RuoShui 3010

RuoShui 3010 Analog Pointer Multimeter

User Manual

1. Introduction

The RuoShui 3010 Analog Pointer Multimeter is a versatile and reliable instrument designed for measuring DC current, AC current, DC voltage, AC voltage, and resistance. Its clear analog display provides intuitive readings, making it suitable for electricians, hobbyists, and DIY enthusiasts. This manual provides essential information for safe and effective operation of your multimeter.

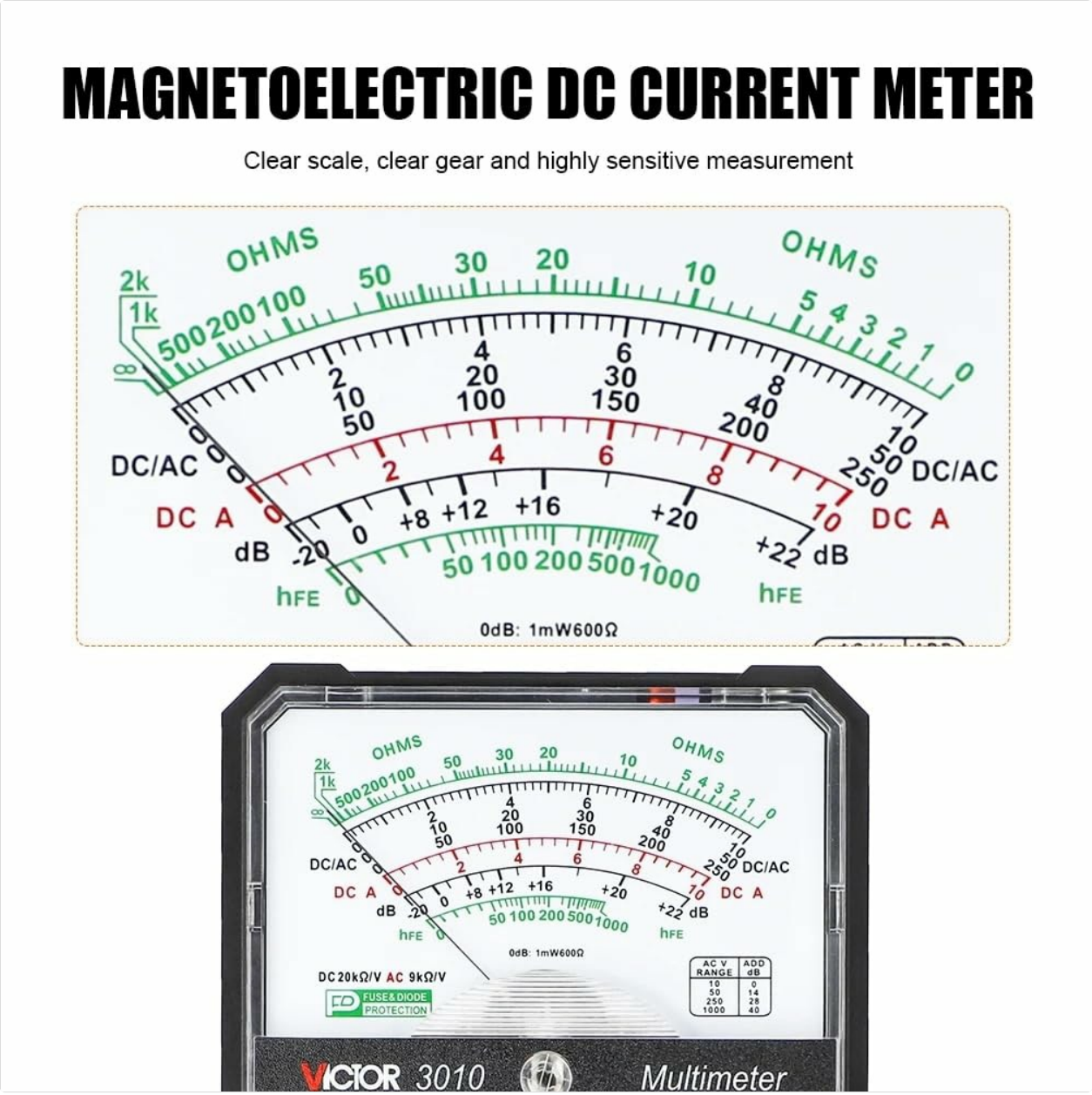

Figure 1.1: Front view of the RuoShui 3010 Analog Pointer Multimeter.

2. Safety Information

Always read and understand all safety warnings and operating instructions before using this multimeter. Failure to do so may result in injury or damage to the instrument.

- Do not exceed the maximum input values for any range.
- Use extreme caution when working with voltages above 30V AC RMS, 42V peak, or 60V DC. These voltages pose a shock hazard.
- Ensure the test leads are in good condition, without any damaged insulation.
- Always connect the common (black) test lead first, then the live (red) test lead. Disconnect the live test lead first.
- Do not use the multimeter if it appears damaged or is not operating correctly.
- Replace batteries immediately when the low battery indicator appears to ensure accurate readings.
- Keep fingers behind the finger guards on the test probes during measurements.

3. Product Overview

3.1 Components

Figure 3.1: Key components of the RuoShui 3010 Multimeter.

1. **Magnetoelectric DC Ammeter Dial:** Displays measurement readings using a needle.
2. **Mechanical Zero Adjuster:** Knob used to set the needle to the zero position when no input is applied.
3. **Resistance Zero Adjuster (Ω ADJ):** Knob used to zero the needle for resistance measurements.
4. **Support Design:** A built-in stand at the back for convenient placement during use.
5. **Input Ports:** Terminals for connecting test leads.

3.2 Display Dial

The multimeter features a clear analog dial with multiple scales for different measurement types. Familiarize yourself with these scales before operation.

Figure 3.2: Detailed view of the analog display dial.

- **OHMS Scale:** Used for resistance measurements.
- **DC/AC Scales:** Used for DC and AC voltage and current measurements.
- **dB Scale:** Used for decibel measurements.
- **hFE Scale:** Used for transistor gain measurements.

4. Setup

4.1 Battery Installation

The RuoShui 3010 requires 2 AAA batteries and 1 9V battery for operation. These are typically included.

1. Locate the battery compartment cover on the back of the multimeter.
2. Unscrew the retaining screw(s) and remove the cover.
3. Insert the batteries, observing correct polarity (+ and -).
4. Replace the cover and secure it with the screw(s).

4.2 Connecting Test Probes

Connect the red and black test probes to the appropriate input jacks on the multimeter.

- Connect the **black** test lead to the **-COM** (Common) jack.
- Connect the **red** test lead to the **VΩmA+** jack for most voltage, resistance, and current measurements. For high current (10A) measurements, use the dedicated **10A** jack if available and specified on the device.

4.3 Mechanical Zero Adjustment

Before taking any measurements, ensure the needle is aligned with the zero mark on the scale. If not, use the mechanical zero adjuster knob (usually a small screw below the dial) to carefully align it.

4.4 Resistance Zero Adjustment

For resistance measurements, after selecting the OHM range, short the red and black test leads together. The needle should move to the zero mark on the OHMS scale. If it does not, use the **Ω ADJ** knob to adjust it to zero. This must be done for each resistance range selected.

5. Operating Instructions

Always select the appropriate measurement function and range before connecting the test leads to the circuit under test. If the value is unknown, start with the highest range and work downwards.

Figure 5.1: Rotary switch for selecting measurement functions and ranges.

5.1 DC Voltage Measurement (DCV)

1. Set the rotary switch to the desired**DCV** range (e.g., 10V, 50V, 250V, 1000V).
2. Connect the red test lead to the positive (+) side of the circuit and the black test lead to the negative (-) side.
3. Read the voltage value from the DCV scale on the display.

5.2 AC Voltage Measurement (ACV)

1. Set the rotary switch to the desired**ACV** range (e.g., 10V, 50V, 250V, 1000V).
2. Connect the test leads across the AC voltage source.
3. Read the voltage value from the ACV scale on the display.

5.3 DC Current Measurement (DCA)

Caution: Never connect the multimeter in parallel with a voltage source when measuring current. This can damage the multimeter and the circuit.

1. Set the rotary switch to the desired**DCA** range (e.g., 50µA, 2.5mA, 50mA, 500mA, 10A).
2. **Break the circuit** and connect the multimeter in series with the load. The current must flow through the multimeter.
3. Read the current value from the DCA scale on the display.

5.4 Resistance Measurement (Ω)

1. Ensure the circuit under test is **de-energized** before measuring resistance.
2. Set the rotary switch to the desired**OHMS (Ω)** range (e.g., x1, x10, x100, x1k, x10k).
3. Perform the resistance zero adjustment as described in Section 4.4.
4. Connect the test leads across the component or circuit to be measured.
5. Read the resistance value from the OHMS scale. Multiply the reading by the selected range multiplier.

5.5 Transistor (hFE) Test

This function is used to measure the DC current gain (hFE) of NPN and PNP transistors.

1. Set the rotary switch to the**hFE** position.
2. Insert the transistor leads into the corresponding NPN or PNP sockets on the multimeter.
3. Read the hFE value from the hFE scale on the display.

6. Maintenance

6.1 Cleaning

Wipe the multimeter casing with a damp cloth and mild detergent. Do not use abrasives or solvents. Ensure the device is dry before use.

6.2 Battery Replacement

Replace batteries when the low battery indicator appears or if the multimeter does not power on. Refer to Section 4.1 for battery installation instructions.

6.3 Storage

When not in use for extended periods, remove the batteries to prevent leakage. Store the multimeter in a cool, dry place, away from direct sunlight and extreme temperatures.

7. Troubleshooting

- **No display/Power issues:** Check battery installation and charge. Replace batteries if necessary.
- **Incorrect readings:** Ensure the correct function and range are selected. Check test lead connections. Perform mechanical and resistance zero adjustments.
- **No continuity/resistance reading:** Ensure the circuit is de-energized. Check test leads for damage.

8. Specifications

Parameter	Value
Model Number	3010
DC Voltage (DCV)	10V, 50V, 250V, 1000V
AC Voltage (ACV)	10V, 50V, 250V, 1000V
DC Current (DCA)	50µA, 2.5mA, 50mA, 500mA, 10A
Resistance (Ω)	x1, x10, x100, x1k, x10k
Transistor (hFE)	Yes
Operating Temperature	0 - 40 °C
Dimensions	160 x 101.5 x 40 mm (approx.)
Power Source	2 AAA batteries, 1 9V battery
Weight	367 Grams
Certifications	CE, RoHS

9. Warranty and Support

For warranty information and technical support, please refer to the documentation provided with your purchase or contact RuoShui customer service. Keep your purchase receipt as proof of purchase.