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Resistance

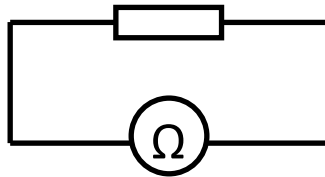
When an electric current flows through a wire some of the electrical energy is changed to heat in the wire. All materials oppose the current passing through them. This opposition to current flow is called resistance. The resistance is a measure of the opposition to the flow of current in a circuit. Insulators have a high resistance, while conductors have a low resistance.

The symbol for resistance is R and resistance is measured in units of ohms (Ω).

Electrical resistance is measured using an ohmmeter which has the symbol:



To measure the resistance of a component, an ohmmeter is connected directly across the component which must be disconnected from the circuit:



The larger the resistance in a circuit, the smaller the current that flows in it.

The smaller the resistance in a circuit, the larger the current that flows in it.

The resistance of a material depends on a number of factors:

- Type of material – the better the conductor, the lower the resistance
- Length of material – the longer the material, the higher the resistance
- Thickness of material – the thicker the material, the lower the resistance
- Temperature of material – for most conductors, the higher the temperature, the higher the resistance

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Ohm's Law

In a conductor at constant temperature, the current increases as the voltage is increased.

Therefore, the ratio of V/I remains constant and is known as the resistance.

Therefore,

$$\text{Resistance} = \frac{\text{voltage}}{\text{current}}$$

Ohms or Ω

Volts or V

$$R = \frac{V}{I}$$

Amperes or A

Example

The current flowing through a resistor is 0.5 A and the voltage across it is 6.0 V.

Calculate the resistance.

Solution

$$V = 6 \text{ V}$$

$$R = V/I$$

$$I = 0.5 \text{ A}$$

$$= 6.0 / 0.5$$

$$R = ?$$

$$= \underline{12 \Omega}$$

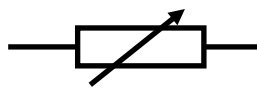
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Variable Resistors

Resistors are components that have the property of electrical resistance. Resistors transform electrical energy into heat in domestic appliances such as heaters, toasters etc. Resistors are used also to limit the current in electronic circuits.

A variable resistor can alter the current in a circuit by changing the resistance in the circuit.

The symbol for a variable resistor is:



Practical uses for variable resistors include:

- Light dimmer controls
- Volume and brightness controls
- Speed controls on electric motors.