Formulari Electrotècnia M09 UF2

Corrent altern

$V(t) = V_{max} \cdot \sin(\omega \cdot t + \phi)$ (V) (Utilitzar la calculadora en radiants (R))

$\omega = 2 \cdot \pi \cdot f$ (rad/s) $T = 1/f$ (s) f (Hz)

$V_{ef} = V_{max}/\sqrt{2}$ (V)

Impedàncies i llei d'ohm

$X_L = 2 \cdot \pi \cdot f \cdot L$ $X_C = \frac{1}{2 \cdot \pi \cdot f \cdot C}$ $Z = \sqrt{R^2 + (X_L - X_C)^2}$ (Ω)

$V_R = R \cdot I_R$ $V_L = X_L \cdot I_L$ $V_C = X_C \cdot I_C$ $V_T = I_T \cdot Z$ (V)

$I_T = V_T / Z$ (A)

Potències

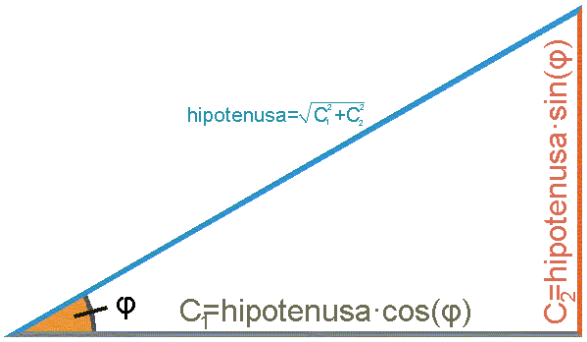
$P = V_R \cdot I_R = R \cdot I_R^2 = V_R^2/R$ (W)

$Q_L = V_L \cdot I_L = X_L \cdot I_L^2 = V_L^2/X_L$ $Q_C = V_C \cdot I_C = X_C \cdot I_C^2 = V_C^2/X_C$ $Q = Q_L - Q_C$ (VA_R)

$S = V_T \cdot I_T = Z \cdot I_T^2 = V_T^2/Z$ (VA)

$P = V_T \cdot I_T \cdot \cos(\phi)$ (W) $Q = V_T \cdot I_T \cdot \sin(\phi)$ (VA_R)

Trigonometria



Exemple: Càlcul en 'D' Degree

Si $\cos(\phi) = 0.8$

Busquem l'angle

$\cos^{-1}(0.8) = \phi = 36.87º$

Busquem el sinus

$\sin(36.87) = 0.6$

$V_T = \sqrt{V_R^2 + (V_L - V_C)^2}$ $V_R = V_T \cdot \cos(\phi)$ $V_L - V_C = V_T \cdot \sin(\phi)$ (V)

$Z = \sqrt{R^2 + (X_L - X_C)^2}$ $R = Z \cdot \cos(\phi)$ $X_L - X_C = Z \cdot \sin(\phi)$ (Ω)

$S = \sqrt{P^2 + Q^2}$ $P = S \cdot \cos(\phi)$ $Q = S \cdot \sin(\phi)$ (VA, W, VA_R)

$\phi = \text{arctg}\left(\frac{V_L - V_C}{V_R}\right) = \text{arctg}\left(\frac{X_L - X_C}{R}\right) = \text{arctg}\left(\frac{Q}{P}\right)$ (°) $\tan \phi = \frac{Q}{P}$

$Factor\ de\ potencia\ (fp) = \cos(\phi) = \frac{P}{S} = \frac{R}{Z}$ $I = \frac{P}{V \cdot \cos \phi}$ (A)

Compensació FP

$Q_C = P \cdot (\text{tg}\ \varphi_1 - \text{tg}\ \varphi_2)$ (VA_R) $C = \frac{Q_C}{2 \cdot \pi \cdot f \cdot V^2}$ (F)

Corrent trifàsica

Estrella (Y)

$V_L = \sqrt{3} \cdot V_F$ (V)

$I_L = I_F$ (A)

Triangle (Δ)

$V_L = V_F$ (V)

$I_L = \sqrt{3} \cdot I_F$ (A)

Potències trifàsiques

$P = \sqrt{3} \cdot I_L \cdot V_L \cdot cos\ \varphi$	$P = 3 \cdot I_F \cdot V_F \cdot cos\ \varphi$	$P = S \cdot cos\ \varphi$	(W)
$Q = \sqrt{3} \cdot I_L \cdot V_L \cdot sin\ \varphi$	$Q = 3 \cdot I_F \cdot V_F \cdot sin\ \varphi$	$Q = S \cdot sin\ \varphi$	(VA_R)
$S = \sqrt{3} \cdot I_L \cdot V_L$	$S = 3 \cdot I_F \cdot V_F$	$S = \sqrt{P^2 + Q^2}$	(VA)

Compensació FP

$Q_C = P \cdot (tg\ \varphi_1 - tg\ \varphi_2)$ (VA_R)

$C_Y = \frac{Q_C}{6 \cdot \pi \cdot f \cdot V^2}$ (F)

$C_\Delta = \frac{Q_C}{2 \cdot \pi \cdot f \cdot V^2}$ (F)

Intensitat en trifàsic

$I_L = \frac{P}{\sqrt{3} \cdot V_L \cdot cos\ cos\ \phi}$ (A)

Motor asíncron

$n_s = \frac{60 \cdot f}{n^\circ_{pp}}$ (r.p.m.)

$s = \frac{n_s - n}{n_s} \cdot 100$ (%)

$\eta = \frac{P_{útil}}{P_{absorbida}} \cdot 100$ (%)

$\omega = n \cdot \frac{2 \cdot \pi}{60}$ ($\frac{rad}{s}$)

$\tau = \frac{P}{\omega}$ (N·m)