

DIGITAL MULTI-METER WITH AUTOMATIC RANGING

Item Number W2971

OWNER'S MANUAL



Performance Tool®



Please read these instructions carefully and retain them for future use.

▲WARNING

It is the owner and/or operators' responsibility to study all WARNINGS, operating, and maintenance instructions contained on the product label and instruction manual prior to operation of this product. The owner/operator shall retain product instructions for future reference.

The owner and/or operator are responsible for maintenance, maintaining all decals or warning labels and while in use, maintaining the unit in good working order. If the owner and/or operator are not fluent in English, the product warnings and instructions shall be read and discussed with the operators' native language by the purchaser/owner or his designee. Make sure that the operator comprehends its contents. Safety information shall be emphasized and understood prior to usage. The product shall be inspected per the operating instructions.

Users of this product must fully understand these instructions. Each person operating this product must also be of sound mind and body and must not be under the influence of any substance that might impair their vision, dexterity or judgment.

Protect yourself and others by observing all safety information.

Failure to comply with instructions could result in personal injury and/or property damage! This manual provides all safety information, operation instruction, specifications and maintenance for the meter, which is compact, handheld, and battery operated. This instrument performs AC/DC voltage, AC/DC Current, Resistance, Audible Continuity, Diode and Cable test, it is a 3 1/2 digits, 1999 counts auto ranging DMM. It has the functions of polarity indication, data hold, back light, over range indication and automatic power-off. It can be operated easily and is an ideal instrument tool. This digital multimeter has been designed according to EN61010-1 oncoming electronic measuring instruments with an over voltage category (CAT II 600V) and Pollution degree 2.

SAFETY INFORMATION

▲WARNING:

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

1. Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.
2. Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity.
3. Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
4. The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement is conducted to prevent damage of the Meter.
5. When the Meter working at an effective voltage over 60V in DC or 30V rms in AC, special care should be taken for there is danger of electric shock.
6. Use the proper terminals, function, and range for your measurements.
7. Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.
8. When using the test leads, keep your fingers behind the finger guards.
9. Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.
10. Remove the connection between the testing leads and the circuit being tested, and turn the Meter power off before opening the Meter case.
11. When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.
12. The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.
13. Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
14. The Meter is suitable for indoor use.
15. Turn the Meter power off when it is not in use and take out the battery when not using for a long time. Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.

Electrical Symbols

	DC (Direct Current)		AC (Alternating Current)
	DC or AC		Low battery
	Warning. Refer to the manual		Earth ground
	Dangerous voltage maybe present		Fuse
	Diode		Continuity test
AUTO	Auto range		Double insulated

GENERAL CHARACTERISTICS

Display	: LCD, 1999 counts updates 2/sec
LCD size	: 46 x 24mm
Polarity Indication	: "-" displayed automatically
Over-range Indication	: "OL" displayed
Low Battery Indication	: "🔋" displayed
Range select	: auto or manual
Operation Temperature	: 0°C to 40°C, less than 80%RH
Storage Temperature	: -10°C to 50°C, less than 85%RH
Battery Type	: 1.5V x 2, AAA size
Dimension (HxWxD)	: 150x70x22mm
Weight	: Approx. 150g

SPECIFICATIONS

Accuracy is guaranteed for 1 year 23°C±5°C less than 80%RH

1. DC VOLTAGE (Auto ranging)

Range	Resolution	Accuracy
200mV	0.1mV	±(0.8% of rdg + 5dgt)
2V	1mV	±(1% of rdg + 2dgt)
20V	10mV	
200V	100mV	
600V	1V	±(1.2% of rdg + 5dgt)

Input Impedance: 10MΩ
Overload Protection: 600V DC/AC rms
Max. Input voltage: 600V DC

2. DC CURRENT

Range	Resolution	Accuracy
200μA	0.1μA	±(0.8% of rdg + 5dgt)
2000μA	1μA	
20mA	10μA	
200mA	100μA	±(2.0% of rdg + 5dgt)
10A	100mA	

Overload Protection: F0.5A/600V fuse
Max. Input Current: 500mA
Voltage Drop: 200μA and 20mA ranges: 20mV
2000μA and 200mA ranges: 200mV

3. AC CURRENT

Range	Resolution	Accuracy
200μA	0.1μA	±(1.0% of rdg + 5dgt)
2000μA	1μA	
20mA	10μA	
200mA	100μA	±(3.0% of rdg + 5dgt)
10A	100mA	

Overload Protection: F0.5A/600V fuse
Max. Input Current: 500mA
Voltage Drop: 200μA and 20mA ranges: 20mV
2000μA and 200mA ranges: 200mV
Frequency Range: 40Hz ~ 400Hz
Response: Average, calibrated in rms of sine wave



4. AC VOLTAGE (Auto ranging)

Range	Resolution	Accuracy
2V	1mV	±(1.2% of rdg + 3dgt)
20V	10mV	
200V	100mV	
600V	1V	±(1.2% of rdg + 8dgt)

Input Impedance: 10MΩ
Frequency Range: 40Hz ~ 400Hz
Overload Protection: 600V DC/AC rms
Response: Average, calibrated in rms of sine wave
Max. Input voltage: 600V AC rms

SPECIFICATIONS CONT.

5. Diode and Continuity

Range	Introduction	Remark
	The approximate forward voltage drop will be displayed	Open circuit voltage: about 1.5V
	The built-in buzzer will sound if the resistance is less than about 30Ω.	Open circuit voltage: about 0.5V

Overload Protection: 250V DC/AC rms

For continuity test: When the resistance is between 30Ω and 100Ω, the buzzer may sound or may not sound. When the resistance is more than 100Ω, the buzzer won't sound.

6. RESISTANCE (Auto Ranging)

Range	Resolution	Accuracy
200Ω	0.1Ω	±(1.5% of rdg + 3dgt)
2KΩ	1Ω	
20KΩ	10Ω	
200KΩ	100Ω	
2MΩ	1KΩ	
20MΩ	10KΩ	

Open Circuit Voltage: about 0.25V

Overload Protection: 250V DC/AC rms

7. BATTERY TEST

Range	Resolution	Internal Resistance
12V	10mV	1.2KΩ
9V	10mV	900Ω
1.5V	1mV	3KΩ

OPERATION

Measuring Voltage

- 1) Connect the BLACK test lead to the "COM" jack and the RED to the "INPUT" jack.
- 2) Set the function switch to V or V range.
Select auto range or manual range with the "RANGE" button.
- 3) In manual range, if the voltage magnitude to be measured is unknown beforehand, select the highest range.
- 4) Connect the test leads across the source or load to be measured.
- 5) Read LCD display. The polarity of the RED lead connection will be indicated when making a DC measurement.

NOTE:

- a. In small range, the meter may display an unstable reading when the test leads have not been connected to the load to be measured. It is normal and will not affect the measurements.
- b. In manual range mode, when the meter shows the over range symbol "OL", a higher range must be selected.
- c. To avoid damage to the meter, don't measure a voltage which exceeds 600Vdc (for DC voltage measurement) or 600Vac (for AC voltage measurement).

Measuring Current

- 1) Connect the BLACK test lead to the "COM" jack.
- 2) Set the range switch to desired μA or mA range. If the current magnitude to be measured is not known beforehand, set the ranges switch to the highest range position and then reduce it range by range until satisfactory resolution is obtained.
- 3) Select DC current measurement or AC current measurement with the "SELECT" Button.
- 4) Select auto range or manual range with the "RANGE" button. In manual range, if the current magnitude to be measured is not known beforehand, select the highest range.
- 5) Connect test leads in series with the circuit to be measured.
- 6) Read the reading on the display. For DC current measurement, the polarity of the red test lead connection will be indicated as well.

NOTE: When the display shows the over range symbol "OL", a higher range must be selected.

OPERATION CONT.

Measure Resistance

- 1) Connect the BLACK test lead to the "COM" jack and the RED to the "INPUT" jack (Note: The polarity of the red test lead is positive "+").
- 2) Set the range switch to Ω range
- 3) Select auto range or manual range with the "RANGE" button. In manual range, if the current magnitude to be measured is not known beforehand, select the highest range.
- 4) Connect the test leads across the load to be measured.
- 5) Read the reading on the display.

NOTE:

- a. For resistance measurements >1MΩ, the meter may take a few seconds to stabilize reading. This is normal for high-resistance measurement.
- b. When the input is not connected, i.e. at open circuit, the symbol "OL" will be displayed as an over range indicator.
- c. Before measuring in-circuit resistance, be sure that the circuit under test has all power removed and all capacitors are fully discharged.

Continuity Test

- 1) Connect the BLACK test lead to the "COM" jack and the RED to the "INPUT" jack (Note: The polarity of the red test lead is positive "+").
- 2) Set the range switch to range
- 3) Press the "SELECT" Button to select continuity measurement mode, and the symbol " " will appear as an indicator.
- 4) Connect the test leads across the load to be measured.
- 5) If the circuit resistance is lower than about 30Ω, the built-in buzzer will sound.

Diode Test

- 1) Connect the BLACK test lead to the "COM" jack and the RED to the "INPUT" jack (Note: The polarity of the red test lead is positive "+").
- 2) Set the range switch to range
- 3) Press the "SELECT" Button to select continuity measurement mode, and the symbol " " will appear as an indicator.
- 4) Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode.
- 5) The meter will show the approximate forward voltage of the diode. If the connections are reversed, "OL" will be shown on the display.

Battery Test

- 1) Red lead to "VΩmA", Black lead to "COM"
- 2) RANGE switch to desired "BATT" position.
- 3) Connect red test lead to the battery's negative.
- 4) The display will read the battery's voltage.

Auto Power Off

If you don't operate the meter for about 15 minutes, it will turn off automatically. To turn it on again, just rotate the range switch or press a button.

If you press the "SELECT" button and turns on meter, the automatic power-off function will be disabled.

Battery Replacement

If the sign " " appear on the display, it indicates battery should be replaced. Remove screws and open the back case, replace the exhausted battery with new batteries (Size AAA, 1.5V x2 or equivalent).

Fuse Replacement

Fuse rarely needs replacement and is blown almost always as a result of operator's error. To replace the fuses, open the battery cover; replace the damaged fuse with a new fuse of the specified ratings.

Reinstall the battery cover and lock this cover.

Disposal

If you intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled. Please do not dispose it in the garbage, but check with your local council for recycling facilities in your area.

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