

USEFUL ELECTRICAL FORMULAS

Ohms Law:

$$\text{Ohms} = \text{Volts/Amperes}$$

$$\text{Amperes} = \text{Volts/Ohms}$$

$$\text{Volts} = \text{Amperes} \times \text{Ohms}$$

Power — A.C. Circuits:

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

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

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

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

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

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

Power — D.C. Circuits:

$$\text{Watts} = \text{Volts} \times \text{Amperes}$$

$$\text{Amperes} = \frac{\text{Watts}}{\text{Volts}}$$

$$\text{Horsepower} = \frac{\text{Volts} \times \text{Amperes} \times \text{Efficiency}^*}{746}$$

* Efficiency in %

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Motor Application Formulas:

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

$$\text{Shaft Stress (pds per sq inch)} = \frac{\text{HP} \times 321.000}{\text{RPM} \times \text{Shaft Diam.}^3}$$

For Pumps:

$$\text{Horsepower} = \frac{\text{GPM} \times \text{Head in Feet} \times \text{Specific Gravity}}{3960 \times \text{Efficiency of Pump}}$$

For Fans and Blowers:

$$\text{Horsepower} = \frac{\text{CFM} \times \text{Pressure (pounds/sq ft)}}{33000 \times \text{Efficiency}}$$

Speed:

$$\text{Synchronous RPM} = \frac{\text{Hertz} \times 120}{\text{Poles}}$$

$$\text{Percent Slip} = \frac{\text{Synchronous RPM} - \text{Full-Load RPM}}{\text{Synchronous RPM}} \times 100$$