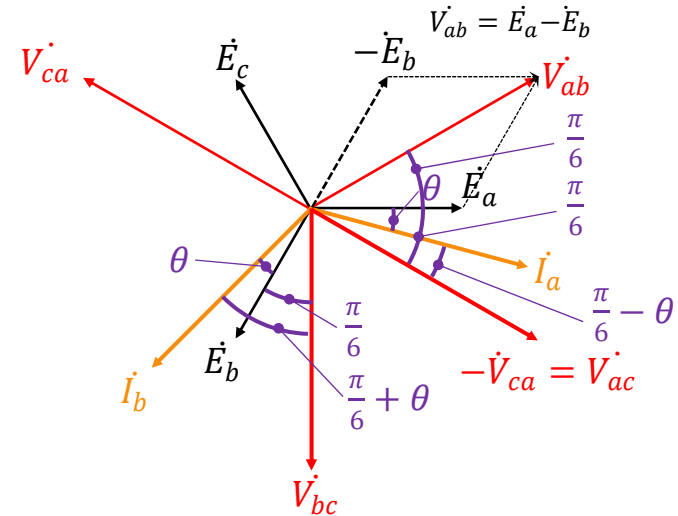
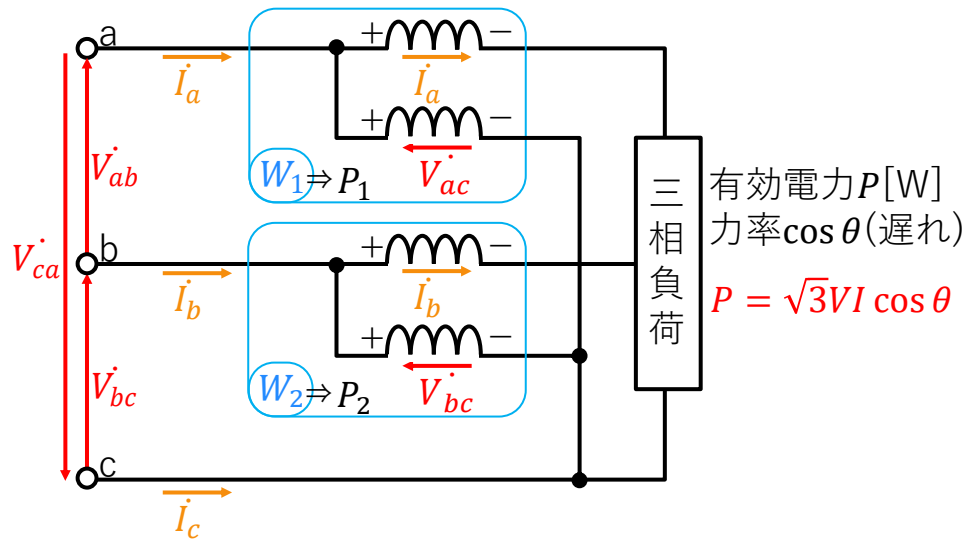


### 三相電力計測 (1)



電力計  $W_1$  :  $P_1 = V_{ac} I_a \cos\left(\frac{\pi}{6} - \theta\right) = VI \cos\left(\frac{\pi}{6} - \theta\right)$

電力計  $W_2$  :  $P_2 = V_{bc} I_b \cos\left(\frac{\pi}{6} + \theta\right) = VI \cos\left(\frac{\pi}{6} + \theta\right)$

$$P_1 + P_2 = VI \cos\left(\frac{\pi}{6} - \theta\right) + VI \cos\left(\frac{\pi}{6} + \theta\right) = VI \left\{ \cos\left(\frac{\pi}{6} - \theta\right) + \cos\left(\frac{\pi}{6} + \theta\right) \right\} = VI \cdot 2 \cos\frac{\pi}{6} \cos(-\theta) = \sqrt{3}VI \cos \theta$$

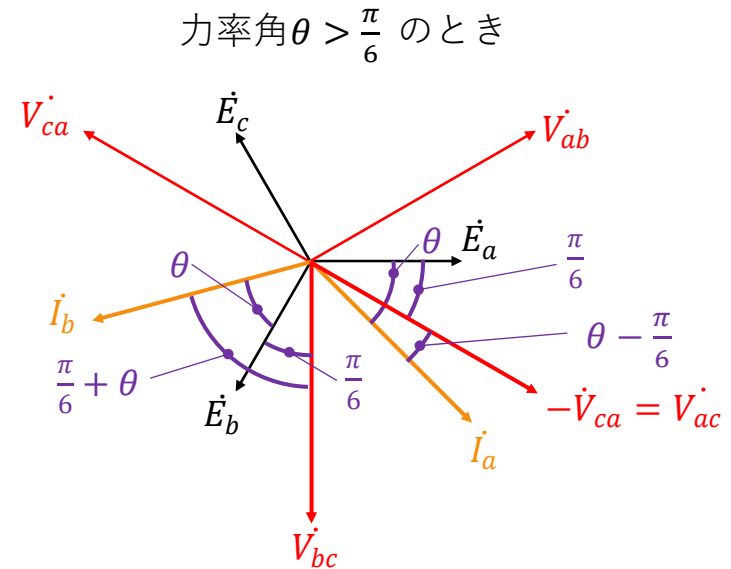
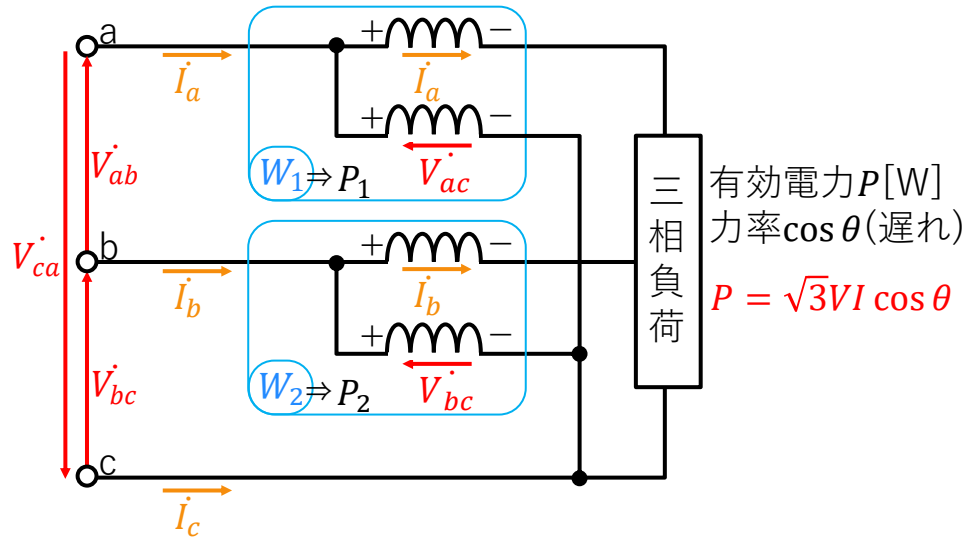
【和積の公式】

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}, \quad \cos(-\theta) = \cos \theta$$

$$P_1 + P_2 = \sqrt{3}VI \cos \theta \quad \therefore P = P_1 + P_2$$

三相電力計測 (2)



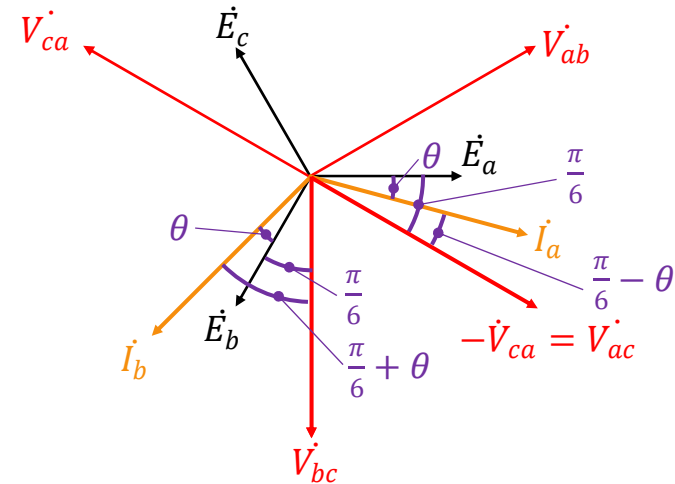
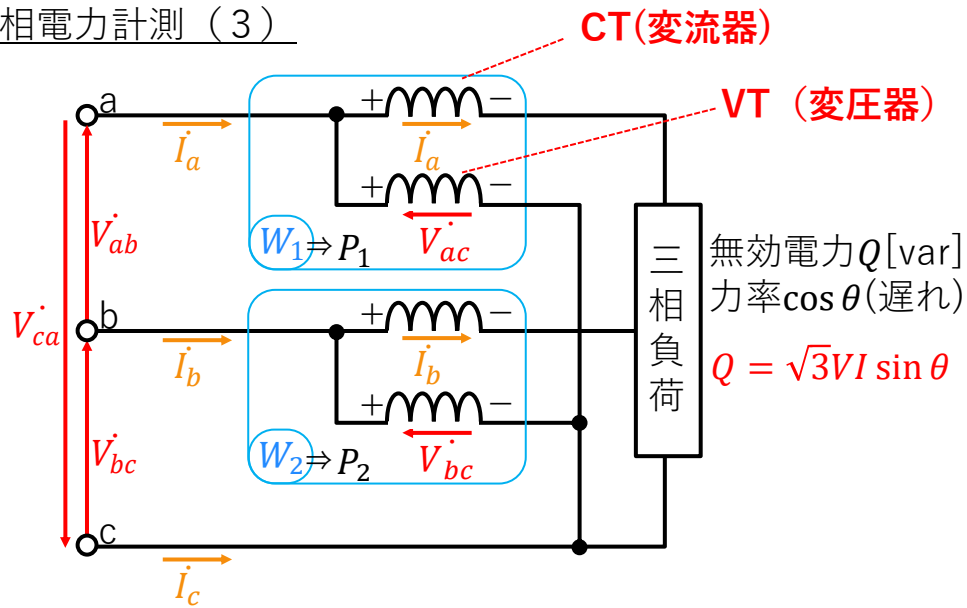
電力計  $W_1$  :  $P_1 = V_{ac} I_a \cos \left( \theta - \frac{\pi}{6} \right) = VI \cos \left( \theta - \frac{\pi}{6} \right)$       電力計  $W_2$  :  $P_2 = V_{bc} I_b \cos \left( \frac{\pi}{6} + \theta \right) = VI \cos \left( \frac{\pi}{6} + \theta \right)$

$P_1 + P_2 = VI \cos \left( \theta - \frac{\pi}{6} \right) + VI \cos \left( \frac{\pi}{6} + \theta \right) = VI \left\{ \cos \left( \theta - \frac{\pi}{6} \right) + \cos \left( \frac{\pi}{6} + \theta \right) \right\} = VI \cdot 2 \cos \theta \cos \left( -\frac{\pi}{6} \right) = \sqrt{3}VI \cos \theta$

$P_1 + P_2 = \sqrt{3}VI \cos \theta \quad \therefore P = P_1 + P_2$

【和積の公式】  
 $\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$        $\cos \left( -\frac{\pi}{6} \right) = \frac{\sqrt{3}}{2}$

三相電力計測 (3)



$$P_1 - P_2 = VI \cos\left(\frac{\pi}{6} - \theta\right) - VI \cos\left(\frac{\pi}{6} + \theta\right) = VI \left\{ \cos\left(\frac{\pi}{6} - \theta\right) - \cos\left(\frac{\pi}{6} + \theta\right) \right\} = VI \cdot -2 \sin \frac{\pi}{6} \sin(-\theta) = VI \sin \theta$$

【和積の公式】  
 $\cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$       $\sin \frac{\pi}{6} = \frac{1}{2}$ 、 $\sin(-\theta) = -\sin \theta$

$$P_1 - P_2 = VI \sin \theta \quad \therefore Q = \sqrt{3}(P_1 - P_2)$$

$$\cos \theta = \frac{P_1 + P_2}{\sqrt{3}VI}, \quad \sin \theta = \frac{P_1 - P_2}{VI} \text{ より、} \quad \tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\sqrt{3}(P_1 - P_2)}{P_1 + P_2} \quad \therefore \cos \theta = \frac{1}{\sqrt{1 + \tan^2 \theta}} = \frac{P_1 + P_2}{2\sqrt{P_1^2 - P_1 P_2 + P_2^2}}$$