

DATA SHEET FOR ENGINEERS GENERAL INFORMATION FOR ELECTRIC MOTORS

1. BRAKE HORSE POWER OF ELECTRIC MOTORS

$$1 \text{ b.h.p.} = 0.746 \text{ kW} \quad 1 \text{ kWh} = 3.6 \text{ M} = 3413 \text{ BTU}$$

$$= 860 \text{ kcal}$$

$$\text{Single phase b.h.p.} = \frac{E \times I \times n \times \text{pf}}{746 \times 100}$$

$$\text{Two phase b.h.p.} = \frac{E \times I \times n \times \text{pf} \times 2}{746 \times 100}$$

$$\text{Three phase b.h.p.} = \frac{E \times I \times n \times \text{pf} \times 1.732}{746 \times 100}$$

$$\text{D.C. b.h.p.} = \frac{E \times I \times n}{746 \times 100}$$

Where

E = Voltage
n = Percentage efficiency of motor
I = Current in amperes
pf = Power factor

2. A.C. MOTOR SPEEDS

$$\text{Synchronous speed of AC motors in RPM} = \frac{\text{Frequency} \times 2 \times 60}{\text{Number of poles}}$$

Actual speeds of 3 phase induction motors will be 3 to 5% less at full load depending on the slip, which varies with size and characteristics of the motor.

Type of Motor	Type of Starter	Rotor Winding			
		Ordinary		High Torque	
		Starting Torque Full Load	Current X Full Load	Starting Torque X Full Load	Current X Full Load
Squirrel Cage	Direct on Line	1.0-1.75	5.0-7.5	1.5-2.5	4.0-5.5
	Star Delta	0.33-0.58	1.7-2.5	0.5-0.83	1.3-1.8
	Autotransformer				
	50% tap	0.25-0.45	1.25-1.88	0.37-0.62	1.0-1.37
	60% tap	0.36-0.63	1.8-2.7	0.54-0.87	1.45-2.0
	75% tap	0.56-0.98	2.8-4.2	0.84-1.4	2.24-3.1
Slip Ring Commutator	Rotor Resistance	1.0-2.0	1.25-2.5	-	-
	Direct on Line	1.25-1.75	About 1.5	-	-

3. STARTING TORQUES AND CURRENT FOR INDUCTION MOTORS

4. POWER FACTOR IMPROVEMENT

Capacitors are often connected across low power-factor loads to decrease the current drawn from the supply mains by reducing Wattless current.

The figures given below multiplied by kiloWatt input give the kVA of capacitance required to improve one power-factor to another.

Original Power Factor	Desired Power Factor			
	1.0	0.95	0.90	0.80
0.55	1.518	1.189	1.034	0.763
0.60	1.333	1.004	0.849	0.583
0.65	1.169	0.840	0.685	0.419
0.70	1.020	0.691	0.536	0.270
0.75	0.882	0.553	0.398	0.132
0.80	0.750	0.421	0.266	
0.85	0.484	0.291	0.136	
0.90	0.328	0.155		