USER'S MANUAL

DIGITAL MULTIMETER

1. Overview

The instrument is a high reliability digital multimeter driven by battery, with stable function and performance. The meter uses LCD display for clear reading and more convenient use.

This instrument has the function of measuring DC voltage and AC voltage, DC current and AC current, resistance, capacitance, diode, transistor, continuity test, Live(mains power line judgment);The whole machine with A/D conversion as the core, it is a superior performance instrument, is the ideal tool for laboratories, factories, radio enthusiasts and families.

2. Open the Package for Checking

Open the box, take out the meter, checking the items below if they are missing or damaging:

1. Manual 1pc
2. Test leads 1pair
3. 9V Battery 1pc

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

3. Comprehensive Characteristics

1-1. Display mode : LCD display;

1-2. Maximum display: 1999 (3 1/2 bits) automatic polarity display;

1-3. Measurement method: double integral A/D conversion;

1-4. Sampling rate: about 3 times per second;

1-5. Over range display: the highest bit display "OL" or "-OL";

1-6. Low voltage display: " " symbol appears;

1-7.Working environment: (0 ~ 40)℃, relative humidity <80%RH

1-8.Storage environment :-20℃ ~ 60℃, relative humidity <85%RH;

1-9.Power supply: one 9V battery;

1-10.Volume (size) :(167×81×43) mm

1-11.Weight: Approx. 167g (No batteries)

4. Measurement Operation Instructions

First please pay attention to check the battery, put the knob in the desired measurement position, if it is with low battery, the LCD display will appear " " symbol. Note the symbol "⚠" next to the test lead jack which warns you to pay attention to the test voltage and current do not exceed the indicated value

(I). AC and DC voltage measurement

A. Turn the knob to the appropriate ACV/DCV gear. If the measured voltage is unknown, should select a larger range and gradually reduce it until obtain the highest resolution reading

B. Insert the red watch pen into the " " jack and the black watch pen into the "COM" jack.

C. Touch the test marker reliably to the test point, and the screen will display the measured voltage; When measuring the DC voltage display, it is the voltage and polarity of the point connected to the red marker.

⚠ Attention

1) .Do not measure DC voltage higher than 1000V or AC voltage higher than 750V, although it is possible to read the reading, but it will damage the internal circuit and harm yourself, before measuring if you do not know the range of voltage values to be measured, you should set the range switch to high range, according to the reading needs to gradually lower the measurement range .

2) When the LCD only displays "OL" at the high level, it indicates that the range has been exceeded, and the range must be adjusted higher. At each range,the input impedance of the meter is 10MΩ. This load effect will cause measurement errors when measuring high resistance circuits. If the impedance of the circuit under test is less or equal than10kΩ, the error can be ignored (0.1% or less).

3) After completing all measurement operations, disconnect the watch pen from the measured circuit.

4) .When measure the AC/DC voltage is higher than 24V, a high voltage symbol appears on the on-screen meter. The tester should wear personal protective equipment (approved rubber gloves, masks and flame-retardant clothing, etc.) to prevent electric shock and electric arc injury when the dangerous live conductor is exposed.

(II). AC/DC current measurement

A. Turn the knob to the corresponding AC/DC current gear, and connect the pen string to the power supply or circuit under test. When testing DC, the current polarity of the red marker point will be displayed on the screen simultaneously.

B. Insert the red pen into the "mA" socket (up to 200mA), or insert the red probe into the "10A" socket (up to 10A) and the black probe into the "COM" jack.

⚠ Attention

1) Before measurement, be sure to cut off the measured power supply, seriously check whether the position of the input end and the range switch is correct, and confirm that it is correct before power on measurement. If you do not know the range of the measured current value, the range switch should be set to a high range, and gradually lower according to the reading needs.

2) .For mA input jack, input overload will blow the internal fuse, must be replaced. Fuse dimensions ϕx20mm, electrical specifications 200mA /250V; 10A input jack, no internal fuse; For safe use, each measurement time should be less or equal than 10 seconds, and the interval time should be greater or equal than 15 minutes.

(Ⅲ).Resistance measurement

A. Turn the knob to the corresponding resistance range, and then connect the two probes on the resistance being measured.

B. Plug the black pen into the "COM" socket and the red pen into the " ᵛΩ⊣ " socket.

⚠ Attention

1) When detecting online resistance, in order to avoid damage to the instrument, it is necessary to confirm that the power supply of the measured circuit is turned off and the capacitor is discharged before measurement.

2) When measuring at 200Ω, the test pen lead will bring a resistance measurement error of 0.1Ω to 0.3Ω. In order to obtain an accurate reading, the reading can be subtracted from the reading value of the red and black pen short circuit as the final reading value.

3) When the measured resistance is greater than 1MΩ, the meter takes a few seconds to stabilize the reading, which is a normal phenomenon.

4) Do not input voltage in the resistance range.

(IV). Capacitance Measurement

A. Turn the knob to the corresponding capacitance range, and the pen corresponds to the polarity (note that the polarity of the red pen is "+" pole) to connect the measured capacitance.

B. Plug the red watch pen into the " ᵛΩ⊣ " socket and the black watch pen into the" COM "socket.

⚠ Attention

1) If the screen displays "OL", it indicates that the range has been exceeded, and it can measure 20nF to 200 uF.

2) When measuring severe leakage or breakdown capacitance, will show some numerical value and unstable; When measuring large capacitors, the reading takes a few seconds to stabilize, which is normal when measuring large capacitors.

3) Before testing the capacity of the capacitor, the capacitor must be sufficiently discharged to prevent damage to the meter.

4) Unit: luF=1000nF lnF=1000pF

(V). Diode and on-off test

A. Insert the red watch pen into the " ᵛΩ⊣ " jack and the black watch pen into the" COM "jack.

B. Turn the knob to the diode/On/off measuring gear, which defaults to diode gear (automatic conversion for diode/on/off testing), and connect the red watch pen to the positive electrode of the tested diode and the black watch pen to the negative electrode of the tested diode.

C. Reading the measurement result from the display is the forward voltage drop of the diode, and the reverse connection shows the OL.

D. Connect the watch pen to both ends of the line to be tested. If the resistance value between the two ends is less than about 50Ω, the built-in buzzer will sound.

⚠ Attention

In order to avoid damage to the instrument, before online measurement of the diode, it must be confirmed verify that the circuit under test is powered off and the capacitor has been discharged before measurement.

Diode file can be used to measure the voltage drop of diode and other semiconductor devices PN junction, for a normal structure of silicon semiconductor forward voltage drop reading should be between 0.5v~0.8V, reverse display "OL" is open circuit, at this time the corresponding pole of the black watch pen is "+", the corresponding pole of the red watch pen is "-".

(VI)hFE triode measurement

1.Turn the knob to the triode hFE measuring gear.

2.Determine whether the measure transistor is NPN type or PNP type, and insert the emitter, base and collector into the corresponding jack respectively.

(VII) Judgment of mains live line

1.Insert the red pen into the “ VΩHz ” hole.

2.Turn the knob to the "Live" gear;

3. Contact the measured position or socket with a red test lead. If there is a sound and light alarm, the measured point is the live line. If there is no change, the measured point is the neutral line or no live power.

(VIII)Automatic switch

In order to save power consumption and extend battery life, the APO automatic shutdown function will be enabled by default after the meter is turned on. If user doesn’t operate the meter within 15 minutes. the instrument will automatically turn off the power .To restart, turn the range switch to "OFF" and start again.

5. Technical Characteristics

Accuracy: ± (a% reading + the lowest significant digit), to ensure accuracy ambient temperature :(23±5)℃, relative humidity <75%RH, calibration guarantee period from the factory date is one year.

1. DC Voltage (DCV)

range	accuracy	resolution	input impedance	overload protection
200mV	±(0.5%＋4)	100uV	About 10MΩ	250VDC/AC rms
2V		1mV		1000VDC/750V AC rms
20V		10mV		
200V		100mV		
1000V	±(0.8%＋15)	1V		

2. AC voltage (ACV) true RMS measurement

range	accuracy	resolution	input impedance	overload protection
2V	±(0.8%+4)	1mV	About 10MΩ	1000VDC/750VACrms
20V		10mV		
200V		100mV		
750V	±(1.0%+15)	1V		

⚠ Accuracy measurement range: 10%-100% of the range;

Frequency response: 40Hz-1kHz;

Measurement method (sine wave): true RMS measurement;

3. Direct Current (DCA)

range	accuracy	resolution	overload protection
200uA	±(0.8%＋5)	0.luA	FUSE 200mA/250V
2mA		1uA	
20mA		10uA	
200mA		0.1mA	
10A	±(1.0%+15)	10mA	

⚠ Maximum input current :10A (no more than 10 seconds);

Overload protection :200mA /250V quick fuse, no fuse for 10A range,

Measurement time ≤10 seconds, interval should be ≥15 minutes.

4.AC current (ACA) true RMS measurement

range	accuracy	resolution	overload protection
200mA	±(2.0%+15)	0.1mA	FUSE 200mA/250V
10A	±(3.5%+15)	10mA	

⚠ Accuracy measurement range: 10%-100% of the range;

Frequency response :40Hz-1kHz;

Measurement method (sine wave) : true RMS measurement;

Maximum input current: 10A(no more than 10 seconds);

Overload protection: 200mA/ 250V quick fuse, the measurement time must be no less or equal than 10 seconds and should be greater or equal than 15 minutes.

5.Resistance(Ω)

range	accuracy	resolution	open-circuit voltage	overload protection
200Ω	±(1.0%+25)	0.lΩ	about1V	250V DC/ACrms
2kΩ		1Ω		
20kΩ		10Ω		
200kΩ		100Ω		
2MΩ		1kΩ		

20MΩ		10kΩ		
200MΩ	±(5%+30)	100kΩ		

⚠Attention:The measurement error does not include lead resistance.

6. Capacitance

range	accuracy	resolution	overload protection
20nF	±(2.5%+20)	10pF	250V DC/AC rms
2uF		1nF	
200uF	±(5.0%+ 10)	100nF	

⚠Accuracy measurement range: 10%~100%; Measurement error does not include lead distributed capacitance

7. Diode and on-off test

range	show value	test condition
	Diode forward voltage drop	Test current: about 0.4mA Open circuit voltage: approx 2V
	The buzzer makes a long sound, and the resistance value of the testing two points is about less than 50Ω	Test current: about 0.2mA

⚠Warning: For safety, do not input voltage values in this range!

Error: 5%

Overload protection: 250VDC/ AC rms

8. Triode Hfe Parameter Test;

range	Display range
hFE NPN or PNP	0~ 1000

6. Replace the Battery or Fuse

If the " " symbol appears on the LCD, the battery needs to be replaced.

Please follow these steps:

- The watch pen leaves the circuit under test, pulls out the watch pen from the input jack, and turns the knob to "OFF" to turn off the power supply of the instrument.
- Use a screwdriver to unscrew the battery door and remove the battery door to replace the battery.
- Open the rear cover and replace the fuse.
- Close the battery door and fasten the screws with a screwdriver.
- Fuse specifications:
  mA input fuse :ϕ5X20mm 200mA 250V

Note: When the under voltage " " symbol is displayed on the LCD, you should replace the built-in battery immediately; otherwise, the measurement accuracy will be affected.

7. Instrument Maintenance

This instrument is a precision instrument, users should not arbitrarily change the circuit

a. Please pay attention to waterproof, dustproof, anti-fall;
b. It is not suitable to store and use the instrument in the environment of high temperature and humidity, inflammable and explosive and strong magnetic field;
c. Please use a damp cloth and mild detergent to clean the surface of the instrument, do not use abrasive and alcohol and other organic solvents;
d. If it is not used for a long time, the battery should be removed to prevent battery leakage and corrosion of the instrument;
e. When replacing fuse tube, use a fuse of the same specifications and model.

8. Troubleshooting

If your meter is not working properly, the following methods can help you

Quick resolution of general problem. If the fault still cannot be removed, please contact the repair center or dealer.

Fault phenomenon	Check the site and method
Not display	■Power not connected ■change battery
Appear symbol	■Change battery
Current no input	■Change fuse
Large display error	■Change battery
Display Dark	■Change battery