service center or dealer.

Malfundions	Check the location and methods
Not shown	Battery not connected Replace the battery
Symbol exit	Replace the battery
Current is not input	Replace fuse
Display error	Replace the battery

6 INSTRUMENT MAINTENANCE

This multimeter is a precision instrument. Don't arbitrarily change the circuit.

- 1. Prevent it from water, dust and dropping;
- 2. Do not store and use instrument under high temperature or a humid, flammable, explosive and strong magnetic environment.
- 3. Please use a damp cloth and a mild detergent to clean the meter surface, do not use abrasive and alcohol and other strong solvents.
- 4. If you do not use the instrument for a long time, you should remove the battery to prevent the battery leakage to corrode the instrument.

4-1 Pay attention to the battery usage, when the screen shows the symbol, you should replace the battery, the steps are as follows

4-1-1 Unscrew the screws that secure the battery cover and detach the battery cover:

4-1-2 Remove the battery and put on a new battery. It would be better to use alkaline batteries

4-1-3 Install the battery cover and tighten the screws.

4-2 Fuse replacement

When replacing the fuse, use a fuse of the same type.

7 LEGAL DISCLAIMER

This manual is subject to change without notice;

The contents of this manual is considered correct, if the user should find that there are errors, omissions, etc., please contact the manufacturer

The Company does not assume any responsibility for any accidents and hazards caused by incorrect operation of the user;

The functions described in this manual are not intended to be used for special purposes.