E = Voltage / I = Amps /W = Watts / PF = Power Factor / Eff = Efficiency / HP = Horsepower

AC/DC Formulas

To Find	Direct Current	AC / 1phase 115v or 120v	AC / 1phase 208,230, or 240v	AC 3 phase All Voltages
Amps when Horsepower is Known	HP x 746 E x Eff	HP x 746 E x Eff X PF	HP x 746 E x Eff x PF	HP x 746 1.73 x E x Eff x PF
Amps when Kilowatts is known	kW x 1000 E	kW x 1000 E x PF	kW x 1000 E x PF	kW x 1000 1.73 x E x PF
Amps when kVA is known		kVA x 1000 E	kVA x 1000 E	kVA x 1000 1.73 x E
Kilowatts	I x E 1000	I x E x PF 1000	I x E x PF 1000	I x E x 1.73 PF 1000
Kilovolt-Amps		I x E 1000	I x E 1000	I x E x 1.73 1000
Horsepower (output)	I x E x Eff 746	I x E x Eff x PF 746	I x E x Eff x PF 746	I x E x Eff x 1.73 x PF 746

Three Phase Values

For 208 volts x 1.732, use 360
For 230 volts x 1.732, use 398
For 240 volts x 1.732, use 416
For 440 volts x 1.732, use 762
For 460 volts x 1.732, use 797
For 480 Volts x 1.732, use 831

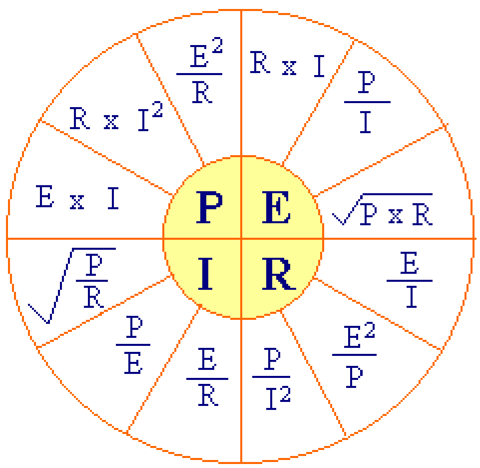
E = Voltage / I = Amps /W = Watts / PF = Power Factor / Eff = Efficiency / HP = Horsepower

AC Efficiency and Power Factor Formulas

To Find	Single Phase	Three Phase
Efficiency	746 x HP E x I x PF	746 x HP E x I x PF x 1.732
Power Factor	Input Watts V x A	Input Watts E x I x 1.732

Power - DC Circuits
Watts = E xI
Amps = W / E

Ohm's Law / Power Formulas



P = watts

I = amps

R = ohms

E = Volts

Voltage Drop Formulas

Single Phase (2 or 3 wire)	VD =	$\frac{2 \times K \times I \times L}{CM}$
	CM=	$\frac{2K \times L \times I}{VD}$
Three Phase	VD=	$\frac{1.73 \times K \times I \times L}{CM}$
	CM=	$\frac{1.73 \times K \times L \times I}{VD}$

K = ohms per mil foot

(Copper = 12.9 at 75°)

(Alum = 21.2 at 75°)

Note: **K** value changes with temperature. See Code chapter 9, Table 8

L = Length of conductor in feet

I = Current in conductor (amperes)

CM = Circular mil area of conductor

Check out these Online Calculators!

If there is anything you would like to add or if you have any comments please feel free to email E.T.E. at tchism@elec-toolbox.com.

Back to Main Page

For balanced 3-phase loads, either wye or delta:

Power(kW) = (Volts X Amps X Square root of 3 X Power Factor) / 1000

Amps = (Power(kW) X 1000) / (Volts X Sqrt3 X Power Factor)

If the load contains only resistance, the power factor is 1 and doesn't affect the calculation. If the load is a motor, the power factor is probably about 0.85 at full load and could be less than 0.25 when the motor is lightly loaded.