



Digital Multimeter

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Introduction

The Meter is a handheld, battery operated instrument that is designated and tested according to IEC Publication 1010-1 (EN 61010-1) (Overvoltage Category II), The EMC Directive (EN 50081-1 AND EN 50082-1) , UL 1244, CSA C22.2 No. 231 and ISA-DS82.

Specifications

Display:	Digital, LCD, 2000 Count, Updates 3 times/second
Fuse Protection:	2A 600V High Energy/Fast Fuse 15A 600V High Energy/Fast Fuse
Storage Temperature:	-20°C to 60°C (-4°F to 140°F)
Operating Temperature:	0°C to 45°C (32°F to 95°F)
Relative Humidity:	0% to 80% (0°C to 35°C; 32°F to 113°F) 0% to 70% (35°C to 45°C; 95°F to 113°F)
Temperature Coefficient:	0.10 x (Specified Accuracy/°C)
Battery Type:	9V, NEDA 1604 or IEC 6LR61
Battery Life:	350 Hours typical (alkaline)
Size (H x W x L):	Meter Only 4.0cm x 8.5cm x 19.0cm With Holster 5.4cm x 10.3cm x 20.8cm
Weight:	Meter Only 380g With Holster 655g
Vibration & Shock:	Designed to MIL-T-28800 for a Class II Instrument

Service & Technical Support

Questions or inquiries about service can be answered by contacting Ferret at:

Ferret Instruments, Inc., 1310 Higgins Drive, Cheboygan, MI 49721
(231) 627-5664, Fax (231) 627-2727, Toll Free (800) 627-5655.

Battery Replacement

The Meter uses a 9V battery (NEDA 1604 or IEC 6F22). To replace the battery, remove the two screws of the battery compartment from the back of the Meter and lift off the cover of the compartment. Replace the battery. Reattach the battery compartment to the back of the Meter, and reinstall the screws.

Ranges & Accuracy

Accuracy is give as \pm ([% of reading] + [number of least significant digits]) at 18°C to 28°C with relative humidity up to 80%, for a period of one year after calibration.

Function	Range	Resolution	Accuracy	Input Impedance
DC Volts	200mV	100 μ V	0.5% + 1 digit	10M Ω
	2V	1mV	0.5% + 1 digit	10M Ω
	20V	20V	0.5% + 1 digit	10M Ω
	200V	0.1V	0.5% + 1 digit	10M Ω
	1000V	1V	0.5% + 1 digit	10M Ω
AC Volts	200mV	100 μ V	0.8% + 3 digits	10M Ω
	2V	1mV	0.8% + 3 digits	10M Ω
	20V	10mV	0.8% + 3 digits	10M Ω
	200V	0.1V	0.8% + 3 digits	10M Ω
	750V	1V	1.2% + 3 digits	10M Ω
Function	Range	Resolution	Accuracy	Voltage Drop
DC Amps	200 μ A	0.1 μ A	0.8% + 1 digit	1mV/ μ A
	2mA	1 μ A	0.8% + 1 digit	100mV/ μ A
	20mA	10 μ A	0.8% + 1 digit	10mV/mA
	200mA	100 μ A	0.8% + 1 digit	1.2mV/mA
	2A	1mA	0.8% + 1 digit	0.28V/A
AC Amps	10A	10mA	2.0% + 10 digits	0.22V/A
	200 μ A	0.1 μ A	0.8% + 3 digits	1mV/ μ A
	2mA	1 μ A	0.8% + 3 digits	100mV/ μ A
	20mA	10 μ A	0.8% + 3 digits	10mV/mA
	200mA	100 μ A	0.8% + 3 digits	1.2mV/mA
	2A	1mA	0.8% + 3 digits	0.28V/A
	10A	10mA	2.0% + 10 digits	0.22V/A
Function	Range	Resolution	Accuracy	Open Circuit
Voltage Ohms	200 Ω	0.1 Ω	0.5% + 10 digits	< 1.2 V
	2K Ω	1 Ω	0.5% + 1 digit	< 1.2 V
	20K Ω	10 Ω	0.5% + 1 digit	< 1.2 V
	200K Ω	0.1K Ω	0.5% + 1 digit	< 1.2 V
	2M Ω	1K Ω	0.5% + 1 digit	< 1.2 V
	20M Ω	10K Ω	1.0% + 2 digits	< 1.2 V

Voltage

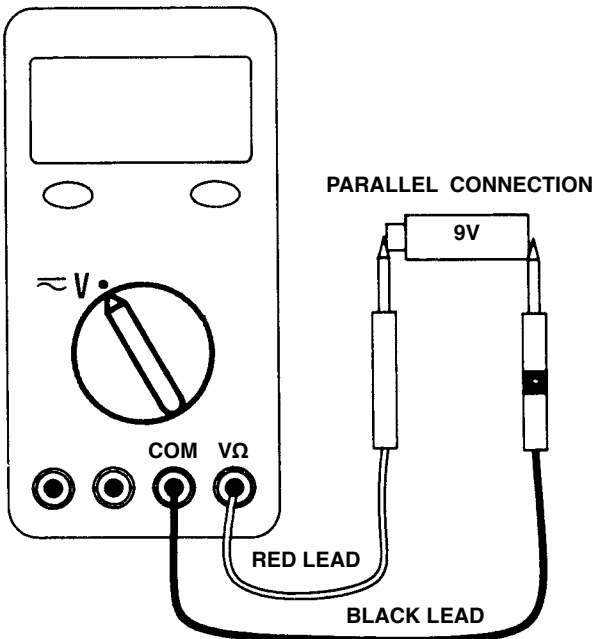
WARNING!

TO AVOID THE RISK OF ELECTRICAL SHOCK AND INSTRUMENT DAMAGE, INPUT VOLTAGES MUST NOT EXCEED 1000V DC OR 750V AC RMS. DO NOT ATTEMPT TO TAKE ANY UNKNOWN VOLTAGE MEASUREMENT THAT MAY BE IN EXCESS OF 1000V DC OR 750V AC RMS.

NOTE: When taking voltage measurements, this Meter must be connected in PARALLEL with the circuit, or circuit element under test.

Accuracy

A measurement range determines the highest value the Meter can measure. Most Meter functions have more than one range.



Being in the right measurement range is very important when measuring. Selection of a lower range will move the decimal point one place and increase the accuracy of the reading. The "1." (overload) display means the range is too low; select the next higher range.

To Measure Voltage:

Set the function and range switch to the desired DC V (or AC V) range. If you do not know the value of the voltage to be measured, always start with the highest range.

Insert the Black lead in the COM jack.

Resistance/Continuity

Resistance is measured in Ohms(Ω) and the values can greatly vary from a few Milliohms ($m\Omega$) for contact resistance to millions of ohms for insulators. The Meter can measure down to about 0.1 Ohms and measure as high as $40M\Omega$.

WARNING!

TURN OFF POWER AND DISCHARGE ALL CAPACITORS ON CIRCUIT TO BE TESTED BEFORE ATTEMPTING IN CIRCUIT RESISTANCE MEASUREMENTS. ACCURATE MEASUREMENT IS NOT POSSIBLE IF EXTERNAL OR RESIDUAL VOLTAGE IS PRESENT.

NOTE: The resistance in the test leads can affect accuracy in the 200Ω range. Touch the tips of test leads together and record the reading. Subtract this reading from any additional measurement to obtain the most accurate value.

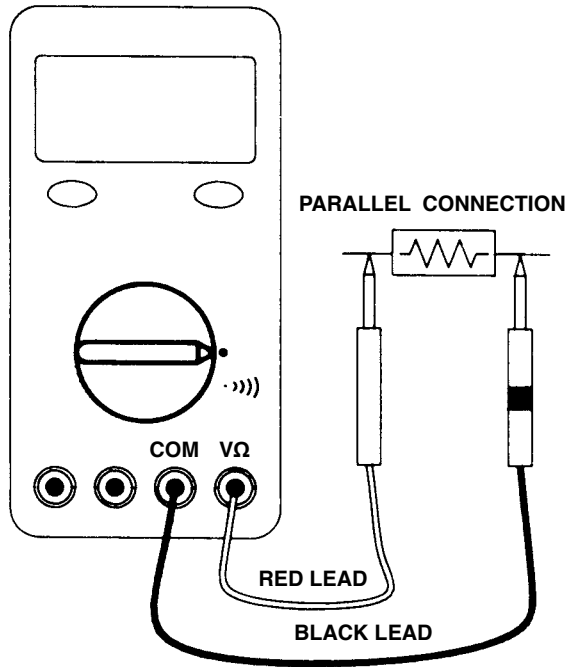
To Measure Resistance:

Set the function switch to the desired Ω range.

Insert the Black lead in COM jack.

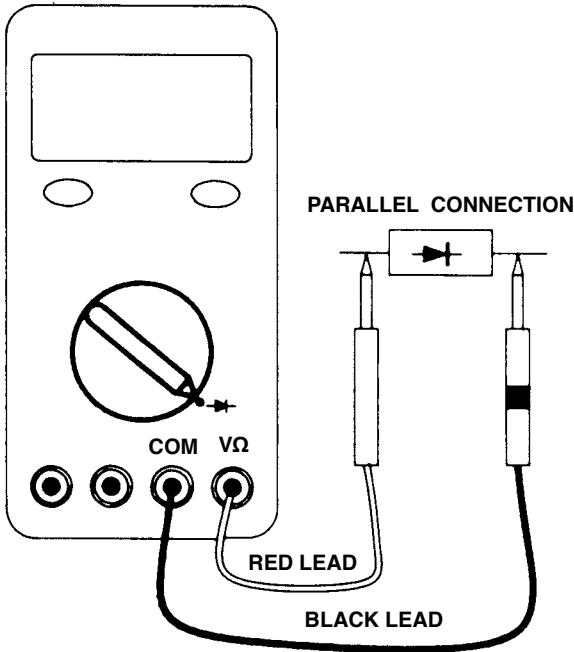
Insert the Red lead in the $V\Omega RPM$ Jack.

Touch the test lead probes across the resistance or circuit to be




Diode Check

A diode is an electronic switch that allows current to flow in one direction only. It turns on when the voltage is over a certain level, generally greater than 0.3 Volts for a silicon diode. The Meter has a special mode called "Diode Check". In this mode, the readings across the diode will typically be greater than 0.7 Volts in one direction, and indicate an open circuit in the other direction. This indicates a good diode.



NOTE: Turn the power OFF to the circuit to be tested.

To Check a Diode:

Select the  setting with the rotary switch.

Insert the Black lead in COM jack.

Insert the Red lead in the VΩRPM jack.

Touch the Red test probe to the positive (+) side

of the diode.

Current

CAUTION

THE CURRENT FUNCTIONS ARE PROTECTED BY A FUSE OF 600 VOLT RATING. TO AVOID DAMAGE TO THE INSTRUMENT, CURRENT SOURCES HAVING OPEN CIRCUIT VOLTAGES GREATER THAN 600 VOLTS DC OR AC MUST NOT BE MEASURED.

NOTE: When taking current measurements, this Meter must be connected In **SERIES** with the circuit (or circuit element) under test. **NEVER CONNECT THE TEST LEADS ACROSS A VOLTAGE SOURCE** while the rotary switch is set to Amps. This can cause damage to the circuit under test or this Meter.

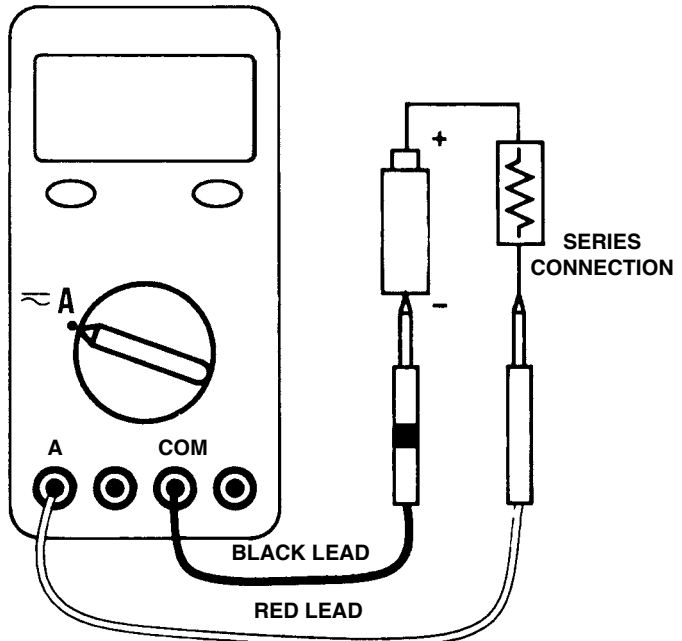
For current measurements of more than 10A use a Inductive Current Probe.

To Measure Current:

Turn all power to the circuit off or disconnect the circuit from the power source.

Disconnect, cut or unsolder the circuit, creating a place where the Meter probes can be inserted.

Select the AC or DC



SAFETY PRECAUTIONS

—Read All Instructions Before Using The Probe—

Exceeding the limits of this meter is Dangerous. It will expose you to serious or possible fatal injury. Carefully read and understand the cautions and the specifications limits of this meter.

Do not try to measure any voltage that exceeds 1000V DC or 750V AC RMS. Voltages above 60V DC or 25V AC RMS may constitute a serious shock hazard.

Circuit tested must be protected by a 15A fuse or circuit breaker.

Do not attempt to use this Meter if either the Meter or the test leads have been damaged.

Use a current clamp to measure circuits exceeding 10A.

Avoid electrical shock: do not touch the test leads, tips or the circuit being tested.

Select the proper function and range for the measurement. Do not try voltage or current measurements that may exceed the ratings marked on the input limit for switch or terminal.

Never connect more than one set of test leads to the Meter.

Disconnect the live test lead before disconnecting the common test lead.

Battery gas is highly explosive. If a battery explodes flush the acid away from skin with generous amounts of water. Follow up with a neutralizing solution of baking soda and then more water.

Never use a wrench on the ungrounded battery terminal until the grounded one has been disconnected. Contact between the vehicle body metal and the hot terminal can cause sparks to ignite gas or even weld tools into a battery short circuit.

Keep the space around a battery well ventilated. Do not make sparks or allow flames near batteries.

Before working on a vehicle set the brakes and block the wheels. Beware of automatic parking brake releases.