AC/DC FORMULAS

To Find	DC	AC		
		1ϕ, 115 or 220 V	1ϕ, 208, 230, or 240 V	3ϕ – All Voltages
I, HP known	$\frac{HP \times 746}{E \times Eff}$	$\frac{HP \times 746}{E \times Eff \times PF}$	$\frac{HP \times 746}{E \times Eff \times PF}$	$\frac{HP \times 746}{1.73 \times E \times Eff \times PF}$
I, kW known	$\frac{kW \times 1000}{E}$	$\frac{kW \times 1000}{E \times PF}$	$\frac{kW \times 1000}{E \times PF}$	$\frac{kW \times 1000}{1.73 \times E \times PF}$
I, kVA known		$\frac{kVA \times 1000}{E}$	$\frac{kVA \times 1000}{E}$	$\frac{kVA \times 1000}{1.763 \times E}$
kW	$\frac{I \times E}{1000}$	$\frac{I \times E \times PF}{1000}$	$\frac{I \times E \times PF}{1000}$	$\frac{I \times E \times 1.73 \times PF}{1000}$
kVA		$\frac{I \times E}{1000}$	$\frac{I \times E}{1000}$	$\frac{I \times E \times 1.73}{1000}$
HP (output)	$\frac{I \times E \times Eff}{746}$	$\frac{I \times E \times Eff \times PF}{746}$	$\frac{I \times E \times Eff \times PF}{746}$	$\frac{I \times E \times 1.73 \times Eff \times PF}{746}$

HORSEPOWER FORMULAS

To Find	Use Formula	Example		
		Given	Find	Solution
HP	$HP = \frac{I \times E \times Eff}{746}$	240 V, 20 A, 85% Eff	HP	$HP = \frac{I \times E \times Eff}{746}$ $HP = \frac{20\ A \times 240\ V \times 85\%}{746}$ $HP =$ **5.5**
I	$I = \frac{HP \times 746}{E \times Eff \times PF}$	10 HP, 240 V, 90% Eff, 88% PF	I	$I = \frac{HP \times 746}{E \times Eff \times PF}$ $I = \frac{10\ HP \times 746}{240\ V \times 90\% \times 88\%}$ $I =$ **39 A**

VOLTAGE DROP FORMULAS – 1ϕ, 3ϕ

Phase	To Find	Use Formula	Example		
			Given	Find	Solution
1ϕ	VD	$VD = \frac{2 \times R \times L \times I}{1000}$	240 V, 40 A, 60′ L, .764 R	VD	$VD = \frac{2 \times R \times L \times I}{1000}$ $VD = \frac{2 \times .764 \times 60 \times 40}{1000}$ $VD =$ **3.67 V**
3ϕ	VD	$VD = \frac{2 \times R \times L \times I}{1000} \times .866$	208 V, 110 A, 75′ L, .194 R, .866 multiplier	VD	$VD = \frac{2 \times R \times L \times I}{1000} \times .866$ $VD = \frac{2 \times .194 \times 75 \times 110}{1000} \times .866$ $VD =$ **2.77 V**

VOLTAGE DROP VARIABLES

V = Voltage (in V) V_s = Supply voltage (in V) I = Current (In A)	VD = Voltage drop (in V) K = Resistivity of conductor (in Ω) L = Length of conductor (in ft)	$\%VD$ = Percent voltage drop (in V) R = Resistance of conductor (in Ω/kft) 1000 = 1000′ or less of conductor	V_l = Voltage loss (in V) CM = Circular mils (in area) $.866 = \frac{\sqrt{3}}{2}$