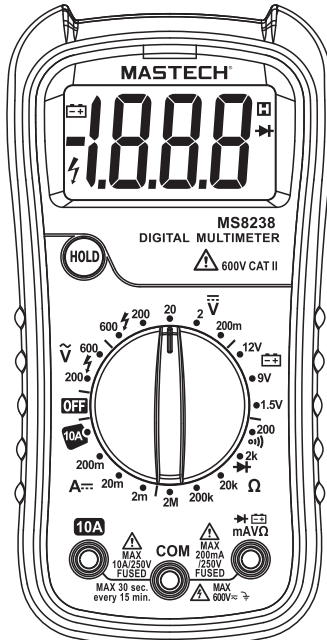


MS8238

Digital Multimeter User's Manual



1. Overview

⚠ WARNING

To avoid electrical shock or personal injury, please read all safety information, warnings and precautions before using the meter.

The Meter is a small, safe and reliable 3 1/2 digit handheld multimeter. This meter can measure AC/DC voltage, DC current, resistance, diode, continuity and battery test. This tool is ideal for professionals and hobbyists alike.

2. Safety Information

2.1 Safety Standards

The Meter meets the safety standards UL61010-1, CSA C22.2 No.61010-1, CAT II 600V and a pollution degree 2.

- The protection provided by the meter can only be ensured if all safety procedures are strictly followed.
- The safety symbols on the meter are to advise of potential dangerous situations. Caution is required when measuring close to the meter's safety limits.
- Never exceed the protection limit values indicated in the specifications for each range of measurement.

⚠ WARNING

The special attention should be paid when using the meter because the improper usage may cause electric shock and damage the meter. The safety measures in common safety regulations and operating instruction should be complied with when using. In order to make fully use of its functions and ensure safe operations please comply with the usage in this section carefully. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

2.2 Precautions

- To avoid electrical shock or personal injury, observe and follow all safety precautions
- Check the meter for damage before use. Do not use if any damage is observed.
- Check the test leads for cracks or exposed wires before using the meter. Replace if necessary.
- Ensure the meter works properly by testing a known voltage source first. If not working properly, the protective equipment may be damaged; have the meter serviced before using.
- Never measure voltages that may exceed the protection limit indicated on the meter.
- Always be careful when working with voltages above 60V dc or 30V ac rms. Keep fingers behind the probe barriers when making voltage measurements.
- Make sure the test leads are in the correct input jacks before measurement.
- Do not expose the meter to explosive gas, dust or vapor.
- When connecting the test leads to a measurement circuit, connect the common lead first, then the live lead. Reverse when disconnecting.
- Turn off power to circuit and discharge all capacitors before making resistance, continuity or diode measurements.
- In order to avoid incorrect DC voltage readings, check the circuit for AC voltage first, then put the meter in the appropriate DC voltage range.
- Turn off circuit power and check fused before connect the leads when measuring current. Turn circuit power on after making connection.
- Never use the meter unless the back cover is in place and fastened securely.

- When the low battery indicator " is displayed, replace the battery. The accuracy of the meter cannot be guaranteed while the low battery indicator is on.
- Before opening the case, always disconnect test leads from all energized circuits.
- For continued protection against fire, replace fuse only with the specified voltage and current ratings listed in the manual.

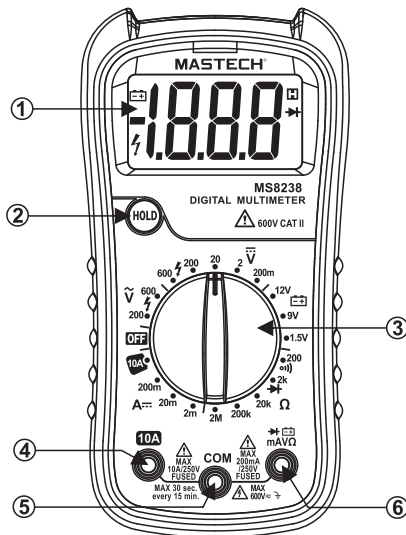
2.3 Electrical Symbols

	Note-Important safety information, refer to the instruction manual.
	Caution, possibility of electric shock
	Equipment protected throughout by double insulation or reinforced insulation.
	Conforms to UL STD. 61010-1, 61010-2-032, 61010-2-033; Certified to CSA STD C22.2 NO. 61010-1, 61010-2-032, 61010-2-033
	Fuse must be replaced as per the specification herein.
	Earth (ground) TERMINAL
	Direct current
	Alternating current
	This product has been tested to the requirements of CAN/CSA C22.2 NO. 61010-1, second edition, including Amendment 1.

CAT II Measurement category II: it is for measurements performed on circuits directly connected to the low voltage installation.

3 Description and Usage

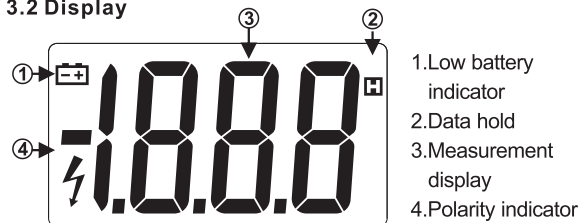
3.1 Front Panel



(all functions except current greater than 200mA)

- | | |
|---------------------|-------------------|
| 1. LCD display | 4. 10A input jack |
| 2. Data hold button | 5. Common jack |
| 3. Rotary switch | 6. Input jack |

3.2 Display



1. Low battery indicator
2. Data hold
3. Measurement display
4. Polarity indicator

3.3 Using the Meter

3.3.1 Data Hold

The data hold function will hold the current reading on the display.

- Press the “**HOLD**” button to hold the current reading. “H” symbol will appear on the display.
- Press the “**HOLD**” button to release the hold.

3.3.2 AC/DC voltage measurement

- Set the rotary switch to the appropriate AC or DC voltage range.
- Connect the red test lead to the input jack and the black lead to the COM jack.
- Connect the leads to the circuit under test and read the measurement on the display. Observe polarity for DC measurements.

⚠ Warning

Do not measure voltages higher than 600V DC or AC rms to prevent damage to the meter or personal injury.

3.3.3 DC current measurement

- Turn off power to the circuit. Allow all capacitors to discharge.
- Set the rotary switch to the appropriate DC current range.
- Depending on the current to be measured, connect the red test lead to either the input or 10A jack and the black lead to the COM jack.
- Break the circuit and connect the leads in series with the circuit (black lead on the lower voltage side).
- Turn circuit power on and read the measurement on the display. If “OL” is display, it means the measurement has exceeded the current range. Move the rotary switch to a higher range.

Warning

Never measure open-circuit voltages exceeding 250V between the input terminals and ground to prevent injury or damage to the meter.

NOTE

Check fuses before making current measurements, Make sure to use correct input jacks to prevent damage to the meter.

3.3.4 Resistance measurement

- Turn off power to the circuit. Allow all capacitors to discharge.
- Set the rotary switch to the appropriate resistance range.
- Connect the red test lead to the input jack and the black lead to the COM jack.
- Connect the leads to the circuit under test and read the measurement on the display.

Tips for measuring resistance:

- In-circuit resistance is usually different from a resistors rating due to the fact that the meter's test current flows in parallel with the circuit.
- For increased accuracy when measuring low resistances, short the test leads, record the value displayed, then connect the leads to the circuit and subtract the shorted value from the circuit measurement.
- When the leads are disconnected from the circuit under test, “OL” will be displayed on the screen.

WARNING

To prevent injury or damage to the meter, turn off power to circuit and discharge all capacitors fully before making resistance measurements.

3.3.5 Continuity measurement

- Turn off power to the circuit. Allow all capacitors to discharge.
- Set the rotary switch to the continuity position.
- Connect the red test lead to the input jack and the black lead to the COM jack.
- Connect the leads to the circuit under test. If the measured resistance is less than 50Ω, the buzzer will sound.

WARNING

To prevent injury or damage to the meter, turn off power to circuit and discharge all capacitors fully before making resistance measurements.

3.3.6 Diode test

- Turn off power to the circuit. Allow all capacitors to discharge.
- Set the rotary switch to the diode position.
 - Connect the red test lead to the input jack and the black lead to the COM jack.
 - Connect the red test lead to the anode (+) and the black lead to the cathode (-) of the diode and read the measurement on the display. The meter will display "OL" if the connection is reversed.

WARNING

To prevent injury or damage to the meter, turn off power to circuit and discharge all capacitors fully before making resistance measurements.

3.3.7 Battery test

- Set the rotary switch to the appropriate battery test range.
- Connect the red test lead to the input jack and the black lead to the COM jack.
- Connect the red test lead to the positive (+) end and the black lead to the negative (-) end of the battery and read the measurement on the display.

Warning

To prevent injury or damage to the meter, do not connect the meter to a battery with a voltage rating exceeding 60V AC or 30V DC

4. Specifications 4.1 General Specifications

Function	Range
Safety Rating	CAT II 600V; pollution degree: 2
Operating Altitude	≤2000m
Operating TEMP/Humidity	0~40°C, <80% RH
Storage TEMP/Humidity	-10~60°C, <70% RH, remove battery
Max. Input between terminals and earth ground	600V DC or AC rms
Fuse Protection	mA range: Fuse F 250mA H 250V 10A range: Fuse F 10A H 250V
Sample Rate	Approx. 3 times/sec.
Display	3 ½ digit LCD display
Overload Indication	Display shows "OL"
Low Battery Indication	When battery voltage drops below normal operating voltage,  "is shown on the display
Polarity Indication	Display automatically displays "-"
Power Source	1x 9V battery (NEDA 1604, 6F22 or 006P)

4.2 Technical Specifications

Accuracy: $\pm$ (% of reading + digits) at 18°C~28°C with a relative humidity of <80%; guaranteed for a period of one year.

4.2.1 DC Voltage

Measuring range	Resolution	Accuracy
200mV	0.1mV	$\pm$ (0.5% of reading +2 digits)
2V	0.001V	
20V	0.01V	
200V	0.1V	
600V	1V	$\pm$ (0.8% of reading +5 digits)

Max. input voltage: 600V DC or AC rms.

4.2.2 AC Voltage

Measuring range	Resolution	Accuracy
200V	0.1V	$\pm$ (1.0% of reading +5 digits)
600V	1V	

Max. input voltage: 600V DC or AC rms.

Frequency Response: 40~400Hz, sine wave rms (avg. response)

4.2.3 Resistance

Measuring range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm$ (0.8% of reading +4 digits)
2k Ω	0.001k Ω	
20k Ω	0.01k Ω	
200k Ω	0.1k Ω	
2M Ω	0.001M Ω	

Overload protection: 250V DC or AC (RMS)

4.2.4 Diode Test

Function	Resolution	Description
Diode Test 	0.001V	Forward DC current: 1mA Reverse DC voltage: 3.0V Display shows forward voltage drop

Overload protection: 250V DC or AC (RMS)

4.2.5 Continuity

Function	Description	Description
	If measured resistance is less than 50 Ω , buzzer will sound	Open circuit voltage: 2.9V

Overload protection: 250V DC or AC (RMS)

4.2.6 DC Current

Measuring range	Resolution	Accuracy
2mA	0.001mA	$\pm$ (0.8% of reading +3 digits)
20mA	0.01mA	
200mA	0.1mA	
10A	10mA	$\pm$ (2.5% of reading +3digits)

Overload protection: mA jack: F 250mA H 250V fuse
10A jack: F10A H 250V fuse

Max input current: mA jack: 200mA DC

10A jack: 10A DC

When measuring current exceeding 2A, do not measure for longer than 2 minutes continuously. Wait 10 minutes to continue measurement.

4.2.7 Battery Test

Position	Resolution	Accuracy
12V	0.01V	$\pm(0.8\% \text{ of reading} + 7 \text{ digits})$
9V	0.01V	$\pm(0.8\% \text{ of reading} + 7 \text{ digits})$
1.5V	0.001V	$\pm(3.0\% \text{ of reading} + 5 \text{ digits})$

Overload protection: F250mA H 250V fuse

5. Maintenance

5.1 General Maintenance

This section provides basic information on maintaining the meter, such as replacing fuses and the battery. Only experienced and authorized personnel should make repairs to the meter.

Warning

To avoid injury or damage to the meter, do not allow moisture inside the case and remove test leads before opening battery cover.

- Use a damp cloth to regularly clean the outside of the meter. Do not use abrasives or chemical solvents. Dirty or damp input jack can adversely affect readings.
- To clean input jacks, follow the following steps:
 1. Turn off the instrument and remove the test leads.
 2. Clear any dirt or other particles on the input jacks.
 3. Use a cotton ball/swab with a lubricant (i.e. WD-40) to clean off the contacts of the input jacks.
 4. Use a separate cotton ball/swab for each jack to prevent cross-contamination.

5.2 Replacing the Battery and Fuses

1. Under normal conditions, it is unnecessary to replace the fuse. Don't replace it until the probes are unplugged and the power is shut down. Take out the two screws of the rear cover to remove the housing.
2. The specification of the fuse is:
F1: F 10A H 250V, F2: F 250mA H 250V
The replacement should be of the same specification.
3. The battery for this multimeter is 9V NEDA 1604 or 6F22.
The replacement should be of the same specification.
4. Don't put the instrument into use until the rear cover is screwed after replacing battery or fuse.

WARNING

To avoid electric shock, make sure the probes are disconnected from the measured circuit before removing the rear cover. Make sure the rear cover is tightly screwed before using the instrument.

5.3 Replacing the Probe

If insulation on probe is damaged, replace it.

WARNING

Use meet EN 61010-031 standard, rated CAT II 600V, 10A or better probe.

