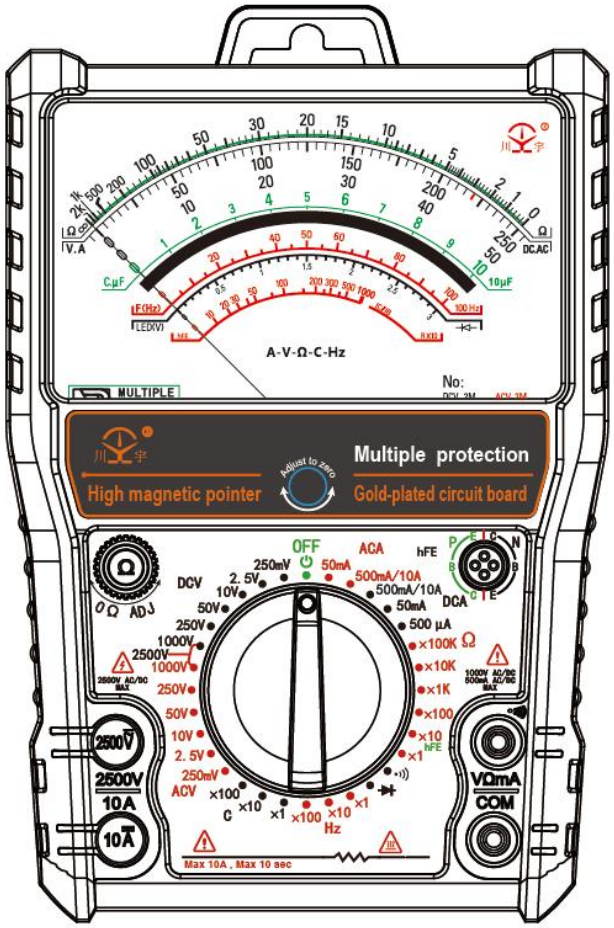
Analog Multimeter
User's Manual



Introduction

This series of multimeters is the latest high-sensitivity pointer-type multimeters made of rare earth magnetic materials, covered with soft rubber sleeves, shockproof and drop-resistant. Designed to measure a wide range, it can measure DC voltage and current, AC voltage and current, resistance, capacitance, frequency, diode forward voltage drop, Zener tube, transistor hFE parameters and circuit continuity, battery power, infrared remote control emission signal detection And fire line discrimination, etc.

Panel Indication

1.Dial

2 Pointer to zero

3 hFE test socket

4 Position rotary switch

5 VΩmA input socket

6 COM input socket

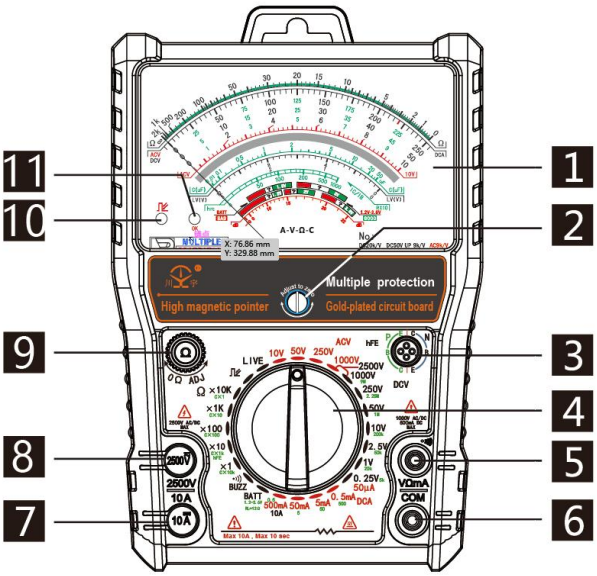
7 10A input socket

8 2500V input socket

9 Resistor zeroing

10 Infrared receiving window

11 Infrared and live wire identification indicator light



Security Information

*When using this instrument, the user must comply with all standard safety procedures in the following two areas:

A Safety Procedures to Prevent Electric Shock

B Safety regulations to prevent misuse of instruments

*For your own safety, please use the test pen provided with the watch. Check to make sure they are in good condition before use.

Precautions for use

*If the meter is used near equipment with relatively large electromagnetic interference, the indication of the meter will be unstable, and may even cause large errors.

*Do not use the meter or test pen when it is damaged to avoid electric shock.

*If the meter is not used correctly, the safety function provided by the meter may be impaired.

*When working around exposed conductors or buses, it is forbidden to touch the conductor wires, and measure work under the premise of ensuring safety.

* Do not use this instrument near explosive gas, vapor or dust.

* The correct input terminal, function and range must be used for measurement.

* The input value must not exceed the input limit value specified in each range to prevent damage to the instrument.

* Do not touch unused inputs when the meter is connected to the line under test.

* When the measured voltage exceeds the effective value of 60VDC or 30VAC, be careful to avoid electric shock.

* When measuring with a test lead, place your finger behind the protective ring of the test lead.

* Before changing the range, it must be ensured that the test pen has left the circuit under test.

* Before performing resistance, diode, capacitance or continuity measurement, the power supply of the circuit under test must be cut off and all high-voltage capacitors in the circuit under test must be discharged.

* Do not measure resistance value, capacitance capacity or conduct continuity test on live circuit.

* Before measuring the current, check the fuse of the instrument. Before connecting the meter to the circuit under test, the power of the circuit under test should be turned off.
* When performing TV repairs or measuring power conversion circuits, care must be taken of high-amplitude voltage pulses in the circuit under test to avoid damage to the meter.
* The instrument uses two 1.5V AAA batteries for power supply, and the batteries must be correctly installed in the battery box of the instrument.
* When the adjustment of the resistance scale is less than zero, it means that the battery in the meter is exhausted. Please replace the battery immediately to ensure the measurement accuracy and prevent the battery electrolyte from overflowing and corroding the parts in the meter.
* Never use the meter with the case (or part of the case) removed.
* When using the 2500V gear to measure high voltage, you must wear rubber gloves on your hands and measure on a dry and insulated site.

Maintaintenance

* When opening the instrument case or removing the battery cover, the test lead should be pulled out first.
* When servicing the meter, only specified replacement parts must be used.
* Before turning on the meter, you must cut off all relevant power supplies, and you must also ensure that you do not have static electricity to avoid damage to the components of the meter.
* Calibration and maintenance of the instrument can only be performed by professionals.
* When opening the meter case, it must be noted that some capacitors inside the meter hold dangerous voltages even after the meter is powered off.
* If any abnormality is observed in the meter, the meter should be taken out of service immediately and sent for repair. And make sure that it cannot be used before passing the inspection.
* When not in use for a long time, please remove the battery and avoid storing it in a place with high temperature and high humidity.

Input protection measures

* When performing voltage measurement, the highest input voltage that can withstand is AC and DC voltage 1000V (V/Ω jack) / 2500V (2500V jack).
* When making frequency, resistance, continuity and diode measurements, it can withstand no more than 250V AC voltage or equivalent RMS voltage.
* When measuring μA current and mA current, it is protected by a fuse or a self-recovery fuse of the same specification. After the fuse is blown, it needs to be replaced with the same fuse. After the self-recovery fuse is activated, the heat is severe, and you must wait for 30 seconds before measuring again, otherwise the measurement accuracy may be affected.

Instrument maintenance

This section provides basic maintenance information, including instructions for replacing fuses and replacing batteries.

Do not try to repair the instrument unless you are an experienced maintenance person and have relevant calibration and performance testing instruments and maintenance documents.

General maintenance

To avoid electric shock or damage to the meter, do not get the inside of the meter wet when opening the case or battery.Before closing the cover, turn off the power and check that the test lead has been disconnected from the circuit to be measured.

Regularly use a damp cloth and a small amount of detergent to clean the meter case, do not use abrasives or chemical solvents. Input socket Dirt or moisture can cause oxidation of the metal surface, which may affect readings.

Model / Structure&Function			88A	88B	88C	88L	88N
structure	Internal magnetism		●	●			
	External magnetism				●	●	●
	Gold plated circuit board		●	●	●	●	●
function	DCA		●	●	●	●	●
	ACA						●
	ACV& DCV		●	●	●	●	●
	Resistance	R×1~R×10k	●	●	●	●	●
		R×100k			●	●	●
	Continuity&Buzzer		●	●	●	●	●
	LED/Diode					●	●
	voltage regulator tube(under10V)					●	
	Infrared remoter detection			●	●	●	
	hFE		●	●	●	●	●
	Battery power		●	●	●		
	Capacitance						●
	Frequency						●
	Standard Resistance Box		●	●	●	●	
	Live Wire Identification			●			
	Multiple protection circuits		●	●	●	●	●
	Automatic protection and automatic recovery circuit		●	●	●	●	●
	Automatically shut down after 15 minutes of no operation						●
Package	color box		●	●	●	●	●

Technical indicators

Comprehensive index：

* Use environmental conditions:

Altitude <2000m.

Working environment temperature and humidity: 0~40°C (<80%RH).

Storage environment temperature and humidity: -10~60°C (<70%RH; remove the battery).

* Test or calibration ambient temperature: 20℃±2℃
* The maximum voltage allowed between the measuring terminal and the earth: AC and DC 2500V
* Fuse protection: "mA" gear Fuse: 500mA instant fuse or self-recovery fuse of the same specification
  "10A" gear fuse: 10A instant fuse
* Over-range indication: the pointer exceeds the maximum scale of the dial.
* Power supply: 2 x 1.5V AAA batteries on the 7th
* Dimensions: 179mm(L)×118mm(W)×50mm(H).
* Weight: about 400g (without battery) (A/B type)
  About 500g (without battery) (C/L/N models)

Accuracy index

Accuracy: ±(% of reading), guaranteed for one year from the date of delivery.

Reference conditions: ambient temperature 18°C to 28°C, relative humidity not greater than 80%.

Technical parameters (Model N)

Basic Fuction	Range	Resolution	Accuracy
DCA	500μA/50mA/500mA	10μA	±2.0%
	10A	0.2A	±5%
ACA	50mA/500mA	1mA	±5%
	10A	0.2A	±5%
DCV	250mV/2.5V/10V/50V/250V/1000V	input resistance 2MΩ	±2.0%
	2500V	input resistance 4.8MΩ	
ACV	250mV/2.5V/10V/50V/250V/1000V	input resistance 2MΩ	±5%
	2500V	input resistance4.8MΩ	
Resistance Ω	R×1/R×10/R×100 R×1k/R×10k/R×100k	central value 20	± 10%
Capacitance(C)	×1/×10/×100 (1000uF)	1uF	±5%
Frequency(Hz)VPP>1V	×1/×10/×100(10kHz)	5Hz	±5%
Buzzer	The buzzer works when it is lower than 15Ω		

Technical parameters (Model A/B/C/L)

Measurement Range			Sensitivity	Accuracy	Error representation method
DCA	50μA/0.5mA/5mA/ 50mA/500mA		0.25V	±2.5%	Calculated as a percentage of indicated value
	10A			±5%	
DCV	0.25V/1V/2.5V/ 10V/50V		20kΩ	±2.5%	
	250V/500V/1000V		9kΩ	±2.5%	
	2500V			±5%	
ACV	10V/50V/250V/500V 1000V/2500V			±5%	
Resistance Ω	R×1/R×10/ R×100/R×1k/ R×10k/R×100k		中心值20	± 10%	
BATT	1.2V/1.5V/2V/3V/3.6V		RL=8Ω-12Ω(only models A/B/C)		
Buzzer	The buzzer works when it is lower than 30Ω				
LV detection	R×1- ×1k	3V			
	R×10k	12V			
LED detection	Voltage regulation tube within 10V, detection current: DC 5mA (only Model L)				
hFE	0~1000hFE	R×10			
Infrared remoter detection	vertical angle±15 distance1-30cm	Red light-emitting tube indication (light up) (only B/C/L models)			
Standard resistance box Ω	0.025/0.5/5/50/500/5k/20k/50k/200k/1M/2.25M/4.5M/9M/22.5M				
LIVE wire detection	Red light-emitting tube indication (light up, 220V AC detection) (only model B)				

Instructions

Before use, check whether the pointer points to the mechanical zero position. If it does not point to the zero position, you can turn the "pointer to zero" on the cover.Make the pointer point to zero.

DC voltage measurement (DCV)

1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
When measuring a voltage greater than 1000V, insert the red test pen into the 2500V jack, and set the "gear rotary switch" to 1000V.

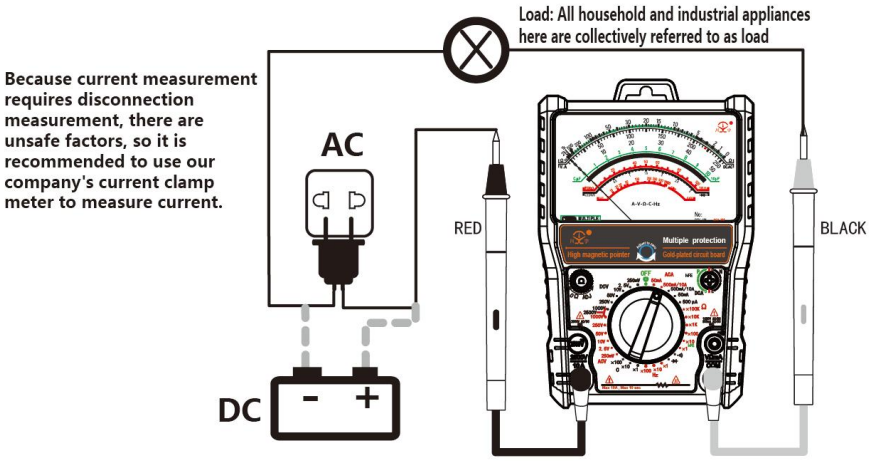
2) Set the gear rotary switch to the "DCV" range, and connect the test pen to the load or signal source under test.

Notice:

a. If you do not know the measured voltage range before measurement, you should set the gear rotary switch to the highest range and lower it step by step.
b. If the pointer exceeds the maximum scale of the dial, it means that the measured voltage has exceeded the range, and the gear rotary switch needs to be adjusted to last gear.
c. Pay special attention to avoid electric shock when measuring high voltage.

AC voltage measurement (ACV)
1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
When measuring a voltage greater than 1000V, insert the red test pen into the 2500V jack, and set the "gear rotary switch" to 1000V.
2) Set the gear rotary switch to the "ACV" range, and connect the test pen to the load or signal source under test.
Note: See DC voltage measurement notes a, b, c.

Direct current measurement (DCA) (see Figure 1)
1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
When the measurement is greater than "500mA", insert the red test pen into the "10A" jack, and place the gear rotary switch on the "500mA" gear.
2) Set the gear rotary switch to the "DCA" range, and connect the test pen to the circuit under test.
Notice:
a. If you do not know the range of the measured current before the measurement, you should set the gear rotary switch to the highest range and lower it step by step.
b. If the needle momentarily exceeds the maximum scale of the dial, it means that the measured current has exceeded the range, and the gear rotary switch needs to be adjusted to a higher gear.



Alternating current measurement (ACA) (see Figure 1) (N version only)
1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
When measuring more than 500mA, insert the red test pen into the "10A" jack, and set the "gear rotary switch" to ACA 500mA.
2) Set the gear rotary switch to the "ACA" range, and connect the test pen to the circuit under test.
Note: See DC current measurement note a, b.
Resistance measurement (Ω)
1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
2) Set the gear rotary switch to the "Ω" range, and connect the test pen to the resistance to be tested.
Note: When measuring the resistance in the circuit, the power supply should be cut off first. If there is a capacitor in the circuit, it should be discharged first. The reading on the dial is the first scale line Ω
Capacitance measurement (C) (N model only)
1) Put the gear position rotary switch in the "C" range, then insert the black test pen into the "COM" jack, and the red test pen into the "V ΩmA" jack; connect the measured capacitor to both ends of the test pen (The red test pen is positive), please pay attention to the polarity connection if necessary.
Notice:
a. The capacitor should be completely discharged before each measurement, otherwise the measurement error will increase.

b. Polarized capacitors should be connected according to the correct polarity, otherwise the measurement error and loss resistance will increase.

Capacitance C(μF)	C×1	C×10	C×100
Measuring Range (μF)	0μF-10μF	0μF-100μF	0μF-1000μF

Frequency measurement (Hz) (N model only)

1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
2) Set the gear rotary switch to the "Hz" range, and connect the test pen to the frequency source (VPP>1V).

Frequency Hz	×1	×10	×100
Measuring Range	0-10	0-1000	0-10000

Transistor hFE parameter measurement

1) Set the gear rotary switch to "hFE" (resistance × 10 gears).
2) First determine whether the transistor is PNP or NPN, and then insert the three pins E, B, and C of the tested tube into the corresponding test sockets on the panel, and the value indicated by the pointer deflection is the value of the transistor's DC amplification factor hFE.

Notice:
If the pointer deflection indication is greater than 1000, first check whether the pins are inserted incorrectly and whether the transistor is damaged.

Diode measurement (⟶|) (N model only) (Maximum voltage 3V)

1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack (the polarity of the black test lead is "+").
2) Set the gear rotary switch to the "⟶|" range, and the pointer will deflect directly to the right full-scale position at this time, which is a normal phenomenon. Connect the test pen to the diode under test, the forward conduction pointer indicates the conduction voltage, and the ordinary LED light-emitting diode is lit at the same time when indicating the forward voltage.

LED/ Voltage regulator tube measurement (L model only) (light-emitting tubes within 10V can be measured)

Put the gear position rotary switch in the "⟶|" position, and the pointer will deviate to the right near the full scale. This is a normal phenomenon and can be measured directly. When measuring, the red test pen is the output voltage "+", and the forward measurement indicates the forward voltage drop of the PN junction of the diode. It can also measure various types of LED light-emitting diodes, and light up the light-emitting tube while indicating the forward voltage drop. The reverse measurement is the steady voltage value of the Zener tube (the Zener tube is reversed), please refer to the special scale for the "" Zener tube for the reading.

Buzzer continuity test (•))))

1) Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
2) Set the gear rotary switch to the "•))) " range, and connect the test pens to both ends of the circuit to be checked.
3) If the resistance value between the two points to be checked is less than 30Ω (A/B/C/L type) or 15Ω (N type), the buzzer will beep immediately.

Note: The circuit under test must be checked for continuity when the power is cut off, because any load signal will make the buzzer sound, resulting in wrong judgment.

Infrared remote control emission signal detection (⌐|)

This is set for judging whether the infrared remote control transmitter is working normally. When adjusting to this position, align the transmitter head of the infrared remote control transmitter vertically with the infrared receiver, the deviation should not be greater than ±15°, and press the remote control launch button. If the red light-emitting tube on the right is flashing at the same time, it means that the transmitter is working normally. Move the transmitter within a certain distance (1-30cm), and the output power status of the transmitter can be judged.

Notice:

1. When there is strong light directly irradiating the receiving head, the red indicator light will be on, and it will change with the intensity of the incident light (it can be used as a reference for the light meter at this time), so when you only need to detect the infrared transmitter remote control, you should set the Keep the multimeter receiver away from other strong light sources.
2. The transmitting head of the remote control must be perpendicular to the infrared receiver of the instrument (the maximum deviation angle is ±15°)

Live wire identification (LIVE) (only B model)
1. Insert the red test lead into the "VΩmA" jack, and the black test lead into the "COM" jack.
2. When the red test pen is connected to the live wire, the red indicator light will be on.

Battery power detection (BATT)
1. Insert the black test lead into the "COM" jack, and the red test lead into the "VΩmA" jack.
2. Set the position rotary switch to the "BATT" position, press the correct polarity of the test pen and connect it to both ends of the battery to be tested.
3. Observe the scale corresponding to BATT on the dial. Red means the battery is low or damaged, and green means the battery is intact.

Standard resistance box application (A/B/C/L only)
In some special cases, the meter can be used as a standard resistance by using the DC voltage or current range. When the meter is in the DC voltage range, for example, the 2.5V range is equivalent to a 50k standard resistance (2.5V×20k/V=50k), and the rest Various analogies. When the meter is in the DC current range, for example, the 5mA range is equivalent to a 100Ω standard resistance (0.5÷0.005A=100Ω), and the rest of the ranges can be deduced according to the technical specifications (note: when using this function, avoid overloading to have the damage.)

Gear	10A	500 mA	50mA	5mA	0.5mA	50μA	1V	2.5V	10V	50V	250V	500V	1000V	2500V
Standard resistance (Ω)	0.025	0.5	5	50	500	5k	20k	50k	200k	1M	2.25M	4.5M	9M	22.5M

Load voltage LV (V) parameter measurement
When measuring the resistance value with the resistance gear, the corresponding voltage drop (that is, the voltage at both ends of the test pen) at different resistance values, R×1-R×1k indicated by the 0-3V scale;R×10k for 0-12V indication.

Switch position (Ω)	R×1	R×10	R×100	R×1k	R×10k
Measuring range LV	0-3V				0-12V

Replace battery and fuse, accessories
Please follow the steps below to replace the battery and fuse:
1 Turn off the instrument power supply (N model).
2 Pull out all test leads from the input jacks.
3 Loosen the screw securing the battery cover with a screwdriver.
4 Remove the battery cover.
5 Remove old batteries or damaged fuses.
6 Replace with new 2×1.5V AAA batteries or new fuses.
7 Put the battery cover on and tighten the screws.
Accessories
1 An instruction manual
2 test pens, one pair
3 Two 1.5V AAA batteries