

GUIDE to using a Multimeter to Measure Voltage, Current, Resistance and Power

Ohm's Law states the basic relationship between voltage (**V**) and current (**I**)
Where **R** is the circuit Resistance:

$$V = I * R \quad \text{rewrite this 2 ways:}$$

Voltage: The electric potential between 2 points
The units of Voltage are Volts, written as V.

To measure voltage:

1. Set the multimeter to V and choose DC -- or AC ~
2. Voltage can be measured on any component or object, whether or not it is in a circuit.
3. Use the meter's 2 probes to get the voltage difference between any 2 points. Positive voltage readings mean the red probe is at a higher voltage, negative readings mean the black probe is at the higher voltage.

Current: the flow of electrons in a circuit
The units of Current are Amperes, written as A.

To measure current:

1. Set the multimeter to A and choose DC -- or AC ~
2. Current can only be measured in a closed circuit. The meter must become part of the circuit at the point where you want to measure current.
3. Open the circuit and close it by inserting the 2 meter probes. Current flowing in the direction from red to black will read as positive, from black to red will read as negative.

Resistance: The opposite of conductivity; a measure of how easily current will flow through a component or material.
The units of Resistance are Ohms, written as Ω .

To measure resistance:

1. Set the multimeter to Ω .
2. Resistance can be measured on any component or object, but it cannot be measured in a circuit.
3. Use the meter's 2 probes to measure the resistance of a component or material.

Power: The rate at which energy is used
The units of electrical power are Watts, written as W

Power = Voltage * Current \rightarrow **$P = V * I$**
In terms of units, Watts = Volts * Amps