FSH1 Pen Type Digital Multimeter User Manual

1. Introduction and Overview

The FSH1 Pen Type Digital Multimeter is a professional, auto-ranging instrument designed for precise measurement of DC/AC voltage, capacitance, resistance, diode, and continuity. Its compact, handheld design makes it ideal for diagnosing electrical issues in automotive, industrial, and household applications. Equipped with a flashlight function and a large backlit LCD, it ensures clear readings even in dim environments.

Figure 1.1: FSH1 Pen Type Digital Multimeter. This image shows the compact, pen-shaped design of the multimeter with its integrated test lead and a separate probe.

2. Key Features

- **Multifunctional Measurement:** Automatically measures DC/AC voltage, capacitance, resistance, diode, and line continuity. Includes a switch buzzer for continuity testing.
- **High Accuracy:** Features a built-in high-sensitivity sensor with a sampling rate of 3 times per second. Data retention function allows for stable reading and recording.
- **User-Friendly Design:** Pen-type design allows for single-handed operation. A 180-degree flip dual display enhances viewing from various angles.
- **Safety Features:** Sturdy outer shell, NCV (Non-Contact Voltage) detection for

distinguishing neutral and live lines, and all-round intelligent anti-burning protection circuit.

- **Automatic Recognition:** No need to turn a dial; the meter automatically identifies the function based on input voltage/resistance.
- **Integrated Flashlight and Backlight:** Ensures clear visibility of readings and work area in low-light conditions.
- **Power Saving:** Automatic shutdown after a period of inactivity to conserve battery life.

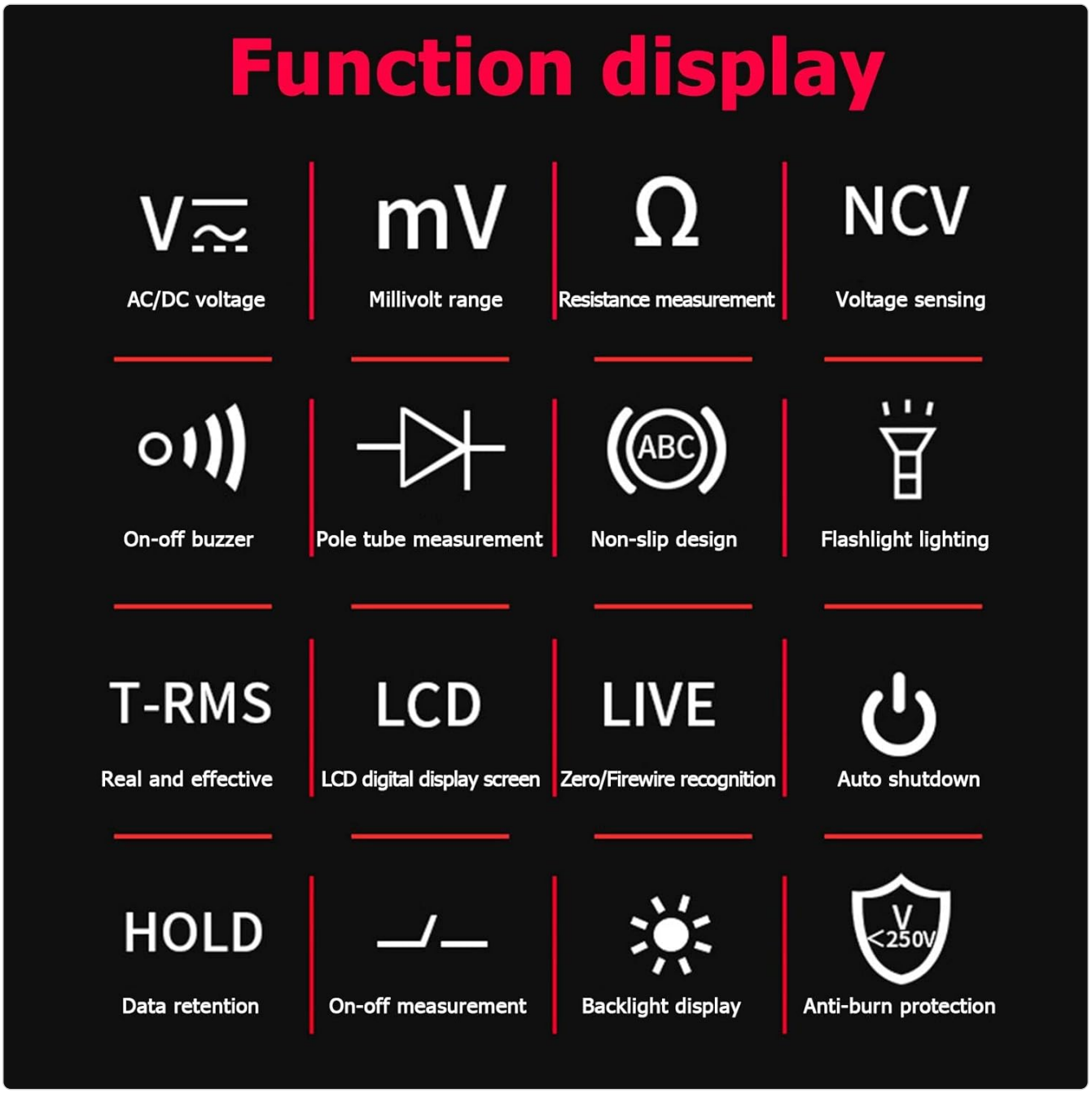

Figure 2.1: Visual representation of the multimeter's various functions, including AC/DC voltage, millivolt range, resistance, NCV, continuity, diode, non-slip design, flashlight, True RMS, LCD display, Live wire detection, auto shutdown, data hold, on-off measurement, backlight, and anti-burn protection.

3. Setup

3.1 Battery Installation

The FSH1 Multimeter requires 2 x 1.5V AAA batteries (not included). To install or replace batteries:

1. Locate the battery compartment cover on the back of the device.
2. Use a small screwdriver to open the battery compartment.
3. Insert two AAA batteries, ensuring correct polarity (+ and -).
4. Replace the battery compartment cover and secure it.

3.2 Probe Connection

The multimeter comes with an integrated test lead (red) and a separate black probe. The black probe connects to the "COM" (Common) input jack.

1. Insert the black test lead's banana plug into the "COM" input jack on the multimeter.
2. The red test lead is integrated into the pen-type design.
3. Ensure both connections are secure before use.

4. Operating Instructions

The FSH1 features automatic recognition, simplifying operation. Press the power button to turn the device on or off.

Figure 4.1: Close-up of the multimeter's function buttons and the integrated flashlight. The buttons allow selection of specific modes like NCV, millivolt, resistance, and continuity, as well as backlight and data hold functions.

4.1 Automatic Measurement Mode

Upon powering on, the multimeter enters automatic measurement mode. It will automatically identify and measure AC/DC voltage, resistance, and continuity when connected to a circuit.

- Connect the red probe to the positive test point and the black probe to the negative or common test point.
- The meter will display the measured value and automatically select the appropriate range.

4.2 Specific Function Selection

While the multimeter primarily operates in auto-ranging mode, specific functions can be accessed via the function buttons:

- **NCV (Non-Contact Voltage) Detection:** Press the NCV button to activate. Hold the tip of the multimeter near an AC voltage source. The device will indicate the presence of voltage through an audible alarm and visual indicator. This function helps distinguish between neutral and live lines.
- **Millivolt (mV) Measurement:** Press the mV button to enter the millivolt range for more precise low-voltage measurements.
- **Resistance (Ω) Measurement:** Press the Ω button to specifically measure resistance.
- **Continuity/Diode Test:** Press the continuity/diode button. For continuity, a buzzer will sound if the circuit is continuous. For diode testing, the forward voltage drop will be displayed.
- **Data Hold (H):** Press the 'H' button to freeze the current reading on the display. Press again to release.
- **Backlight:** Press the backlight button to turn the display backlight on or off for improved visibility in dark conditions.
- **Flashlight:** Press the flashlight button to activate the integrated flashlight, illuminating the work area.

Figure 4.2: The multimeter demonstrating its non-contact voltage detection capability, highlighting its intelligent features for safe electrical testing.

5. Maintenance

5.1 Cleaning

To maintain the accuracy and longevity of your multimeter:

- Wipe the device with a damp cloth and mild detergent. Do not use abrasive cleaners or solvents.
- Ensure the device is completely dry before storage or next use.

5.2 Battery Replacement

Replace batteries when the low battery indicator appears on the display or when the device fails to power on. Refer to Section 3.1 for battery installation instructions.

5.3 Storage

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

6. Troubleshooting

Problem	Possible Cause	Solution
Device does not power on.	Dead or incorrectly installed batteries.	Check battery polarity or replace batteries.
Inaccurate readings.	Low battery, dirty probes, or incorrect measurement technique.	Replace batteries, clean probes, ensure proper contact with test points.
Display shows "OL" (Overload).	Measured value exceeds the meter's range.	Ensure the measurement is within the specified range for the selected function.
No continuity beep.	Open circuit or continuity function not selected.	Verify the circuit is closed; ensure continuity mode is active.

7. Specifications

General Features		
Display mode	Liquid crystal display	
Maximum display	5999 digits automatic polarity display	
Measurement method	Double integral A/D conversion	
Sampling rate	about 3 times per second	
Over-range display	The highest digit displays "OL"	
Power supply	2*1.5V AAA batteries (not included)	
Working environment	0℃-40℃ relative humidity <80%	
Range	**Resolution**	**Accuracy**
AC and DC voltage		
DC/AC 6V	0.001V	± (0.5%+3)
DC/AC 60V	0.01V	
DC/AC 60OV	0.1V	
Resistance		
600Ω	0.1Ω	± (0.8%+5)
6KΩ	1Ω	± (0.8%+3)
60KΩ	10Ω	
600KΩ	100Ω	
6MΩ	1KΩ	
60MΩ	10KΩ	± (2.5%+0.3)
Continuity test		
Range	**Display value**	**Test condition**
Continuity test		Forward DC current is about 1mA, open circuit voltage is about 3V
	The buzzer sounds for a long time, and the resistance value of the test two points is less than (50±20)Ω.	The open circuit voltage is about 0.4V. Press "power" to switch between the two functions.
NCV	Support	
Neutral/Live Wire Test	Support	
Backlight/Auto shutdown	Automatic shutdown without any operation for 15 minutes	
Data retention	Support	
Flashlight	Support	

Figure 7.1: Detailed table outlining the general features and technical specifications of the multimeter, including display mode, maximum display, measurement method, sampling rate, over-range display, power supply, working environment, and various measurement ranges with their resolutions and accuracies.

Feature	Specification
Display Mode	Liquid crystal display
Maximum Display	5999 digits automatic polarity display
Measurement Method	Double integral A/D conversion
Sampling Rate	About 3 times per second
Over-range Display	The highest digit displays "OL"
Power Supply	2*1.5V AAA batteries (not included)
Working Environment	0°C - 40°C, relative humidity < 80%
Product Dimensions	8.66 x 3.15 x 1.57 inches (220 x 80 x 40 mm)
Item Weight	4.23 ounces (120 g)
Model Number	d3fc5b5c-516a-4d63-9bc5-3a58b75212cf

7.1 Measurement Ranges

Measurement Type	Range	Resolution	Accuracy
DC/AC Voltage	6V	0.001V	± (0.5% + 3)
	60V	0.01V	
	600V	0.1V	
Resistance	600Ω	0.1Ω	± (0.8% + 5)
	6KΩ	1Ω	
	60KΩ	10Ω	
	600KΩ	100Ω	
	6MΩ	1KΩ	± (2.5% + 0.3)
	60MΩ	10KΩ	
Continuity Test	The buzzer sounds for a long time, and the resistance value of the test two points is less than (50±20)Ω. Forward DC current is about 1mA, open circuit voltage is about 3V.		
NCV	Support		
Neutral/Live Wire Test	Support		
Backlight/Auto Shutdown	Automatic shutdown without any operation for 15 minutes		
Data Retention	Support		
Flashlight	Support		

Figure 7.2: Dimensions of the FSH1 Pen Type Digital Multimeter, showing a length of 180mm (7.1in) and a width of 48mm (1.9in).

8. Safety Information

Always observe basic safety precautions when using this multimeter to avoid personal injury or damage to the device.

- Do not apply voltage or current that exceeds the maximum specified limits for the meter.
- Exercise extreme caution when working with live circuits.
- Do not use the meter if it appears damaged or if the test leads are damaged.
- Ensure the battery compartment is securely closed before operation.
- Do not operate the meter in explosive gas, vapor, or dusty environments.
- Always disconnect power to the circuit before making resistance or continuity measurements.
- Use the NCV function as a preliminary check, but always verify with direct contact measurement when safety permits.

Figure 8.1: The multimeter's acoustic and light screen alarm protection feature, which activates when testing voltage, providing visual and audible alerts for safety.