

Manual de instrucciones - Instructions manual
Manuel d'instructions - Handbuch

1. Introduction



WARNING

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

The equipment is a small, safe and reliable multi-meter with less than 3 ½ digits. This multimeter can measure AC/DC voltage, DC current, resistance, diode, continuity, and battery test. This tool is ideal for professionals and amateurs alike.

2. Safety information

2.1 Safety standards

The multimeter complies with safety standards UL61010-1, CSA C22.2 No61010-1, CAT II 600V and pollution degree 2.

- The protection provided by the multimeter can only be guaranteed if all safety procedures are strictly followed.
- The safety symbols on the multimeter are to warn of possible dangerous situations. Care should be taken when measuring near the safety limits of the multimeter.
- Never exceed the protective limit values indicated in the specifications of each measuring range.



WARNING










Special attention should be paid to the use of the multimeter, as improper use can cause electric shocks and damage the multimeter.

The usual measures of the safety regulations and operating instructions must be observed during use. In order to make full use of its functions and to ensure safe operation, please comply carefully with the use of this section. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be affected.

2.2 Precautions

- To avoid electric shock or personal injury, observe and follow all safety instructions.
- Check the multimeter for damage before use. Do not use if you notice any damage.
- Check test leads for cracks and exposed wires before using the multimeter. Replace if necessary.
- Make sure multimeter is working properly by first testing a known voltage source. If not working properly, protective equipment may be damaged; take the multimeter to a service facility before use.
- Never measure voltages that may exceed the protection limit indicated on the multimeter.
- Always be careful when working with voltages above 60V DC or 30V AC RMS. Keep your fingers behind the probe barriers when taking voltage measurements.
- Make sure the test probes are connected to the correct input terminals before taking measurements.
- Do not expose the multimeter to dust, steam, or explosive gases.
- When connecting the test leads to a measurement circuit, connect the common terminal first and then the active terminal. Reverse the operation when disconnecting.
- Disconnect power from the circuit and discharge all capacitors before making resistance, continuity or diode measurements.
- To avoid incorrect DC voltage readings, check the AC voltage circuit first and then set the multimeter to the appropriate DC voltage range.
- Disconnect the power from the circuit and check the fuses before connecting the wires when measuring the current. Turn on the power supply circuit after making the connection.
- Never use the multimeter unless the back battery cover is in place and securely fastened.
- When the low battery indicator " " appears, change the battery. The accuracy of the multimeter cannot be guaranteed while the low battery indicator is on.
- Always disconnect the test leads from all powered circuits before opening the cover.
- For continuous fire protection, replace the fuse with a fuse with the voltage and current ratings specified in this manual.

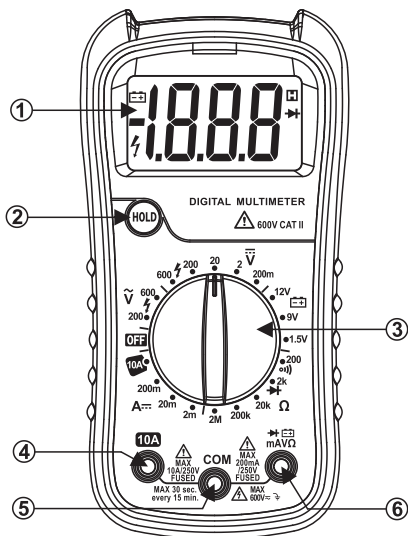
2.3 Electrical symbols

	Note: Important safety information, see instruction manual.
	Caution, possibility of electric shock.
	The equipment is protected at all times 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: is for measurements made on circuits directly connected to the low voltage installation.

3 Description and usage

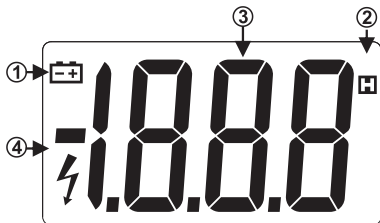
3.1 Front panel



(all functions except current over 200mA)

- | | |
|--------------------------|-----------------------|
| 1. LCD Screen | 4. 10A input terminal |
| 2. Data retention button | 5. Common terminal |
| 3. Thumbwheel | 6. Input terminal |

3.2 Display



1. Low battery indicator
2. Data retention
3. Measurement screen
4. Polarity indicator

3.3 Use of the meter

3.3.1 Data retention

The data retention function will keep the current reading on the display.

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

3.3.2 AC/DC voltage measurement

- Set the thumbwheel to the appropriate AC or DC voltage range.
- Connect the red test leads to the input terminal or the black test lead to the COM terminal.
- Connect the test probes to the circuit being tested and read the measurement on the display. Observe the polarity for DC measurements



WARNING

Do not measure voltages above 600V DC or AC RMS to avoid damage to the multimeter or personal injury.

3.3.3 DC Current Measurement

- Disconnect power from the circuit. Allow all capacitors to discharge.
- Set the thumbwheel to the appropriate DC current range.
- Depending on the current to be measured, connect the red test lead to the input or 10A socket and the black lead to the COM
- Cut the circuit and connect the wires in series with the circuit (the black wire on the low voltage side)
- Connect the power supply to the circuit and read the measurement on the display. If “OL” appears on the display, it means that the measurement has exceeded the current range. Move the thumbwheel to a higher range.

**WARNING**

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

**NOTE**

Check the fuses before making current measurements. Be sure to use the correct input sockets to prevent damage to the meter.

3.3.4 Resistance measurement

- Disconnect power from the circuit. Allow all capacitors to discharge.
- Set the thumbwheel to the appropriate resistance range.
- Connect the red test lead to the input terminal and the black lead to the COM terminal.
- Connect the wires to the circuit being tested and read the measurement on the display.

Tips for measuring resistance:

- The resistance in the circuit is usually different from the measured resistance because the test current also flows through the multimeter.
- For greater accuracy when measuring low resistances, short the test leads, record the displayed value, then connect the leads to the circuit and subtract the shorted value from the circuit measurement.
- When the wires are disconnected from the circuit you are testing, “OL” will appear on the display.

**WARNING**

To avoid injury or damage to the multimeter, disconnect power from the circuit and completely discharge all capacitors before making resistance measurements.

3.3.5 Continuity Measurement

- Disconnect power from the circuit. Allow all capacitors to discharge.
- Set the thumbwheel to the continuity position.
- Connect the cables to the circuit being tested. If the measured resistance is less than 50Ω, the buzzer will sound.



WARNING

To avoid injury or damage to the multimeter, disconnect power from the circuit and completely discharge all capacitors in the circuit before making resistance measurements.

3.3.6 Diode test

- Disconnect power from the circuit. Allow all capacitors to discharge.
- Set the thumbwheel to the diode position.
- Connect the red test lead to the input socket and the black lead to the COM socket.
- Connect the red test lead to the anode (+) and the black test 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 avoid injury or damage to the multimeter, disconnect power from the circuit and completely discharge all capacitors before performing diode measurements.

3.3.7 Battery test

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



WARNING

To avoid injury or damage to the multimeter, do not connect it to a battery with a nominal voltage greater than 60V AC or 30V DC.

4. Specifications

4.1 General specifications

- Safety grade: CAT II 600V; pollution degree: 2
- Operating altitude: ≤2000m
- TEMP/Functional humidity: 0~40°C, <80% RH
- TEMP/Stockroom humidity: -10~60°C, <70% RH, remove battery
- Max. Input between terminals and ground: 600V DC or AC RMS
- Fuse protection: mA range: F250mA H 250V fuse
- 10A range: F 10A H 250V fuse
- Sampling rate: Approx. 3 times/second
- Screen: 3-digit LCD display ½ digits
- Overload indication: The display shows "OL"
- Low battery indication: When the battery voltage is below the normal operating voltage, " " is shown on the display
- Polarity indication: The display automatically shows "-"
- Power supply: One 9V battery

4.2 Technical specifications

Accuracy: ± (% 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

Range	Resolution	Accuracy
200mV	0.1mV	±(0.5% of reading + 2 digits)
2V	0.001V	
20V	0.01V	
200V	0.1V	
600V	1V	±(0.8% of reading + 5 digits)

Maximum input voltage: 600V DC or AC RMS

4.2.2 AC voltage

Range	Resolution	Accuracy
200V	0.1V	$\pm(1.0\% \text{ of reading} + 5 \text{ digits})$
600V	1V	

Maximum input voltage: 600V DC or AC RMS


Frequency response: 40~400Hz, RMS sine wave (medium response)

4.2.3 Resistance

Range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm(0.8\% \text{ of reading} + 4 \text{ digits})$
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
	0.001V	Direct DC current: 1mA Reverse DC voltage: 3.0V The display shows the direct voltage drop

Overload protection: 250V DC or AC RMS

4.2.5 Continuity

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

Overload protection: 250V DC or AC RMS

4.2.6 DC current

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

Overload protection:

mA socket: F 250mA H 250V fuse

10A socket : F10A H 250V fuse

Maximum input current:

mA output: 200mA DC

10A socket : 10A DC

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

4.2.7 Battery test

Range	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 both the maintenance of the multimeter and the replacement of the fuses and battery. Only experienced and authorised personnel should carry out repairs to the multimeter.



WARNING

To avoid injury or damage to the multimeter, do not allow moisture to enter the housing and remove the test leads before opening the battery cover.

- Use a damp cloth to regularly clean the outside of the multimeter. Do not use abrasives or chemical solvents. A dirty or wet input terminal may adversely affect the reading.
- To clean the input terminals, follow the steps below:
 - 1) Turn off the instrument and remove the test leads.
 - 2) Clean any dirt or other particles from the inlet terminals.
 - 3) Use a cotton or swab with lubricant to clean the inlet terminal contacts.
 - 4) Use a separate cotton ball or swab for each terminal to avoid cross-contamination.

5.2 Battery and Fuse Replacement

- 1) Under normal conditions, it is not necessary to replace the fuse. Do not replace it until the test probes are unplugged and the power is turned off. Remove the two rear cover screws to remove the housing.
- 2) The specification of the fuse is:
F1: F 10A H 250V, F2: F 250mA H 250V
The replacement must be of the same specification.
- 3) The battery of this multimeter is 9V NEDA 1604 or 6F22. The replacement must be of the same specification.
- 4) Do not put the instrument into use until the back cover is screwed on after replacing the battery or fuse.



WARNING

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

5.3 Replacing Test Leads

If the insulation of the test probes is damaged, replace them.

**WARNING**

Use test probes that comply with EN 61010-031, rated CAT II 600V, 10A or better.