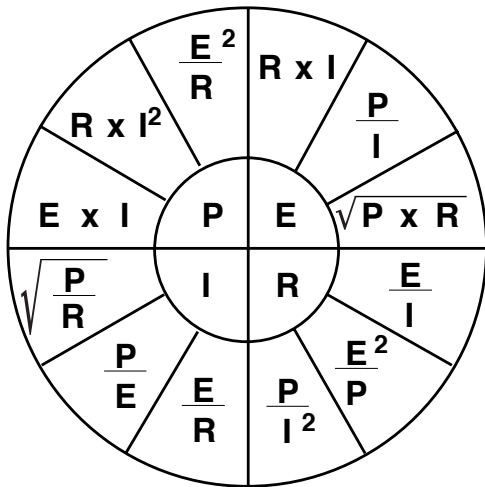


CHAPTER 1

ELECTRICAL FORMULAS

OHM'S LAW/POWER FORMULAS



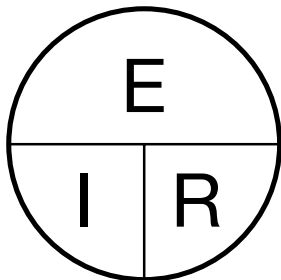
P = Power = Watts

R = Resistance = Ohms

I = Current = Amperes

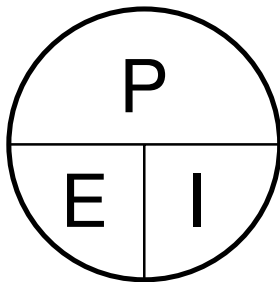
E = Force = Volts

OHM'S LAW DIAGRAM AND FORMULAS



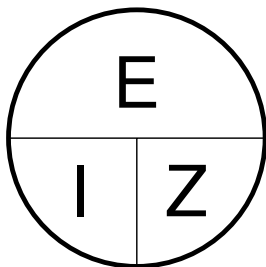
$$E = I \times R \quad \text{Voltage} = \text{Current} \times \text{Resistance}$$
$$I = E \div R \quad \text{Current} = \text{Voltage} \div \text{Resistance}$$
$$R = E \div I \quad \text{Resistance} = \text{Voltage} \div \text{Current}$$

POWER DIAGRAM AND FORMULAS



$$I = P \div E \quad \text{Current} = \text{Power} \div \text{Voltage}$$
$$E = P \div I \quad \text{Voltage} = \text{Power} \div \text{Current}$$
$$P = I \times E \quad \text{Power} = \text{Current} \times \text{Voltage}$$

OHM'S LAW AND IMPEDANCE



E = VOLTAGE (IN V)

I = CURRENT (IN A)

Z = IMPEDANCE (IN Ω)

$$E = I \times Z$$

$$I = \frac{E}{Z}$$

$$Z = \frac{E}{I}$$

Ohm's law and the power formula are limited to circuits in which electrical resistance is the only significant opposition to current flow including all DC circuits and AC circuits that do not contain a significant amount of inductance and/or capacitance. AC circuits that include inductance are any circuits that include a coil as the load such as motors, transformers, and solenoids. AC circuits that include capacitance are any circuits that include a capacitor(s).

In DC and AC circuits that do not contain a significant amount of inductance and /or capacitance, the opposition to current flow is resistance (R). In circuits that contain inductance (X_L) or capacitance (X_C), the opposition to the flow of current is reactance (X). In circuits that contain resistance (R) and reactance (X), the combined opposition to the flow of current is impedance (Z). Resistance and Impedance are both measured in Ohms.

Ohm's law is used in circuits that contain impedance, however, and Z is substituted for R in the formula. Z represents the total resistive force (resistance and reactance) opposing current flow.