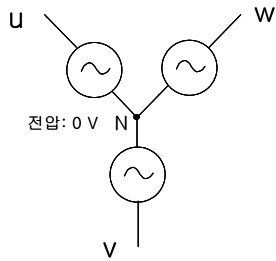


Chapter 3 교류 (AC) 전력

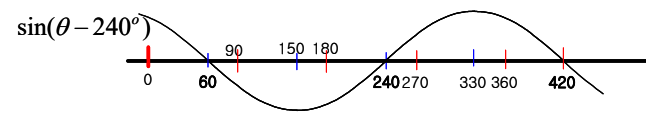
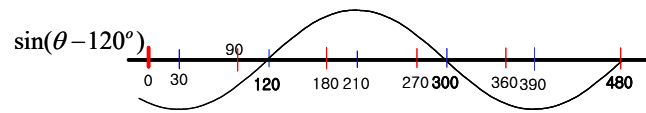
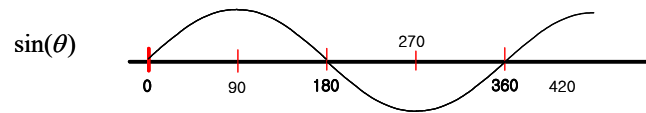
3상 전력



$$u = V \sin(\theta)$$

$$v = V \sin(\theta - 120^\circ)$$

$$w = V \sin(\theta - 240^\circ)$$



3상 송전 (4선)

U-V-W, N

단상 110 Vrms

3상 220 Vrms

3상 380 Vrms

Delta and Wye 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

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

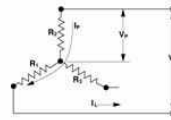
Open 3-Phase Circuit Formulas:

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

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

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

3-Phase Wye (Balanced Load)



Equations For Wye Only

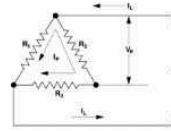
$$I_P = I_L$$

$$V_P = V_L / 1.73$$

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

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

3-Phase Delta (Balanced Load)



Equations For Delta Only

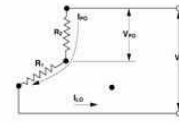
$$I_P = I_L / 1.73$$

$$V_P = V_L$$

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

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

3-Phase Open Wye (No Neutral)



Equations For Open Wye Only (No Neutral)

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

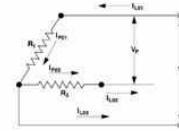
$$V_{PO} = V_L / 2$$

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

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

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

3-Phase Open Delta



Equations For Open Delta Only

$$V_P = V_L$$

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

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

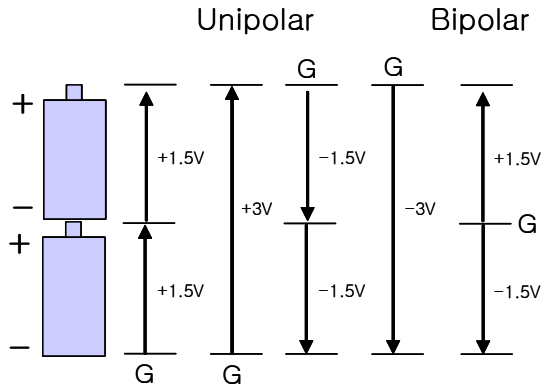
$$W_{\text{ODELTA}} = 2 (V_L^2 / R)$$

전원의 극성

unipolar: ground를 기준으로 + 또는 - 방향으로 전압만 사용하는 방식

bipolar: ground를 기준으로 +와 - 의 양방향으로 전압을 사용하는 방식

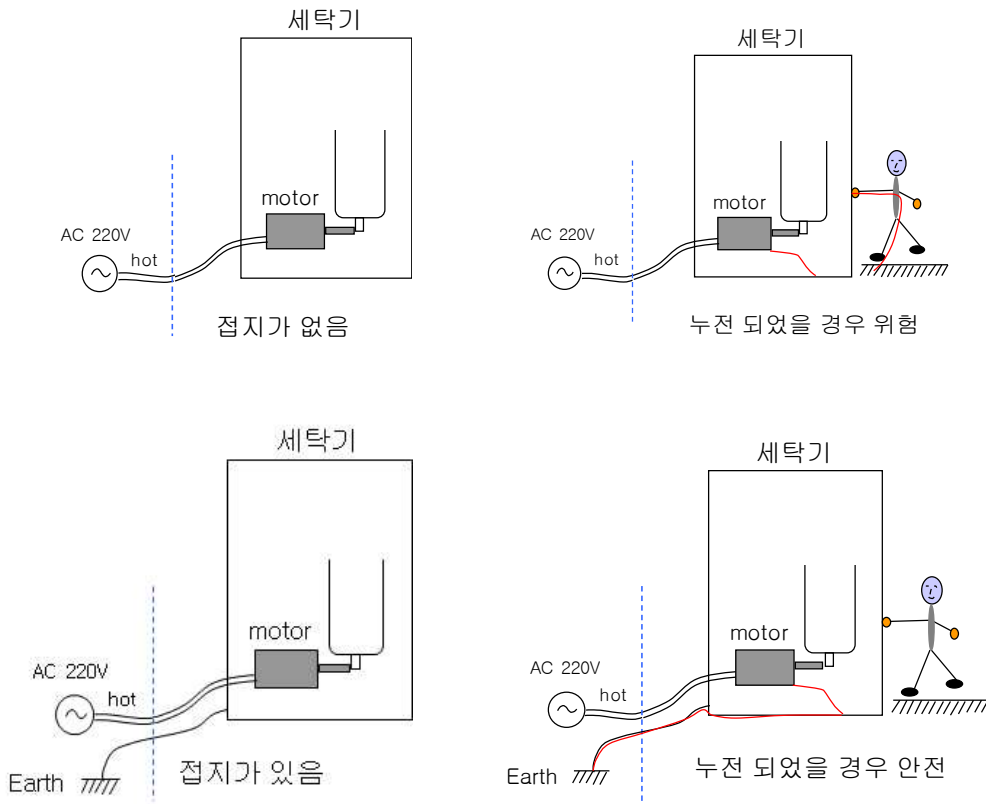
ground: 전압의 기준이 되는 부분



Earth:

누전이 될 때 사람을 보호하기 위하여 case를 땅에 연결하는 것

예)



누전될 경우: earth 있으면 안전, 없으면 감전, 위험

변압기 (Transformer)

상호인덕턴스 이용

입력전압: 출력전압 = n_1 : n_2 ; 감은 횟수에 비례

