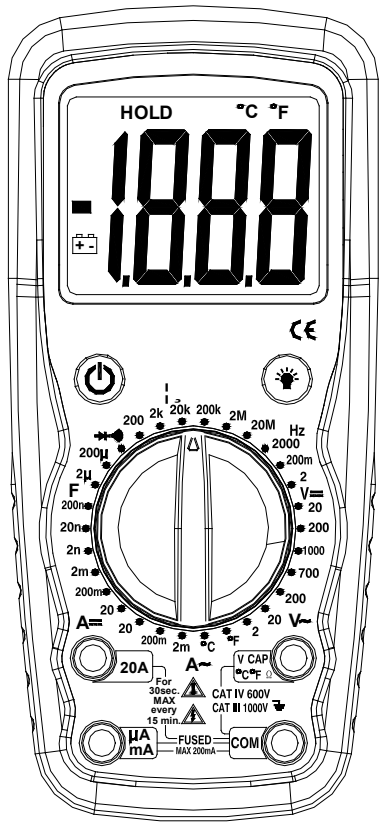


OPERATING INSTRUCTION

DIGITAL MULTIMETER

MODEL 9908



- When using the probes, keep your fingers behind the finger guards on the probes.
- Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.
- Never apply voltage or current to the meter that exceeds the specified maximum:

Input Limits	
Function	Maximum Input
V DC or V AC	1000V DC, 700V AC
mA DC/AC	200mA DC/AC
A DC/AC	20A DC/AC (30 seconds max every 15 minutes)
Frequency, Resistance, Capacitance, Diode, Continuity, Temperature	250V DC/AC

SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
- Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
- Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Use caution when working above 60V dc or 30V ac rms. such voltages pose a shock hazard.

SAFETY SYMBOLS



This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

WARNING

This **WARNING** symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION

This **CAUTION** symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.

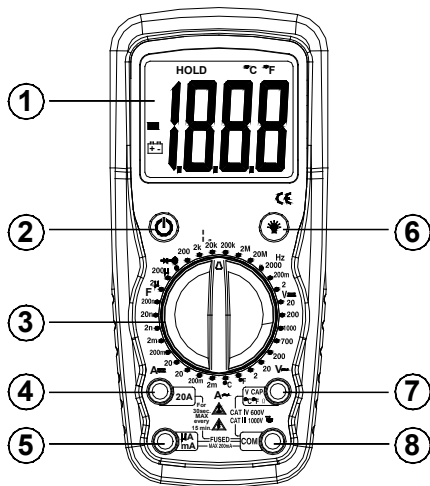


This symbol advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case) 1000 VAC or VDC.



This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum safety, the meter and its test leads should not be handled when these terminals are energized.

CONTROLS AND JACKS



1. Large 2000 count Liquid Crystal Display
With backlight and HOLD, °C, °F, BAT symbolic signs.
2. Power pushbutton: the power button turns the meter ON or OFF.
3. Function switch
4. 20A (positive) input jack for 20A DC or AC measurements.
5. mA input jack for mA DC or AC measurements
6. Backlight pushbutton.
7. V, Ω, CAP, Hz, TEMP. input jack
8. COM (negative) input jack.

SPECIFICATIONS

The instrument complies with: EN61010-1.

Insulation: Class2, Double insulation.

Overvoltage category: CATII - 1000V.

Display: 2000 counts LCD display with function indication.

Polarity: Automatic, (-) negative polarity indication.

Overrange: “OL” mark indication.

Low battery indication: The “ ” is displayed when the battery voltage drops below the operating level.

Auto power off: Meter automatically shuts down after approx. 10 minutes of inactivity.

Measurement rate: 2 times per second, nominal.

Operating environment: 0 °C to 50 °C (32 °F to 122 °F) at < 70 % relative humidity.

Storage temperature: -20 °C to 60 °C (-4 °F to 140 °F) at < 80 % relative humidity.

For inside use, max height: 2000m

Pollution degree: 2

Power: One 9V battery , NEDA 1604, IEC 6F22.

Dimensions: 182 (H) x82 (W) x 55 (D) mm

Weight: Approx.: 360g.

Accuracy is given at 18 °C to 28 °C (65 °F to 83 °F), less than 70 % RH

DC Voltage

Range	Resolution	Accuracy
200.0mV	0.1mV	±0.5% of rdg ± 2 dgts
2.000V	1mV	
20.00V	10mV	
200.0V	100mV	
1000V	1V	±0.8% of rdg ± 2 dgts

Input Impedance: 10MΩ.

200mV range Maximum Input: 250V dc or 250V ac rms.

Maximum Input: 1000V dc or 700V ac rms.

AC Voltage

Range	Resolution	Accuracy
2.000V	1mV	±1.0% of rdg ± 3 dgts
20.00V	10mV	
200.0V	100mV	
700V	1V	±1.2% of rdg ± 5 dgts

Input Impedance: 10MΩ.

Frequency Range:50 to 400Hz

Maximum Input: 1000V dc or 700V ac rms.

DC Current

Range	Resolution	Accuracy
2.000mA	1uA	±1.0% of rdg ± 3 dgts
200.0mA	100uA	±1.5% of rdg ± 3 dgts
20.00A	10mA	±2.5% of rdg ± 10 dgts

Overload Protection: 0.2A / 250V and 20A / 250V

Fuse.

Maximum Input: 200mA dc or 200mA ac rms on mA ranges, 20A dc or ac rms on 20A range.

AC Current

Range	Resolution	Accuracy
2.000mA	1uA	$\pm 1.2\%$ of rdg ± 3 dgts
200.0mA	100uA	$\pm 2.0\%$ of rdg ± 3 dgts
20.00A	10mA	$\pm 3\%$ of rdg ± 10 dgts

Overload Protection: 0.2A / 250V and 20A / 250V Fuse.

Frequency Range: 50 to 400 Hz

Maximum Input: 200mA dc or 200mA ac rms on mA ranges, 20A dc or ac rms on 20A range.

Resistance

Range	Resolution	Accuracy
200.0Ω	0.1Ω	$\pm 1.0\%$ of rdg ± 4 dgts
2.000kΩ	1Ω	$\pm 1.0\%$ of rdg ± 2 dgts
20.00kΩ	10Ω	$\pm 1.2\%$ of rdg ± 2 dgts
200.0kΩ	100Ω	
2.000MΩ	1kΩ	
20.00MΩ	10kΩ	

Input Protection: 250V dc or 250V ac rms.

Capacitance

Range	Resolution	Accuracy	
2.000nF	1pF	$\pm 4.0\%$ of rdg ± 70 dgts	
20.00nF	10pF	$\pm 4.0\%$ of rdg ± 3 dgts	
200.0nF	0.1nF	$\pm 4.0\%$ of rdg ± 3 dgts	
2.000uF	1nF		
200.0uF	0.1uF	$\leq 20\mu\text{F}$	$\pm 4.0\%$ of rdg ± 15 dgts
		$\geq 21\mu\text{F}$	unspecified

Input Protection: 250V dc or 250V ac rms.

Frequency

Range	Resolution	Accuracy
2000Hz	1Hz	$\pm 1.5\%$ of rdg ± 5 dgts

Sensitivity: 200mV~ 10V RMS ;

Overload protection: 250V dc or ac rms.

Temperature

Range	Resolution	Accuracy
-20°C~+760°C	1°C	$\pm 3\%$ of rdg $\pm 5^\circ\text{C}/9^\circ\text{F}$
-4°F~+1400°F	1°F	

Sensor: Type K Thermocouple

Overload protection: 250V dc or ac rms.

Diode Test

Test current: 1mA typical

Open circuit voltage: 2.8V dc typical

Overload protection: 250V dc or ac rms.

Audible continuity

Audible threshold: Less than 50Ω; Test current: <0.3mA

Overload protection: 250V dc or ac rms.

OPERATION

WARNING: Risk of electrocution.

High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

If “1” appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

NOTE: On some low AC and DC voltage ranges, with the test leads not connected to a device, the display may show a random, changing reading. This is normal and is caused by the high-input sensitivity. The reading will stabilize and give a proper measurement when connected to a circuit.

BACK LIGHT BUTTON

The **BACK LIGHT BUTTON** is used to turn the back light on Only. To extend the battery life, The back light will be turned off automatically within around 3 seconds

DC VOLTAGE MEASUREMENTS

CAUTION: Do not measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the V DC position (“mV” will appear in the display).
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug into the positive (V) jack.
3. Touch the test probe tips to the circuit under test. Be sure to observe the correct polarity (red lead to positive, black lead to negative).
4. Read the voltage in the display. The display will indicate the proper decimal point and value. If the

polarity is reversed, the display will show (-) minus before the value.

AC VOLTAGE MEASUREMENTS

WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

CAUTION: Do not measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

1. Set the function switch to the V AC position.
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug into the positive (V) jack.
3. Touch the test probe tips to the circuit under test.
4. Read the voltage in the display. The display will indicate the proper decimal point, value and symbol (AC, V, etc.).

DC CURRENT MEASUREMENTS

CAUTION: Do not make current measurements on the 20A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to 200mA DC, set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
3. For current measurements up to 20A DC, set the function switch to the A position and insert the red test lead banana plug into the 20A jack.
4. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
5. Touch the black test probe tip to the negative side of the

circuit. Touch the red test probe tip to the positive side of the circuit.

6. Apply power to the circuit.
9. Read the current in the display. The display will indicate the proper decimal point, value.

AC CURRENT MEASUREMENTS

WARNING: To avoid electric shock, do not measure AC current on any circuit whose voltage exceeds 250V AC.

CAUTION: Do not make current measurements on the 20A scale for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

1. Insert the black test lead banana plug into the negative (COM) jack.
2. For current measurements up to 200mA AC, set the function switch to the mA range and insert the red test lead banana plug into the (mA) jack.
3. For current measurements up to 20A AC, set the function switch to the A position and insert the red test lead banana plug into the 20A jack.
4. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
5. Touch the black test probe tip to the negative side of the circuit. And touch the red test probe tip to the positive side of the circuit.
6. Apply power to the circuit.
7. Read the current in the display. The display will indicate the proper decimal point, value.

8. RESISTANCE MEASUREMENTS

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.


1. Set the function switch to the Ω position.
2. Insert the black test lead banana plug into the negative (COM) jack and the red test lead banana plug into the positive Ω jack.
3. Touch the test probe tips across the circuit or part under

test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.

4. Read the resistance in the display. The display will indicate the proper decimal point, value


CONTINUITY CHECK

WARNING: To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

1. Set the function switch to the  position.
2. Insert the black lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (Ω).
3. Touch the test probe tips to the circuit or wire you wish to check.
4. If the resistance is less than approximately 50Ω , the audible signal will sound. The display will also show the actual resistance.

DIODE TEST

WARNING: To avoid electric shock, do not test any diode that has voltage on it.

1. Set the function switch to  position.
3. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (Ω).
4. Touch the test probe tips to the diode or semiconductor junction you wish to test. Note the meter reading
5. Reverse the probe polarity by switching probe position. Note this reading.
6. The diode or junction can be evaluated as follows:
 - A. If one reading shows a value and the other reading shows "1", the diode is good.
 - B. If both readings show "1", the device is open.
 - C. If both readings are very small or 0, the device is shorted.

NOTE: The value indicated in the display during the diode check is the forward voltage.

FREQUENCY MEASUREMENT

1. Set the function switch to the 20KHz position.

2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (F).
3. Touch the test probe tips to the circuit under test.
4. Read the frequency in the display. The digital reading will indicate the proper decimal point, value.

CAPACITANCE MEASUREMENTS

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

1. Set the function switch to the CAP position.
2. Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (CAP).
3. Touch the test leads to the capacitor to be tested. The display will indicate the proper decimal point, value

TEMPERATURE MEASUREMENTS

WARNING: To avoid electric shock, disconnect both test probes from any source of voltage before making a temperature measurement.

1. If you wish to measure temperature in °F, set the function switch to the °F range. If you wish to measure temperature in °C, set the °F/°C Button to the °C range.
2. Insert the Temperature Probe into the negative (-) jack (COM) and the positive (+) jack (Temperature), making sure to observe the correct polarity.
3. Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
4. Read the temperature in the display. The digital reading will indicate the proper decimal point and value.

WARNING: To avoid electric shock, be sure the thermocouple has been removed before changing to another measurement function.

REPLACING THE BATTERY

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery door.

1. When the batteries become exhausted or drop below the operating voltage, "BAT" will appear in the right-hand side of the LCD display. The battery should be replaced.
2. Follow instructions for installing battery. See the Battery Installation section of this manual.
3. Dispose of the old battery properly.

WARNING: To avoid electric shock, do not operate your meter until the battery door is in place and fastened securely.

BATTERY INSTALLATION

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery door.

1. Disconnect the test leads from the meter.
2. Open the battery door by loosening the screw using a Phillips head screwdriver.

3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery door back in place. Secure with the one screw.

WARNING: To avoid electric shock, do not operate the meter until the battery door is in place and fastened securely.

NOTE: If your meter does not work properly, check the fuses and battery to make sure that they are still good and that they are properly inserted.

REPLACING THE FUSES

WARNING: To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover

1. Disconnect the test leads from the meter and any item under test.
2. Open the back cover by loosening the screw on the back cover using a Phillips head screwdriver.
3. Remove the old fuse from its holder by gently pulling it out.
3. Install the new fuse into the holder.
4. Always use a fuse of the proper size and value (0.2A/250V fast blow for the 200mA range, 20A/250V fast blow for the 20A range).
5. Put the back cover. Insert the screw and tighten it securely.

WARNING: To avoid electric shock, do not operate your meter until the fuse door is in place and fastened securely.