# Star Connected Unbalanced Load

**Power consumed by three phase load**

The power consumed by the three phase load is given by sum of power consumed by each individual load in each phase.

$$P = |V_R|\ |I_R|\ \cos\varnothing_R + |V_Y|\ |I_Y| \cos\varnothing_Y + |V_B|\ |I_B|\ \cos\varnothing_B$$

$$= V_R I_R\ \cos\varnothing_R + V_B I_B\ \cos\varnothing_Y + V_B I_B\ \cos\varnothing_B$$

Where, $\theta_R$ = Phase difference between $V_R$ and $I_R$
$\theta_Y$ = Phase difference between $V_Y$ and $I_Y$
$\theta_B$ = Phase difference between $V_B$ and $I_B$

Since the current and voltage through each phase is unbalanced the total power can be calculated by using the current and voltage flowing through each phase

$$I_R \neq I_Y \neq I_B$$

$$V_R \neq V_Y \neq V_B$$

Hence the power consumed by the three phase unbalanced load is given by,

$$P = V_R I_R\ \cos\varnothing_R + V_B I_B\ \cos\varnothing_Y + V_B I_B\ \cos\varnothing_B$$