Rockwell Automation
Allen-Bradley

AC Motor Formula

To Find Amperes when HP is known:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$I = \frac{746 * HP}{E * Eff * PF}$	$I = \frac{746 * HP}{2 * E * Eff * PF}$	$I = \frac{746 * HP}{1.73 * E * Eff * PF}$

To find Amperes when KW is known:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$I = \frac{1000 * KW}{E * PF}$	$I = \frac{1000 * KW}{2 * E * PF}$	$I = \frac{1000 * KW}{1.73 * E * PF}$

To find Amperes when KVA is known:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$I = \frac{1000 * KVA}{E}$	$I = \frac{1000 * KVA}{2 * E}$	$I = \frac{1000 * KVA}{1.73 * E}$

To find Kilowatts Input:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$KW = \frac{E * I * PF}{1000}$	$KW = \frac{2 * E * I * PF}{1000}$	$KW = \frac{1.73 * E * I * PF}{1000}$

To find Kilovolt Amperes:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$KVA = \frac{E * I}{1000}$	$KVA = \frac{2 * E * I}{1000}$	$KVA = \frac{1.73 * E * I}{1000}$

To find Horsepower Output:

Single Phase	Two Phase - *(4 - wire)	Three Phase
$HP = \frac{E * I * Eff * PF}{746}$	$HP = \frac{2 * E * I * Eff * PF}{746}$	$HP = \frac{1.73 * E * I * Eff * PF}{746}$

* For two phase three wire balanced circuits, the Amperes in common cunductor = 1.41 times that in either of the two.

Synchronous Speed:

$$n_s = \frac{120 * f}{P}$$

Frequency:

$$f = \frac{P * n_s}{120}$$

Number of poles:

$$P = \frac{120 * f}{n_s}$$

Relation between horsepower, torque and speed:

$$HP = \frac{T * n}{5250}$$

$$T = \frac{5250 HP}{n}$$

$$n = \frac{5250 HP}{T}$$

Motor Slip:

$$\% Slip = \frac{n_s - n}{n_s} * 100$$