

User Manual



Limited Warranty and Responsibilities

This product is covered by a one-year warranty from the date of purchase.

The warranty does not cover damage to general accessories or damage resulting from accidents, negligence, misuse, modifications, contamination, or abnormal operating environments.

Note: If the device freezes or becomes unresponsive during use, please restart it.。

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Overview

This product is a 2-in-1 digital measuring instrument that combines a battery internal resistance tester with a high-precision multimeter. It features an elegant design, compact size, and portable, user-friendly operation. Equipped with a 2.4-inch high-resolution TFT display, it allows one-touch intelligent switching between resistance tester and multimeter modes.

The internal resistance measurement section uses an aviation plug for input, providing professional-grade testing of various battery voltages and internal resistances. In multimeter mode, it offers high-precision 25,000-count display with real-time waveform curve recording.

This product delivers the perfect integration of an internal resistance tester and a multimeter, offering powerful performance and versatile functionality to meet a wide range of user measurement needs.

Safety Instructions

To avoid potential electric shock, fire, or personal injury, please read the safety instructions carefully before use.

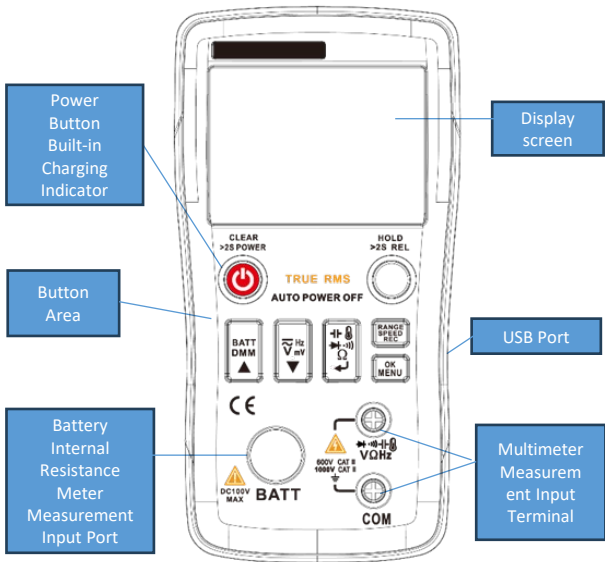
Use this product only as specified; improper use may compromise the protection provided by the instrument.

Before use, inspect the casing for cracks or damage to the plastic. Pay special attention to the insulation around the input terminals.

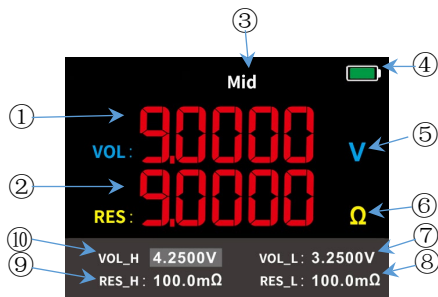
Operate the instrument in accordance with this manual. Use the correct input terminals and function settings, and ensure measurements are within the specified range indicated in this manual.

- Do not use this product in the presence of explosive gases, vapors, or in humid environments.
- Keep your fingers behind the protective guard on the test probes during use.
- Do not touch unused input terminals while the instrument is connected to a circuit.
- Disconnect the test leads from the circuit before switching measurement modes.
- When measuring DC voltages above 36V or AC voltages above 25V, serious injury may occur — take proper precautions to avoid electric shock.
- Always select the correct function and range to avoid damaging the instrument or causing personal injury.
- Do not operate the product with the front or rear cover removed.
- Low battery power may affect measurement accuracy — please recharge promptly.
- Handle the instrument with care during use and avoid excessive movement or vibration.

Instrument Panel Description



Battery Internal Resistance Display Interface Description



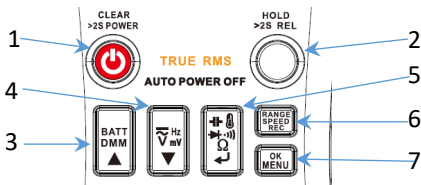
1	Voltage	Displays measured battery voltage value
2	Internal Resistance	Displays measured internal resistance value
3	Measurement Speed	Displays set measurement speed
4	Power Level Indicator	Displays current power supply status
5	Voltage Unit	Displays voltage unit symbol
6	Internal Resistance Unit	Displays internal resistance unit symbol
7	Voltage Lower Limit	Sets voltage lower threshold
8	Internal Resistance Lower Limit	Sets internal resistance lower threshold
9	Internal Resistance Upper Limit	Sets internal resistance upper threshold
10	Voltage Upper Limit	Sets voltage upper threshold

Multimeter Display Interface Description



1	Measurement Symbol Display	Shows current measurement type symbols: AC, DC, Resistance, Capacitance, Diode, Continuity (Buzzer)
2	Primary Display	Shows multimeter measurement value (Max display: 25000 counts)
3	AUTO	Indicates auto-ranging mode is active
4	Max	Displays maximum measured value
5	FreQ	Displays measured frequency value
6	Min	Displays minimum measured value
7	AVG	Displays average measured value
8	Waveform Display Area	Dynamically generates waveform curves based on measurement variations. Records signal change states

Button Functions



- 1 Power Key: Long press for 2 seconds to power the device on or off. In multimeter mode, short press to clear the waveform curve on the screen.
- 2 HOLD/REL Key: Short press to enter or exit data hold mode. Long press to activate relative measurement mode, which sets the baseline value to zero.
- 3 Up Key: Long press to switch between multimeter and internal resistance tester modes. In the settings menu, use this key to increase values or move the selection to the left.
- 4 Down Key: In multimeter mode, press this key to switch voltage measurement ranges. In the settings menu, use it to decrease values or move the selection to the right.
- 5 Return Key: Press to return or exit the settings menu. In multimeter mode, press to cycle through resistance, capacitance, diode, continuity, and temperature modes.
- 7 RANGE/SPEED/REC Key: In internal resistance tester mode, short press to adjust the measurement speed; long press to enter the recording mode. In multimeter mode, short press to select the measurement range manually.
- 7 OK/MENU Key: Long press to enter the system settings menu. Short press to select or confirm values.

Introduction to Battery Internal Resistance

Input Terminal

The input terminal uses an aviation plug, with a maximum allowable input voltage of DC 100V. AC voltage input is strictly prohibited.



Measurement Method

1. Turn on the power. Once the screen displays the measurement interface and the internal circuitry stabilizes after a few seconds, the device is ready for measurement.
2. Long press the BATT/DMM key to switch to the internal resistance measurement interface.
3. Insert the aviation plug test clips and connect them to the positive and negative terminals of the battery under test.
4. Read the battery's internal resistance value and voltage displayed on the screen.

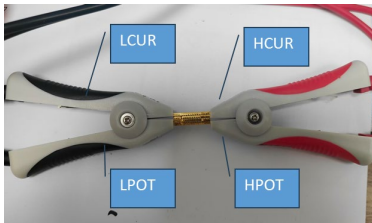
Note:

- a. The red clip connects to the battery's positive terminal, and the black clip to the negative terminal.
- b. During measurement, avoid short-circuiting the battery by allowing the positive and negative terminals to touch.
- c. Refer to the appendix for battery internal resistance reference values.

Introduction to Battery Internal Resistance

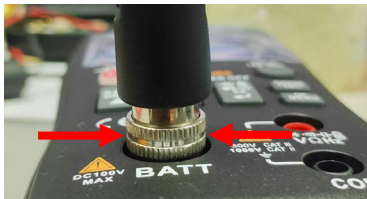
Wire clamping method

1. When measuring, try to keep the wire clamps parallel to avoid crossing and twisting of wires.
2. Try to keep the clamping direction of LCUR and HCUR the same, and that of LPOT and HPOT the same (as shown in the figure below).



How to pull out the aviation plug

Pinch the metal outer ring of the aviation plug and pull it out vertically upwards (as shown in the figure below). Do not pull it out by directly pulling the wire upwards.



Battery Internal Resistance

Appendix 1

Reference Internal Resistance Ranges for Various Battery Types		
Battery Category	Specification	Typical Internal Resistance Range
Lead-Acid	Starting Battery	2-5 mΩ
	Deep Cycle Battery	5-20 mΩ
	VRLA Battery	2-10 mΩ
Lithium-Ion	18650	20-90 mΩ
	Lithium Polymer	10-50 mΩ
	LiFePO4	10-30 mΩ
NiMH	AA/AAA NiMH	50-200 mΩ
	High-Capacity NiMH	20-100 mΩ
NiCd	AA/AAA NiCd	50-150 mΩ
	High-Capacity NiCd	20-100 mΩ
Alkaline	AA/AAA Alkaline	100-300 mΩ
Zinc-Carbon	AA/AAA Zinc-Carbon	200-600 mΩ
Lithium Polymer	High-Rate LiPo	1-5 mΩ
	Standard LiPo	10-50 mΩ
Supercapacitor	Supercapacitor	0.1-10 mΩ
Notes: 1. Internal resistance varies with temperature (typically increases at lower temperatures) 2. New batteries exhibit lower IR values, which gradually increase with usage time 3. These ranges are for reference only - always refer to manufacturer's specifications for exact values		

Battery Internal Resistance

Appendix 2

Capacity-Based Battery Internal Resistance Chart							
No.	Capacity	Voltage	Internal Resistance	No.	Capacity	Voltage	Internal Resistance
1	0.8Ah	12V	120mΩ	33	150Ah	12V	4mΩ
2	1.3Ah	12V	102mΩ	34	200Ah	12V	3mΩ
3	2.2Ah	12V	63.7mΩ	35	230Ah	12V	2mΩ
4	3.3Ah	12V	55.7mΩ	36	250Ah	12V	1mΩ
5	4Ah	12V	46.9mΩ	37	1.3Ah	6V	55mΩ
6	5Ah	12V	37.4mΩ	38	2.8Ah	6V	40mΩ
7	6Ah	12V	30.2mΩ	39	3.2Ah	6V	28.5mΩ
8	7Ah	12V	23mΩ	40	4Ah	6V	24mΩ
9	8Ah	12V	20mΩ	41	5Ah	6V	18.3mΩ
10	9Ah	12V	19mΩ	42	7Ah	6V	14mΩ
11	10Ah	12V	18.7mΩ	43	10Ah	6V	12mΩ
12	12Ah	12V	14.4mΩ	44	110Ah	6V	4.3mΩ
13	14Ah	12V	13.6mΩ	45	200Ah	6V	1.7mΩ
14	15Ah	12V	13mΩ	46	100Ah	2V	1mΩ
15	17Ah	12V	12.1mΩ	47	150Ah	2V	0.83mΩ
16	18Ah	12V	11.4mΩ	48	170Ah	2V	0.76mΩ
17	20Ah	12V	10.6mΩ	49	200Ah	2V	0.7mΩ
18	24Ah	12V	9.8mΩ	50	250Ah	2V	0.68mΩ
19	25Ah	12V	9.5mΩ	51	300Ah	2V	0.65mΩ
20	26Ah	12V	9.2mΩ	52	350Ah	2V	0.6mΩ
21	28Ah	12V	8.9mΩ	53	400Ah	2V	0.5mΩ
22	31Ah	12V	8.6mΩ	54	420Ah	2V	0.48mΩ
23	33Ah	12V	8.4mΩ	55	450Ah	2V	0.45mΩ
24	38Ah	12V	8.2mΩ	56	462Ah	2V	0.43mΩ
25	40Ah	12V	7.9mΩ	57	500Ah	2V	0.4mΩ
26	60Ah	12V	6.5mΩ	58	600Ah	2V	0.32mΩ
27	65Ah	12V	5.8mΩ	59	800Ah	2V	0.24mΩ
28	75Ah	12V	5.5mΩ	60	1000Ah	2V	0.2mΩ
29	80Ah	12V	5.3mΩ	61	1500Ah	2V	0.16mΩ
30	85Ah	12V	5mΩ	62	2000Ah	2V	0.12mΩ
31	100Ah	12V	4.5mΩ	63	3000Ah	2V	0.11mΩ
32	120Ah	12V	4.3mΩ				

Note: This battery internal resistance table is for reference only. Actual values may vary depending on brand and manufacturing process. Always refer to the manufacturer's measured data for accurate specifications.

Internal Resistance Calibration

To calibrate the instrument:

Long press the OK key to enter the system settings menu. Then press the Down key to select the Calibration Settings menu. You may calibrate all 14 points — 0Ω, 1mΩ, 10mΩ, 100mΩ, 1Ω, 10Ω, 100Ω, 1kΩ, -60V, -10V, -1V, 1V, 10V, 60V — or perform calibration on a single selected point.

Use the Up/Down keys to select the calibration point, connect the corresponding standard source, and press the OK key to begin calibration. The screen will display a “Calibrating” message.

Upon successful calibration, the buzzer will sound once (“beep”), and the screen will display “Calibration Successful.”

If the input value is incorrect, the buzzer will sound twice (“beep beep”), and the screen will display “Calibration Failed.”

Notes:

- a. Use non-inductive resistors as standard references. Do not use wire-wound resistors.
- b. For 10mΩ and 100mΩ calibration, PBV four-terminal resistors are strongly recommended.
- c. Voltage calibration requires a precision DC voltage source.

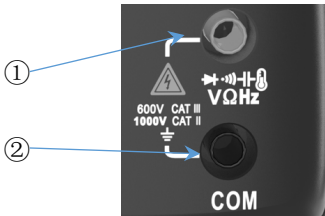
Additional Information:

Although the user calibration function is available, each unit is 100% factory-calibrated before shipment. Calibration is generally not required. Perform calibration only if necessary.

If calibration values become inaccurate or corrupted, you can restore the factory settings to return to the default factory calibration.

Multimeter Function Overview

Measurement Input Port



1	Input ports for the following measurements: 1. AC/DC Voltage 2. Resistance 3. Continuity 4. Diode 6. Capacitance 7. Temperature 8. Frequency
2	COMMON (Return) Port for All Measurements

Measurement Method

Measuring AC and DC Voltage

1. Insert the black test lead into the COM terminal and the red test lead into the V Ω Hz terminal.
2. Select the appropriate range based on the type of voltage to be measured. Press the Voltage Measurement button to choose between DC Voltage, AC Voltage, DC Millivolts, or AC Millivolts.
3. Use the test probe tips to touch the correct test points on the circuit.
4. Read the voltage value displayed on the screen. When measuring AC voltage, the frequency will be displayed simultaneously.

- Do not measure voltages that exceed the specified maximum rating, as this may damage the instrument and pose a serious safety hazard.
- When measuring high-voltage circuits, avoid any contact with live high-voltage parts to prevent electric shock.。

Resistance Test

1. Insert the black test lead into the COM terminal and the red test lead into the V Ω Hz terminal.
2. Press the Resistance (Ω) button to select the resistance measurement mode.
3. Touch the test probe tips to the desired points in the circuit.
4. Read the resistance value displayed on the screen.

Continuity Test

1. Insert the black test lead into the COM terminal and the red test lead into the V Ω Hz terminal.
2. Press the Continuity button to select the continuity test mode.
3. Touch the test probe tips to the two points of the circuit under test. If the built-in buzzer sounds, it indicates a short circuit.

Diode Test

1. Press the Diode button to select the diode test mode.
 2. Connect the red test lead to the diode's anode (positive) and the black test lead to the diode's cathode (negative), then read the forward voltage displayed on the screen.
- If the test lead polarity is reversed or the diode is damaged, the screen will display “OL.”

- Do not apply voltage input when the meter is set to continuity or diode test mode.
- Before testing, disconnect the circuit power and discharge all high-voltage capacitors.

Capacitance Test

1. Insert the black test lead into the COM terminal and the red test lead into the V Ω Hz terminal.
2. Press the Capacitance button to select the capacitance measurement mode.
3. Connect the red test lead to the positive terminal of the capacitor under test and the black test lead to the negative terminal.
4. After the reading stabilizes, read the capacitance value displayed on the screen.

Temperature Test

1. Insert the black thermocouple plug into the COM terminal and the red thermocouple plug into the V Ω Hz terminal.
2. Press the Temperature button to select the temperature measurement mode.
3. Place the thermocouple probe on the point to be measured.
4. After the reading stabilizes, read the temperature value displayed on the screen.

Firmware Upgrade

1. While the device is powered off, press and hold the HOLD key, then press and hold the Power key simultaneously. The screen will display the message “USB-Boot.”
2. Connect the device to a computer using a Type-C data cable. A disk named BATT will appear on the computer.
3. Copy the prepared firmware upgrade file into the LCR disk. The instrument will automatically start the upgrade. Avoid any operation during the upgrade process.
4. Once complete, the screen will automatically return to the measurement interface, indicating a successful upgrade.

Care and Maintenance

Except for basic maintenance, do not attempt to repair or modify the circuit of this product unless you are qualified and have the appropriate calibration, performance testing, and repair instructions.

Product Cleaning

Please clean the housing with a damp cloth and mild detergent. Do not use corrosive agents or solvents. Dust or moisture on the test terminals may affect measurement accuracy.

*Before cleaning the product, disconnect all input signals.

Battery Charging

When the battery icon appears as “  ” in the upper right corner of the screen, please charge the device promptly.

Follow these steps:

Connect the Type-C cable to a DC 5V power adapter for charging. Alternatively, connect the Type-C cable to a computer USB port for charging.

While charging, the power indicator light will be red.

When fully charged, the power indicator light will turn blue.

Technical Specifications

Multimeter General Specifications

Display (TFT)	25000 counts
Range Selection	Auto/Manual
Material	ABS+TPE
Sampling Rate	3 readings/s
True RMS	✓
Data Hold	✓
Backlight	✓
Low Battery Indicator	✓
Auto Power Off	✓

Mechanical Specifications

Dimensions	149*76*33.5mm
Weight	191 g (with built-in battery)
Battery Type	2000mAh Li-ion battery × 1
Warranty Period	1 year

Environmental Specifications

Operating Environment	Temperature	0~40°C
	Humidity	<75%
Storage Environment	Temperature	-20~60°C
	Humidity	<80%

Multimeter Technical Specifications

Function	Range	Resolution	Accuracy
DC Voltage (V)	2.5000V	0.0001V	±(0.05%+3)
	25.000V	0.001V	
	250.00V	0.01V	
	1000.0V	0.1V	
DC Voltage (mV)	25.000mV	0.001mV	±(0.5%+3)
	250.00mV	0.01mV	
AC Voltage (V)	2.5000V	0.0001V	±(0.5%+3)
	25.000V	0.001V	
	250.00V	0.01V	
	750.0V	0.1V	
AC Voltage (mV)	25.000mV	0.001mV	±(0.8%+3)
	250.00mV	0.01mV	
AC Voltage Frequency Response: 40Hz to 1kHz			

Function	Range	Resolution	Accuracy
Resistance	250.00Ω	0.01Ω	±(0.5%+3)
	2.5000kΩ	0.0001kΩ	±(0.2%+3)
	25.000kΩ	0.001kΩ	
	250.00kΩ	0.01kΩ	
	2.5000MΩ	0.0001MΩ	±(1%+3)
	25.00MΩ	0.01MΩ	
	250.0MΩ	0.1MΩ	±(5.0%+5)
Capacitance	9.999nF	0.001nF	±(5.0%+20)
	99.99nF	0.01nF	±(2.0%+5)
	999.9nF	0.1nF	
	9.999μF	0.001μF	
	99.99μF	0.01μF	
	999.9μF	0.1μF	
	9.999mF	0.001mF	±(5.0%+5)
	99.99mF	0.01mF	

Function	Range	Resolution	Accuracy
<i>Frequency</i>	9.999Hz	0.001Hz	$\pm(2.0\%+2)$
	99.99Hz	0.01Hz	$\pm(0.1\%+2)$
	999.9Hz	0.1Hz	
	9.999kHz	0.001kHz	
	99.99kHz	0.01kHz	
	999.9kHz	0.1kHz	

Function	Range	Resolution	Accuracy
Temperature	(-20~1000)°C	1°C	±(2.5%+5)
	(-4~1832)°F	1°F	
Diode	√		
Continuity	√		

Battery Internal Resistance Meter Technical Specifications

Feature	Specification
Measurement Functions	Battery Voltage, Internal Resistance
Voltage Range	$\pm 100V$
Resistance Range	$0.1m\Omega \sim 200\Omega$
Resistance Accuracy	$\pm 0.5\%$
Voltage Accuracy	$\pm 0.2\%$
Measurement Speed	1s/reading, 2s/reading, 4s/reading
Output Impedance	100Ω
Languages	Chinese, English
Brightness	Adjustable (10% to 100%)
Auto Power Off	Configurable (5–120 minutes) or disabled
Buzzer Volume	Adjustable (0% to 100%)
Internal Resistance Meter Calibration	0Ω 、 $1m\Omega$ 、 $10m\Omega$ 、 $100m\Omega$ 、 1Ω 、 10Ω 、 100Ω 、 200Ω 、 $-60V$ 、 $-10V$ 、 $-1V$ 、 $1V$ 、 $10V$ 、 $60V$

