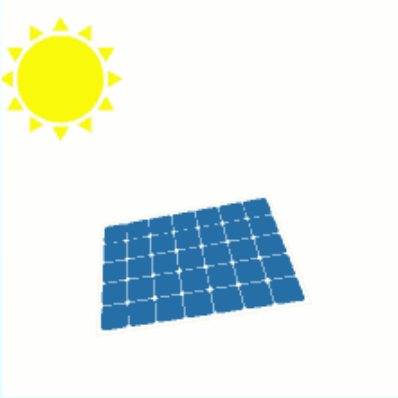
BALANCED THREE PHASE STAR CONNECTED LOAD



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BALANCED THREE PHASE LOAD

The three phase load has three separate load impedances which may be star connected or delta connected. The three phase load is said to be balanced load if the three impedances are identical. A balanced three phase load is treated as three identical single phase circuits. We may treat this case as single phase circuits and work only in phase values.

Star Connection

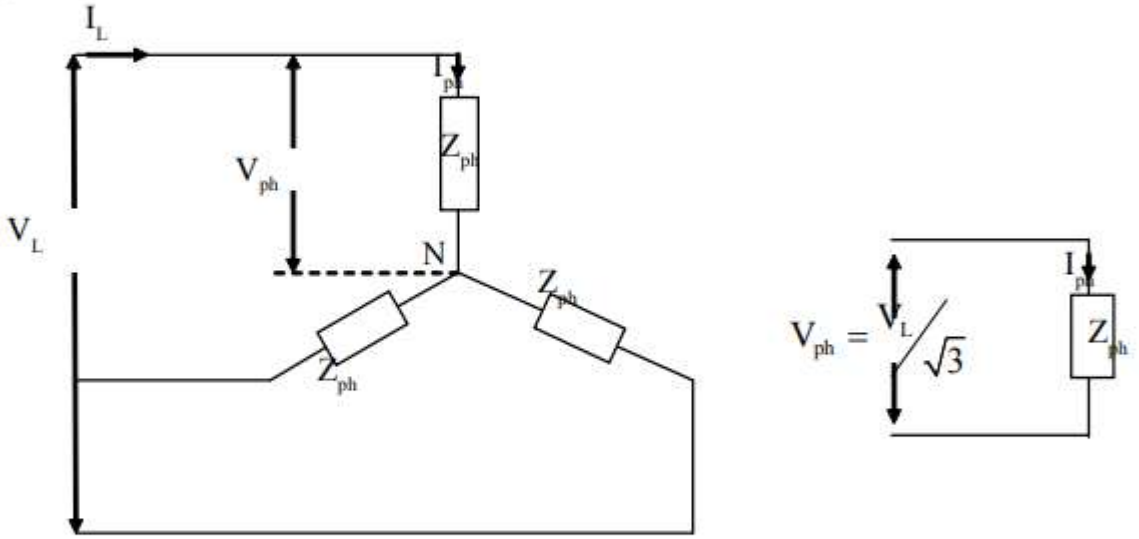

Fig. Balanced Star Load

Phase voltage, $V_{ph} = \frac{V_L}{\sqrt{3}}$

Phase impedance, $Z_{ph} = R + jx = \sqrt{R^2 + X^2}$

Phase current, $I_{ph} = \frac{V_{ph}}{Z_{ph}}$

Line current, $I_L = I_{ph}$

Power factor, $\cos\phi = \frac{R}{Z}$

per phase power $= V_{ph} I_{ph} \cos\phi$

Total power, $p = \sqrt{3}\, V_L I_L \cos\phi$ W

Reactive power per phase $= V_{ph}\ I_{ph} \sin\phi$

Total reactive power, $Q = \sqrt{3}\ V_L I_L \sin\phi$ VAR

Apparent power per phase $= V_{ph}\ I_{ph}$

Total apparent power; $S = \sqrt{P^2 + Q^2}$

$$= \sqrt{\left(\sqrt{3} V_L I_L \cos\phi\right)^2 + \left(\sqrt{3} V_L I_L \sin\phi\right)^2}$$

$$S = \sqrt{3}\ V_L\ I_L\ VA$$


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Thank You


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