ELECTRICAL EQUATIONS

Power - AC Circuits

$$\text{Efficiency} = \frac{746 \times \text{Output Horsepower}}{\text{Input Watts}}$$

$$\text{Three Phase KW} = \frac{\text{Volts} \times \text{Amperes} \times \text{Power Factor} \times 1.732}{1000}$$

$$\text{Three Phase Volt Amperes} = \text{Volt Amperes} \times 1.732$$

$$\text{Three Phase Power Factor} = \frac{\text{Input Watts}}{\text{Volts} \times \text{Amperes} \times 1.732}$$

$$\text{Three Phase Efficiency} = \frac{746 \times \text{Horsepower}}{\text{Volts} \times \text{Amperes} \times \text{Power Factor} \times 1.732}$$

$$\text{Three Phase Amperes} = \frac{746 \times \text{Horsepower}}{1.732 \times \text{Volts} \times \text{Efficiency} \times \text{Power Factor}}$$

$$\text{Single Phase KW} = \frac{\text{Volts} \times \text{Amperes} \times \text{Power Factor}}{1000}$$

$$\text{Single Phase Amperes} = \frac{746 \times \text{Horsepower}}{\text{Volts} \times \text{Efficiency} \times \text{Power Factor}}$$

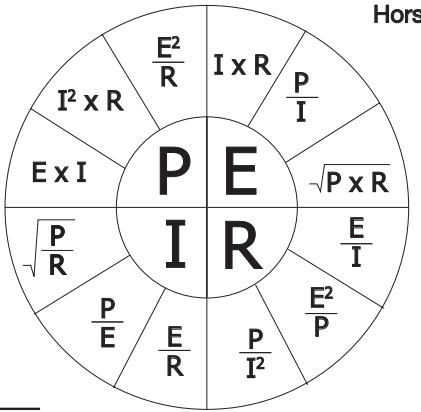
$$\text{Single Phase Efficiency} = \frac{746 \times \text{Horsepower}}{\text{Volts} \times \text{Amperes} \times \text{Power Factor}}$$

$$\text{Single Phase Power Factor} = \frac{\text{Input Watts}}{\text{Volts} \times \text{Amperes}}$$

$$\text{Horsepower (3 Phase)} = \frac{\text{Volts} \times \text{Amperes} \times 1.732 \times \text{Efficiency} \times \text{Power Factor}}{746}$$

$$\text{Horsepower (1 Phase)} = \frac{\text{Volts} \times \text{Amperes} \times \text{Efficiency} \times \text{Power Factor}}{746}$$

Ohm's Law



For Pumps

$$\text{Horsepower} = \frac{\text{GPM} \times \text{Head (ft)} \times \text{Specific Gravity}}{3960 \times \text{Efficiency of Pump}}$$

For Fans and Blowers

$$\text{Horsepower} = \frac{\text{CFM} \times \text{Pressure (lbs./sq.ft)}}{33{,}000 \times \text{Efficiency}}$$

Motor Application Equations

$$\text{Torque (lb. - ft.)} = \frac{\text{Horsepower} \times 5250}{\text{RPM}}$$

$$\text{Horsepower} = \frac{\text{Torque (lb. - ft.)} \times \text{RPM}}{5250}$$

$$\text{KW} = \text{HP} \times .746$$

Time for Motor to Reach Operating Speed (Seconds)

$$\text{Seconds} = \frac{\text{WK}^2 \times \text{Speed Change}}{308 \times \text{Avg. Accelerating Torque}}$$

WK^2 = Inertia of Rotor + Inertia of Load (lb. - ft.²)

$$\text{Average Accelerating Torque} = \frac{[(\text{FLT} + \text{BDT})/2] + \text{BDT} + \text{LRT}}{3}$$

$$\text{Load WK}^2 \text{ (@ Motor Shaft)} = \frac{\text{WK}^2 \text{ (Load)} \times (\text{Load RPM})^2}{(\text{Motor RPM})^2}$$

$$\text{Shaft Stress (lbs. per sq. inch)} = \frac{\text{HP} \times 321{,}000}{\text{RPM} \times (\text{Shaft Diameter})^3}$$