Formulas - Electrical

VOLTS =

$$Amps \ x \ Ohms \qquad \frac{Watts}{Amps} \qquad \sqrt{Watts \ x \ Ohms}$$

AMPS =

$$\frac{Volts}{Ohms} \qquad \frac{Watts}{Volts} \qquad \sqrt{\frac{Watts}{Ohms}}$$

WATTS =

$$Volts \ x \ Amps \qquad Amps^2 \ x \ Ohms \qquad \frac{Volts^2}{Ohms}$$

OHMS =

$$\frac{Volts}{Amps} \qquad \frac{Volts^2}{Watts} \qquad \frac{Watts}{Amps^2}$$

$$Power \ Factor = \frac{KW}{KVA} = Cos \ \Theta$$

Single Phase	Three Phase
$KW = \dfrac{\sqrt{\ x \ A \ x \ PF}}{1000}$	$\dfrac{\sqrt{3} \ x \ V \ x \ A \ x \ PF}{1000}$
$KVA = \dfrac{V \ x \ A}{1000}$	$\dfrac{\sqrt{3} \ x \ V \ x \ A}{1000}$
$AMPS = \dfrac{KVA \ x \ 1000}{V}$	$\dfrac{KVA \ x \ 1000}{\sqrt{3} \ x \ V}$

$$\sqrt{3} = 173$$

Approx. Motor KVA = Motor Horsepower (At Full Load)

Capacitors Connected In Parallel $C_1 + C_2 + C_3 = C \ Total$

Capacitors Connected In Series

For Two	**More Than Two**
$\dfrac{C_1 \ x \ C_2}{C_1 + C_2} = C \ Total$	$\dfrac{1}{\dfrac{1}{C_1} + \dfrac{1}{C_2} + \dfrac{1}{C_3}} = C \ Total$

VOLTAGE UNBALANCE

$$\% \ Voltage \ Unbalance =$$

$$\frac{100 \ x \ Max. \ Voltage \ Deviation \ From \ Average \ Voltage}{Average \ Voltage}$$

BOOST TRANS.:

$$Rating \ Plate \ F.L.A. \ x \ Rating \ Plate \ VOLTS = KVA$$

$$\frac{Rating \ Plate \ VOLTS}{Rating \ Plate \ VOLTS \ - \ Norm. \ Line \ VOLTS} = FACTOR$$

$$\frac{KVA}{FACTOR} = Trans. \ KVA \ Rating$$

$$\left(\frac{V_2}{V_1}\right)2 \ x \ Heater \ Rating = Rating \ @ \ New \ Voltage$$

$$V_1 \ Rated \ Volts \qquad V_2 = Measured \ Volts$$
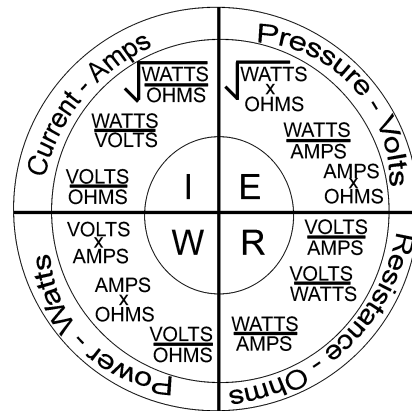
This chart shows four ways to figure each value: Amps (I), Volts (E), Ohms (R) or Watts (W).

Example: A 4800 Watt electric heat element is connected to a 240 Volt circuit. How many Amps does it draw?

Solution: Locate Amps section of chart: $\dfrac{Watts \ (W)}{Volts \ (E)} = Amps \ (I)$

Thus 4800 ÷ 240 = 20 Amps. Carried further, what is the resistance?

$$\frac{Volts^2 \ E^2}{Watts \ (W)} = Ohms \ (R) \ 240 \ x \ 240 \div 4800 = 12 \ Ohms.$$

Conversion Table For
Watts - Amperes - Volts

Watts	Voltage (C - Single Phase)			
	120	208	240	277
	Amperes			
500	4.2	2.4	2.1	1.8
1000	8.3	4.8	4.2	3.8
1500	12.5	7.2	6.3	5.4
2000	16.7	9.6	8.3	7.2
2500	20.9	12.0	10.4	9.0
3000	25.0	14.4	12.5	10.6
3500	29.2	16.8	14.5	12.6