

Read this owner's manual thoroughly before use and save.



Figure 1

- |                            |                                    |
|----------------------------|------------------------------------|
| 1. DC Volts/AC Volts       | 6. Diode Test                      |
| 2. AC Amps                 | 7. Battery testing                 |
| 3. DC Amps                 | 8. Common input jack               |
| 4. Resistance              | 9. Positive input jack             |
| 5. Audible Continuity Test | 10. Durable drop resistant housing |

## 1.0 METER FUNCTIONS

**Meter type:** Manual

**Functions:** 8

**Ranges:** 28

**Display Count:** 1999

**Test Lead Icons:** on display indication of proper test lead input for easy to see proper test lead placement.

**Input impedance:** 10 Meg Ohm

**AC Volt Ranges:** 2V, 20V, 200V, 750V, best accuracy (0.8%+5)

**DC Volt Ranges:** 200mV, 2V, 20V, 200V and 1000V, best accuracy (0.5%+5)

**AC Amps:** 200µA, 2mA, 20mA, 200mA and 10A, best accuracy (1.0%+5)

**DC Amps:** 200µA, 2mA, 20mA, 200mA and 10A, best accuracy (0.8%+2)

**Resistance Ranges:** 200ohm, 2kohm, 20kohm, 200kohm, 2M ohm and 20M ohm, best accuracy (0.8%+3)

**Battery Testing:** (1.5V) 2000mV / (9V), best accuracy (0.8%+5)

**Over Range Indication:** Displayed value > 1999, displays OL (The safety and accuracy will only be guaranteed within the specification range) by the input.

**Polarity Indication:** "-" is displayed for negative polarity

**Electro-Magnetic:** When it is under 1V/m frequency : total accuracy = assigned accuracy +5% of the range. When it is over 1V/m frequency: there is no assigned accuracy.

**Agency Approvals:** ETL, CE (IEC/EN61010.; CAT III 600V, Pollution Degree 2

Operating Temperature: 32°F–104°F (0°C–40°C)

Relative Humidity: 32°F–86°F below <75%, 86°F–104°F<50%

**Storage Temperature:** 14°F–122°F(-10°C–50°C)

**Dimension:** 179mm x 88mm x 39mm

Weight: Around 380g (including battery)

**Altitude:** Maximum 2000m

**Warranty info:** 5 yr.


## 2.0 READ FIRST: IMPORTANT SAFETY INFORMATION

Read this operators manual thoroughly before using this multimeter. This manual is intended to provide basic information regarding this meter and to describe common test procedures which can be made with this unit. Many types of appliance, machinery and other electrical circuit measurements are not addressed in this manual and should be handled by experienced service technicians.


Use extreme caution when using this multimeter. Improper use of this meter can result in severe damage to personal injury or death. Follow all instructions and suggestions in this operators manual as well as observing normal electrical safety precautions. Do not use this meter if you are unfamiliar with electrical circuits and proper test procedures.

### 2.1 FOR YOUR SAFETY

- This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition.
- Read through and understand the instructions contained in this manual before using the instrument.
- Keep the manual at hand to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual.
- It is essential that all safety instructions are adhered to.
- Failure to follow the safety instructions may cause injury, instrument damage

The symbol  indicated on the instrument means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the symbol appears in the manual.

 **DANGER** is reserved for conditions and actions that are likely to cause serious or fatal injury.

 **WARNING** is reserved for conditions and actions that can cause serious or fatal injury.

 **CAUTION** is reserved for conditions and actions that can cause injury or instrument damage.

## DANGER

- Never make measurement on a circuit in which voltage over 1000V exists.
- Do not exceed the CAT rating of the measuring device
- Do not attempt to make measurement in the presence of flammable gases.  
The use of the instrument may cause sparking, which can lead to an explosion.
- Never use the instrument if its surface or your hand is wet.
- Do not exceed the maximum allowable input of any measuring range.
- Never open the battery cover during a measurement.
- The instrument is to be used only in its intended applications or conditions.  
Use in other than as intended may cause instrument damage or serious personal injury.

## WARNING

- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case, cracked test leads and exposed metal part.
- Do not turn the function selector switch with plugged in test leads connected to the circuit under test.
- Do not install substitute parts or make any modification to the instrument.  
Return the instrument to your distributor for repair or recalibration.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Always switch off the instrument before opening the battery compartment cover for battery replacement.











## ⚠ CAUTION

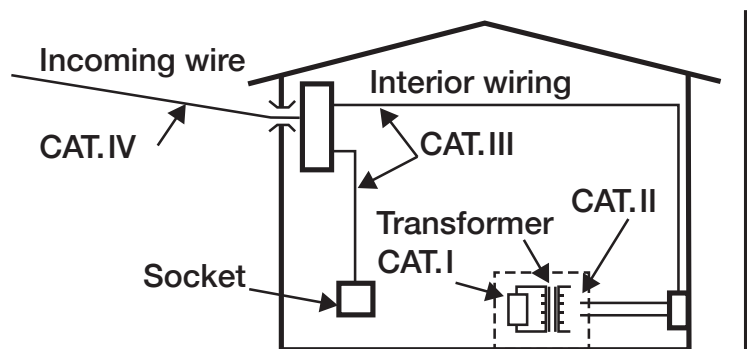
- Set the Function Switch to an appropriate position before starting measurement.
- Firmly insert the test leads.
- Disconnect the test leads from the instrument for current measurement.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Be sure to power off the instrument after use. When the instrument will not be in use for a long period, place it in storage after removing the batteries.
- Use only a soft cloth dampened with water or neutral detergent for cleaning the meter.  
Do not use abrasives, solvents or harsh chemicals. Allow to dry thoroughly before use.

### Measurement categories (Over-voltage categories)

To ensure safe operation of measuring instruments, IEC61010 establishes safety standards for various electrical environments, specified as CAT I through CAT IV, and called measurement categories. Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.

- CAT I: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
- CAT II: Primary electrical circuits of equipment connected to an AC electrical outlet by a power cord.
- CAT III: Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
- CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary over current protection device (distribution panel).

Symbols	
	Caution, risk of danger, refer to the operating manual before use
	Caution, risk of electric shock
	AC (Alternating Current)
	DC (Direct current)
	AC/DC Selectable (Alternating Current/Direct Current)
	Earth (ground) Terminal
	The equipment is protected throughout by double insulation or reinforced insulation
	Application around and removal from hazardous live conductors is permitted.
	Conforms to Standards of European Union
	Designates the product as recyclable electronic waste per WEEE Directive



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**Storage Temperature:** 14°F–122°F(-10°C–50°C)

**Dimension:** 179mm x 88mm x 39mm

Weight: Around 380g (including battery)

**Altitude:** Maximum 2000m

**Warranty info:** 5 yr.

## 2.2 OPERATING INSTRUCTIONS

1. Set the function/range switch to the proper position before making a measurement. When the voltage is not known, it MUST be determined that the capacity of the selected range will handle the amount of voltage in the circuit (see #3 under "For Your Safety").
2. Avoid placing the meter in areas where vibration, dust or dirt are present. Do not store the meter in excessively hot, humid or damp places. This meter is a sensitive measuring device and should be treated with the same regard as other electrical and electronic devices.
3. When the meter is not in use keep the meter turned off to keep the battery from discharging.
4. When disconnecting the test leads from the unit, always grasp the leads where the input jacks meet the tester housing. Do not pull the leads out of the jacks by the insulated wire or transport the tester using the test leads as a carrying strap.

**⚠ WARNING** 5. Do not immerse the meter in water or solvents. To clean the housing use a damp cloth with a minimal amount of mild soap.

*NOTE: With any measurement made by this meter, there will be some fluctuation of the digital display. This is due to the meter's sampling method. This unit samples at a rate of 2 times per second, thus the fluctuation of the readout.*

## 3.0 FUNCTION BUTTONS

### 3.1 POWER BUTTON TURNS METER POWER ON AND OFF

1. To conserve battery life the meter powers off automatically after 15 minutes of non use.  
*To disable auto off press the select button while turning the meter on.*

### 3.2 HOLD BUTTON

1. Press HOLD once to enter data hold mode to freeze the displayed value.
2. Press HOLD again to exit data hold mode and resume normal measurement mode.

## 4.0 DIAL SETTINGS

**⚠ WARNING** To avoid personal injury or damage to the Meter, do not attempt to measure voltages higher than 750V AC.

### 4.1 AC VOLTS V~

There are four ranges for measuring AC voltage, 2V, 20V, 200V, 750V. For more accurate measurements use the lowest setting possible without exceeding the voltage setting. I.e. Use the 2V setting only if the voltage is 2 V or less.

1. Set the function/range switch to the appropriate AC V range.
2. Insert the black test lead into the COM input terminal.
3. Insert the red test lead into the V input terminal.
4. Touch the test leads to the circuit under test. With AC voltage, the polarity of the test leads is not a factor.

*NOTE: It is best to touch one of the test leads to ground or Neutral first and then touch the 2nd test lead to the hot wire.*

5. Read the value of the measurement displayed.
6. Typical AC Voltage measurements include wall outlets, appliance outlets, motors, light fixtures and switches.

### 4.2 DC VOLTS

**⚠ WARNING** To avoid personal injury or damage to the Meter, do not attempt to measure voltages higher than 1000V DC. There are five ranges for measuring DC voltage, 200mV, 2V, 20V, 200V and 1000V. For more accurate measurements use the lowest range possible without exceeding the voltage setting.

1. Set the function/range switch to the appropriate DC V range.
2. Insert the black (negative) test lead into the COM input terminal.
3. Insert the red (positive) test lead into the V input terminal.
4. Touch the test leads to the circuit under test. With DC voltage, the polarity of the test leads is a factor. Touch the black (common) test lead to the negative DC source (ground) first and red (positive) test lead to the "live" source second.
5. Read the value of the measurement displayed. If the leads are reversed a "-" indicator will appear on the display.
6. Typical DC Voltage measurements include car batteries, automotive switches, motors and house hold batteries.

### 4.3 AC AMPS A~

**⚠ WARNING** Never attempt an in-circuit current measurement where the open circuit voltage between terminals and ground is greater than 30V AC. If the fuse burns out during measurement, the meter may be damaged or personal injury may occur. Use proper terminals, function, and range for the measurement. When the test leads are connected to the Amp terminals, DO NOT connect them in parallel across any circuit.

**⚠ WARNING** To avoid possible damage to the Meter or to the equipment under test, check the Meter's fuses before measuring current. Use the proper terminals, function, and range for the measurement. Never place the test leads in parallel with any circuit or component when the leads are plugged into the current terminals.

**⚠ WARNING** Do not attempt to measure current exceeding 10Amps AC. If you are not sure if the current exceeds 10Amps do not attempt to measure current with this meter.

1. Set the rotary switch to 10 Amps AC.
2. Insert the black test lead into the COM input terminal.
3. Insert the red test lead into the 10A max terminal.
4. Turn off power to the circuit to be measured.
5. Open the circuit to be measured.
6. Touch the red test lead to one side of the break in circuit and the black test lead to the other side of the break in circuit. For AC Amp measurement the polarity of the leads does not matter.
7. Return power to the circuit.
8. Read the amps on the display.

Notes: When measuring AC Amps this meter displays the effective value of the sine wave (mean value response). When the measured current is <5 amps continuous measurement is acceptable.

**⚠ WARNING** When the measured current is 5–10 amps do not exceed 10 seconds of continuous measurement. Wait 15 minutes before performing additional current measurements.

Always start with the highest 10A~ measurement range and reduce the range in steps once you know that the current does not exceed the next lower range. The red test lead will be inserted into the  $\mu$ A mA input terminal for measuring amps 200m Amps. Always turn of power to circuit and remove the leads from the circuit before removing and reinserting the leads into the meter's input terminals. Once the measurement is complete, immediately remove the test leads from the circuit under test and remove the test leads from the input terminals of the meter.

#### 4.4 DC AMPS A

**⚠ WARNING** Never attempt an in-circuit current measurement where the open circuit voltage between terminals and ground is greater than 60V DC. If the fuse burns out during measurement, the Meter may be damaged or personal injury may occur. Use proper terminals, function, and range for the measurement. When the test leads are connected to the Amp terminals, DO NOT connect them in parallel across any circuit.

**⚠ WARNING** To avoid possible damage to the Meter or to the equipment under test, check the meter's fuses before measuring current. Use the proper terminals, function, and range for the measurement. Never place the test leads in parallel with any circuit or component when the leads are plugged into the current terminals.

**⚠ WARNING** Do not attempt to measure current exceeding 10Amps DC. If you are not sure if the current exceeds 10Amps do not attempt to measure current with this meter.

1. Set the rotary switch to 10 A (DC). Insert the black test lead into the COM input terminal.
2. Insert the red test lead into the 10A max terminal.
3. Turn off power to the circuit to be measured.
4. Open the circuit to be measured.
5. Touch the red test lead to the positive side of the break in circuit and the black test lead to the negative side of the break in circuit for DC Amp measurement.
6. Return power to the circuit.
7. Read the amps on the display.

When the measured current is <5 amps continuous measurement is acceptable.

**⚠ WARNING** When the measured current is 5–10 amps do not exceed 10 seconds of continuous measurement. Wait 15 minutes before performing additional current measurements. Always start with the highest 10A measurement range and reduce the range in steps once you know that the current does not exceed the next lower range. The red test lead will be inserted into the  $\mu$ A mA input terminal for measuring amps  $\leq$  200m Amps. Always turn off power to circuit and remove the leads from the circuit before removing and reinserting the leads into the meter's input terminals. Once the measurement is complete, immediately remove the test leads from the circuit under test and remove the test leads from the input terminals of the meter.

#### 4.5 RESISTANCE $\Omega$

There are six ranges for measuring resistance 200, 2K, 20K, 200K, 2 M, and 20Meg Ohms. For more accurate measurements use the lowest range possible without exceeding the setting value. When measuring resistance always make sure the power to the circuit is off.

1. Set the function/range switch to the appropriate resistance setting to measure  $\Omega$  (ohms).
2. Insert the black (negative) test lead into the COM input terminal.
3. Insert the red (positive) test lead into the V $\Omega$  input terminal.
4. Touch the test leads to the resistor or non-energized component to be measured. Use the 20 M Ohm range when testing for resistance values in electronic components such as resistors and potentiometers. If the value of the component falls within the range of a lower setting, reset the function/range switch to that setting for a more accurate reading.
5. Read the value of the measurement displayed. With resistance measurements, the polarity of the test leads is not a factor.
6. Typical resistance/continuity measurements include resistors, potentiometers, switches, extension cords and fuses.

#### 4.6 CONTINUITY $\rightarrow$ )

**⚠ WARNING** To avoid damages to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

**⚠ WARNING** Do not input 60V DC or 30V AC to avoid personal harm. Do not use on energized circuits.

1. Insert the red test lead into V $\Omega$  terminal and the black test lead into the COM terminal.
2. Set the function switch to  $\rightarrow$ )
3. Connect the test leads across with the object being measured.
4. The buzzer sounds continuously if the resistance of a circuit under test is  $\leq$  10 $\Omega$ , it indicates the circuit is in good connection.
5. The buzzer does not sound if the resistance of a circuit under test is  $\geq$  100 $\Omega$ , it indicates a possible broken circuit.
6. Read the resistance value on the display.

*Note: Open circuit voltage is around 3V.*

#### 4.7 DIODE TESTING

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, and then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

*To test out a diode while removed from a circuit, connect the Meter as below:*

1. Insert the black (negative) test lead into the COM input terminal.
2. Insert the red (positive) test lead into the V $\Omega$  input terminal.
3. Set the function switch to diode position " $\rightarrow$ +"
4. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode.
5. Read the nearest value of the diode's forward voltage drop as displayed.

*Notes*

- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- Connect the test leads to the proper terminals as in figure above to avoid error display. The LCD displays OL indicating open-circuit for improper connection.
- Open circuit voltage is approximately 3V.

#### 5.0 HOUSEHOLD BATTERY TESTING

There are two ranges for measuring common household batteries, 1.5 V and 9 V.

1. Insert the black (negative) test lead into the COM input terminal.
2. Insert the red (positive) test lead into the V terminal.
3. Set the function/range switch to the appropriate battery position.
4. Touch the test leads to the positive and negative terminals on the battery. With DC voltage, the polarity of the test leads is a factor. Touch the black (common) test lead to the negative (-) terminal and the red test lead to the positive (+) terminal.
5. Read the value of the measurement displayed. If the leads are reversed a "-" indicator will appear on the display.

## 6.0 BATTERY REPLACEMENT

**⚠ WARNING** To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears

1. Disconnect the connection between the test leads and the circuit under test, and remove the test leads from the input terminals of the meter.
2. Turn the Meter power off.
3. Remove the rubber boot from the meter.
4. Remove the 3 screws from the case, and separate the case top from the case bottom.
5. Take the back cover off and turn the back cover over.
6. You'll see a spot to place a 9 volt battery at the top of the back cover and it should only fit one way unless you force it. This is supposed to indicate the polarity of the battery along with a plus and minus symbol, but sometimes this is covered up by a security tag.
7. Replace with one fresh 9 volt battery (NEDA 1604 6F22 006P)  
*Note: Do not use rechargeable batteries in this unit.*
8. Carefully replace the battery cover and tighten the 3 screws. Do not overtighten the screws as this may strip the threads in the meter housing.

## 7.0 FUSE REPLACEMENT

**⚠ WARNING** To avoid personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

To replace the Meter's fuse:

1. Turn the Meter off and remove test leads from the input terminals.
2. Remove the rubber boot from the Meter.
3. Remove the 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the fuse by gently prying one end loose, then remove the fuse from its bracket.
5. ONLY install replacement fuses of the identical type and specification as follows and make sure that all fuses are inserted firmly into the fuse holder brackets.

Fuse 1: 10A, H240V, fast type, 6x25 mm.

Fuse 2: 1A, H 250V, fast type, 6x25 mm.

6. Rejoin the case bottom and case top, and reinstall the 3 screws. Be careful not to overtighten the screws. Reinstall the rubber boot. Replacement of the fuses is seldom required. A burned fuse suggests improper operating procedures.

### A. GENERAL SERVICE

- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals use a cotton swab and detergent, as dirt and moisture in the terminals can affect readings.
- Turn the Meter power off when it is not in use.
- Take out the battery when it is not used for a long time.
- Do not use or store the Meter in a place of humidity, high temperature.



## **SPERRY INSTRUMENTS LIMITED LIFETIME WARRANTY**

Subject to the exclusions and limitations detailed below, Sperry Instruments provides a limited lifetime warranty on products of its manufacture will be free from defects in materials and workmanship under normal use and service.

### **Limited**

Limited means that Sperry Instruments warrants to the original purchasers of products from Sperry Instruments authorized distributors at the time of shipment such products shall be free of defects in material and workmanship while the tool is used under normal working conditions. Standard wear and tear, dulling over time, overloading, misuse, and acts of God are not covered under warranty. This warranty does not cover batteries, fuses, or test leads.

When a warranty claim arises, the purchaser must contact Sperry Instruments. If the defect comes under the terms of this limited warranty, Sperry Instruments will arrange, at its sole discretion, one of the following options:

- Product will be replaced

The purchaser is solely responsible for determining the suitability of Sperry products for the purchaser's use or resale, or for incorporating them into articles or using them in the purchaser's applications. The distributor is authorized to extend the foregoing limited warranty to its original purchasers in connection with the sales of Sperry products, provided that such products shall not have been altered by the distributor. The distributor shall be fully responsible for any warranties the distributor makes to its purchasers which are broader or more extensive than Sperry's limited warranty.

### **Lifetime Warranty**

Warranty Limitation: The foregoing warranties are exclusive and are in lieu of all other express and implied warranties whatsoever, including but not limited to implied warranties of merchantability and fitness for a particular purpose. The foregoing warranties do not cover ordinary wear and tear, abuse, misuse, overloading, alterations, products which have not been installed, operated or maintained in accordance with Sperry's written instructions. Test leads, fuses, batteries and calibration are not covered under any implied warranty. "Lifetime" of products that are no longer offered by Sperry will be either repaired or replaced with an item of Sperry Instruments choice of similar value. Lifetime is defined as 5 years after Sperry discontinued manufacturing the product, but the warranty period shall be at least ten years from date of purchase. Original proof of purchase is required to establish original ownership of product.

No warranty will be honored unless an invoice or other proof of purchase date is provided to Sperry Instruments. Hand written receipts or invoices will not be honored.

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- See more at: <http://www.sperryinstruments.com/en/resources/warranty-page#sthash.4sNKZu3b.dpuf>

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