

RESISTORS IN SERIES

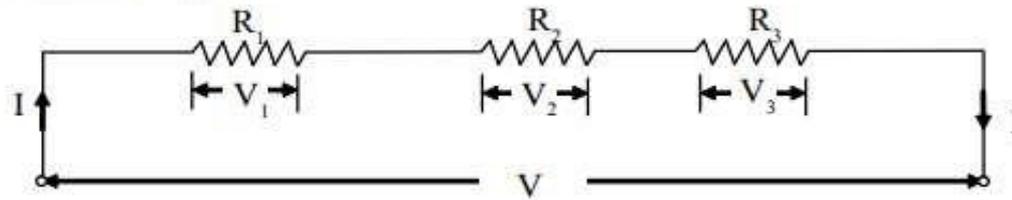


Fig. Resistors in series

The figure shows three resistance connected in series, when the same current passes from one to other, they are said to be connected in series. But, voltage drop across each of them will vary as per value of individual resistance.

The sum of all the voltage drops ($V_1 + V_2 + V_3$) is equal to the applied voltage (V).

$$V = V_1 + V_2 + V_3$$

Using ohms law : $V = IR$, we get

$$IR = IR_1 + IR_2 + IR_3$$

$$R = R_1 + R_2 + R_3$$

where, $R \rightarrow$ Equivalent resistance of series combination.

RESISTORS IN PARALLEL

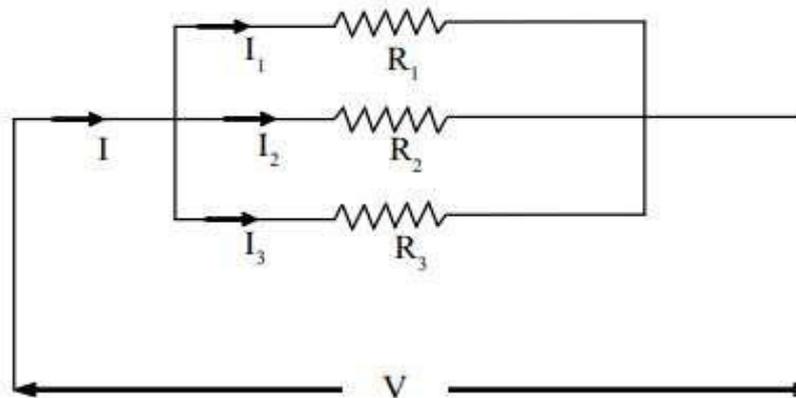


Fig. Resistors in Parallel

The figure shows three resistance connected in parallel. When both the terminals of the circuit elements are connected together and the same voltage appears across their terminal then, they are said to be in parallel. The current will be different, depending upon the value of the individual resistance.

$$\text{i.e, } I = I_1 + I_2 + I_3$$

$$\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \Rightarrow \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

where, $R \rightarrow$ Equivalent resistance of three resistances connected in parallel.

Compare Series and Parallel Circuit

S. No.	Series Circuit	Parallel Circuit
1.	The current flowing is same through all the elements.	The current flowing through each resistance is different.
2.	The voltage is distributed.	The voltage is same across each element.
3.	There is only one path for flow of current.	There are more than one path for the flow of current.
4.	The total effective resistance is the sum of the individual resistances. $R_{\text{eff}} = R_1 + R_1 + \dots + R_N$	The reciprocal of the total effective resistance is the sum of the reciprocals of individual resistances. $\frac{1}{R_{\text{eff}}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_N}$