



Electrical Formulas

To Find	Alternating Current		To Find	Alternating or Direct Current
	Single-Phase	Three-Phase		
Amperes when horsepower is known	$\frac{Hp \times 746}{E \times Eff \times pf}$	$\frac{Hp \times 746}{1.73 \times E \times Eff \times pf}$	Amperes when voltage and resistance is known	$\frac{E}{R}$
Amperes when kilowatts are known	$\frac{Kw \times 1000}{E \times pf}$	$\frac{Kw \times 1000}{1.73 \times E \times pf}$	Voltage when resistance and current is known	IR
Amperes when Kva are known	$\frac{Kva \times 1000}{E}$	$\frac{Kva \times 1000}{1.73 \times E}$	Resistance when voltage and current are known	$\frac{E}{I}$
Kilowatts	$\frac{I \times E \times pf}{1000}$	$\frac{1.73 \times I \times E \times pf}{1000}$	General Information (Approximation) *all values @ 100% load At 1800 rpm, a motor develops 36 lb. -In. per hp At 1200 rpm, a motor develops 54 lb. - In. per hp At 575 volts, a 3-phase motor draws 1 amp per hp At 460 volts, a 3-phase motor draws 1.25 amps per hp At 230 volts, a 3-phase motor draws 2.5 amps per hp At 230 volts, a single-phase motor draws 5 amps per hp At 115 volts, a single-phase motor draws 10 amps per hp	
Kva	$\frac{I \times E}{1000}$	$\frac{1.73 \times I \times E}{1000}$		
Horsepower = (Output)	$\frac{I \times E \times Eff \times pf}{746}$	$\frac{1.73 \times I \times E \times Eff \times pf}{746}$		
I = Amperes; E = Volts; Eff = Efficiency; pf = power factor Kva = Kilovolt; Kw = Kilowatts; R = Ohms (Resistance)				<u>Temperature Conversion:</u> Deg C = (Deg F - 32) X 5/9 Deg F = (Deg C X 9/5) + 32

Motor Amps @ Full Load*

HP	Alternating Current		DC	HP	Alternating Current		DC	HP	Alternating Current		DC	HP	Alternating Current		DC
	Single Phase	3-Phase			Single Phase	3-Phase			Single Phase	3-Phase			Single Phase	3-Phase	
	4.9	2.0	2.7	5	28	14.4	20	25	-	60	92	75	-	180	268
1	8.0	3.4	4.8	7	40	21.0	29	30	-	75	110	100	-	240	355
1	10.0	4.8	6.6	10	50	26.0	38	40	-	100	146	125	-	300	443
2	12.0	6.2	8.5	15	-	38.0	56	50	-	120	180	150	-	360	534
3	17.0	8.6	12.5	20	-	50.0	74	60	-	150	215	200	-	480	712

*Values are for all speeds and frequencies @ 230 volts.

Amperage other than 230 volts can be figured:

$$V = \frac{230 \times \text{Amp from Table}}{\text{New Voltage}}$$

Example:

For 60 hp, 3-phase @ 550 volts: $\frac{(230 \times 150)}{550} = 62$ amps.