TESLA

MOTORS & DRIVES

FORMULAS FOR ELECTRIC MOTORS

TO FIND	DIRECT CURRENT	SINGLE PHASE	THREE PHASE
Horsepower	$\frac{E \times I \times EFF}{746}$	$\frac{E \times I \times EFF \times PF}{746}$	$\frac{1.732 \times E \times EFF \times PF}{746}$
Current	$\frac{746 \times hp}{E \times EFF}$	$\frac{746 \times hp}{E \times EFF \times PF}$	$\frac{746 \times hp}{1.732 \times E \times EFF \times PF}$
Efficiency	$\frac{746 \times hp}{E \times I}$	$\frac{746 \times hp}{E \times I \times PF}$	$\frac{746 \times hp}{1.732 \times E \times I \times PF}$
Power Factor		$\frac{\text{Input watts}}{E \times I}$	$\frac{\text{Input watts}}{1.732 \times E \times I}$

E = Volts
EFF = Efficiency (decimal)
hp = Horsepower
I = Amperes
PF= Power factor (decimal)

FORMULAS FOR ELECTRICAL CIRCUITS

TO FIND	DIRECT CURRENT	SINGLE PHASE	THREE PHASE
Amperes	$\frac{\text{Watts}}{\text{Volts}}$	$\frac{\text{Watts}}{\text{Volts x power factor}}$	$\frac{\text{Watts}}{1.732 \times \text{Volts} \times \text{Power factor}}$
Volt-Amperes		Volts x Amperes	1.732 x Volts x Amperes
Watts	Volts x Amperes	$\frac{\text{Volts x Amperes x}}{\text{Power factor}}$	$\frac{1.732 \times \text{Volts} \times \text{Amperes x}}{\text{Power factor}}$

OHMS LAW	CAPACITANCE IN MICROFARADS AT 60 HZ	
Ohms = Volts/Amperes (R = E/I) Amperes = Volts/Ohms(I=E/R) Volts=Amperes x Ohms (E=IR)	Capacitance =	$\frac{2650 \times \text{Amperes}}{\text{Volts}}$
	Capacitance =	$\frac{2.65 \times \text{kVAR}}{(\text{Volts})^2}$

TESLA
MOTORS & DRIVES

MOTOR APPLICATION FORMULAS OUTPUT

$$\text{Horsepower} = \frac{\text{Torque (lb} \cdot \text{ft)} \times \text{rpm}}{5252} \qquad \text{Kilowatts} = \frac{\text{Torque (N} \cdot \text{m)} \times \text{rpm}}{9550}$$

$$\text{Torque(lb} \cdot \text{ft)} = \frac{\text{Horsepower} \times 5252}{\text{rpm}} \qquad \text{Torque (N} \cdot \text{m)} = \frac{\text{Kilowatts} \times 9550}{\text{rpm}}$$

For approximation, use:
Full-load torque = 1.5 ft · lb per hp per pole pair at 60 Hz
Full-load torque = 3.2 N · m per kilowatt per pole pair at 50 Hz

SPEED-AC MACHINER

$$\text{Synchronous rpm} = \frac{120 \times \text{Frequency (Hz)}}{\text{Number of poles}}$$

$$\text{Percent slip} = \frac{\text{Synchronous rpm-full-load rpm}}{\text{Synchronous rpm}} \times 100$$