Percent of Rated Wattage for Various Applied Voltages

Applied Voltage	Rated Voltage 110	115	120	208	220	230	240	277	380	415	440	460	480	550	Applied Voltage
110	100%	91%	84%	28%	25%	23%	21%	16%	8.4%	7%	6.3%	5.7%	5.3%	4%	110
115	109%	100%	92%	31%	27%	25%	23%	17%	9.2%	7.7%	6.8%	6.3%	5.7%	4.4%	115
120	119%	109%	100%	33%	30%	27%	25%	19%	10%	8.4%	7.4%	6.8%	6.3%	4.8%	120
208			300%	100%	89%	82%	75%	56%	30%	25%	22%	20%	19%	14%	208
220				112%	100%	91%	84%	63%	34%	28%	25%	23%	21%	16%	220
230				122%	109%	100%	92%	69%	37%	31%	27%	25%	23%	17%	230
240				133%	119%	109%	100%	75%	40%	33%	30%	27%	25%	19%	240
277							133%	100%	53%	45%	40%	36%	33%	25%	277
380								188%	100%	84%	75%	68%	63%	48%	380
415									119%	100%	89%	81%	75%	57%	415
440										112%	100%	91%	84%	64%	440
460										123%	109%	100%	92%	70%	460
480											119%	109%	100%	76%	480
550											156%	143%	131%	100%	550

To determine the resultant wattage on a voltage not shown in the chart above, use the following formula:

$$\text{Actual Wattage} = \frac{\text{Rated Wattage} \times (\text{Applied Voltage})^2}{(\text{Rated Voltage})^2}$$

CAUTION Applying higher than the actual rated voltage to heating elements will increase the watt density (watts/in.sq.), which can lead to premature heater failure and/or damage the material being heated.

Watt Density Calculations

Band Heaters

$$\text{Watts/In}^2 = \frac{\text{Wattage}}{(\text{Diameter} \times 3.1416 \times \text{Width}) - (\text{Cold Area})}$$

Mica Strip Heaters

$$\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times \text{Width}}$$

Cartridge and Tubular Heaters

$$\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Diameter} \times 3.1416 \times \text{Heated Length}}$$

Channel Strip Heaters

$$\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times 3.625}$$

Ohm's Law

Volts

$$\text{Volts} = \sqrt{\text{Watts} \times \text{Ohms}}$$

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

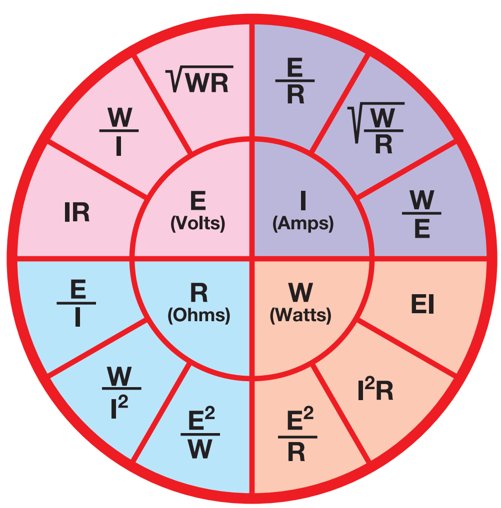
$$\text{Volts} = \text{Amperes} \times \text{Ohms}$$

Ohms

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

$$\text{Ohms} = \frac{\text{Watts}}{\text{Amperes}^2}$$

$$\text{Ohms} = \frac{\text{Volts}^2}{\text{Watts}}$$



Amperes

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

$$\text{Amperes} = \sqrt{\frac{\text{Watts}}{\text{Ohms}}}$$

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

Watts

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

$$\text{Watts} = \text{Amps}^2 \times \text{Ohms}$$

$$\text{Watts} = \frac{\text{Volts}^2}{\text{Ohms}}$$