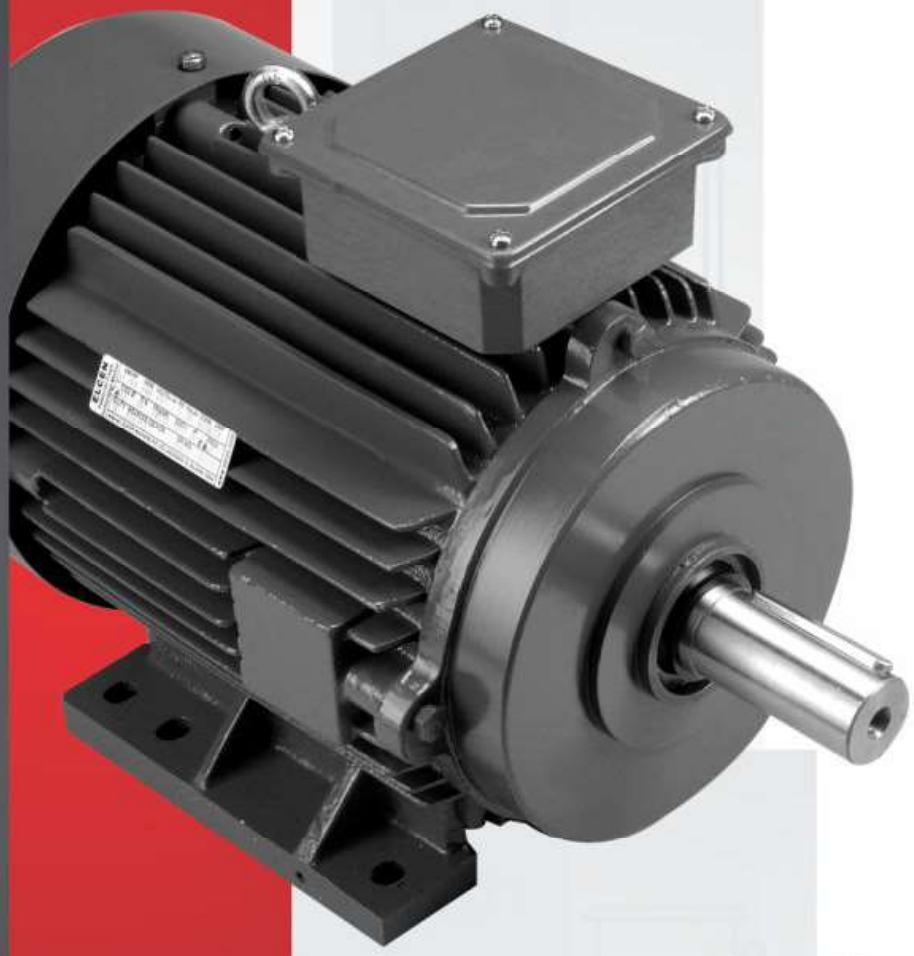
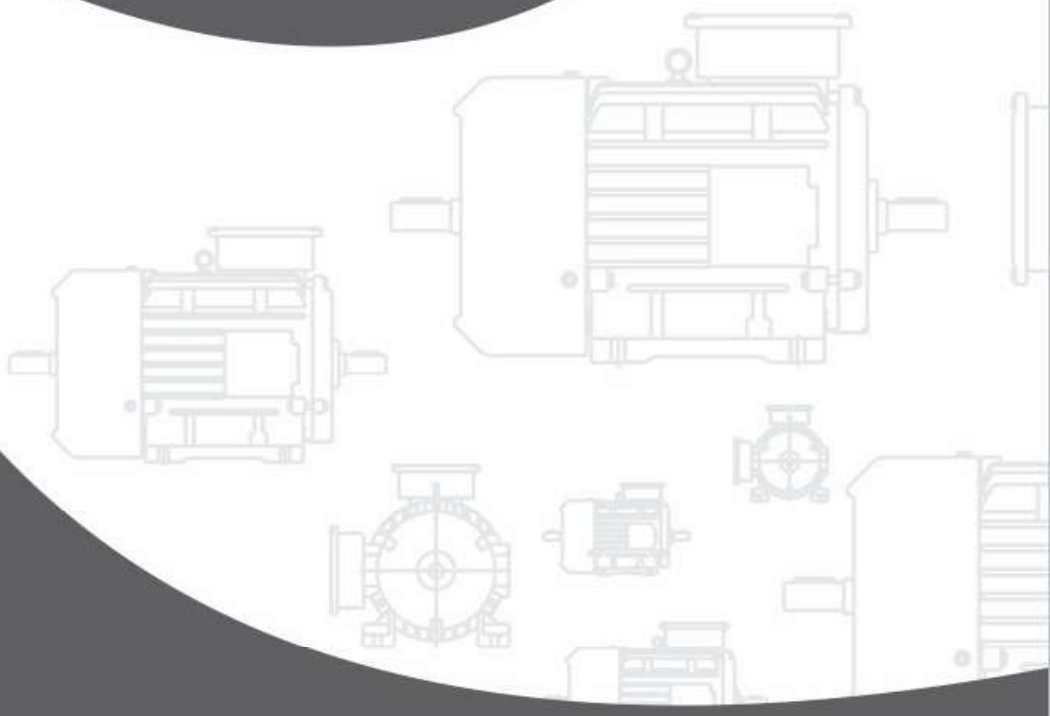
ELCEN

EFFICIENT SOLUTION FOR PRIME MOVERS



what is INSIDE



ELCEN

WHO WE ARE...

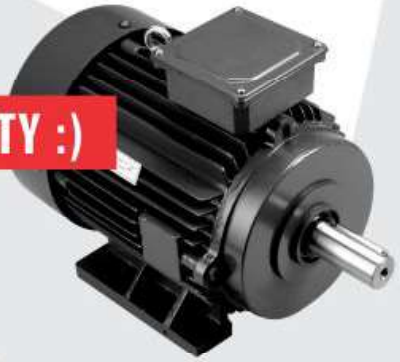
Elcen Machines P Ltd is a private company established in 1973 to manufacture Electric Motors under ËLCEN" BRAND. Since inception, the company has excelled in manufacturing and sales of Squirrel Cage Induction Electric Motors, having standard as well as custom built motors. "ELCEN" provides custom built Prime Mover Solutions with timely deliveries, with the best quality. Optimum performance of products keeping in view the customer's economically attractive quantities and product cost.

Elcen Machines Pvt. Ltd. An ISO:9001-2008 Certified company and the products manufactured are CE certified By DNV, caters to different industrial segments like Power Generation (Wind Turbine as well), Power Distribution, Machines Tools, Pharmaceutical Machinery, Plastic Processing Machinery, Chemical, Foundry Equipment's, Textile Machinery, Material Handling Equipment's, Food Processing Equipment's and Many more.

"ELCEN " motors are backed not only by energetic, motivated and inspiring team members but also with a common goal to produce quality motors and provide after sales service to customer satisfaction.

"ELCEN" has earned the trust and reputation in India and abroad by winning the customer's confidence. Lakhs of motors have been manufactured and are in operation in India and abroad. The Titans of Indian Industry & consultant/ Specifiers are now referring ELCEN Motors for most critical and specific application.

INNOVATION WITH FLEXIBILITY :)



IS-12615-2011
CM/L-7200112889
CE
QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2008

About ELCEN MACHINES

ELCEN is a well-known brand synonymous with the latest technology and high quality motors. We have acquired this recognition over the past 3 decades through consistent efforts.

LARGE CAPACITY

Today, our plant at Vadodara, GUJARAT is one of the leading LT motor manufacturing Company in India capable of producing 3000 induction motors /products every month. We are probably the most well-known motor company in India offering customized solutions, with more than 1000 products developed for specific applications.

CUSTOMIZED SOLUTIONS

Thanks to our customer orientation, capabilities in design, development and flexible manufacturing processes, development of non-standard motors for specific applications comes easy to us . We have experience in offering such motors in large quantities and consistent quality levels.

why ELCEN MACHINES ?

On Demand deliveries, Assured consistent quality, Pan-India network, Best-in-class technology, Unflienching after sales service, Ready to respond team, Best suited development, Lower LCC (Life cycle cost), Discerning client profile & Globally acclaimed brand.

ELCEN

LOW COST OF OWNERSHIP

ELCEN motors is the first choice of several leading Original Equipment Manufacturers and Engineering Projects Contracting companies. We are preferred for competitive prices, quick delivery periods, low running costs and with almost nil maintenance costs. ELCEN motors have proved its worth through the recognition of the "lowest cost of ownership"

EXCELLENT QUALITY

The quality and reliability of our motors is a culmination of multiple efforts which include global technology assimilation, in-house developments, use of latest manufacturing machines , adoption of world-class manufacturing practices and state-of-the-art testing equipment.

ENVIRONMENTALLY - FRIENDLY

ELCEN is an environmentally-friendly Co. for two principal reasons. One, we manufacture highly energy efficient motors which consume less energy. Two, during the process of manufacturing, we consistently work towards reduction of our carbon footprint by consciously enhancing our reliance on green energy and adapting energy efficient processes.

WIDE RANGE OF SOLUTIONS

ELCEN offers several types of LT motors up to 225M frame size (up to 60 HP). They include standard induction motors, gear motors, brake motors, energy-efficient motors, encoder motors and different combinations thereof.

SERVICE ASSURED

ELCEN motors come with an efficient post sales service assurance. With 10service center available in 10 cities in India , for major service we have 5 service engineers who provide services all over in India. ELCEN service is not far away when you need it and is available 24 X 7 round the year. The qualified and experienced team ensures quick response and turn-around resulting in low downtimes. Over the years ELCEN has become one of the most trusted brands for several leading manufacturing companies in India and abroad.

PRODUCT RANGE

Improved Efficiency Three Phase Motors (IE1)

Frames	63 to 225M
Rating	0.18 kW to 45 kW
Poles	2, 4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC

*for export only

IE 2 Energy Efficient Motors

Frames	63 to 200L
Rating	0.18 kW to 25 kW
Poles	2,4 & 6
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC

Brake Motors

Frames	63 to 200L
Rating	0.18 kW to 37 kW
Poles	2, 4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP54
Enclosure	TEFC
Brake Torque	Up to 250 nm

Dual Speed Motors

Frames	71 to 180L
Rating	0.18 to 18.5 kW
Poles	2/4, 4/6, 4/8 & 6/8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC
Type	Dual Winding - Dual Speed
	Single Winding - Dual Speed

Dual Voltage Motors

Frames	63 to 225M
Rating	0.18 kW to 45 kW
Poles	2, 4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC

Inverted Rated Motors

Frames	63 to 225M
Rating	0.18 kW to 45 kW
Poles	2, 4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC & TEFFC
Operating Frequence	10 to 200Hz

Cooling Tower Motors

Frames	71 to 225M
Rating	0.37 to 45 kW
Poles	4, 6, 8, 10 & 12
Mountings	B3 & B5
Protection	IP55
Enclosure	Totally Enclosed

Torque Motors

Frames	63 to 160L
Rating	0.055 to 3.75 kW
Poles	4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC & TEFFC

Crane Motors

Frames	71 to 200L
Rating	0.18 to 37.0 kW
Poles	4, 6 & 8
Mountings	B3, B5, B14 & Combi.
Protection	IP55
Enclosure	TEFC
Starts/hour	60, 150, 300 Nos.

ELCEN

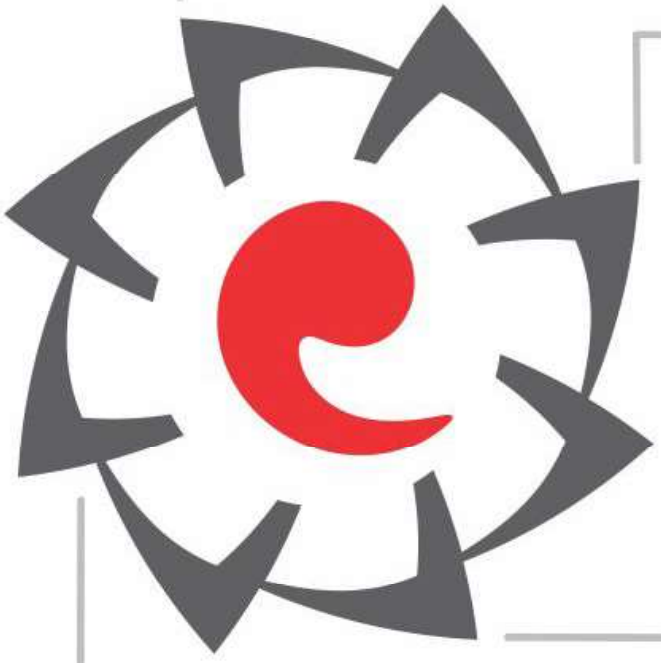
Core Value

INTEGRITY - We do the right thing.

COMMITMENT - We keep our word.

RESPECT - We value people.

EXCELLENCE - We give our best.



Core Purpose

Strive constantly to conserve energy by enhancing efficiency of solution delivered by us. There by contribute to the cause of cleaner, Greener world generation to come.

Mission

Making India proud by becoming largest contributor of producing energy efficient solution with customization

Vision

Provide Solutions for Energy Efficiency which can give product longer life & easy to maintain

APPLICABLE STANDARDS

"ELCEN" motors pass through stringent quality controls to meet the requirements of National and International Standards

INTERNATIONAL STANDARDS

EQUIVALENT EUROPEAN STANDARDS	TITLE
	Safety of machinery – Electrical equipment of machines
EN 60204-1	Part 1: General Requirements
EN 60034-1	Three phase induction motor – Specifications
EN 60034-1	Type of duty & classes of rating assigned to rotating electrical machines
EN 60034-2	Method of determination of efficiency rotating electrical machines
EN 60034-5	Degree of protection provided by enclosure for rotating electrical machinery
EN 60034-6	Designation of methods of cooling of rotating electrical machinery
	Designation for types of construction & mounting arrangement of
EN 60034-7	Rotating electrical machines
EN 60034-8	Terminal marking & direction of rotation of rotating electrical machinery
EN 60034-9	Permissible limits of noise levels for rotating electrical machines
	Mechanical vibration of rotating electrical machines with shaft height
EN 60034-14	56 mm & higher – Measurements, evaluation & limits of vibration severity
EN 60034-1	Temperature Rise Measurement of rotating Electrical Machines
EN 60072-1	Dimensions of foot mounted induction motors
EN 60072-1	Dimensions of flange mounted induction motors
EN 60034-18	Thermal evaluation and classification of electrical insulation

INDIAN STANDARDS

EQUIVALENT EUROPEAN STANDARDS	TITLE
IS : 900	Code of practice for installation and maintenance of induction motors.
IS : 1231	Dimensions of Foot mounted A.C. induction motors.
IS : 2223	Dimensions of Flange mounted A.C. Induction motors.
IS : 4029	Guide for testing three phase Induction motors.
IS : 4691	Degree of protection provided by Enclosures for Rotating Electrical Machinery.
IS : 6362	Designation of Methods of noise level for Rotating Electrical machines.
IS : 12065	Permissible limits of noise level for Rotating Electrical Machines.
IS : 12075	Mechanical Vibration of Rotating Electrical machines.
IS : 12615	Energy Efficient Induction Motors – Three phase Squirrel Cage.

MECHANICAL FEATURES

STANDARD FEATURES

Body : 63 to 100L Motor frames are available in cast iron as well as aluminum constructions. 112M to 225M Motors Frames are in cast iron constructions only.

End Covers : All end covers and flanges are with integrated bearing housings and of Cast Iron construction.

Terminal Box : Terminal boxes from 63 to 132M frames are of aluminum or Cast Iron construction with Aluminum pressure die cast terminal box with covers. All other frames are with Cast Iron construction with cast iron terminal box covers.

Cable Entry : Except 80 frame are aluminum constructions, all terminal box can be rotated in step of 90 Degree and are provided Metric threads for cable gland. Other threads like PG, B.S. Condute can be provided.

Shaft : Shafts are manufactured with of EN 8 steel with a taping in the center to secure pulley or similar types of mountings. Shafts with special diameter and length, with specified shaft material can be manufactured.

Bearings : Single Row Deep Groove Ball Bearings of internationals brands like SKF, TATA, FAG are used on driving end as well as no riving ends.

Lubrication : "ELCEN" motors are fitted High Temperature grease of Lithium Complex soap type, NLGI 2 no, in the bearings, for optimum performance and longer bearings life. (Castrol LCG-2) for high temperature H class insulation motor with molykott-41 high temperature grease in Bearings

Sealing : "ELCEN" motors are fitted with "V" rings for protection at the shaft and the rubber gaskets at terminal box and terminal cover. Oil seals can be provided instead of "V" rings on the shaft on request.

Mountings : Standard motors are available with either B3-Foot mounting, B5-Flange mounting. Special mountings can be manufactured suitable to customer's requirements.

Noise Levels : "ELCEN" motors are designed and manufactured to perform silently. The noise levels are within the limits as per EN 60034-9

Balancing and Vibration : All rotating parts, mainly rotor with shaft are dynamically balanced to grade 2.5 for smooth running. However precession grade 1.0 can also be offered if required. Vibration levels of "ELCEN" motor are within the limits as per EN 60034-14.

APPLICABLE STANDARDS

TERMINAL BOX DATA

Frame Size	Cable Entry Size	Max. Cu. Cable Size DOL starting	Max. Cu. Cable Size Star-Delta starting	Terminal Stud size
56-71	1 x 3/4"	3C x 2.5mm^2	-	M4
80-90	1 x 3/4"	3C x 4mm^2	-	M4
100-132	2 x 1"	3C x 10mm^2	2 x 3C x 10mm^2	M5
160-180	2 x 1"	3C x 35mm^2	2 x 3C x 25mm^2	M6
200-250	2 x 2", 1 x 3/4"	3C x 120mm^2	2 x 3C x 70mm^2	M8
280-315	2 x 2"	3C x 240mm^2	2 x 3C x 150mm^2	M12
355	2 x 3", 2 x 1"	3C x 400mm^2	2 x 3C x 300mm^2	M16

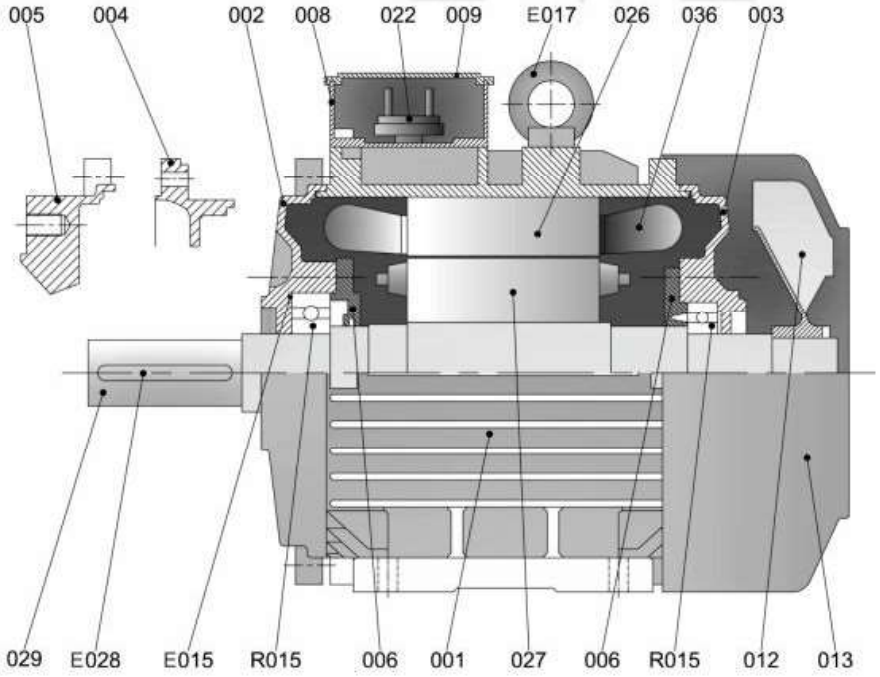
Equivalent matric & Pg threadings can also be provided on request.

EFFECT OF VARIATION VOLTAGE AND FREQUENCY ON MOTOR PERFORMANCE

Characteristics	Voltage		Frequency	
	110%	90%	105%	95%
Torque Starting & Maximum	Increase 21%	Decrease 19%	Decrease 10%	Increase 11%
Speed				
Synchronous	No Change	No Change	Increase 5%	Decrease 5%
Full Load	Increase 1%	Decrease 1.5%	Increase 5%	Decrease 5%
Current				
No Load	Increase 10-15%	Decrease 10-12%	Decrease 5-6%	Increase 5-6%
Starting	Increase 10-12%	Decrease 10-12%	Decrease 5-6%	Increase 5-6%
Full Load	Decrease 7%	Increase 11%	Slight Decrease	Slight Decrease
Temp Rise	Decrease 3-4°C	Increase 6-7°C	Slight Decrease	Slight Decrease
Over Load Capacity	Increase 21%	Decrease 19%	Slight Decrease	Slight Decrease
MAG Noise	Slight Increase	Slight Decrease	Slight Decrease	Slight Increase
Efficiency				
Full Load	Increase 0.5-1%	Decrease 2%	Slight Increase	Slight Decrease
Power Factor				
Full Load	Decrease 3%	Increase 1%	Slight Increase	Slight Decrease

BEARING ARRANGEMENT

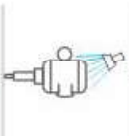
Frame Size	B3		B5		B14		B35		B34		Brake
	DE	NDE	DE	NDE	DE	NDE	DE	NDE	DE	NDE	NDE
63	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ	6201ZZ
71	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6202ZZ	6203ZZ
80	6204ZZ	6203ZZ	6204ZZ	6203ZZ	6204ZZ	6203ZZ	6204ZZ	6203ZZ	6204ZZ	6203ZZ	6204ZZ
90S	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ
90L	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ	6204ZZ	6205ZZ
100L	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ	6206ZZ
112M	6306ZZ	6206ZZ	6306ZZ	6206ZZ	6306ZZ	6206ZZ	6306ZZ	6206ZZ	6306ZZ	6206ZZ	6206ZZ
132S	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6208ZZ
132M	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6308ZZ	6208ZZ	6208ZZ
160M	6309	6309	6310	6309	-	-	6310	6309	6310	6309	6309
160L	6310	6309	6310	6309	-	-	6310	6309	6310	6309	6309
180L	6310	6310	6311	6310	-	-	6311	6310	6311	6310	6310
180M	6310	6310	6311	6310	-	-	6311	6310	6311	6310	6310
200L	6313	6313	6314	6313	-	-	6314	6313	6314	6313	6313
225M	6313	6313	6314	6313	-	-	6314	6313	6314	6313	6313



001 - Stator body
002 - Endshield DE B3
003 - Endshield NDE
004 - Endshield DE B5
005 - Endshield DE B14
006 - Bearing cover DE
006 - Bearing cover NDE
008 - Terminal box
009 - Terminal box cover
012 - Fan
013 - Fan cover
E015 - Wavy washer
R015 - Bearing DE
R015 - Bearing NDE
E017 - Eye bolt
022 - Terminal block
026 - Stator packet
027 - Rotor packet
036 - Stator winding
E028 - Shaft Key
029 - Shaft

DEGREE OF PROTECTION

The degree of protection as classified in IS 4691 is given below. It is denoted by two digit. The first digit denotes protection against solied bodies or particles and the second digit denotes protection against liquid. All our standard TEFC motor have degree of protection IP 55, unless otherwise specified.

	Second Characteristic							
First Characteristic Numeral		No Protection	Water falling up vertical shall not harm	Water falling up to 15° form vertical shall not harm	Water falling up to 60° form vertical shall not harm	Water splashes shall not harm	Water Projected by nozzle shall not harm	Water from heavy seas shall not harm
		0	1	2	3	4	5	6
0	No Protection							
1	Special Protection against bodies 50 mm dia.							
2	DP protection against bodies 12 mm dia.		IP 21	IP 22	IP 23			
4	TEFC Protection against bodies 1mm dia.					IP 44		
5	TEFC Protection against powder					IP 54	IP 55	IP 56

APPLICABLE STANDARDS

PERMISSIBLE RADIAL LOAD

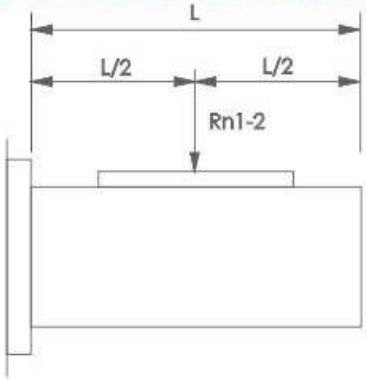
The Output Shaft of the motors can be subject to Radial Loads which depends on the type and size of pulley/pinion and also type of driven machine.

The extent of which can be calculated with the following formula.

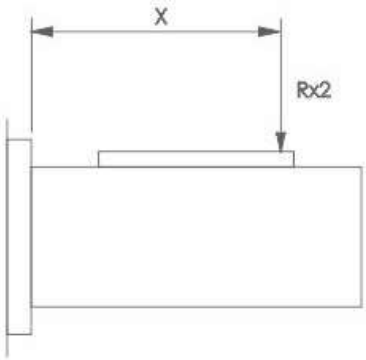
$$R = \frac{p \times 973 \times kW}{RPM \times D/2} + Wt$$

Where
- R = Redial Lead
- p = 1, for chain
- p = 1.25 for grear
- p = 1.5 - 2.5 for v-beat
- kW = output of the motor in kW
- RPM = RPM of the motor
- D = diameter of the pulley / sprocket / gear in mm
- W = weight of the pulley / sprocket / gear.

DEPENDING ON THE APPLICATION THERE MUST BE TWO CASES FOR RADIAL LOADS.



Load applied on shaft at Mid-Point as shown above



Load applied at X distance from shaft shoulder as shown above

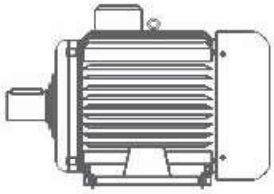
For radial loads other than those recommended in the Table below customers are advised to consult Elcen machines Pvt. Ltd. For maximum allowable loads.

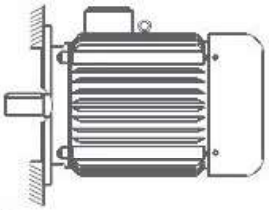
FRAME SIZE	SYNCHRONOUS RPM & RADIAL LOAD IN KG.				PERMISSIBLE AXIAL LOAN IN kg	RECOMMENDED PULLY SIZE DIA X WIDTH (D X W) IN mm
	3000 (3600)	1500 (1800)	1000 (1200)	750 (900)		
63	30	30	30	30	10	10
71	25	35	35	35	12	12
80	50	60	60	60	20	20
90	55	55	65	75	25	25
100	70	80	80	100	35	35
112	95	110	110	110	40	40
132	150	175	200	210	50	50
160	260	300	325	350	70	70
180	325	350	400	400	80	80
200	425	500	575	575	100	100
225	450	600	650	650	100	100

INSTALLATION POSITIONS

Different applications demand different installation positions. It is always better to keep to keep in mind the installation position and the type of load while selecting the motor. However be construction and general arrangement of motors remains same for almost all installation positions.

MOTOR INSTALLATION POSITIONS


B3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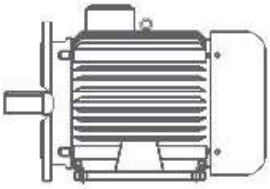
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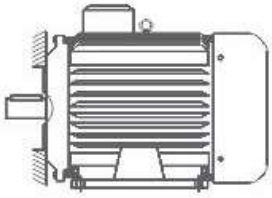
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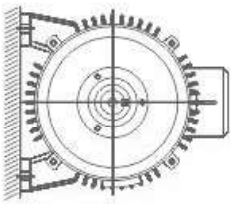
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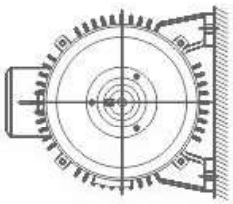
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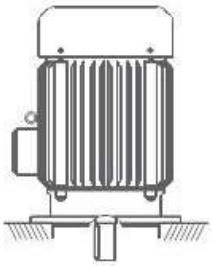
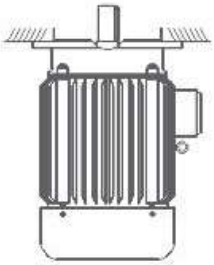
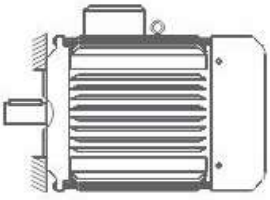

V1


V3


B8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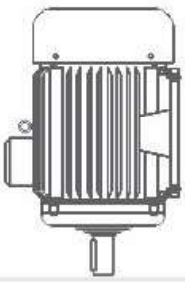
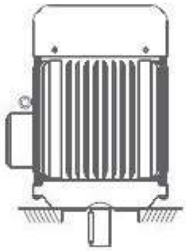
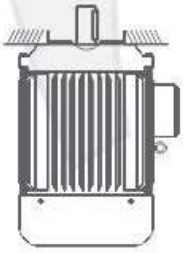

V5


V6


V18


V19

APPLICABLE STANDARDS

SELECTION OF MOTORS

The kilowatt requirement of the motor can be obtained by the following formula

1. For horizontal motion

$$PL = \frac{F \times V}{102 \times L}$$

Where:

PL = Kilowatt required

F = Max total load in kg

V = Hoisting speed in Mtrs / Second

L = O/A eff. Of the driving unit:

2. For rotary motion

$$PL = \frac{M \times N}{974 \times Eff.}$$

Where:

M = Torque for movement in kgm

N = Motor speed in RPM

Ensure the rated output of motor is greater than the power PL

TOLERANCE ON DIMENSIONS

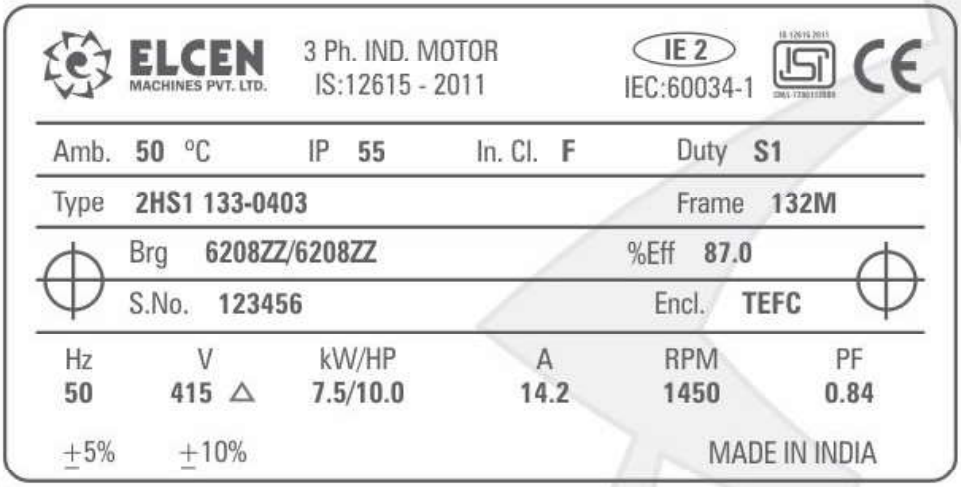
Dimension	Tolerances
Frame Size H ≤ 250	0, - 0.5 mm
≥ 280	0, - 0.5 mm
Diameter D of Shaft extension:	
• 11 to 28 mm	j6
• 32 to 48 mm	K6
• 55mm and over	m6
Diameter N of Shaft spigot:	
Up to F 500 B	j6
Above F 500 B	js6
Key Width	h9
Width of driveshaft keyway (keying)	N9
Key depth:	
• Square section	h9
• Rectangular section	h11

Dimension	Tolerances
Eccentricity of shaft in flanged motors (Standard class):	
D ≤ 10 mm	0.030 mm
10 mm < D ≤ 18 mm	0.035 mm
18 mm < D ≤ 30 mm	0.040 mm
30 mm < D ≤ 50 mm	0.050 mm
50 mm < D ≤ 80 mm	0.060 mm
80 mm < D ≤ 120 mm	0.070 mm
Concentricity of spigot diameter and perpendicularity of mating surface of flange to shaft (standard class)	
Flange:	
F65 to F115	0.080 mm
F130 to F265	0.100 mm
F300 to F500	0.125 mm
F600 to F740	0.160 mm
F940 to F1080	0.200 mm

TOLERANCE ON PERFORMANCE PARAMETERS

Performance Parameter	Tolerances
Efficiency (η):	
a) By summation of losses:	
I) Motors P ≥ 50 kW	- 15% (1-η)
II) Motors P > 50 kW	- 10% (1-η)
b) by input P - output test	- 15% (1-η)
Total losses applicable to motors P> 50 kW	+10% of total losses
Power factor (Cos Ø)	- 1/6 of (1-Cos Ø); min 0.02, max 0.07
Slip at full load and at working temperature :	
a) For machines having output 1 kW (or kVA) or more:	±20% of the guaranteed slip
b) For machines having output less than 1 kW (or kVA):	±30% of the guaranteed slip
Breakaway starting current (Ist) with the Specified starting method/apparatus	+20% of the guaranteed starting current (no negative tolerance)
Breakaway Torque (Tst)	-15% to +25% of the guaranteed torque (+ 25% may be exceeded by agreement between manufacturer & Purchaser)
Pullout Torque (Tpo)	-10% of the guaranteed torque except that after allowing for this tolerance, the torque shall not be less than 1.6 or 1.5 times the rated torque
Moment of interia or stored energy constant for motors above 315 frame	+10% of the guaranteed value

RATING PLATE



ELECTRICAL FEATURES

The various operating cycle of driven machines can be classified into nine basic duties, ranging from S1 to S9 separately indicated in the following pages. Suitable motors can be offered to match the duty cycle of the driven machines.

CLASSES OF DUTY

The following are the duty types:

Duty	Type	Description	Application
S1	Continuous duty	Operation at constant load of sufficient duration for thermal equilibrium to be reached. These are our Standard Motors.	Pumps, Blowers, Fan Compressors
S2	Short time duty	Operation at constant load during a given time, less than that required to reach thermal equilibrium, followed by a rest of sufficient duration to re-establish equality of temperature with the cooling medium. The recommended values for the short-time duty are 10, 30, 60 and 90 minutes. These motors are generally suitable for valve Actuators, Mixers etc.	Operation of gates of dams, siren, Capstan
S3	Intermittent periodic duty	A sequence of identical duty cycles, each consisting of a period of operation at constant load and a rest periods being too short to attain thermal equilibrium during one duty cycle. In the duty type, the starting current does not significantly affect the temperature-rise. Unless otherwise specified, the duration of the duty cycle is 10 minutes. The recommended values for the load factor are 15, 25, 40 and 60 percent. These motors also come in Crane Duty Applications and the Duty Cycle is designated as S3 – 40%, S3 – 60%. The No of Starts is also less; either 45 or 60 Starts / hour	Valve actuators, Wire drawing machines
S4	Intermittent periodic duty with starting	A sequence of identical duty cycles each consisting of a period of starting, a period of operation at constant load and a rest period, the operating and rest and de-energized being too short to attain thermal equilibrium during one duty cycle. In this duty the stopping of the motor is obtained either by natural deceleration after disconnection of the electricity supply or by means of braking such as mechanical brake which does not cause additional heating of the windings. These are generally suitable for Crane Duty/Lift Duty Applications where Moment of Inertia of the load is maximum equal to Moment of Inertia of the Motor. Either one has to offer these motors in higher frame size or with extra Active material and with LM6 Rotors or a MS Rotor or a MS Rotor, to reduce the Starting Losses. The Duty Designation is mentioned as S4 – 60% CDF, 150 Starts / hr etc.	Hoist, Cranes, Lifts
S5	Intermittent periodic duty with starting and braking	A sequence identical duty cycles each consisting of a period of starting, a period of operation at constant load, a period of braking and a rest period. The operating and de-energized periods being too short to obtain thermal equilibrium during one duty cycle. In this duty braking is rapid and is carried out electrically. These are motors where generally Braking is done through Electromagnetic DC Brakes as normal Brake Motors or by Injection of DC Voltage in the Rotor. Since the Braking is done electrically, the Braking Losses are also added to the Starting Losses, thus making this Duty most stringent and heavy. The Duty Designation is mentioned as S5 – 60% CDF, 300 Starts / hr etc. Either one has to offer these motors in higher frame size or with extra Active material and with LM6 Rotor or a MS Rotor, to reduce the Starting Losses.	Hoist, Cranes, Rolling Mills
S6	Continuous duty with intermittent periodic loading	A sequence of identical duty cycles each consisting of a period of operation at constant load and a period of operation at no-load, machines with excited windings having normal no-load rated voltage excitation. The operation and no-load periods are too short to attain thermal equilibrium during one duty cycle. Unless otherwise specified the duration of the duty cycle is 10 minutes.	Conveyors, Machines Tools

Duty	Type	Description	Application
		The recommended values of cyclic duration factor are 15, 25, 40 and 60 percent. This Duty is different from S2 duty, as in S2 Duty there is a period of rest after the On-Load operation. Normal S1 duty motors are suitable to operate on S6 Duty provided the Load Inertia is maximum equal to Motor Inertia is maximum equal to Motor Inertia	
S7	Continuous duty with starting and braking	A sequence of identical duty cycles each consisting of a period of starting, a period of operation at constant load and a period of electrical braking. There is no rest and de-energized period. This is also a very stringent duty Application similar to S5 Duty Motors, except in this case there is no rest period. These motors may be used for Balancing Machines, Tapping Applications. Either one has to offer these motors in higher frame size or with extra Active material and with LM6 Rotor or a MS Rotor, to reduce the Starting Losses.	Machine Tools
	Continuous duty with periodic speed charges	A sequence of identical duty cycles each consisting of a period of operation at constant load corresponding to a determined speed of rotation, followed immediately by a period of operation at another load corresponding to a different speed of rotation (carried out, for example, by means of change of the number of poles in the case of induction motors), the operating periods being too short to attain equilibrium during one duty cycle. There is no rest and de-energized period. These motors are always Multi-speed Motors e.g. 4P/2P, 8P/4P, 6P/4P etc. Here the Speed change is done by Pole Changing method. This is achieved by connecting the Motor terminals in two different ways to achieve 2 different speeds.	Special applications where the motor is required to run at different speeds and different loads
S8	Duty with non-periodic load and speed variations	A duty in which generally load and speed are varying non-periodically within the permissible operating range. This duty includes frequently applied overloads that may greatly exceed the full loads. For this loads. For this duty type, suitable load values should be taken as the basis of the overload concept.	Special applications where the motor is required to run at different speeds and different loads

DESIGNATION

A duty type is designated by mean of the abbreviation given below. For the duty type S2 the abbreviation is followed an indication if the duration of the duty. For duty type S3 and S6 the abbreviations are followed by an indication of the cyclic duration factor.

Examples: S2 60 minutes S3 25 percent S6 40 percent

For the duty types S4 and S5 the abbreviation are followed by the indication of the cyclic duration factor, the number of duty cycles per hour (c/h) and the factor of inertia (FI)

Example: S4 25 percent 120 Starts / hr Load factor =2 (Load Factor = Load Inertia / Motor Inertia)

For the duty type S7 the abbreviation is followed by the number of cycles per hour and the factor of inertia.

Example: S7 500 Starts / hr Load Factor = 2

For the duty type S8 and S9 the abbreviation is followed by the indication of the number of duty cycles per hour and the factor inertia together with the load. In addition, the cyclic duration factor should be indicated for each speed.

Examples: S8 or S9 30 Starts / hour Load Factor = 3

S2/S3 RATED MOTOR OUTPUTS

Standard motors can be used for S2 and S3 duties with increased outputs. However, the starting torque and pullout torque as percentage of full load torque would be reduced. The ratings indicated in the table are with minimum 200% pull out torque.

ELECTRICAL FEATURES

TEMPERATURE RISE AND INSULATION GLASS

Normally motors are insulated to Class "F" with a temperature rise restricted to Class "B". Class "H" insulation can be produced if required. All the motor winding with VPI treatments

Class of Insulation	Max. Permissible Temp. Limit °C	Max. Permissible Temperature rise for winding at Ambient Temperature in °C		
		40°C	45°C	50°C
B	130	80	75	70
F	155	105	100	95
H	180	125	120	115

DERATING FACTOR

Theratings and performance values are specified at 40°C ambient temperature and below 1000 meter altitude. However the same motor can be used with higher ambient temperature and altitude but has to be derated as specified in adjoining tables.

Class of Temperature in °C	% Output of Motor
30°C - 45°C	103 %
50°C	100 %
55°C	96 %
60°C	92 %

Altitude above Sea level in meter	% Output of Motor
2000	95
3000	85
4000	77

MOTOR PROTECTION

Normally motors are protected against over current by overload relays, fuses or MCBs. For thermal protection, motors can be supplied with thermister or thermal switch. For condensing environments, motors with space heaters can be supplied as well. The table below is a general guide line for selection of fuse ratings.

DOL Starting

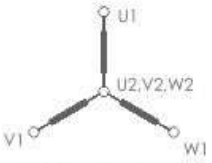
kw/hp	0.37/0.5	0.55/0.75	0.75/1.0	1.1/1.5	1.5/2.0	2.2/3.0	3.7/5.0	5.5/7.5	7.5/10	9.3/12.5	11/15	15/20	18.5/25	22/30	30/40	37/50	45/60
Avrg. Current	1.1	1.4	1.9	2.6	3.7	4.8	7.8	11.2	15	18	21	27	33	39	53	65	78
Fuse Ranting	4	6	6	6	10	16	16	25	25	35	35	50	63	63	100	100	160
Relay Range	1-2	1-2	1-2	2-4	2-4	3-6	6-12	6-12	10-16	18-24	18-24	16-32	24-45	24-45	32-63	50-90	50-90

STAR - DELTA Starting

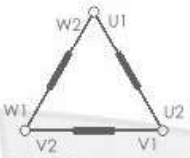
kw/hp		2.2/3.0	3.7/5.0	5.5/7.5	7.5/10	9.3/12.5	11/15	15/20	18.5/25	22/30	30/40	37/50	45/60
Average Current	Line	4.8	7.8	11.2	15	18	21	27	33	39	53	65	78
	Phase	2.8	4.5	6.5	9	11	12.7	16.8	20.2	23.2	30.6	37.5	46.4
Fuse Ranting		16	16	25	25	35	35	50	63	63	100	100	160
Relay Range		1.5-3	3-6	4-8	6-12	6-12	10-16	18-24	18-24	18-24	16-32	24-45	32-63

WIRING GUIDELINES

Motors with six terminals have to be connected in accordance with supply conditions. Verify the connection instruction before putting the motor in operation. With different connections of the motor, it is possible to use the same motor at different voltage supplies (Dual voltage motor) Star Conne--ction – On Six termination plate, connect U2, V2 and W2 with link supplied along with the motor and connect three phase supply wires to U1, V1 and W1 to connect the motor in star connection. Delta Connection – On a Six Termination plate, connect V1-U2, U1-W2 and W1-V2 with the link supplied along with the motor and connect three phase supply wires to U1, V1 and W1 to connect end of one phase to beginning of next phase.



Star Connection



Delta Connection

	VOLTS				
Delta	110	125	220	240	415
Star	190	220	380	415	690

While changing the connections, ensure that the rated Voltage is maintained on the supply to brake, rectifier or any other type of equipment that is directly connected to the motor termination.

ELECTRICAL FEATURES

TESTING

The standard test programmes are divided into four parts: routine tests type tests, optional tests and special tests. The routine test program is done to every machine and it is included in price of the machine. Type test is performed in addition to routine tests normally to one of the machines of a series of similar machine or by a request of the customer. Optional tests and special test are additional type tests subject to mutual agreement between purchaser and the manufacturer.

CONTENTS OF TEST PROGRAMMES:

ROUTING TESTS

1. Insulation resistance test
2. Measurement of resistance of the stator
3. Locked rotor test
4. No load test
5. Reduced voltage running test
6. High voltage test

OPTIONAL TESTS

1. Vibrational severity test
2. Sound level measurement
3. Degree of protection test
4. Temp. rise test at limiting values of voltage & frequency variation
5. Over speed test
6. Test on insulation system

TYPE TESTS

1. Dimensions
2. Measurement of resistance of stator
3. Locked rotor test
4. Temperature rise test
5. Full load test
6. No load test at rated voltage
7. Reduced voltage running test
8. Momentary overload test
9. Insulation resistance test
10. High voltage test

SPECIAL CUSTOMIZED DESIGNS

Pole / Synchronous RPM At 50 (60) Hz

Frame	56	63	71	80	90	100	112	132	160	180	200	225
Electrical												
Non std voltage &/or freq.	■	■	■	■	■	■	■	■	■	■	■	■
Gelcoat on winding overhang	■	■	■	■	■	■	■	■	■	■	■	■
Insulation class H	■	■	■	■	■	■	■	■	■	■	■	■
Two speed motors	N	■	■	■	■	■	■	■	■	■	■	■
High torque motors	■	■	■	■	■	■	■	■	■	■	■	■
Special performance requirements	■	■	■	■	■	■	■	■	■	■	■	■
Mechanical												
Second std shaft end	■	■	■	■	■	■	■	■	■	■	■	■
Non std shaft end	■	■	■	■	■	■	■	■	■	■	■	■
Shaft length = 2E	■	■	■	■	■	■	■	■	■	■	■	■
B3, B6, B7, B8, V5, V6 mtg.	□	□	□	□	□	□	□	□	□	□	□	□
B5, V1, V3, mtg.	□	□	□	□	□	□	□	□	■	■	■	■
B14, V18, V19 mtg.	□	□	□	□	□	□	□	□	■	-	-	-
B35, V15 mtg.	■	■	■	■	■	■	■	■	■	■	■	■
B34 mtg.	■	■	■	■	■	■	■	■	-	-	-	-
Non std flange	■	■	■	■	■	■	■	■	■	■	■	■
Spl. Vibration level	■	■	■	■	■	■	■	■	■	■	■	■
Epoxy paint	■	■	■	■	■	■	■	■	■	■	■	■
Thermisters, RTD, BTS	N	N	N	N	N	■	■	■	■	■	■	■
Space heaters	N	N	N	N	N	N	N	N	N	N	□	□
Regreasing arrangement	■	■	■	■	■	■	■	■	■	■	■	■
Colour other then RAL 6011	■	■	■	■	■	■	■	■	■	■	■	■
Special shaft material	■	■	■	■	■	■	■	■	■	■	■	■
Special bearings	■	■	■	■	■	■	■	■	■	■	■	■
Force cooling arrangement	N	N	N	N	N	■	■	■	■	■	■	■

A Available upon request N Cannot be supplied □ No extra cost ■ Extra cost

ENERGY EFFICIENCY THREE PHASE MOTORS (IE1)

To meet the international standards and trends, "ELCEN" three phase motors are available in standard frames as indicated in Table below. Certain motors are also available in different frames as indicated in (bracket)

FRAME V/S OUTPUT SUMMARY

		Pole / Synchronous RPM At 50 (60) Hz			
KW	HP	2 / 3000 (3600)	4 / 1500 (1800)	6 / 10015 (1209)	8 / 750 {900}
0.18	0.25	63	63	71	80L
0.25	0.33	63(71)	71	71	90S
0.37	0.50	71	71	80	90L
0.55	0.75	71(80)	80(71)	80	100L
0.75	1.00	80	80	90S	100L
1.10	1.50	80	90S(80)	90L	112M
1.50	2.00	90S	90L	100L	132S
2.20	3.00	90L	100L	112M	132M
3.70	5.00	100L	112M	132S	160M
5.50	7.50	132S	132S	132M	160L
7.50	10.0	132S	132M	160M	180M
9.30	12.5	132M	160M{132M}	160M	180L
11.0	15.0	160M	160M	160L	200L
15.0	20.0	160M	160L	180L	225S
18.5	25.0	160L	180M	200L	225M
22.0	30.0	180M	180L	200L	
30.0	40.0	200L	200L	225L	
37.0	50.0	200L	225S		
45.0	60.0	225M	225M		

EFFICIENCY LEVEL

"ELCEN" standard motors are with IE 1.

Pole	Kw	0.37	0.55	0.75	1.1	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
2	Efficiency in %	66.1	69.1	72.1	75	77.2	79.7	82.7	84.7	86	87.6	88.7	89.3	89.9	90.7	91.2	91.7
4		65.1	69.1	72.1	75	77.2	79.7	82.7	84.7	86	87.6	88.7	89.3	89.9	90.7	91.2	91.7
6		63.1	67	70	72.9	75.2	77.7	80.9	83.1	84.7	86.4	87.7	88.6	89.2	90.2	90.8	91.4

IE 2 ENERGY EFFICIENT MOTORS

In today's power scenario, we are facing a major power crunch. Day by day, the gap between demand & supply of electric energy is widening at the rate of 3%. Bridging this gap from supply side is very difficult & expensive proposition. The only viable way in handling these crises, in addition to capacity addition, is the efficient use of available energy, which is possible by use of energy efficient devices.

Electric motors are industry's basic need. Electric motors consume around 70% of the total electricity used in the industrial sector. As motors are the largest users of electrical energy, even small efficiency improvements can produce large savings across the country. Energy conservation measure taken by individual consumers in this direction can improve the national economy & benefit the environment on global scale.

An energy efficient motor produces the same shaft output power but draws less input power than a standard motor. Hence energy efficient motor consumes less electricity than comparable standard motor.

FEATURES

Standards : IS: 12615, IS: 1231, IS: 2223 & IEC-60034-1
Mounting : Foot (B3), Flange (B5), Face (B14) & combi.
Voltage : 415V $\pm$ 10% or as required
Frequency : 50Hz $\pm$ 5% or as required
Ambient : 50°C.
Altitude : Upto 1000m above m.s.l.
Enclosure : Totally enclosed fan cooled (TEFC)
Protection : IP55
Ins. Class : Class F Ins. With temp. rise limited to class B.

ADVANTAGES

- Saves energy & money
- Near uniform efficiency from 50% to 100% of full load ensuring energy savings even at part load conditions
- Short payback period
- Substantial savings after payback period

IS-12615:2011 CM/L-7200112889 APPROVED

ENERGY-SAVING TECHNOLOGY

RANGE

"ELCEN" Energy efficient motor are designed as per the values specified in IS: 12615. They have near uniform efficiencies between 50 & 100% of load as shown in the figure. The motors are available form 2.2kW to 200.0kW in 2 & 4 pole variety as given in the performance tables. Performance figures of 6 & 8 pole motors are available upon request

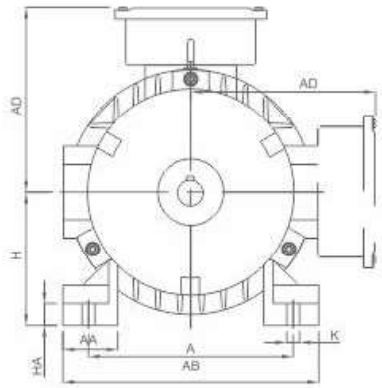
EFFICIENCY LEVEL

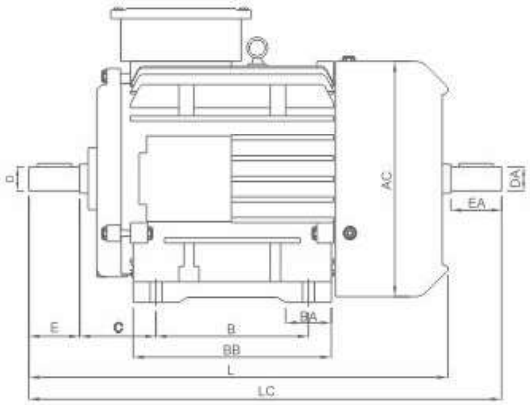
"ELCEN" standard motors are with IE 2.

Pole	Kw	0.37	0.55	0.75	1.1	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45
2	Efficiency in %	72.2	74.8	77.4	79.6	81.3	83.2	85.5	87	88.1	89.4	90.3	90.9	91.3	92	92.5	92.9
4		70.1	75.1	79.6	81.4	82.8	84.3	86.3	87.7	88.7	89.8	90.6	91.2	91.6	92.3	92.7	93.1

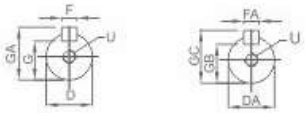
IE2 - MOTOR (FOOT MOUNTED)

Mechanical Dimension (B3 Construction)



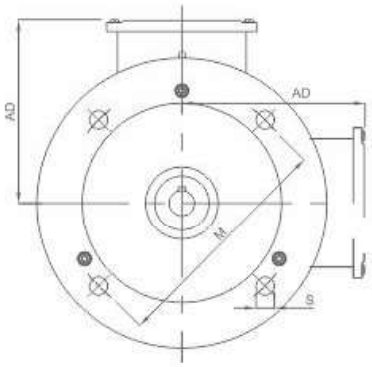


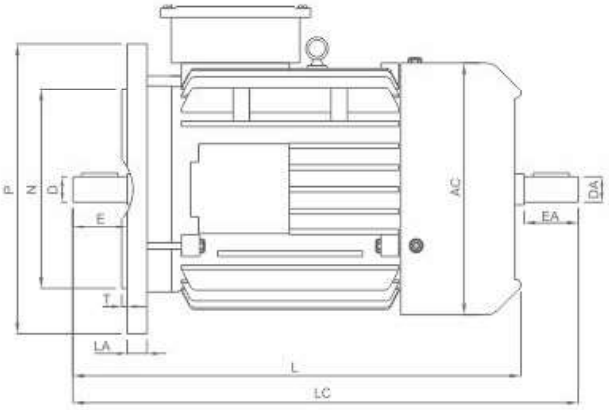
Frame Size	A	B	C	H	K	L	LC	AA	AB	BB	BA	AC	HA	U	AD	D DA	E EA	F FA	GA GC	G GB	TOL ON D,DA	TOL ON F, FA	TOL ON H
63	100	80	40	63	7	210	238	35	125	106	28	115	10	M4	95	11	23	4	12.5	8.5	+.008 -.003 (j6)	+.0 -.030 (h9)	
71	112	90	45	71	7	240	275	35	140	112	35	140	10	M5	105	14	30	5	16	11			
80	125	100	50	80	10	277	322	38	160	130	40	162	13	M6	128	19	40	6	21.5	15.5			
90S	140	100	56	90	10	312	369	37	175	132	45	173	14	M8	135	24	50	8	27	20	+.009 -.004 (j6)	+.0 -.036 (h9)	+.0 -.5
90L	140	125	56	90	10	360	416	37	175	157	45	173	14	M8	135	24	50	8	27	20			
100L	160	140	63	100	12	370	437	42	200	170	50	195	14	M10	165	28	60	8	31	24			
112M	190	140	70	112	12	435	497	50	225	175	57	226	14	M12	178	28	60	8	31	24			
132S	216	140	89	132	12	450	540	55	258	176	60	260	18	M12	198	38	80	10	41	33			
132M	216	178	89	132	12	559	652	55	258	214	60	260	18	M16	198	38	80	10	41	33			
160M	254	210	108	160	15	636	765	72	320	260	78	310	25	M16	240	42	110	12	45	37	+.018 +.002 (k6)	+.0 -.043 (h9)	
160L	254	254	108	160	15	683	811	73	320	304	78	310	25	M20	240	42	110	12	45	37			
180M	279	241	121	180	15	635	757	80	360	300	95	360	25	M20	260	48	110	14	51.5	42.5			
180L	279	279	121	180	15	673	795	80	360	338	95	360	25	M20	260	48	110	14	51.5	42.5			
200L	318	305	133	200	19	740	865	85	400	370	95	390	30	M20	295	55	110	16	59	49	+.030 +.011 (m6)		
225M	356	311	149	225	19	780/810	905/965	105	450	370	110	424	35	M20	320	55/60	110/140	16/18	59/64	49/53			



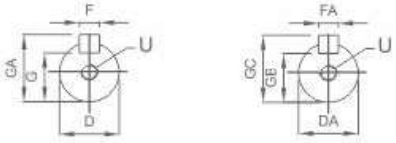
IE2 - MOTOR (FLANGE MOUNTED)

Mechanical Dimension (B5 Construction)



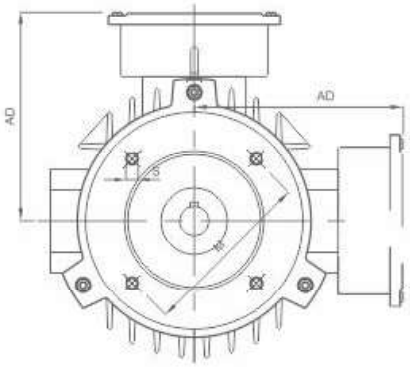


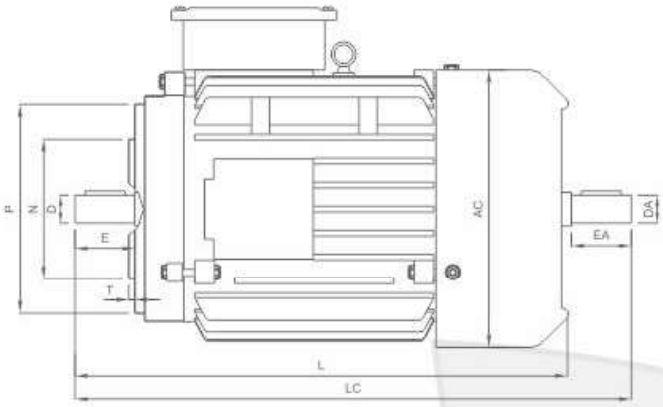
Frame Size	L	LC	AC	AD	U	D DA	E EA	F FA	GA GC	G GB	P MAX	M	N	S	T MAX	LA				
63	210	238	115	95	M4	11	23	4	12.5	8.5	140	115	95	10	3	9	+.008 -.003 (j6)	+.0 -.030 (h9)	±0.3	+.013 -.009 (j6)
71	240	275	140	105	M5	14	30	5	16	11	160	130	110	10	3.5	9				
80	277	322	162	128	M6	19	40	6	21.5	15.5	200	165	130	12	3.5	10	+.009 -.001 (j6)			+.014 -.009 (j6)
90S	312	369	173	135	M8	24	50	8	27	20	200	165	130	12	3.5	10				
90L	337	394	173	135	M8	24	50	8	27	20	200	165	130	12	3.5	10		+.0 -.036 (h9)		
100L	370	437	195	165	M10	28	60	8	31	24	250	215	180	15	4	11				
112M	400	464	226	178	M10	28	60	8	31	24	250	215	180	15	4	11				
132S	450	540	260	198	M12	38	80	10	41	33	300	265	230	15	4	12				+.016 -.011 (j6)
132M	488	478	260	198	M12	38	80	10	41	33	300	265	230	15	4	12				
160M	580	700	310	240	M16	42	110	12	45	37	350	300	250	19	5	13	+.018 -.002 (j6)	+.0 -.043 (h9)	±0.5	
160L	624	744	310	240	M16	42	110	12	45	37	350	300	250	19	5	13				
180M	635	757	360	260	M16	48	110	14	51.5	42.5	350	300	250	19	5	13				
180L	673	795	360	260	M16	48	110	14	51.5	42.5	350	300	250	19	5	13				
200L	740	865	390	295	M20	55	110	16	59	49	400	350	300	19	5	15	+.030 -.011 (m6)			+.016 -.016 (j6)
225M	780/810	905/965	424	320	M20	55/60	110/140	16/18	59/64	49/53	450	400	350	19	5	16				+.018 -.018 (j6)



IE2 - MOTOR (FACE MOUNTED)

Mechanical Dimension (B14 Construction)





Frame Size	L	LC	AC	AD	U	D DA	E EA	F FA	GA GC	G GB	P MAX	M	N	S	T MAX	TOL ON D,DA	TOL ON F,FA	TOL ON M	TOL ON N
63	210	238	115	95	M4	11	23	4	12.5	8.5	90	75	60	M5	2.5	0.0087 -0.003 (j6)	0 -0.03 (h9)		0 -0.036 (h9)
71	240	275	140	105	M5	14	30	5	16	11	105	85	70	M6	2.5				
80	277	322	162	128	M6	19	40	6	21.5	15.5	120	100	80	M6	3.0				
90S	312	369	173	135	M8	24	50	8	27	20	140	115	95	M8	3.0				
90L	337	394	173	135	M8	24	50	8	27	20	140	115	95	M8	3.0	0.009 -0.004 (j6)		±0.3	0.013 -0.009 (j6)
100L	370	437	195	165	M10	28	60	8	31	24	160	130	110	M8	3.5		0 -0.036 (h9)		
112M	400	464	226	178	M10	28	60	8	31	24	160	130	110	M8	3.5				
132S	450	540	260	198	M12	38	80	10	41	33	200	165	130	M12	3.5	+0.018 +0.002 (k6)			0.014 -0.011 (j6)
132M	488	578	260	198	M12	38	80	10	41	33	200	165	130	M12	3.5				

BRAKE MOTORS

Type of Load	Safety Factor
Low mass, uniform loading, non-intermittent operation	2
Low mass, light shock load with intermittent operation	2.5
Medium mass, light shock load with intermittent operation	3
Heavy mass, light shock load with intermittent operation	3
Overhauling Loads	3.5

SELECTION

Depending upon the application, the service factor of the brake has to be selected for proper braking.

Service factors for guidelines are mentioned in the selection table. How ever while selecting the service factor, other criteria like mounting positions, type of transmission and reductions should also be considered as well.

SELECTION OF "ELCEN" DC FAILSAFE BRAKE MOTOR

OUTPUT		2 - POLE 3000 RPM			4 - POLE 1500 RPM			6 - POLE 1000 RPM			8 - POLE 750 RPM		
KW	HP	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor
0.18	0.25	63	4.5	7.5	63	4.5	3.8	71	4.5	2.6	80	4.5	1.75
0.37	0.50	71	4.5	3.6	71	4.5	1.8	80	8	2.24	90S	8	1.63
0.37	0.50	-	-	-	71	8	3.24	-	-	-	90S	12	2.5
0.55	0.75	71	4.5	2.15	80	8	2.15	80	8	1.5	90L	12	1.8
0.55	0.75	71	8	4.3	-	-	-	80	20	3.7	90L	20	3
0.75	1.00	80	8	3.2	80	-	1.6	90L	20	2.7	100L	20	2.1
0.75	1.00	-	-	-	80	12	2.4	-	-	-	100L	40	4.2
1.10	1.50	80	8	2.15	90S	20	2.6	90L	20	1.8	100L	40	2.8
1.10	1.50	80	12	3.18	-	-	-	90L	32	3	-	-	-
1.50	2.00	-	-	-	90L	20	2	100L	32	2.24	112M	40	2
1.50	2.00	90S	12	2.4	90L	40	4	-	-	-	112M	70	3.5
2.20	3.00	-	-	-	100L	40	2.7	112M	32	1.5	132S	70	2.5
2.20	3.00	90L	20	2.6	100L	70	4.6	112M	70	3.3	132S	90	3.15
3.70	5.00	-	-	-	112M	70	2.8	132S	70	1.9	132M	90	1.9
3.70	5.00	100L	40	3.2	112M	90	3.6	132S	90	2.5	132M	160	3.4
5.50	7.50	112M	40	2.1	132S	90	2.4	132M	90	1.7	160M	160	2.3
5.50	7.50	112M	70	3.8	-	-	-	-	-	-	-	-	-
7.50	10.00	132M	70	2.8	132M	90	1.8	160M	160	2.2	160L	160	1.7
9.30	12.50	132M	90	2.2	160M	160	2.6	160M	160	1.8	-	-	-
9.30	12.50	132M	160	5.2	-	-	-	160M	240	2.69	-	-	-
11.00	15.00	160M	90	2.5	160M	160	2.2	160L	240	2.25	-	-	-
11.00	15.00	160M	160	4.4	-	-	-	-	-	-	-	-	-
15.00	20.00	160L	90	1.8	-	-	-	-	-	-	-	-	-
15.00	20.00	160L	160	3.2	-	-	-	-	-	-	-	-	-

DESCRIPTION

"ELCEN" Brake motors are normally supplied with fail safe brakes, also known as normally ON brake. The Motor is braked (Locked) when power is not applied i.e. de-energized to brake. This ensures real fail safe braking. The Construction is quite robust and requires very limited maintenance. With wearing of liners on the rotor of brake, the air – gap can be easily adjusted. If necessary. The rotor can be replaced completely as will, The brake is mounted on end cover on non-driving end of the motor. It comes with a Manual release lever. Depending upon the application requirement, AC or DC brake can be used.

ELCEN

SELECTION OF "ELCEN" AC FAILSAFE BRAKE MOTOR

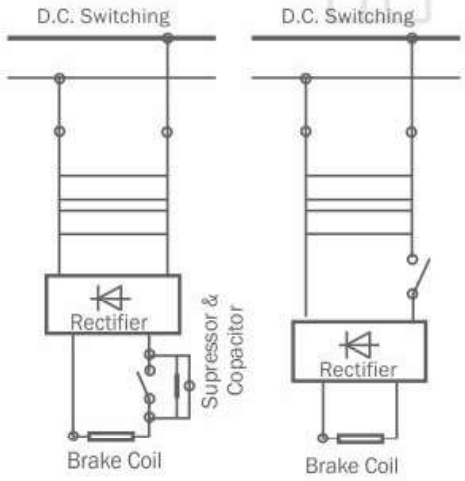
OUTPUT		2 - POLE 3000 RPM			4 - POLE 1500 RPM			6 - POLE 1000 RPM			8 - POLE 750 RPM		
KW	HP	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor	FRAME Size	Brake Torque Nm	Safety Factor
0.18	0.25	63	4	6.72	63	4	3.36	71	4	2.32	80	4	1.75
0.37	0.50	71	4	3.24	71	4	1.62	80	8	2.24	90S	8	1.63
0.37	0.50	-	-	-	71	8	3.24	-	-	-	90S	16	3.26
0.55	0.75	71	4	2.15	80	8	2.15	80	8	1.5	90L	16	2.4
0.55	0.75	71	8	4.3	-	-	-	80	16	3	-	-	-
0.75	1.00	80	8	3.2	80	8	1.6	90L	16	2.2	100L	16	1.68
0.75	1.00	80	16	6.3	80	16	3.2	-	-	-	100L	32	3.36
1.10	1.50	80	8	2.15	90S	16	2.15	90L	16	1.5	100L	32	2.24
1.10	1.50	80	16	4.3	-	-	-	90L	32	3	-	-	-
1.50	2.00	90S	8	1.62	90L	16	1.62	100L	32	2.24	112M	32	1.63
1.50	2.00	90S	16	3.24	90L	32	3.24	-	-	-	112M	60	3.05
2.20	3.00	90L	16	2.15	100L	32	2.15	112M	32	1.5	132S	60	2.1
2.20	3.00	90L	32	4.3	100L	60	4	112M	60	2.81	132S	80	2.8
3.70	5.00	100L	32	2.58	112M	60	2.42	132S	60	1.68	132M	80	1.68
3.70	5.00	100L	60	4.8	112M	80	3.22	132S	80	2.24	132M	150	3.15
5.50	7.50	112M	32	1.74	132S	80	2.15	132M	80	1.5	160M	150	2.14
5.50	7.50	112M	60	3.26	-	-	-	-	-	-	-	-	-
7.50	10.00	132M	60	2.4	132M	80	1.6	160M	150	2.09	160L	150	1.57
9.30	12.50	132M	80	1.94	160M	150	2.43	160M	150	1.68	180M	240	2.02
9.30	12.50	132M	150	4.86	-	-	-	160M	240	2.69	-	-	-
11.00	15.00	160M	80	2.24	160M	150	2.1	160L	240	2.25	180L	240	1.68
11.00	15.00	160M	150	4.2	160M	240	3.36	-	-	-	180L	360	2.52
15.00	20.00	160L	80	1.6	160L	240	2.5	180L	240	1.68	-	-	-
15.00	20.00	160L	150	3	160L	360	3.74	180L	360	2.52	-	-	-

Unless otherwise specified, in AC fail safe brake, 415V 3 phase AC voltage brakes are supplied. Where as in DC fail safe brake. Brake voltages are 190V D.C., with a rectifier of 415V A.C. dual phase input and 190V D.C. output, duly fitted in the terminal box of the motor. For quicker releasing action of DC brake, 96V D.C. brakes can be used with the same rectifier but without rectifier. For these supply voltages of brake, inbuilt rectifier is not available, hence the brake, supply voltage of 230V or 110V AC, 3 phase can be supplied.

(DC) BRAKE MOTOR WIRING DETAILS

SWITCHING (D.C. brakes)

Motors are connected with AC switching as standard. For faster action and reduction of the delay in operation, DC switching can be used. Care must be taken with DC switching as it generates heavy sparking, which can lead to shorting of switching contacts and ultimately leads to failure of contact braking. Suitable universal shock suppressors and capacitors can be used (not in the scope of "ELCEN")



OPTIONS

Energized to brake (Normally off) brakes in different operating voltage can be supplied subject to confirmation. Rear side shaft extension for manual rotation of motor can be supplied if required.

LENGTH

As brake is mounted on the rear side of the motor, lengthof motor increases.

DUAL SPEED MOTORS

A Variety applications such as machine tools, fan and pumps, joists and cranes, positioning equipment and many others need dual speed motors. Dual speed motors. Dual speeds can be achieved either by separate winding or by changing the speed; the output power of the motor changes but the torque remains almost constant. The best motor for the application can be selected from the table below. For quantity requirements special ratings can be developed.

Pole →	2/4	4/6	4/8	6/8
Frame ↓	Horse Power			
71	-	-	0.18/0.09	-
90S	1.2/0.6	0.5/0.33	0.5/0.25	-
90L	2.0/1.4	-	-	-
90L	1.7/1.1	-	-	-
90L	2.0/0.4	-	-	-
90L	1.2/0.8	1.0/0.75	0.75/0.37	-
100L	3.2/1.6	1.5/1.1	1.5/0.75	-
112M	-	2.0/0.98	-	-
112M	5.0/2.5	3.0/2.13	2.6/1.3	-
132S	7.0/3.5	5.0/3.33	4.0/2.0	-
132M	-	-	-	-
132M	-	5.5/2.5	-	-
132M	-	7.0/3.5	5.5/2.2	-
132M	8.0/4.0	6.0/3.0	7.5/5.5	-
160M	15.0/10.0	10.0/7.5	10.0/5.0	7.5/5.0
160L	20.0/15.0	15.0/10.0	15.0/7.5	10.0/7.5
180M	25.0/15.0	17.5/12.5	17.5/8.4	12.5/8.4
180L	-	-	20.0/15.0	-

DUAL VOLTAGE MOTORS

Dual Voltage Motors can be Supplied
with The voltage ration of either 1 : 1.73 or 2 : 1

Voltage Ratio	690	460	415	380	220
1 : 1.73	400	265	240	220	130
2 : 1	350	230	210	190	110

INVERTER RATED MOTORS

Frequency Inverter OR VFD Duty

Machine tools and process equipment can perform better if the speed of the prime mover can be controlled. This requirement leads to use of Variable Frequency Inverters or Drives, popularly known as VFDs in combination with the electric motors. It is advisable to use Inverted Rated motors while controlling the motor through VFDs. Invert Rated Insulation protects the motor from voltage spikes and surges generated while operating the motor with VFDs. Depending upon the requirement, motor can be selected.

(A) Where speed of the motor is to be reduced approximately up to 50% of the rated speed. An integral (directly driven) fan mounted on the motor shaft provides sufficient cooling (IC41 Cooling). Hence only insulation system becomes important which provides protection against voltage spikes and surges.

(B) Where the speed of the motor to be reduced further the integral fan mounted on the motor shaft becomes inactive OR when the speed of the motor is to be increased with a frequency above 60 Hz, the integral fan overloads the motor. In such a situation, it becomes very important to provide cooling by a separately powered fan servo ventilation (IC 46 cooling) Servo ventilation (IC 46 cooling) is available from frame size 71 t0 225M.

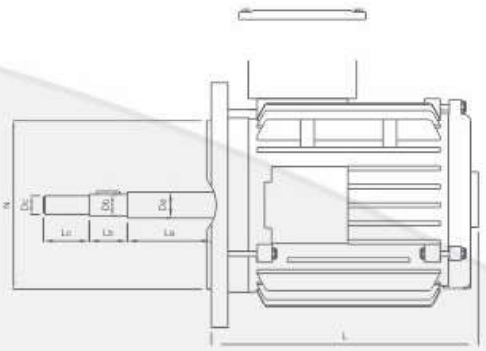
(C) When to motors are to be used in synchronization, positioning or similar applications, "ELCEN" motors available with rotary optional encoders. The criteria for selection of cooling system remains as described earlier. Depending upon the speed. Either integral cooling fan or servo ventilated cooling can be selected. As a standard 1024PPR incremental encoder, with 4.75V to 26.8V with short circuit push-pull output and RS422 functionality at 5V operation, how ever if application demands, either incremental or absolute can be supplied fitted with the motor.

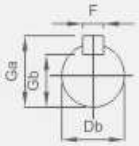
Servo Ventilated motors, encoder fitted motors with or without servo ventilation are longer then the standard motor. Conform the length at the time of selection.

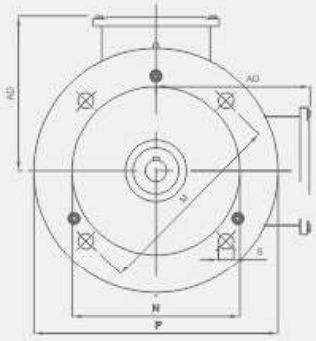
COOLING TOWER MOTORS

Cooling tower requires robust and efficient motors which "ELCEN" provides. Being higher ambient temper--ature, highly moist air and continuous operation need special care. "ELCEN" cooling tower motors are quite efficient and protected to fight against moisture, i.e. painted for high moist environment, low temper--ature rise due to batter efficiency and IP 55 protected. More over the windings are protected against moisture as well. All put together, it is made for cooling tower for longer and efficient life. The special shaft diameters and lengths can be manufactured as per requirement.

KW/HP	RPM	FRAME	L	Da	La	Db	Lb	Dc	Lc	N	T	F	Ga	Gb
0.37/0.5	1500	71	178	17	55	14	25	M12	30	110	3.5	5	16	11
0.75/1.0	1500	80	200	20	60	19	50	M16	35	130	3.5	6	21.5	15.5
0.75/1.0	1000	90S	220	25	60	24	50	M20	40	130	3.5	8	27	20
1.1/1.5	1000	90L	220	25	60	24	50	M20	40	130	3.5	8	27	20
1.5/2.0	1000	100	258	30	60	28	50	M24	50	130	4	8	31	24
2.2/3.0	750	132S	305	40	60	38	50	M30	50	180	4	10	41	33
2.2/3.0	1000	112M	271	30	60	28	50	M24	50	230	4	8	31	24
3.7/5.0	1000	132S	305	40	60	38	50	M30	50	180	4	10	41	33
3.7/5.0	750	132M	328	40	90	38	75	M30	50	230	4	10	41	33
5.5/7.5	1000	132M	328	40	90	38	75	M30	50	230	4	10	41	33
5.5/7.5	750	160M	398	45	90	42	75	M30	50	230	5	12	45	37
7.5/10.0	1000	160M	398	45	90	42	75	M30	50	250	5	12	45	37
7.5/10.0	750	160M	398	45	90	42	75	M30	50	250	5	12	45	37
9.3/12.5	1000	160M	398	45	90	42	75	M30	50	250	5	12	45	37
9.3/12.5	750	180M	445	50	50	48	105	M30	50	250	5	14	51.5	42.5
11.0/15.0	1000	160M	398	45	45	42	75	M30	50	250	5	12	45	37
11.0/15.0	750	180M	465	50	50	48	105	M30	50	250	5	14	51.5	42.5

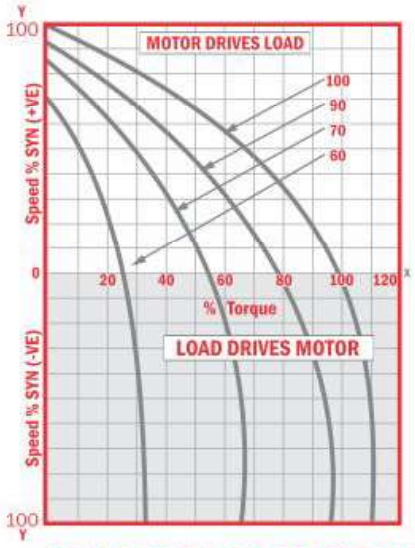






TORQUE MOTORS

Torque motors are special induction motors with specific stall torque – speed characteristic curve. Torque Motors have high Slip Characteristic which can be smartly used in winder application, may it be plastic film or metallic wire. "ELCEN" make Torque Motor is a precision designed, of robust constriction and is noted for its reliability in worst operating conditions. These motors are available in IEC frame size as wall as modified Mechanical frames for special applications. Special frames as per customer requirement are also available.



A standard squirrel cage motor tries to maintain the speed as it is loaded while a Torque motor will drop in speed as it is loaded. The desired speed can also be achieved by varying supply voltage.

APPLICATION OF TORQUE MOTORS

HDPE Tapes, Monofilament- yarns, Box Strapping
All types of extruded plastic films
Rubberised Fabrics, textiles 20 to 100Hz,
50 to 250 V, flange mounting type.
Copper Wires from 8 SWG.
S.S. Wires from 8 SWG to 43 SWG.
S.S. Wires/ M.S. Wires
Strips of Copper, Mild Steel etc.

TORQUE IN KGM	HP	RPM	FRAME
0.072	0.075	750	71
0.048	0.1	750	63
0.096	0.1	150	80
0.096	0.2	1500	71
0.19	0.2	750	90S
0.12	0.25	1500	80
0.24	0.25	750	90L
0.24	0.5	150	90S
0.48	0.5	750	100L
0.31	0.65	1500	90L
0.72	0.75	750	112M
0.48	1.0	1500	100L
0.96	1.0	750	132S
1.44	1.5	750	132M
0.96	2.0	1500	112M
0.96	2.0	1500	132S
1.2	2.5	1500	132S
1.44	3.0	1500	132M
2.4	5.0	1500	160L

CRANE MOTORS

"ELCEN" brand crane duty motors are specially designed for frequent starts / stops & reversing required in cranes & lifts of all types. They can also be used in applications such as material handling weirs & sluices auxiliary motors in rolling mills or wherever intermittent drives are required.

CONSTRUCTION

Castings: "ELCEN" crane duty motor's housings & endshields are made from high quality castings as per IS: 210. All components are machined to correct accuracy & alignment.

Terminal Box: Standard location of terminal box is on box is on top. However the terminal box on right or left side can be provided on request. The terminal box can be rotated in steps of 90° in each position. Motors up to 250 frames have aluminum boxes whereas frames 280 & 315 are with cast iron terminal boxes.

Winding & Protection: All motors are wound with super enameled dual coast copper wires. This enable motors to be used for inverter applications as well. Features like vacuum pressure impregnation (VPI) & PTC thermistors embedded in stator winding can be provided on request.

Stampings: Stampings are made from low loss high permeability steel.

Earthing terminals : Two earthing terminals are provided one in the terminal box & other on the motor body.

Anti-condensation Heater: To avaid moisture accumulation accumulation inside the motor, the motor windings can be heated by connecting 4-10% of rated voltage to the motor terminals. This will generate enough heat equivalent to 20-25% of rated current. Alternatively any method as described in IS:900 can be used. Motor can also be offered with space heaters on request for frames 100 & above.

RANGE

KW : 0.18 to 45 kW
RPM : 1500, 1000, 750
Mounting : Foot (B3), Flange (B5), Face (B14) & combinations
Frame : 71 to 225M
Voltage : 415V±10% or as required
Frequency : 50Hz ± 5% or as required
Ambient : 45C. (Refer Table 1)
Altitude : Upto 1000m above msl (Refer Table 2)
Rotor type : Squirrel cage aluminium die cast
Enclosure : Totally enclosed fan cooled (TEFC)
Protection : Ip55
Insl. Class : Class F insulation with temp. rise limited to class B
Duty cycle : S3, S4 & S5
Standards : IS: 325, IS: 1231, IS: 2223 & IS:4722

MOTORS WITH INTEGRAL BRAKES

These motors can also be supplied with integral electromagnetic DC fail safe brakes with built in rectifiers for frames up to 200L.

Table 1

Ambient temp (°C)	Deration factor for Power
45°C	1.00
50°C	0.96
55°C	0.92
60°C	0.87

Table 2

Altitude above msl (m)	Deration factor for Power
1000	1.00
1500	0.97
2000	0.94
2500	0.90
3000	0.86

ENQUIRY DETAILS

When placing an enquiry, please furnish the following details;

- Application details
- Motor power & speed
- Voltage & frequency variations
- Mounting
- No. of Start / Stops per hour with duty & CDF
- Load GD^2 at motor speed
- Load torque or torque / speed curve of driven equipment
- Duty cycle diagram if other than those described herein

CUSTOM BUILT MOTORS

Use of custom built motors many times results in make the application much easier, cost competitive of maintenance free. "ELCEN" has excelled in developing and manufacturing custom built motors. Motors with non standard flanges, Shaft dimensions or mounting bases can be manufacturing custom built motors. Motors with non standard flanges, shaft dimensions or mounting bases can be manufactured in economically attractive quantities. Different duty cycles at different speeds in dual speed motors OR different torque speed characteristic motors can be manufactured economically as well.

For special positioning purposes "ELCEN" has developed a dual speed brake motor with continuous duty at higher speed (power) and short time duty at lower speed (power) in 71 frame. Typically the motor starts at 0.18 kW/400 RPM continuous duty (S1). When it reaches near to the required position the motor rating will change to 0.09kW/670 RPM for a short time (S2 duty) of a second or two. Once it reaches the final position, it stops immediately with brake. With this mechanism, the positioning accuracy can be increased by 60% better.

For Stirrer applications ELCEN developed an extended shaft motor which eliminates the coupling, bearing housing and reduces a lot of mounting structure, which in turn reduces the overall cost and manufacturing time. AS the unit has less components, maintenance is also reduced.

Compact machines like humidifires of similar where motor it self can become the frame for the mounting of other parts and components of the machine and can make the machine versatile and easy to operate.

"ELCEN" manufactures Vibrator Motors to suit the requirements of specific machines. The custom built vibrator motor are designed to suits the mounting and dismantling of the motor. "ELCEN" Vibrator Motors are widely applicable because of adjustable amplitude of vibration.

MOTOR DESIGNATION FOR INQUIRY AND ORDER

ES 71 P4 A 415 F S1 B5 V1 IP5S +.. +..

Optionals
TH = Thermister
TS = Integral Thermal Switch
SH = Space Heater
RN = Rain Guard
OI = Incremental Optical Encoder (PPR like 1024)
OA = Absolute Optical Encoder (PPR like 1024)
SV = Servo Ventilation

Ip55 is standard Option IP 56
Installation Position
Mountings
Duty Cycle S1...S6
Class of Insulation F or H
Supply Voltage 41 5 / 380 / 220
Operating Frequency A=50 Hz, B=60Hz,
C = Special mention separately in options.
Pole of motor, mention dual poles
for dual speed motors i.e. 2/4 or 4/6
Frame Size

Type of Motors
ES = Standard 3 Phase Motors (IE 1)
EES = Energy Efficient Motors (IE 2)
ED = Dual Speed Motors
EB = Brake Motors
ECD = Crane Duty Motors
EI = Inverter Duty Motors
EA = Custom Built Motors
ET = Torque Motors
EC = Cooling Tower Motors

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CE
QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2008