

FORMULAS

Formulas - Electrical

$$\text{VOLTS} = \frac{\text{Watts}}{\text{Amps}} = \sqrt{\text{Watts} \times \text{Ohms}}$$

$$\text{AMPS} = \frac{\text{Watts}}{\text{Volts}} = \frac{\sqrt{\text{Watts}}}{\sqrt{\text{Ohms}}}$$

$$\text{WATTS} = \text{Volts} \times \text{Amps} = \text{Amps}^2 \times \text{Ohms} = \frac{\text{Volts}^2}{\text{Ohms}}$$

$$\text{OHMS} = \frac{\text{Volts}}{\text{Amps}} = \frac{\text{Volts}^2}{\text{Watts}} = \frac{\text{Watts}}{\text{Amps}^2}$$

$$\text{Power Factor} = \frac{\text{KW}}{\text{KVA}} = \cos \theta$$

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

$\sqrt{3} = 1.73$

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
$\frac{C_1 \times C_2}{C_1 + C_2} = C$ Total	$\frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}} = C$ Total

VOLTAGE UNBALANCE

$$\% \text{ Voltage Unbalance} = \frac{100 \times \text{Max. Voltage Deviation From Average Voltage}}{\text{Average Voltage}}$$

BOOST TRANS.:

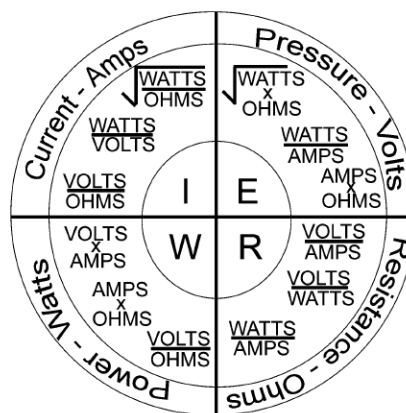
$$\text{Rating Plate F.L.A.} \times \text{Rating Plate VOLTS} = \text{KVA}$$

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

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

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

$$V_1 \text{ Rated Volts } \quad V_2 = \text{Measured Volts}$$



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: $\frac{\text{Watts (W)}}{\text{Volts (E)}} = \text{Amps (I)}$

Thus $4800 \div 240 = 20$ Amps. Carried further, what is the resistance?

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

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