



WYE AND DELTA CIRCUIT EQUATIONS

Typical 3-Phase Wiring Diagrams
and Equations for Resistive Heaters

DEFINITIONS

For Both Wye and Delta
(Balanced Loads)

V_P = Phase Voltage

V_L = Line Voltage

I_P = Phase Current

I_L = Line Current

$R = R_1 = R_2 = R_3 =$

Resistance of each branch

W = Wattage

Wye and Delta Equivalent

$$W_{\text{DELTA}} = 3 W_{\text{WYE}}$$

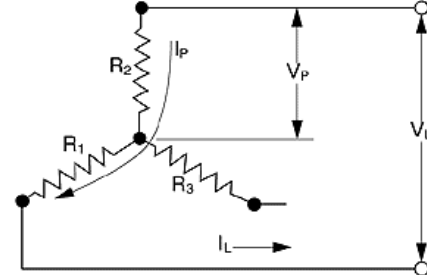
Open 3-Phase Circuit Formulas:

Open Delta Watts = $2/3 W_{\text{DELTA}}$

Open Wye Watts = $1/2 W_{\text{WYE}}$

Open 4-wire Wye Watts = $2/3 W_{\text{WYE}}$

3-Phase Wye (Balanced Load)



Equations For Wye Only

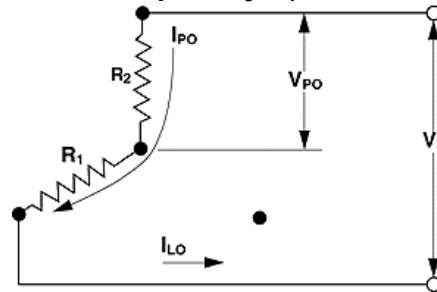
$$I_P = I_L$$

$$V_P = V_L / 1.73$$

$$W_{\text{WYE}} = V_L^2 / R = 3 (V_P^2) / R$$

$$W_{\text{WYE}} = 1.73 V_L I_L$$

3-Phase Open Wye (No Neutral)



Equations For Open Wye Only

$$I_{PO} = I_{LO}$$

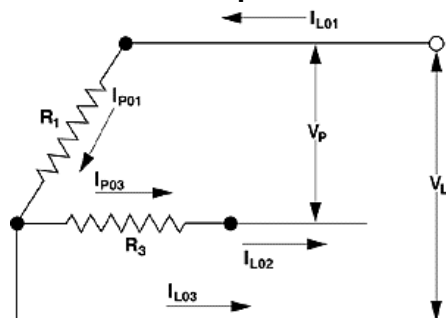
$$V_{PO} = V_L / 2$$

$$W_{\text{OWYE}} = 1/2 (V_L / R)$$

$$W_{\text{OWYE}} = 2 (V_{PO}^2 / R)$$

$$W_{\text{OWYE}} = V_L I_{LO}$$

3-Phase Open Delta



Equations For Open Delta Only

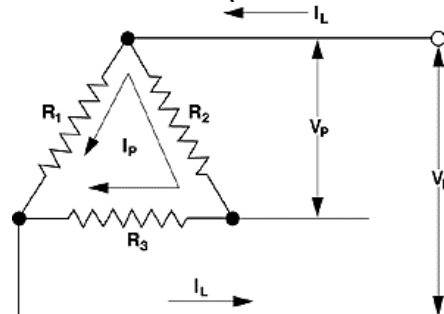
$$V_P = V_L$$

$$I_{PO1} = I_{PO3} = I_{LO2}$$

$$I_{LO3} = 1.73 I_{PO1}$$

$$W_{\text{ODELTA}} = 2 (V_L^2 / R)$$

3-Phase Delta (Balanced Load)



Equations For Delta Only

$$I_P = I_L / 1.73$$

$$V_P = V_L$$

$$W_{\text{DELTA}} = 3 (V_L^2) / R$$

$$W_{\text{DELTA}} = 1.73 V_L I_L$$