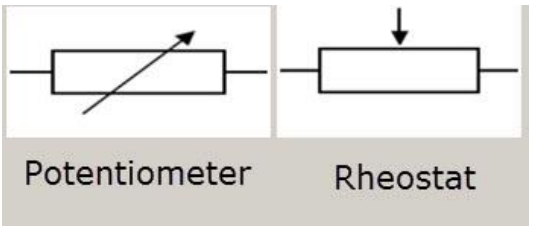
Variable resistor

A variable resistor is a resistor of which the electric resistance value can be adjusted

When a variable resistor is used as a potential divider by using 3 terminals it is called a potentiometer. When only two terminals are used, it functions as a variable resistance and is called a rheostat. Electronically controlled variable resistors exist, which can be controlled electronically instead of by mechanical action. These resistors are called digital potentiometers.



Rheostat **Potentio meter**

Thermistor

A thermistor is a thermally sensitive resistor that exhibits a precise and predictable change in resistance proportional to small changes in body temperature. How much its resistance will change is dependent upon its unique composition. Thermistors are part of a larger group of passive components. And unlike their active component counterparts, passive devices are incapable of providing power gain, or amplification to a circuit**.**

Thermistor Types

There are two types of thermistors. NTC or Negative Temperature Coefficient thermistors, and PTC or Positive Temperature Coefficient thermistors. The difference is that NTC thermistors exhibit a decrease in resistance as body temperature increases, while PTC thermistors exhibit an INCREASE in resistance as body temperature increases.

Applications for NTC and PTC Thermistors include:

- Temperature Compensation
- Temperature Measurement
- Temperature Control
- Inrush Current Limiting

Photo resistor

Photo resistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity.

Varistor

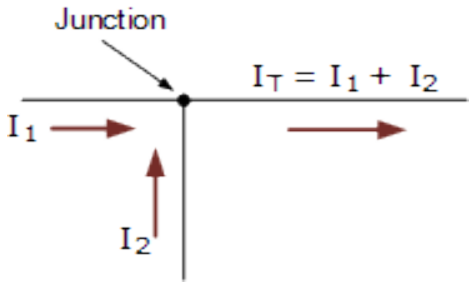
The Varistor is a passive two-terminal solid state semiconductor device that is used to provide protection to electrical and electronic circuits. Unlike a variable resistor whose resistance value can be manually varied between its minimum and maximum values, the varistor changes its resistance value automatically with the change in voltage across it making it a voltage-dependant, non-linear resistor or VDR for short.

Kirchhoff's Current Law

Kirchhoff's Current Law (KCL) is Kirchhoff's first law that deals with the conservation of charge entering and leaving a junction.

Current law states that for a parallel path the total current entering a circuit's junction is exactly equal to the total current leaving the same junction. This is because it has no other place to go as no charge is lost. In other words the algebraic sum of all the currents entering and leaving a junction must be equal to zero as: $\Sigma I_{IN} = \Sigma I_{OUT.}$

Here in this simple single junction example, the current IT leaving the junction is the algebraic sum of the two currents, I_1 and I_2 entering the same junction. That is $I_T = I_1 + I_2$. Note that we could also write this correctly as the algebraic sum of: $I_T - (I_1 + I_2) = 0$.



Kirchhoff's Voltage Law

Kirchhoff's Voltage Law (KVL) is Kirchhoff's second law that deals with the conservation of energy around a closed circuit path.

Voltage law states that for a closed loop series path the algebraic sum of all the voltages around any closed loop in a circuit is equal to zero. This is because a circuit loop is a closed conducting path so no energy is lost.

In other words the algebraic sum of ALL the potential differences around the loop must be equal to zero as: $\Sigma V = 0$.

Note here that the term "algebraic sum" means to take into account the polarities and signs of the sources and voltage drops around the loop. $V_S + I_1R_1 + I_2R_2 = 0$

$V_S = I_1R_1 + I_2R_2$