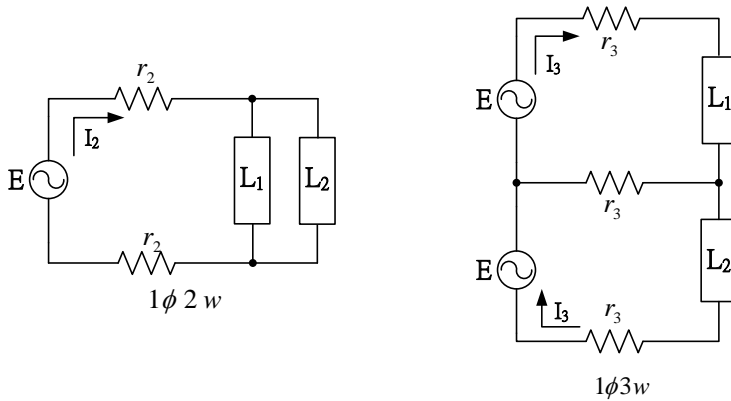


單相三線制(1φ3w) v. s. 單相二線制(1φ2w)



1. 電源提供\_\_\_\_\_相同，使用相同的饋電線(\_\_\_\_\_)，單相三線制的\_\_\_\_\_及\_\_\_\_\_較小  
**電流 I**

$$E \times I_2 = 2 \times E \times I_3 \Rightarrow \text{_____} , \text{ 所以令 } I_2 = I , I_3 = 2I$$

**壓降 V**

$$\begin{cases} V_{r(2w)} = 2 \times I_2 \times r_2 = 4Ir \\ I_3 \times r_3 \leq V_{r(3w)} \leq 2 \times I_3 \times r_3 \Rightarrow Ir \leq V_{r(3w)} \leq 2Ir \end{cases} \Rightarrow \frac{Ir}{4Ir} \leq \frac{V_{r(3w)}}{V_{r(2w)}} \leq \frac{2Ir}{4Ir} \Rightarrow \text{_____} \leq \frac{V_{r(3w)}}{V_{r(2w)}} \leq \text{_____}$$

**損失 P<sub>loss</sub>**

$$\begin{cases} P_{loss(2w)} = I_2^2 \times r_2 \times 2 = (2I)^2 \times r \times 2 = 8I^2r \\ 2 \times I_3^2 \times r_3 \leq P_{loss(3w)} \leq 3 \times I_3^2 \times r_3 \Rightarrow 2I^2r \leq P_{loss(3w)} \leq 3I^2r \end{cases} \Rightarrow \frac{2I^2r}{8I^2r} \leq \frac{P_{loss(3w)}}{P_{loss(2w)}} \leq \frac{3I^2r}{8I^2r}$$

$$\Rightarrow \text{_____} \leq \frac{P_{l o(3w)s}}{P_{l o(2w)s}} \leq \text{_____}$$

2. 若兩系統饋電線\_\_\_\_\_相同，單相三線制節省\_\_\_\_\_  
**用銅量** (r<sub>1</sub> ≠ r<sub>2</sub>)

$$\begin{cases} P_{loss(2w)} = I_2^2 \times r_2 \times 2 = (2I)^2 \times r_2 \times 2 = 8I^2r_2 \\ I_3^2 \times r_3 \times 2 \leq P_{loss(3w)} \leq I_3^2 \times r_3 \times 3 \Rightarrow 2I^2r_3 \leq P_{loss(3w)} \leq 3I^2r_3 \end{cases}$$

若 P<sub>loss(2w)</sub> = P<sub>loss(3w)</sub>，討論極端值

$$\begin{cases} 8I^2r_2 = 2I^2r_3 \\ 8I^2r_2 = 3I^2r_3 \end{cases} \Rightarrow \begin{cases} 4r_2 = r_3 \\ 8r_2 = 3r_3 \end{cases} \Rightarrow \frac{8}{3} \leq \frac{r_3}{r_2} \leq 4 \Rightarrow \frac{8}{3} \leq \frac{A_2}{A_3} \leq 4 \text{ (單條導線)} \Rightarrow \frac{8}{3} \leq \frac{A_2}{A_3} \leq 4 \text{ (全部導線)}$$

$$\Rightarrow \text{_____} \leq \frac{Cu_{(r3)}}{Cu_{(r2)}} \leq \text{_____} \text{ (單條導線)} \Rightarrow \text{_____} \leq \frac{Cu_{(r3)}}{Cu_{(r2)}} \leq \text{_____} \text{ (全部導線)}$$

3. 單相三線制可提供較高負載電壓