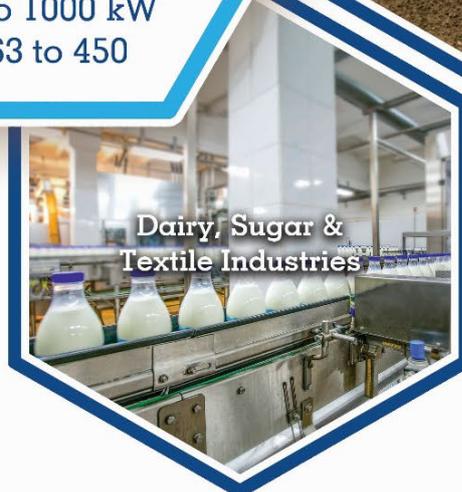
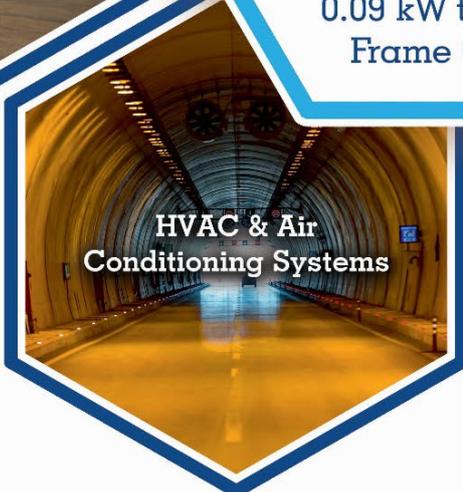
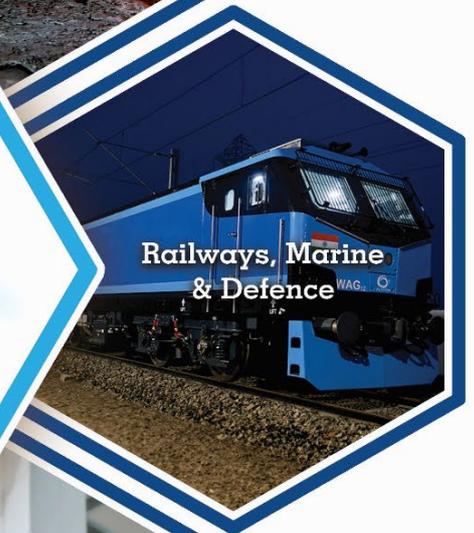
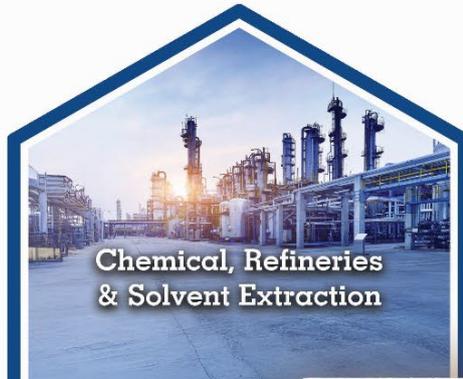


Built for **Reliability**

Engineered for **Tomorrow**



## Plant I



## Plant II



# Contents

<b>INDUSTRIAL MOTORS</b>	<b>1-17</b>
<hr/>	
1. General Technical Information Reference Standards, Electrical Features, Mechanical Features, Effect of VVVF on Motor Performance, Special Features of VVVF Motors.	
<hr/>	
2. Energy Efficiency TEFC IE2 Motors	18-21
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
<hr/>	
3. Premium Efficiency "Supremo" Series TEFC IE3 Motors	22-25
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
<hr/>	
4. Super Premium Efficiency "Ultimo" Series TEFC IE4 Motors	26-32
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
C) General Arrangement Drawing / Dimensions	
<hr/>	
<b>HAZARDOUS AREA MOTORS - Gas/Dust Area</b>	<b>33-38</b>
<hr/>	
1. General Technical Information	
<hr/>	
2. Flame Proof IE2 motors (Ex'db', Ex'eb')	39-42
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
<hr/>	
3. Flame Proof IE3 Motors (Ex'db', Ex'eb')	43-46
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
<hr/>	
4. Flame Proof IE4 Motors (Ex'db', Ex'eb')	47-50
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
C) General Arrangement Drawing / Dimensions	
<hr/>	

# Contents

5. Increased Safety Motors - IE2, IE3, IE4 (Ex'ec' & Ex'eb')	51-72
A) Product specific information	
B) Electrical Performance Tables - 2Pole, 4Pole, 6Pole, 8Pole	
C) General Arrangement Drawing / Dimensions	
<hr/>	
<b>CRANE DUTY MOTORS (IE2 &amp; IE3)</b>	73-84
A) Product specific information	
B) Electrical Performance Tables (DOL & VFD) - 4Pole, 6Pole, 8Pole	
<hr/>	
<b>BRAKE MOTORS</b>	85-86
A) Product specific information	
B) Brake Selection chart - Inline with LP S1, S3/S4	
<hr/>	
<b>ROLLER TABLE MOTORS</b>	87-89
A) Product specific information	
<hr/>	
<b>COOLING TOWER MOTORS</b>	90-91
A) Product specific information	
B) General Arrangement Drawing / Dimensions	
<hr/>	
<b>ENCODER MOTORS</b>	.92-93
A) Product specific information	
<hr/>	
<b>OTHER SPECIAL MOTORS</b>	94-97
1. Motors for Electric Vehicle	
2. Oil Immersed Motor	
3. Smoke Extraction Motor	
<hr/>	
<b>TOLERANCE ON PERFORMANCE VALUES &amp; DIMENSIONS</b>	98
<hr/>	
<b>SHIPPING DIMENSIONS</b>	99
<hr/>	

## Applicable Standards

The motors manufactured conform to the following National standards and equivalent International standards.

National Standards	Title	IEC
IS : 15999 - Part 1	Rotating electrical machines rating and performance	IEC 60034-1
IS : 15999 - Part 2	Methods of determination of efficiency of rotating electrical machines	IEC 60034-2
IS : 12615	Line operated 3 Phase AC motors	IEC 60034-30
IS/IEC 60034-5	Degree of protection provided by enclosure for rotating electrical machines	IEC 60034-5
IS : 6362	Designation of methods of cooling of rotating electrical machines	IEC 60034-6
IS : 2253	Designation for types of construction & mounting arrangements of rotating electrical machines.	IEC 60034-7
IS / IEC : 60034-8	Terminal marking & direction of rotation for rotating electrical machines	IEC 60034-8
IS : 12065	Permissible limits of noise levels for rotating electrical machines	IEC 60034-9
IS : 12075	Mechanical vibration of rotating electrical machines with shaft height 56 mm & higher measurement, evaluation & limits of vibration severity.	IEC 60034-14
IS : 1231	Dimensions of three phase foot mounted induction motors	IEC 60072-1
IS : 2223	Dimensions of flange mounted induction motors	IEC 60072-1
IS : 8223	Dimensions and output series for rotating electrical machines	IEC 60072-2
IS : 1271	Thermal evaluation and classification of electrical insulation	IEC 60034-11
IS/IEC 60079-0	Explosive atmospheres - Part -0	IEC 60079-0
IS/IEC-60079-1	Explosive atmospheres equipment protection by flame-proof enclosures Ex 'db'	IEC 60079-1
IS/IEC : 60079-7	Explosive atmospheres : Equipment protection by increased safety Ex "eb" & 'ec'	IEC 60079-7
EN 1201-3	Smoke Extraction Motor	EN 1201-3

# INDUSTRIAL MOTORS



## Standard Motors : Output Summary

Frame output summary for LHP Three Phase Induction Motor

Output (kW/HP)	Pole-wise Frame Size							
	Standard, Brake & Non-sparking Induction Motor				Flame Proof Motor			
	2 Pole	4 Pole	6 Pole	8 Pole	2 Pole	4 Pole	6 Pole	8 Pole
0.12/0.16	63	63	71	71	63	63	71	71
0.18/0.25	63	63	71	80	63	63	71	80
0.25/0.33	63	71	71	80	63	71	71	80
0.37/0.50	71	71	80	90S	71	71	80	90S
0.55/0.75	71	80	80	90L	71	80	80	90L
0.75/1	80	80	90S	100L	80	80	90S	100L
1.10/1.50	80	90S	90L	100L	80	90S	90L	100L
1.50/2	90S	90L	100L	112M	90S	90L	100L	112M
2.20/3	90L	100L	112M	132S(112M)	90L	100L	112M	132S
3.70/5	100L	112M	132S	160M(132M)	100L	112M	132S	160M
5.50/7.50	132S(112M)	132S	132M	160M	132S	132S	132M	160M
7.50/10	132S	132M	160M	160L	132S	132M	160M	160L
9.30/12.50	160M (132M)	(160M)	(160L)	180L	(132M)	(160M)	(160L)	180L
11/15	160M	160M	160L	180L	160M	160M	160L	180L
15/20	160M	160L	180L	200L	160M	160L	180M	200L
18.50/25	160L	180M	200L	225S	160L	180M	200L	225S
22/30	180M	180L	200L	225M	180M	180L	200L	225M
30/40	200L	200L	225M	250M	200L	200L	225M	250M
37/50	200L	225S	250M	280S	200L	225S	250M	280S
45/60	225M	225M	280S	280M	225M	225M	280S	280M
55/75	250M	250M	280M	315S	250M	250M	280M	315S
75/100	280S	280S	315S	315M	280M	280S	315S	315M
90/120	280M	280M	315M	315L	280M	280M	315M	315L
110/150	315S	315S	315M	315L	315S	315S	315M	315L
125.00/170	315M	315M	315M	315L	315S	315S	315L	315L
132/180	315M	315M	315L	315L	315M	315M	315L	315L
150/200	315L	315L	315L	355L	315L	315L	315L	315L
160/215	315L	315L	355L	355L	315L	315L	355L	355L
180/240	315L	315L	355L	355L	315L	315L	355L	355L
200/270	315L	315L	355L	355L	315L	315L	355L	355L
225/300	315L	315L	355L	-	355L	355L	355L	355L
250/335	355L	355L	355L	355L	355L	355L	355L	355L
280/375	355L	355L	355L	355L	355L	355L	355L	-
315/425	355L	355L	355L	355L	355L	355L	355L	-
355/475	355L	355L	355L	400L	355L	355L	-	-
400/536	355L	355L	355L	400L	355L	355L	-	-
450/603	355L	355L	400L	400L	355L	355L	-	-
475/635	355L	355L	400L	450M	355L	355L	-	-
500/670	355L	355L	400L	450M	355L	355L	-	-
560/750	400L	400L	*400L	450M	-	-	-	-
630/845	400L	400L	450M	450L	-	-	-	-
710/950	--	400L	450M	-	-	-	-	-
800/1070	--	450M	450L	-	-	-	-	-
900/1205	--	450M	-	-	-	-	-	-
1000/1340	-	450L	-	-	-	-	-	-

Note : Frame wise ratings are as per IS standards except those ratings in bracket. These are as per LHP standard.

## Mechanical features for Standard IE2, IE3 & IE4 motors

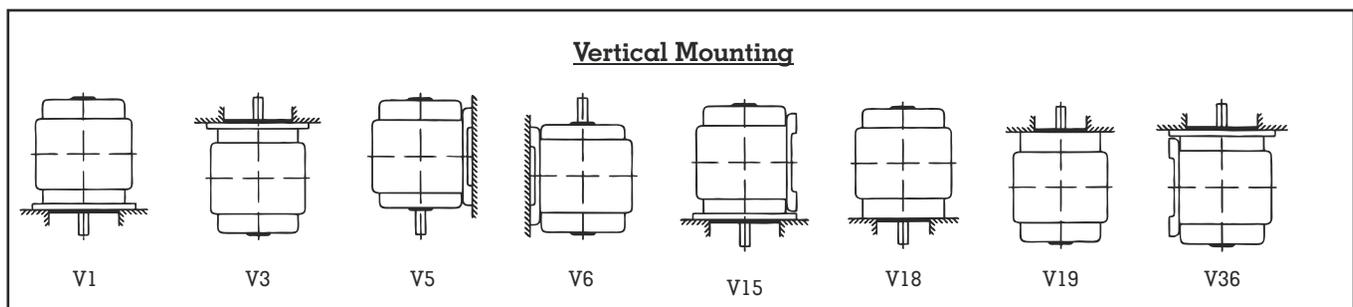
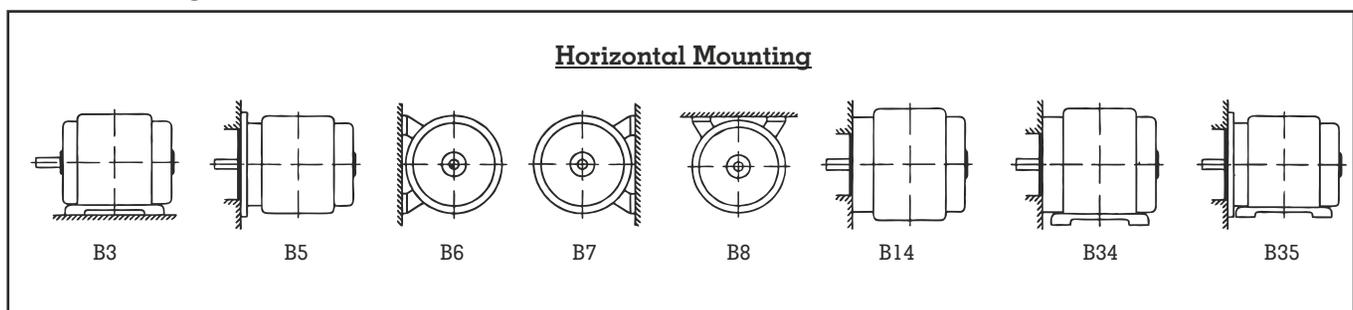
Table No.: 01

Sr. No.	Features	Standard	Optional
1	Frames	Motor frames from 63 to 132 frame are made of Aluminum pressure die cast bodies & 160M to 450 frames are made of cast iron or M.S. fabricated.	Motors frames offered in Al. pressure die cast can be offered in cast iron & M.S. Fabricated also.
2	End Covers	63 to 112 frames are made of Aluminum pressure die cast. All end covers are with integral bearing housing bores.	63 to 112 frames can be offered in cast iron & M.S. Fabricated also..
3	Flanges- D Type/C Type	63 to 112 frames flanges are in Aluminum PDC/GDC. All flanges are with integral bearing housing bores. 100 to 450 frames flanges are in CI or M.S. fabricated.	63 to 112 frames flanges can be offered in CI & M.S. Fabricated. Any non-standard flanges can be offered as per customer's requirement.
4	Terminal Box	Construction : 63 to 112 frame - Aluminum PDC/GDC/Cast Iron 132 to 180 frame - Pressed sheet metal/Cast Iron/M.S. Fabricated 200 to 355 frame- Pressed sheet metal/Cast Iron/M.S. Fabricated	Terminal box with specific material & non-standard design can be offered on demand.
5	Cable Entry Position	All T. Boxes can be rotated in a step of 90° through 360° for desired direction of cable entry. As a standard assy. cable entry will be towards NDE (Fan cover side) or as per GAD submitted.	Any position as per customers requirement can be offered.
6	T.Box Position	63 to 450 Top	As per customer's requirement (LH/Top/RH)
7	Cable Gland	Cable Gland holes (cable entry) are metric threading. For sizes & no. of entries please refer to dimensional table.	Cable entry with other threading like PG type/B.S. Cond. type can be offered on demand.
8	Rotor	Entire range of motors is fitted with dynamically balanced aluminum die cast/copper brazed squirrel cage rotors.	Copper Rotor can be given on demand.
9	Balancing	Rotors are dynamically balanced with a half key in the shaft extension as per ISO:1940 Part II, Grade 2.5	As per customer's specific requirement.
10	Shaft	Motor shafts are made of Carbon Steel 40C8/45C8 as per IS:2073 OR as per BS 970 EN 8/EN8D and dimensions as per IS:1231 . All shafts have threaded center hole as per DIN-332 standard. Key & keyways on shaft are made as per IS:2048	Shaft with other material like AISI-400, AISI-300, En 24 with heat treatment can be offered. Non-std. keys & keyways can be offered.
11	Bearings	63 to 250M frame motors have double shielded deep groove ball bearing (single row). Pre-lubricated for life and 280 to 450L frames motors have open type deep groove ball Bearing on both end (See Table No. 02) with re-greasing facility.	Angular Contact ball bearings, taper roller bearings, spherical roller bearings, cyl. roller bearings, Insulated bearings can be offered. In 63 to 250M frame open bearing can be given on demand.
12	Lubrication	63 to 112 frame motors are with medium temp. pregreased, 132 to 250 frame motors are with high temperature pre-greased bearings. Online greasing arrangement is provided for motors in 280 and above frames. with high temperature grease.	Motors with re-greasing arrangement in 100 to 250 frame can be offered as per customer's requirement.
13	V Ring Seals	63 to 250 frame are with V ring seals.	Motors with oil seals can be offered.
14	Oil Seals	280 to 450 frame are with Oil Seal	63 to 250 frame motor with oil seal can be given
15	Mounting Arrangement as per IS/IEC 60072-1 & IEC 60072-2	63 to 225 frames motors are suitable for both vertical and horizontal mounting arrangement Foot mounting motors are suitable for : B3, B6, B7, B8, V5 & V6 Flange (D Type Flange) Mounting motors : B5, VI, V3, B35, V15 & V36 Flange (C Type Flange) Mounting motors : B14, V18, V19, B34, V58 & V69 250 to 450 frame std. motors are suitable for horizontal mounting only (B3,B6,B37,B8,B5 & B35) (Refer 1.6)	For vertical mounting motors in 250 to 450 frame contact LHPL.
16	Degree of Protection	IP : 55 as per IS/IEC 60034-5 (for more details refer Annex-I	IP :44, IP : 54, IP : 56, IP57, IP:65, IP:66, IP67, IP68 can be given
17	Noise Level	Noise level of motors conform to IS:12065 specifications. (See Table No. B)	Motors with low noise level can be offered on demand.

## Mechanical features for Standard IE2, IE3 & IE4 motors

Sr. No.	Features	Standard	Optional
18	Suitable for Ambt.condition	Temp. -20°C to +50°C Relative humidity - Below 80%	For other than this ambient conditions contact LHPL.
19	Vibration Level/Severity	Vibration levels are maintained as per normal class of IS : 12075. (See Table No. 5)	Precision class of vibration can be offered as per customer's requirement.
20	Paint	(a) Flame-proof , Non-sparking and Increased safety	Other types of Colors & Shades also can be given as per standards.
		(b) Cooling Tower motors	
		(c) Std. IE2 & All other types of motors	
		(d) All premium eff. IE3 & IE4 motors	
21	Cooling	All motors are Totally Enclosed Fan Cooled (TEFC-IC411 as per IS:6362, IC4A1A1 as per IEC 60034-6). The cooling is effected by self driven, bi-directional centrifugal fan protected by fan cover. Following cooling types can be provided on demand. ● Natural ventilation (TESC or TENV (IC410) ● Forced cooling for frame sizes 71 and above (IC 416).	Any other types of cooling arrangements as per customer's requirement can be given.
22	Direction of Rotation	All motors are suitable for bi - directional rotation or as indicated in datasheets & GAD.	Unidirectional can be supplied.
23	Lifting arrangement	All motors with frame size 100 and above are provided with lifting hooks. When two or more hooks are provided, all hooks to be used simultaneously for lifting the motor.	-----
24	Packing	Motors up to 132 frame are packed in EPS and corrugated boxes. Wooden packing boxes or wooden pallets with corrugated box are provided for higher frame size. [sea worthy export packing case for home market (without fumigation certificate) is also available on demand.]	Any multiple product packing as per customer's requirement can be given & for Export [sea worthy / export packing case for home market (without fumigation certificate) is also available on demand.] .

### 1.4 Mounting Positions -



## Mechanical features for Standard IE2, IE3 & IE4 motors

Table No.: 02 Frame wise bearing sizes (for non flame-proof motors)

Frame Size	Bearing No.		
	Pole	DE	NDE
56	2 to 8	6201.2Z	6201.2Z
63-A1	2 to 8	6201.2Z	6201.2Z
63-C1	2 to 8	6201.2Z	6201.2Z
71-A1	2 to 8	6203.2Z	6203.2Z
71-C1	2 to 8	6203.2Z	6203.2Z
80-A1	2 to 8	6204.2Z	6204/6203.2Z
80-C1	2 to 8	6204.2Z	6204/6203.2Z
90-A1	2 to 8	6205.2Z	6205.2Z
90-C1	2 to 8	6205.2Z	6205.2Z
100-A1	2 to 8	6206.2Z	6206.2Z
100-C1	2 to 8	6206.2Z	6206.2Z
112-A1	2 to 8	6306.2Z	6306.2Z
112-C1	2 to 8	6306.2Z	6206.2Z
132	2	6208.2Z	6208.2Z
	4 to 8	6308.2Z	6208.2Z
160	2	6209.2Z	6209.2Z
	4 to 8	6309.2Z	6209.2Z
180	2	6210.2Z	6210.2Z
	4 to 8	6310.2Z	6210.2Z
200	2	6212.2Z	6212.2Z
	4 to 8	6312.2Z	6212.2Z
225	2	6213.2Z	6213.2Z
	4 to 8	6313.2Z	6312.2Z
250	2	6214.2Z	6214.2Z
	4 to 8	6314.2Z	6214.2Z
280	2	6316	6316
	4 to 8	6318	6316
315	2	6218	6218
	4 to 8	6319	6218
355	2	6218	6218
	4 to 8	6322	6319
400	2	6220	6220
	4 to 8	6324	6322
450	2	6322	6322
	4 to 8	6324	6322

- Note :** 1) L10 bearing life is 40000 hrs. for directly coupled loads through flexible couplings & for horizontal mounting position only.  
 2) For Motors with vertical mounting, the bearing life will be L10 bearing life 20000 hrs.  
 3) For belt pulley drives applications LHP recommend cylindrical roller bearing.  
 4) In case of motor supply through VFD in 280 frame & above NDE side Insulated Bearing shall be used.

Table No.: 03 Limiting Mean Sound Power Level Lw in dB (A) for airborne noise emitted by rotating electrical machines as per IS:12065.

Protection	IP	IP	IP	IP	IP	IP	
Enclosure	55	55	55	55	55	55	
Ratings in kW		Rated Speed (rev./min.)					
Above	Up to	960 & below	961-1320	1321-1900	1901-2360	2361-3150	3150-3750
--	1.1	76	79	80	83	84	88
1.1	2.2	79	80	83	87	89	91
2.2	5.5	82	84	87	92	93	95
5.5	11	85	88	91	96	97	100
11	22	89	93	96	98	101	103
22	37	91	95	97	100	103	105
37	55	92	97	99	103	105	107
55	110	96	101	104	105	107	109
110	220	100	104	106	108	110	112
220	630	102	106	109	111	112	114
630	1100	104	107	111	111	112	114

Table No.: 04 Diameter of shaft extension run out of motors

Over	Up to	Normal	Precision Class
0	10	0.030	0.015
10	18	0.035	0.018
18	30	0.040	0.021
30	50	0.050	0.025
50	80	0.060	0.030
80	120	0.070	0.035

Concentricity of spigot diameter and perpendicularity of mounting surface of flange with respect to shaft

Flange No.	Spigot Dia.	Normal Class	Precision Class
F65	50	0.080	0.040
F75	60	0.080	0.040
F85	70	0.080	0.040
F100	80	0.080	0.040
O115	95	0.080	0.040
F130	110	0.100	0.050
F165	130	0.100	0.050
F215	180	0.100	0.050
F265	230	0.100	0.050
F300	250	0.125	0.063
F350	300	0.125	0.063
F400	350	0.125	0.063
F500	450	0.125	0.063
F600	550	0.160	0.080
F740	680	0.160	0.080
F940	880	0.200	0.100
F1080	1000	0.200	0.100

- 5) Other types of bearings like CRB, ACBB, TRB etc. can be given as per requirement.

## Mechanical features for Standard IE2, IE3 & IE4 motors

**Table No.: 05 Limits of maximum vibration magnitude in Velocity Mode for Shaft Height (H) (Refer IS:12075:2024)**

Sl. No.	Vibration Grade	Shaft Height mm	56 < H ≤ 132		132 < H ≤ 225		225 < H ≤ 400			H > 400																
			500 to 1500	> 1500 & up to 3000	500 to 1500	> 1500 & up to 3000	500 to 1500	Above 1500 & up to 3000	500 to 1500	Above 1500 & up to 3000																
i)		Range of speed, RPM	500 to 1500	> 1500 & up to 3000	500 to 1500	> 1500 & up to 3000	500 to 1500	Above 1500 & up to 3000	500 to 1500	Above 1500 & up to 3000																
RMS value of vibration velocity in mm/s for the shaft height H in mm																										
ii)	A	Free Suspension	1.8	1.8	1.8	2.8	2.8	3.2	2.8	3.2																
iii)	A	Rigid Mounting	-	-	1.5	2.3/2.8*	2.3	2.8/3.2*	2.3	2.8/3.2*																
iv)	B	Free Suspension	0.71	0.71	0.71	1.12	1.8	2.3	1.8	2.3																
v)		Rigid Mounting	-	-	0.6	0.9/1.1	1.5	1.8/1.8*	1.5	1.8/2.3*																
<b>Derived values of Limits of Vibration Severity in Rotating Elect. Machines measured in State of Free Suspension.</b>																										
	Shaft Height mm	56 < H ≤ 132					132 < H ≤ 225					225 < H ≤ 400					H > 400									
i)	Speed, RPM	500	600	750	1000	1500	3000	500	600	750	1000	1500	3000	500	600	750	1000	1500	3000	500	600	750	1000	1500	3000	
ii)		Vibration limit in maximum displacement amplitude, in μm																								
iii)	A	96	80	64	48	32	16	96	80	64	48	32	25	150	125	100	75	50	25	150	125	100	75	50	25	
iv)	B	36	30	24	18	12	6	36	30	24	18	12	10	96	80	64	48	32	16	96	80	64	48	32	16	

Note :

- Grade A applies to machines with no special vibration requirements.
- Grade B applies to machines with special vibration requirements.
- Rigid mounting is not considered acceptable for machines with shaft heights less than or equal to 132 mm.
- Vibration at frequencies above 1000Hz should be filtered out.
- The shaft height of a machine without feet, or a machine with raised feet, or any vertical machine is to be taken as the shaft height of a machine in the basis frame, but of the horizontal shaft foot mounting type.

**Table No.: 06 Maximum Cable entry hole cable O.D. In (mm) accommodation in Terminal Box for Standard Motors (Non FLP)**

Frame Size	Cable Entry	Max. Permissible	Stud Size
63	M16-2 Nos.	2Rx3Cx1.5mm <sup>2</sup>	M4
71	M16-2 Nos.	2Rx3Cx1.5mm <sup>2</sup>	M4
80	M25-2 Nos.	2Rx3Cx6mm <sup>2</sup>	M4
90	M25-2 Nos.	2Rx3Cx6mm <sup>2</sup>	M5
100	M32-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M5
112	M32-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M6
132	M32-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M6
160	M40-2 Nos.	2Rx3Cx50mm <sup>2</sup>	M6
180	M40-2 Nos.	2Rx3Cx50mm <sup>2</sup>	M8
200	M40-2 Nos.	2Rx3Cx50mm <sup>2</sup>	M8
225	M50-2 Nos.	2Rx3Cx150mm <sup>2</sup>	M10
250	M50-2 Nos.	2Rx3Cx185mm <sup>2</sup>	M12
280	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M12
315	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M12
355	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M16
400	M75-2 Nos.	4Rx3Cx400mm <sup>2</sup>	M20
450	M75-4 Nos.	4Rx3Cx400mm <sup>2</sup>	M20

**Note :** Customer should specify exact cable OD in mm to select proper cable entry

## Permissible radial/axial load for Standard Motors

The radial load for a given motor depends on the type and size of pulley/pinion chosen and type of driven machine. Radial load can be calculated using the following formula.

$$p = \frac{\alpha \times 973 \times kW}{RPM \times D/2} + W$$

Where,  $\alpha$  = Belt Factor  
 2 for V belts  
 3 for flat belts

kW = Output of the motor in kW.  
 RPM = Speed of the motor in Rev./Min.  
 D = Dia. of pulley in meters.  
 W = Weight of the pulley in kg.

It is recommended that the mounting of pulley/pinion be such that the load acts at the middle of extension of the shaft. For radial loads other than those recommended in Table No. 07, customers are advised to consult LHP for maximum allowable loads.

**Table No. - 07**  
**Permissible Radial and Axial load on Motor**  
**(At the center of extension (Std.) including weight of the pulley)**

Frame Size	Synchronous RPM & Radial Load in Kg.				Permissible Axial Load in Kg.	Recommended Pulley Size Dia.x Width (D x W) in mm.
	3000	1500	1000	750		
63	30	30	30	30	10	52 x 30
71	35	35	35	35	12	60 x 40
80	50	60	60	60	20	100 x 50
90	55	55	65	75	25	125 x 60
100	70	80	80	100	35	150 x 80
112	95	110	110	110	40	200 x 100
132	150	175	200	210	50	225 x 125
160	260	300	325	350	70	275 x 140
180	325	350	400	400	80	315 x 160
200	425	500	575	575	100	355 x 200
225	450	600	650	650	100	400 x 200
250	600	800	900	900	110	400 x 200
280	650	1600	1800	1800	120	450 x 250
315	700	1800	1900	2000	130	500 x 280
355	600	2000	1500	1600	150	550 x 300
400	Refer to LHP					
450						

Note : In case of more axial & radial loads due to application if acting on motor shaft, then inform to LHPL with actual values of loads. LHPL will recommend suitable bearing to bear these more loads.

## Electrical Features

Sr. No. Features	Standard	Optional
1. Supply voltage and frequency	415 ± 10% and 50 Hz ± 5% with combined variations of ± 10%	Voltage up to 690V AC and frequency from 50Hz to 120 Hz
2. Winding and insulation class	Core material is of low loss magnetic steel. Winding wound with dual coat class 'H' copper wire and insulating material and vacuum impregnated with class 'H' (180°C) impregnating resin. Epoxy Gel Coat for frame size 160 & above.	High grade steel and insulation class H can be given on request. And Epoxy Gel coat can be provided on winding for frame size 63 to 132.
3. Rotor	Aluminum die cast rotor dynamically balanced with half key to have low vibration.	Copper rotors can be given on request.
4. Starts	2 Hot, 3 Cold, 4 Equally spread / hr	Other requirement can be given on demand. Customer shall specify GD <sup>2</sup> of load, torque speed curve of equipment and method of starting.
5. Duty	Continuous (S1)	Other duties S2 to S10 can be given on request
6. Starting method	Up to 112 Frame - DOL Starting (6 Pin - Star/Delta) From 112 & above Frame - Star Delta/DOL starting (6 pin T. Block) * However, motors above 132 Frame can be used for DOL starting by making suitable connection.	-
7. Earthing	Provided on frame and inside the terminal box	Can be given as per requirement.
8. Overload	Withstood 160% of rated torque for 15 seconds. Withstood 150% of rated current for 2 minutes.	Other requirement can be given on request.
9. Service factor	1.0	Other service factor can be given on request
10. Accessories	----	BTD, Thermistor/space heater, Thermotrip /Winding RTD'S can be given on request
11. Overspeed	Designed to withstand 120% of rated torque speed for 2 min.	Other ranges can be offered on demand.
12. Altitude	Designed for altitudes upto 1000 mtrs above MSL	Higher altitudes can also be offered on demand.
13. Ambient Temperature	50°C	Above 50°C on request

### Permissible temperature rise :

Standard LHP motors are manufactured with class F insulation and temperature rise restricted to class B insulation.

Class of Insulation	Max. permissible Temp. Limit °C	Max. Permissible Temp. rise for windings at Amb. Temp. in °C			
		40	45	50	60
B	130	80	75	70	60
F	155	105	100	95	85
H	180	125	120	115	105

### Derating factors :

The rating of motor is reduced when ambt. temperature exceeds 50°C and/or the altitude of the site is more than 1000 meters above sea level.

Ambient temp.	% output of motor	Altitude above sea level meters	% output of motor
40°C	100%	1000	100%
45°C	100%	1500	95%
50°C	100%	2000	92%
55°C	95%	2500	90%
60°C	92%	3000	86%
65°C	90%	3500	82%
		4000	80%

## Guidelines for Motors Protection fuse rating

The motors are to be provided with back up fuse protection of suitable ratings in addition to starters (D.O.L. or Star/Delta) being used to protect motors from overload and under voltage. The table given below gives general guidelines for selection of fuse ratings.

**Table No. - 08 Fuse Rating**

### D.O.L. Starting

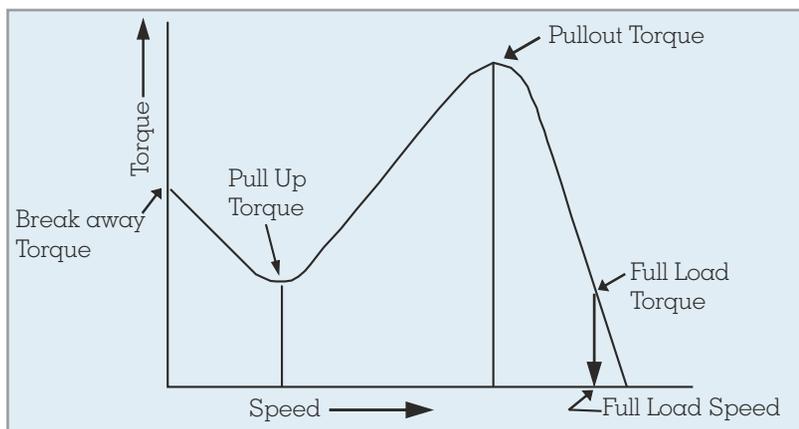
O/P Rating	KW	0.37	0.55	0.75	1.1	1.5	2.2	3.7	5.5	7.5	9.3	11	15	18.5	22	30	37	45	55	75	90
	HP	0.5	0.75	1	1.5	2	3	5	7.5	10	12.5	15	20	25	30	40	50	60	75	100	125
Average Value in AMPS		1	1.3	1.9	2.6	3.7	4.8	7.8	11.2	15	18	21	27	33	39	53	65	78	96	131	156
Fuse Rating		4	6	6	6	10	16	16	25	25	32/35	32/35	50	63	63	100	100	160	160	200	250
Bi-Metal Relay Range		0.5-1	1-2	1-2	1.5-3	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	70-110	90-135	140-170

### Star-Delta Starting

O/P Rating	KW	2.2	3.7	5.5	7.5	9.3	11	15	18.5	22	30	37	45	55	75	90	110	132
	HP	3	5	7.5	10	12.5	15	20	25	30	40	50	60	75	100	125	150	180
Full Load Current Line		4.8	7.8	11.2	15	18	21	27	33	39	53	65	78	96	131	156	185	220
Phase		2.8	4.5	6.5	9	11	12.7	16.8	20.2	23.2	30.6	37.5	46.4	54.5	74	88	107	127
Overload Relay Range Fuse Rating		1.5-3	3-6	4-8	6-12	6-12	10-16	18-24	18.24	12.24	16-32	24-45	32-63	32.63	50-90	80-100	70-110	90-135
		10	16	16	25	25	25	50	50	63	63	80	100	125	160	200	200	250

1. The above are recommended values for H.R.C. delayed action fuse for direct on line starting

### Speed Torque Characteristics



If the voltage varies from its rated value within the permissible limits, the starting, pull-up and pull-out torques vary as the square of the voltage.

### Starting time (T<sub>α</sub>):

The time taken by the motor to achieve its rated speed with load connected.

This Starting Time should be less than the Thermal Withstand Time of motor.

Calculation of Starting Time (T<sub>α</sub>)

$$T_{\alpha} = \frac{K \times \text{Total GD}^2}{\text{Output} \times (K1-K2)}$$

$$K = 24.66 \text{ for 2 pole motor}$$

$$= 6.166 \text{ for 4 pole motor}$$

$$= 2.74 \text{ for 6 pole motor}$$

$$= 1.541 \text{ for 8 pole motor}$$

$$\text{Total GD}^2 = \text{Motor GD}^2 + \text{Load GD}^2$$

Output in kW.

$$k1 = \text{starting torque} / \text{full load torque}$$

$$k2 = \text{load torque} \times k3 / \text{full load torque}$$

$$k3 = 0.3 \text{ for fan \& other centrifugal load}$$

$$= 1 \text{ for constant torque}$$

Starting Time (T<sub>α</sub>) varies inversely as square of voltage

## LHP Motors suitability with VVVF Drive

### Background

Motors which are fed through VVVF drive supply are subjected to rapid increasing peak voltages (i.e. high  $dv/dt$ ). Due to coupling effect of the stator/ rotor & longer length of the supply cables coming from the drive, the peak voltage in phase to phase and phase to ground at the motor terminals can reflect on higher values. The rise of voltage is rapid and depends upon the switching frequencies of IGBT's. These are in the range of 100Hz to 16kHz. Due to the fast rise times of voltage, the voltage drop across first coil from terminals is very high which is harmful to winding insulation. Standard insulation scheme with "Special impregnation process" is suitable for VVVF drive application up to supply voltage of 500V. In

some application with VVVF drive where the supply voltage is greater than 500V, the winding has to be designed to withstand additional peak voltage protection in insulation. This insulation system is called as "Special Insulation Scheme". However this execution is limited for voltage up to 690V only, the peak voltage at the motor terminals can much higher in case of 690V rates motors.

A Impulse voltage insulation category is introduced in IES 60034-18-41 to differentiate the motor insulation for different peak operation voltages at motor terminals.

### **What is VFD?**

It receives electrical energy from three phase or single phase ac supply. It converts the AC supply to a DC. Then through various switching techniques it inverts DC supply to a three phase variable frequency and variable voltage supply.

### **Advantages of using of VVVF on Motors Speed & Torque control**

Stator winding of an induction motor develops a rotating magnetic field. The rotating field rotates at constant speed called synchronous speed given by  $120 \times \text{frequency} / \text{no. of poles}$ . This field induces currents in the rotor bars which produce torque and rotor speeds up close to synchronous speed. As VVVF changes frequency it changes synchronous speed, hence speed of the rotor.

### **Heavy load inertia starting (High $GD^2$ ) :**

Motor does not get heated up during starting as starting current is controlled by VFD. So there is no limit on number of starts and stops and also connected higher load inertia  $GD^2$ .

High efficiency at low speeds.

High P.F. even at low speeds.

VFD motor replaces with advantage DC motors, and slip ring motors.

### **Load Characteristics**

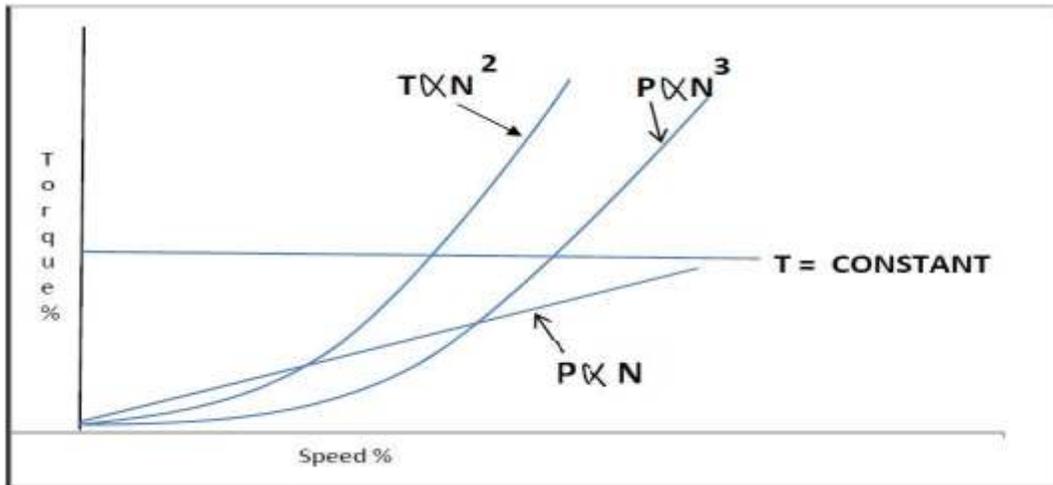
When using a VVVF-motor in an application it is necessary to know torque and speed characteristics of the load. Typically there are three types of loads.

Constant torque: conveyor , cranes , positive displacement pump are the example of constant torque application.

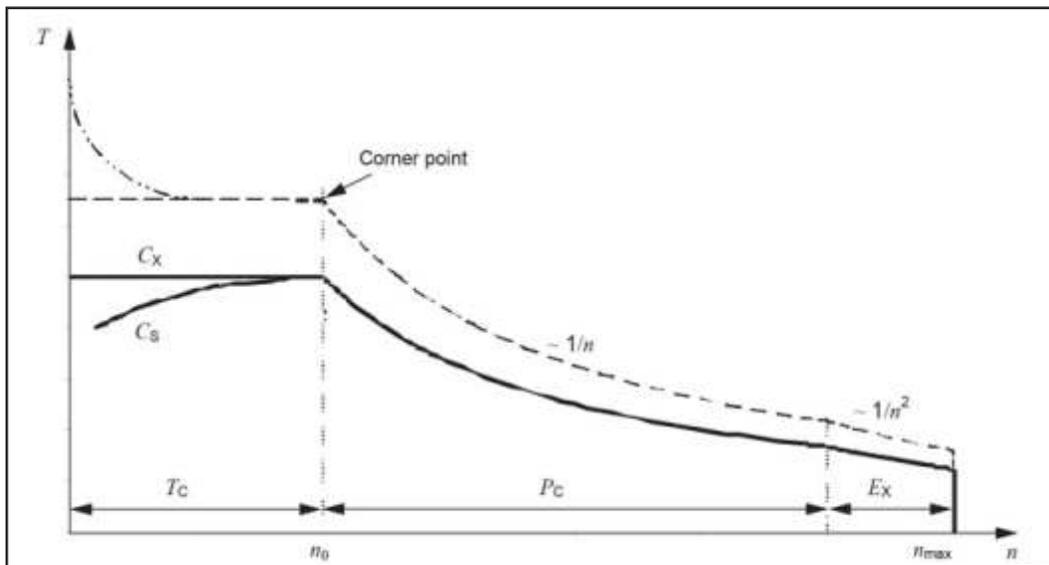
## LHP Motors suitability with VVVF Drive

**Variable torque:** centrifugal pump, fan, blower, compressor are the example of variable torque application.

**Constant HP:** winders, unwinders, drilling machine & certain mixers are the example of variable torque application.



Torque speed capability of motor



**Key**

- |           |                       |  |                        |
|-----------|-----------------------|--|------------------------|
| ————      | Continuous operation  | $T_c$ Constant torque range                              | $C_x$ Separate cooling |
| -----     | Short-time operation  | $P_c$ Constant power range                               | $C_s$ Self-cooling     |
| -----     | Starting torque boost | $E_x$ Extended range (for induction electrical machines) | $T$ Torque             |
| $n$       | Speed                 | $n_0$ Speed at corner point                              |                        |
| $n_{max}$ | Maximum speed         |  |                        |

Note : During starting with load inertia, a voltage boost is necessary at <20% of frequency/speed.

High starting torque & low starting current requirement: The current setting of VFD is to be adjusted as per starting torque desired. For example if starting torque of 150% is desired the current setting is to be adjusted to 250%.

## LHP Motors suitability with VVVF Drive

### Duty details

Lhp VFD Motors can be used for different duty cycles. For special duties like S6 and above with load cycles With respect to time duration needed to design suitable motor torque and speed requirement. High impact loads, rapid increase , decrease loads if any shall be also be confirmed.

### Operating speed range & insulation class/ temperature rise requirement

eg- 10% to 100% speed variation with temperature rise F/B or F/F or H/F etc.

In case of constant torque application, if speed range required from 10 to 100%, motor can be de rated and supplied in higher frame size. If with constraint of space in field, motor can supplied in same frame size with forced cooled ( only above 132 frame size).

### Method of cooling -

Depending upon application requirement, customer to specify-TEFC- IC411 / Forced cooled- IC416 or TENC- IC410 ( straight or circular fins frame) etc.

### Explosive area classification

Customer to specify Gas Group, Zone, Temperature class, ambient temperature for both gas & dust explosive areas.

A combined test of Ex motor with proposed Invertor is mandatory to assess the temp class of motor and necessary statutory & regulatory certification to be obtained.

In case of integration of thermal sensor embedded in motor with invertor for disconnection of motor from drive supply, a combined test is waved except for Increased safety Ex eb & Ex ec motors. In such motors temperature class will be T3.

### Customer/ System integrator shall ensure

- Voltage at motor terminal after considering voltage drop in all equipment's/ cable in between drive and motor. A detailed voltage drop calculation required during enquiry.
- The peak impulse voltage (0 to peak) that is expected to occur at the motor terminals from drive
- The rise time,  $t_r$ , of the impulse of drive

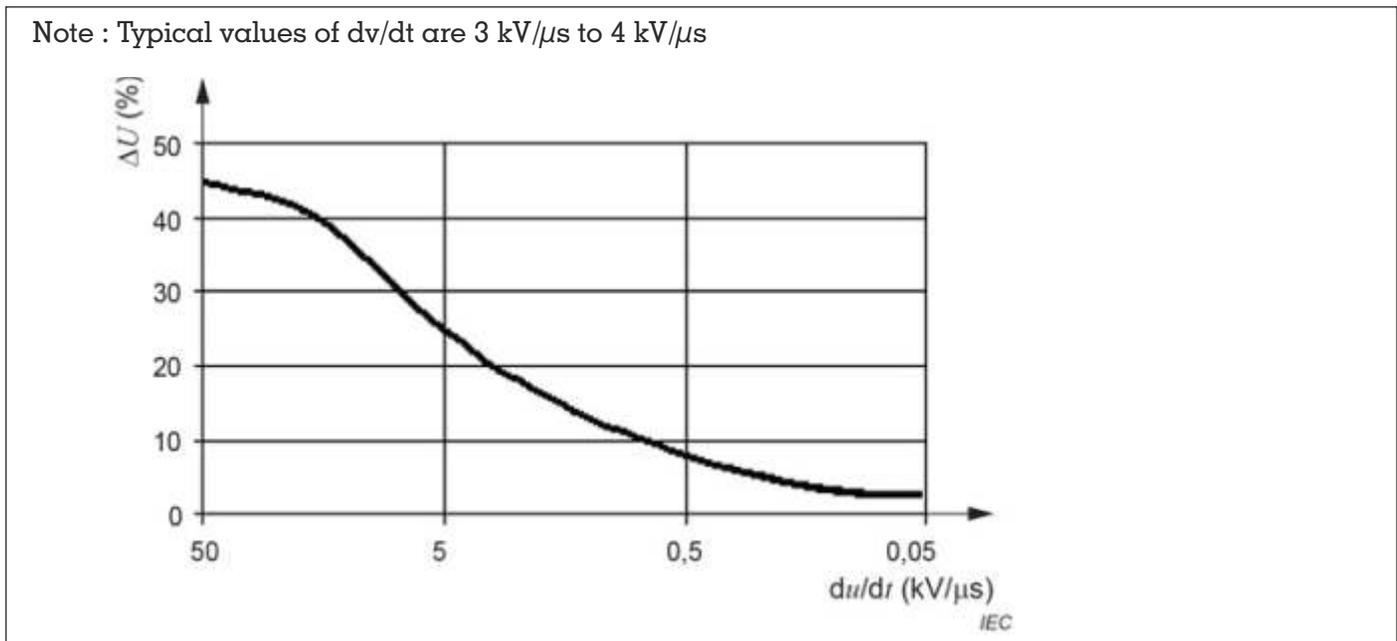
### VVVF parameters from drive considered if not specified.

As per IEC 60034-18-41:2014 + Amd No 1 2019, IS 15880:2009, IEC-TS 60034-25:2022

Drive Parameters	Specifications
Voltage Harmonics $V_{thd}$	< 10% or customer to specify
Impulse rise time	> 0.3 $\mu$ Sec
Individual / multi-motors on drive	Individual. If multiple, customer to specify acceleration /stall time
Pulse duration	> 0.6 $\mu$ Sec
$Dv/dt$	Refer chart on page no. 13
Switching frequency	3- 5 KHz
Invertor type	PWM or Customer to specify
Drive type , make , model & rating	Customer to specify
Details of pulse	38/ 48 Customer to specify

## LHP Motors suitability with VVVF Drive

dv/dt.- as per IEC TS 60034-25:2014@IEC 2022

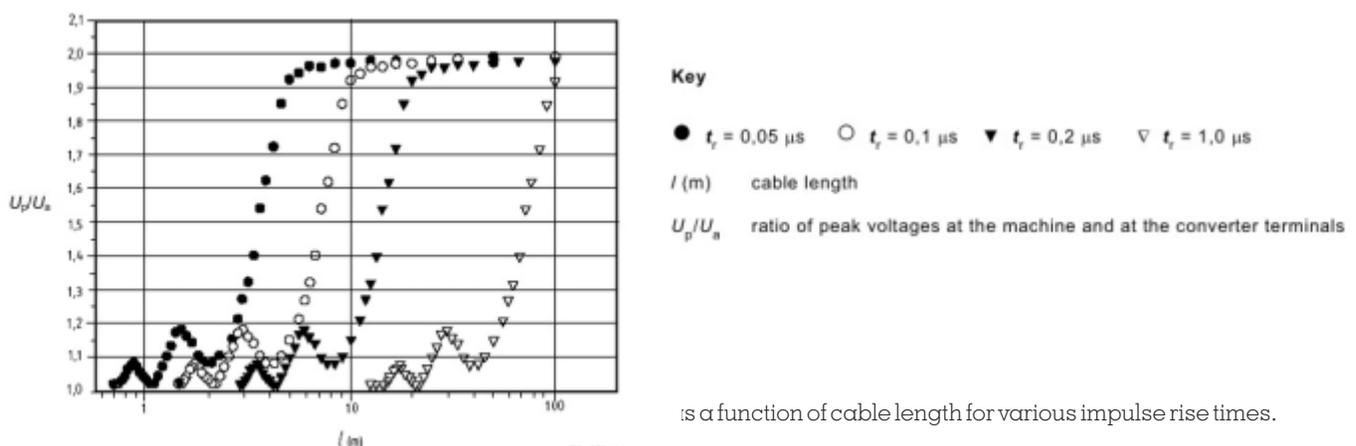


Typical first turn voltage  $\Delta U$  (as a percentage of the line-to-ground voltage) as a function of  $du/dt$

Customer to specify the values of  $dv/dt$  of drive.

### Cable length between drive motor, along with peak voltage limit for motor insulation.

Customer to specify the total cable length between drive and motor to assess the voltage enhancement wrt impulse rise time as per below figure. (ref- IEC60034-18-41:2014 amd No 1:2019)



is a function of cable length for various impulse rise times.

LHP recommend to use sinusoidal filter to mitigate the Peak voltage and Voltage harmonics due to longer cable, which will safe guard the motor insulation and prevent failures. If other types of filters used, same shall be informed.

### Accessories requirement- Customer to specify required accessories

- Encoder- At rear side of motor mounted.
- RTD, Thermistor- Embedder in motor winding
- BTD- For bearing temp monitoring

## LHP Motors suitability with VVVF Drive

### Stress category IVIC class for LHP standard & customised VVVF Motors

As per IEC 60034-18-41:2014 @ IEC 2014 + Amd No 1 2019.

Stress category of IVIC ( Impulse Voltage Insulation Class)	Max peak to peak operating voltage For rated voltage 415V	Max peak to peak operating voltage For rated voltage 690V
IVIC -B- Moderate- Type I insulation for LHP standard VVVF motors Phase/phase maximum operating voltage Phase/ground maximum operating voltage	1.85KV 1.29KV	3.07KV 2.15KV
*IVIC-C- Severe- Type I insulation for Customer specific VVVF Motor requirement Phase/phase maximum operating voltage Phase/ground maximum operating voltage	2.46KV 1.73KV	4.09KV 2.87KV
*IVIC-D- Extreme - Type I insulation for Customer specific VVVF Motor requirement Phase/phase maximum operating voltage Phase/ground maximum operating voltage	3.08KV 2.16KV	5.13KV 3.60KV

\*Note- Customer to specify the requirement of IVIC -C- Severe or D- Extreme category. In case of longer cable lengths, with common DC link and motor operation in regeneration braking, stress IVIC -D is applicable. Customer to confirm such power drive systems to LHP for ensuring suitability of IVIC Insulation class including sporadic peak voltage if any.

### Acceleration time / Deceleration time

Customer to specify ( Required by testing laboratory ).

### Earthing

High frequency earthing (at customer's end). Proper VFD and motor shall be earthed to common earth pit.

### Bearing currents

Insulated bearings or bearing constructions, common mode filters and suitable shielded cabling and grounding methods must be used accordingly to prevent bearing currents.

Insulated bearings which have aluminium oxide coated inner and/or outer bores or ceramic rolling elements, are recommended. Aluminium oxide coatings shall also be treated with a sealant to prevent dirt and humidity penetrating into the porous coating. For the exact type of bearing insulation, see the motor's rating plate. Changing the bearing type or insulation method without LHP's permission is prohibited. Elimination of bearing currents with converters, the user is responsible for protecting the motor and driven equipment from harmful bearing currents, but their effectiveness cannot be guaranteed in all cases.

### Insulation bearing

On request for <250 frame and For >280 frame insulated bearing is recommended.

# INDUSTRIAL MOTORS



## LHP Energy Efficient Motors

Induction motors account for about 60 % of the electric energy consumed in industries. Looking at this, way back LHP has started concentrating on energy saving motor development.

Due to the increasing electrical energy demand, Global warming & increase in prices of fossil fuels, nowadays energy efficiency has become the dominant important.

The new regulations came into force in 01st January 2018 and require industrial users to move to IE2 or higher efficiency motors in India. As per this regulation (Quality control order) by Gov. of India, minimum energy performance standards for line operated 3phase induction motors in India shall be IE2 class.

LHP range of energy efficient motors are designed taking in to account Indian site conditions like quality of power supply, application, maintenance etc.

LHP has introduced the complete range of IE2, IE3 & IE4 motors as per latest IS/IEC standard with BIS certification.

New efficiency classes have been defined in IS:12615-2018 or IEC 60034-30-1:2014 for Induction motors with prefix IE = International Efficiency.

The comparison is as below

Old Nomenclature	New Nomenclature
---	IE 4
---	IE 3
EFF 1	IE 2
EFF 2	IE 1 (now withdrawn)
Stray losses assumed lump sum of 0.5%	Stray losses to be evaluated actually

Stray load losses are due to leakage fluxes induced by load current, non-uniform current distribution, mechanical air-gap imperfection...These losses can be reduced by design optimization and manufacturing method improvements.

As per earlier standard (Eff) stray load losses are to be assumed and efficiency determined. However in new standard (IE) stray load losses are to be evaluated actually by test. This evaluation required special testing facility. LHP has established this facility up to 1000kW.



**LHP Energy Efficient Motors - IE2/IE3/IE4**  
Upto 1000kW

# INDUSTRIAL MOTORS

## LHP Energy Efficient Motors

### REGENERATIVE TEST PLANT - Upto 1000kW



When motor is designed to achieve higher efficiency, we have to use materials of higher quality and quantity. Due to this cost of motor will increase compared to lower efficiency motor cost. However running cost of energy efficient motor will be less compared to lower efficiency motors. While purchasing the motor we have to consider both running as well as lifetime running cost. Generally motor life will be 20 years. If you compare life cost of motor with purchase price, you will find that purchase cost is hardly 1.5 to 2 % of life time cost of motor. (8 to 10 Hrs of running daily)

The investment is straight forward: install electric motors having the highest electrical energy efficiency commensurate with your needs. LHP Energy-efficient motors pay for themselves in a few years or sometimes even a few months, after which they will continue to pile up savings worth many times their purchase cost for as long as they remain in service. We should consider operating costs also, not just first cost when buying a new motor.

Applications:- These machines are suitable for Machine tools, Textile, Air conditioning, Dairy Equipments, Packing machines, Material handling, Motorised geared units, Wood working and seasoning plants, Solvent extraction plant, Oil mills, Cement, sugar, steel plants apart from regular other continuous applications where high energy saving is essential.

Apart from energy saving other advantages of these motors are

- Short payback period.
- Enhance motor life.
- Less maintenance

Latest IS-12615 is based on the International Standard IEC 60034-30:2014 which defines Efficiency Classification for single speed, three phase, induction motors.



## LHP Energy Efficient Motors

Efficiency depends on the total energy losses in the motor. Energy losses in electric motors fall into four categories:

- Copper (Conductor) losses
- Magnetic core (Iron) losses
- Friction and windage losses, and
- Stray load losses.

In order to improve the efficiency, we have to reduce the losses in the above four categories. This is achieved by proper designing with change in quality and quantity of materials. Changes required depends on the amount of efficiency improvement required.

### Weight difference-

As explained above, active material like copper and laminations volume is required to be increased to reduce the losses. This will increase the weight of the motor. (Increase depends on motor size and amount of improvement in efficiency required)

### Bearing size difference in IE2/IE3/IE4 Motors-

For some critical ratings we have to use energy efficient bearing to reduce the friction loss. No difference in bearing life compared to standard motors.

### Considerations for selection and usage of IE2, IE3, IE4 motors

#### Motor size

The load factor should be chosen between 65% and 100% so that the advantage of saving energy is achieved. If the motor is under-sized i.e. in a situation where the load factor is less than 65%, the desired energy saving may not be achieved. The efficiency under such condition standard motor efficiency curve will be in drooping nature, but energy efficient motors have flat efficiency curve, hence fall in efficiency is marginal. Thus energy saving is significant even in partial loads.

#### Operating speed

IE motors have less slip compared to standard motors. Hence, their operating speed is more. This may adversely affect the operating efficiency of the motor pump or the motor fan in case of centrifugal application.

#### Starting current

The resistance of IE motors is low as compared to standard motors. This results in a high starting current and inrush current. The connected system and control gears should be capable of handling the higher starting current.

#### Method of testing efficiency

The efficiency method used to evaluate the efficiency of IE motors is more stringent than the method used in case of standard motors. So there may be cases where standard motor's efficiency may appear to be closer to IE efficiency. However, in the actual usage IE motors consume less power.

#### VFD application

When IE motors are used in conjunction with VFDs, they result in energy saving irrespective of the type of load like intermittent loading, heavy starting duty, etc. Further, the higher inrush current is not encountered by the motor because the VFD

modifies the starting current of the motor. It applies low voltage, low frequency supply at the time of starting.

### LHP IE motors conform to IEC60034-30-1:2014 and 18:12615-2018

- Suitable for continuous process industries where high energy saving is essential
- Short payback period for replacement
- Enhanced motor life
- Less maintenance

#### Applications

- Machine tools
- Textiles
- Air conditioning
- Dairy equipments
- Packing machinery
- Material handling equipments
- Geared motors
- Wood seasoning plants
- Solvent extraction plants
- Edible oil factories
- Cement Plants
- Paper Mills
- Sugar Factory
- Steel plants
- Cooling Towers
- Indian Railway
- Indian Navy
- Mines
- Petrochemical
- Refineries
- Chemical Industries

#### Assessing cost effectiveness

Savings calculated as follows :

**kW = Output of motor**

**E1 = Efficiency of standard motor**

**E2 = Efficiency of IE4 motors.**

**X = kW/E1 kW/E2**

**Savings = X \* working hours \* working days \* Tariff.**

If used VFD any reduction will accrue in efficiency.

Efficiency of motor depends on the quality of power supply. If VFD is used, Power supply through VFD will have harmonics. These harmonics will generate additional losses in the motor which will reduce the efficiency. Harmonics in the output of different makes of inverter are different (Depends on individual make design).

However as a general guidelines as per IS 12615-2018 When used with variable frequency drive, the efficiency of the motor can be lower. Hence these motors shall be tested on sinusoidal power supply for efficiency determination.

## High Efficiency TEFC SC Motors - IE2

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-2, 2-Pole conforms to IS 12615 ,IS 15999-1,IEC60034-1,IEC60034-30

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	2750	0.43	0.04	4.0	2.7	3.0	53.6	53.6	52.0	0.72	0.65	0.55	0.00084	5/6	10	20	42	125
0.18	0.25	63	2750	0.58	0.06	4.0	2.2	2.6	60.4	60.4	60.0	0.72	0.65	0.55	0.00094	6/7	10	20	42	125
0.25	0.33	63	2750	0.75	0.09	4.0	2.5	2.8	64.8	59.0	53.0	0.72	0.66	0.56	0.00104	6/8	10	20	42	125
0.37	0.5	71	2750	1	0.13	5.0	2.4	2.8	69.5	69.5	66.0	0.74	0.67	0.57	0.0015	7/10	10	20	42	125
0.55	0.75	71	2760	1.4	0.19	5.0	2.9	3.5	74.1	74.1	72.4	0.74	0.73	0.61	0.0017	7/11	10	20	42	125
0.75	1	80	2805	1.7	0.26	5.5	2.5	2.8	77.4	77.4	76.0	0.78	0.74	0.60	0.005	10/14	10	20	42	125
1.1	1.5	80	2820	2.5	0.38	5.5	2.7	3.0	79.6	79.6	79.0	0.78	0.76	0.62	0.006	11/15	10	20	42	125
1.5	2	90S	2810	3.2	0.52	5.5	2.3	2.7	81.3	81.3	80.3	0.79	0.78	0.65	0.008	17/25	10	20	42	125
2.2	3	90L	2816	4.7	0.76	6.0	2.3	2.7	83.2	83.0	82.5	0.78	0.77	0.64	0.010	18/26	10	20	42	125
3	4	100L	2840	5.9	1.03	7.0	2.4	2.8	84.6	84.6	83.8	0.84	0.81	0.74	0.024	21/28	8	16	33	100
3.7	5	100L	2870	7.1	1.26	7.0	2.9	3.0	85.5	85.5	84.0	0.85	0.82	0.7	0.025	22/30	8	16	33	100
4	5.5	112M	2865	7.5	1.36	5.5	1.7	2.1	85.8	85.8	84.8	0.86	0.83	0.74	0.031	30/42	8	16	33	100
5.5	7.5	132S	2925	10.3	1.83	6.5	2.0	2.5	87.0	87.0	85.0	0.85	0.8	0.72	0.071	48/61	8	16	33	100
7.5	10	132S	2940	13.9	2.48	7.0	2.2	2.6	88.1	88.0	86.8	0.85	0.82	0.75	0.082	49/68	8	16	33	100
9.3	12.5	160M	2930	16.5	3.09	6.0	1.8	2.2	88.9	88.9	88.0	0.88	0.86	0.84	0.183	102	10	22	42	125
11	15	160M	2930	19.9	3.66	6.0	1.9	2.3	89.4	89.4	88.5	0.86	0.85	0.84	0.187	118	10	22	42	125
15	20	160M	2955	26.9	4.94	7.0	2.2	2.5	90.3	90.3	88.0	0.86	0.85	0.84	0.231	125	10	22	42	125
18.5	25	160L	2950	31.5	6.11	7.0	1.9	2.3	90.9	90.9	89.0	0.90	0.88	0.85	0.231	140	10	22	42	125
22	30	180M	2940	37.2	7.29	7.0	2.5	2.9	91.3	91.3	89.3	0.9	0.88	0.86	0.042	181	10	22	42	125
30	40	200L	2965	50.4	9.85	7.0	2.9	3.2	92.0	91.0	89.5	0.9	0.88	0.85	0.542	245	12	27	50	150
37	50	200L	2960	62.5	12.2	7.0	2.5	2.8	92.5	92.0	91.8	0.89	0.88	0.87	0.618	260	12	27	50	150
45	60	225M	2965	73.2	14.8	7.0	2.3	2.7	92.9	92.9	91.0	0.92	0.9	0.89	1.223	330	12	27	50	150
55	75	250M	2965	94.4	18.1	7.0	1.8	2.3	93.2	92.2	91.2	0.87	0.85	0.82	1.454	465	12	27	50	150
75	100	280S	2965	128	24.6	7.0	2.0	2.5	93.8	93.0	91.0	0.87	0.86	0.81	2.794	650	15	33	50	150
90	120	280M	2970	151	29.5	7.0	1.8	2.3	94.1	93.8	92.0	0.88	0.87	0.85	3.98	720	15	33	50	150
110	150	315S	2980	184	36.0	7.0	1.7	2.1	94.3	94.3	93.8	0.88	0.87	0.86	7.31	800	15	33	50	150
125	170	315M	2980	204	40.9	7.0	1.8	2.3	94.5	94.5	93.0	0.90	0.89	0.84	8.48	840	15	33	50	150
132	180	315M	2980	216	43.1	6.5	1.9	2.3	94.6	94.6	93.0	0.90	0.88	0.85	8.48	860	15	33	50	150
160	215	315L	2980	255	52.3	7.0	1.9	2.3	94.8	94.8	94.5	0.92	0.91	0.88	9.73	1050	15	33	63	188
180	240	315L	2985	293	58.7	7.0	2.0	2.4	94.9	94.5	93.5	0.90	0.88	0.85	10.45	1070	15	33	50	150
200	270	315L	2985	325	65.3	7.0	2.0	2.4	95.0	94.6	93.0	0.90	0.88	0.85	11.66	1085	15	33	50	150
250	335	355L	2984	411	82	7.0	1.8	2.2	95.0	94.5	92.7	0.89	0.86	0.8	19.97	1740	15	33	63	188
315	425	355L	2984	518	103	7.0	1.8	2.2	95.0	94.6	92.8	0.89	0.86	0.8	23.28	1890	15	33	63	188
355	475	355L	2984	578	116	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.8	28.38	2725	15	33	63	188
375	503	355L	2985	610	122	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.81	29.75	2279	15	33	63	188
400	536	355L	2985	651	131	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	31.89	2372	15	33	63	188
450	603	355L	2985	732	147	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	35.23	2544	15	33	63	188
500	* 670	355L	2985	805	163	7.0	1.8	2.5	95.0	94.7	93.1	0.91	0.88	0.81	38.66	2640	15	33	63	188
560	*750	400M/L	2988	901	183	7.0	1.7	2.5	95.0	94.8	92.9	0.91	0.88	0.82	45.6	3081	18	40	63	188
630	*845	400M/L	2988	1014	205	7.0	1.7	2.5	95.0	94.8	93.0	0.91	0.88	0.82	51.3	3145	18	40	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## High Efficiency TEFC SC Motors - IE2

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-2, 4-Pole conforms to IS 12615 ,IS 15999-1,IEC60034-1,IEC60034-30

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	1325	0.4	0.09	3.5	2.0	2.5	59.1	58.0	55.0	0.69	0.56	0.48	0.0013	5/6	15	30	42	125
0.18	0.25	63	1325	0.60	0.13	3.5	2.0	2.5	64.7	63.5	60.0	0.65	0.62	0.52	0.0015	6/7	15	30	42	125
0.25	0.33	71	1400	0.75	0.17	5.0	2.4	2.8	68.5	68.0	62.0	0.68	0.65	0.50	0.0037	8/11	10	20	42	125
0.37	0.50	71	1400	0.98	0.26	5.0	2.5	2.8	72.7	72.0	68.0	0.72	0.65	0.50	0.0043	8/11	10	20	42	125
0.55	0.75	80	1415	1.3	0.38	5.5	2.5	2.8	77.1	75.6	73.0	0.76	0.73	0.55	0.012	9/15	10	20	42	125
0.75	1.0	80	1410	1.7	0.52	5.5	2.5	2.8	79.6	76.5	75.0	0.78	0.74	0.60	0.013	11/16	10	20	42	125
1.1	1.5	90S	1410	2.4	0.76	5.5	2.3	2.6	81.4	79.0	78.0	0.78	0.72	0.54	0.014	14/23	10	20	42	125
1.5	2.0	90L	1420	3.2	1.03	6.0	2.5	2.8	82.8	82.0	81.3	0.79	0.70	0.57	0.018	17/27	10	20	42	125
2.2	3.0	100L	1425	4.8	1.50	6.0	2.2	2.6	84.3	83.3	82.5	0.76	0.70	0.60	0.033	20/28	8	16	33	100
3	4.0	100L	1430	6.5	2.04	6.0	2.3	2.6	85.5	82.0	81.5	0.75	0.7	0.63	0.039	24/34	8	16	33	100
3.7	5.0	112M	1430	7.3	2.52	6.0	2.5	2.9	86.3	85.5	85.0	0.82	0.77	0.67	0.052	32/44	8	16	33	100
4	5.5	112M	1430	7.8	2.72	6.0	2.6	2.9	86.6	85.8	85.0	0.82	0.78	0.68	0.054	36/46	8	16	33	100
5.5	7.5	132S	1455	10.6	3.68	7.0	2.4	2.8	87.7	87.5	86.5	0.82	0.76	0.68	0.121	53/69	8	16	33	100
7.5	10.0	132M	1450	14.0	5.04	7.0	2.3	2.8	88.7	88.5	88.0	0.84	0.78	0.70	0.135	58/74	8	16	33	100
9.3	12.5	160M	1450	17.2	6.25	7.0	2.2	2.5	89.3	88.8	88.0	0.84	0.78	0.65	0.248	107	10	22	42	125
11	15	160M	1460	20.0	7.34	7.0	2.0	2.5	89.8	89.6	89.3	0.85	0.83	0.74	0.256	120	10	22	42	125
15	20	160L	1460	27.1	10	7.0	2.0	2.5	90.6	90.5	90.0	0.85	0.82	0.74	0.332	140	10	22	42	125
18.5	25	180M	1465	33.2	12.3	7.0	2.4	2.7	91.2	91.0	90.8	0.85	0.82	0.75	0.732	163	10	22	42	125
22	30	180L	1470	38.4	14.6	7.0	2.2	2.6	91.6	91.3	90.8	0.87	0.84	0.77	0.805	186	10	22	42	125
30	40	200L	1470	51.4	19.9	7.0	2.2	2.6	92.3	91.7	91.0	0.88	0.85	0.79	1.091	260	12	27	50	150
37	50	225S	1470	63.8	24.5	7.0	2.5	3.0	92.7	92.3	91.6	0.87	0.84	0.75	1.627	310	12	27	50	150
45	60	225M	1470	76.4	29.8	7.0	2.3	2.9	93.1	92.5	92.0	0.88	0.84	0.79	1.875	340	12	27	50	150
55	75	250M	1475	96.3	36.3	7.0	2.0	2.6	93.5	93.2	92.4	0.85	0.84	0.76	2.562	472	12	27	50	150
75	100	280S	1480	129	49.4	7.0	2.0	2.6	94.0	93.5	92.2	0.86	0.82	0.76	4.564	660	15	33	63	188
90	120	280M	1480	155	59.2	7.0	2.2	2.6	94.2	94.0	93.4	0.86	0.84	0.79	4.564	730	15	33	63	188
110	150	315S	1485	184	72.1	6.5	2.0	2.5	94.5	94.3	94.0	0.88	0.86	0.82	10.17	810	15	33	63	188
125	170	315M	1485	209	82.0	6.5	2.0	2.5	94.6	94.2	94.0	0.88	0.86	0.83	11.55	890	15	33	63	188
132	180	315M	1485	220	86.6	6.0	2.0	2.5	94.7	94.3	94.0	0.88	0.86	0.83	12.19	910	15	33	63	188
160	215	315L	1485	267	104.9	7.0	2.2	2.7	94.9	93.8	93.0	0.88	0.86	0.80	14.77	1060	15	33	63	188
180	240	315L	1485	300	117.8	7.0	1.8	2.4	95.0	94.0	93.0	0.88	0.86	0.82	16.46	1080	15	33	63	188
200	270	315L	1485	329	130.7	6.0	2.0	2.6	95.1	95.0	94.8	0.89	0.88	0.84	18.20	1100	15	33	63	188
250	335	355L	1485	416	164	7.0	2.20	2.5	95.1	94.8	93.9	0.88	0.86	0.82	27.186	1860	15	33	63	188
315	425	355L	1485	524	207	7.0	2.20	2.5	95.1	94.6	94.0	0.88	0.86	0.83	33.546	1930	15	33	63	188
355	475	355L	1485	590	233	7.0	2.20	2.5	95.1	94.5	93.1	0.88	0.86	0.83	37.036	1970	15	33	63	188
375	503	355L	1485	616	246	7.0	2.20	2.5	95.1	94.9	93.5	0.89	0.86	0.83	38.786	2204	15	33	63	188
400	536	355L	1485	657	262	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.86	0.83	41.236	2270	15	33	63	188
450	603	355L	1485	740	295	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.87	0.84	45.896	2552	15	33	63	188
500	*670	355L	1485	822	328	7.0	2.10	2.4	95.1	94.6	93.2	0.89	0.87	0.84	49.956	2954	15	33	63	188
560	*750	400M/L	1486	900	367	7.0	2.10	2.5	95.1	94.8	94.0	0.91	0.9	0.85	87.698	3846	15	33	63	188
630	*845	400M/L	1490	1013	412	7.0	2.00	2.5	95.1	94.6	93.6	0.91	0.9	0.85	95.288	3200	15	33	63	188
710	*952	400M/L	1490	1141	464	7.0	2.00	2.5	95.1	94.7	93.6	0.91	0.9	0.85	105.188	4340	15	33	63	188
800	*1072	450M/L	1492	1286	522	7.0	2.10	2.5	95.1	94.8	93.8	0.91	0.9	0.86	158.983	6346	15	33	63	188
900	*1206	450M/L	1492	1447	588	7.0	2.10	2.5	95.1	94.8	93.8	0.91	0.9	0.86	177.283	6641	15	33	63	188
1000	*1340	450M/L	1492	1608	653	7.0	2.10	2.5	95.1	94.8	93.9	0.91	0.9	0.86	195.583	6900	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body
- E) 9.3 kW 4 Pole in 132M frame are suitable for 40°C ambient.

## High Efficiency TEFC SC Motors - IE2

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-2, 6-Pole conforms to IS 12615 ,IS 15999-1, IEC60034-1, IEC60034-30

### Performance Table for 6 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg.m <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	880	0.5	0.13	4.0	1.9	2.3	50.6	49.6	48.1	0.68	0.62	0.45	0.0036	6/9	10	20	42	125
0.18	0.25	71	890	0.7	0.20	4.0	1.9	2.3	56.6	54.5	45.2	0.65	0.55	0.45	0.0036	7/10	10	20	42	125
0.25	0.33	71	900	0.9	0.27	4.5	1.9	2.3	61.6	60.0	55.0	0.65	0.55	0.45	0.0046	8/11	10	20	42	125
0.37	0.5	80	910	1.1	0.40	4.5	1.9	2.3	67.6	67.6	66.0	0.71	0.66	0.53	0.0097	9/15	10	20	42	125
0.55	0.75	80	930	1.5	0.58	4.5	2.0	2.5	73.1	72.0	68.0	0.72	0.64	0.5	0.0118	11/16	10	20	42	125
0.75	1.0	90S	910	2.0	0.80	4.5	1.7	2.1	75.9	73.2	70.0	0.68	0.64	0.55	0.0134	15/25	10	20	42	125
1.1	1.5	90L	910	2.9	1.18	4.5	2.0	2.6	78.1	77.2	76.0	0.68	0.61	0.47	0.0175	18/27	10	20	42	125
1.5	2.0	100L	940	3.8	1.55	5.0	1.9	2.3	79.8	78.2	77.0	0.69	0.64	0.52	0.0502	21/33	10	20	42	125
2.2	3.0	112M	950	5.2	2.26	5.5	2.0	2.4	81.8	81.8	80.5	0.72	0.69	0.55	0.0794	32/42	10	20	42	125
3	4.0	132S	950	6.6	3.08	6.0	1.8	2.2	83.3	82.8	81.8	0.76	0.70	0.55	0.128	60	10	20	42	125
3.7	5.0	132S	945	8.0	3.81	6.0	1.6	2.0	84.3	84.0	83.8	0.76	0.72	0.6	0.136	65	10	20	42	125
4	5.5	132M	955	8.8	4.08	7.0	1.9	2.3	84.6	84.0	83.5	0.75	0.69	0.58	0.153	75	10	20	42	125
5.5	7.5	132M	960	11.4	5.58	6.0	1.7	2.1	86	85.4	82.6	0.78	0.74	0.62	0.177	80	10	20	42	125
7.5	10	160M	970	14.6	7.53	6.0	1.8	2.2	87.2	86.5	84.0	0.82	0.78	0.70	0.361	110	10	22	42	125
9.3	12.5	160L	960	17.9	9.44	6.0	1.7	2.1	88.1	88.0	87.5	0.82	0.78	0.70	0.316	122	10	22	42	125
11	15	160L	960	21.0	11.2	5.5	1.8	2.2	88.7	87.7	87.0	0.82	0.78	0.70	0.463	141	10	22	42	125
15	20	180L	980	28.4	14.9	6.0	2.2	2.9	89.7	89.3	89.0	0.82	0.77	0.65	0.978	195	10	22	42	125
18.5	25	200L	975	33.5	18.5	7.0	1.6	2.0	90.4	90.0	87.6	0.85	0.83	0.72	1.171	235	10	22	42	125
22	30	200L	980	39.6	21.9	7.0	2.5	3.0	90.9	90.5	90.0	0.85	0.83	0.72	1.477	250	12	27	50	150
30	40	225M	980	53.5	29.8	5.5	2.3	2.9	91.7	91.5	91.0	0.85	0.84	0.78	3.018	355	12	27	50	150
37	50	250M	980	66.5	36.8	6.0	1.8	2.2	92.2	92.0	91.7	0.84	0.82	0.75	3.887	475	12	27	50	150
45	60	280S	985	79.5	44.5	7.0	2.0	2.4	92.7	92.5	91.5	0.85	0.83	0.8	6.704	615	15	33	63	188
55	75	280M	980	96.7	54.7	6.5	2.5	3.0	93.1	92.5	91.0	0.85	0.83	0.80	8.792	705	15	33	63	188
75	100	315S	990	131	73.8	6.0	2.2	2.8	93.7	93.3	93.0	0.85	0.83	0.80	11.424	885	15	33	63	188
90	120	315M	990	157	88.5	7.0	2.0	2.6	94	93.8	93.5	0.85	0.83	0.81	14.704	930	15	33	63	188
110	150	315M	990	189	108.2	7.0	2.0	2.5	94.3	94.2	94.0	0.86	0.84	0.81	18.524	1093	15	33	63	188
125	170	315L	990	216	123.0	7.0	1.7	2.1	94.5	94.5	94.3	0.85	0.83	0.82	21.794	1120	15	33	63	188
132	180	315L	990	226	129.9	7.0	2.0	2.5	94.6	94.2	93.0	0.86	0.84	0.80	21.794	1130	15	33	63	188
160	215	355L	990	276	157.4	7.0	2.0	2.5	94.8	94.0	93.0	0.85	0.82	0.80	38.50	1780	15	33	63	188
180	240	355L	990	310	177	7.0	1.80	2.2	94.9	94.5	93.5	0.85	0.83	0.78	43.536	1850	15	33	63	188
200	270	355L	990	345	197	7.0	1.80	2.2	95.0	94.8	93.6	0.85	0.83	0.78	47.766	1935	15	33	63	188
250	335	355L	990	431	246	7.0	1.80	2.3	95.0	94.8	93.2	0.85	0.82	0.76	58.33	2065	15	33	63	188
315	425	355L	991	543	310	7.0	1.80	2.2	95.0	94.5	93.0	0.85	0.82	0.77	72.206	2300	15	33	63	188
355	475	355L	991	612	349	7.0	1.80	2.2	95.0	94.8	93.4	0.85	0.82	0.77	80.666	2484	15	33	63	188
375	503	355L	991	646	369	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	84.896	2643	15	33	63	188
400	536	355L	991	689	393	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	90.186	2654	15	33	63	188
450	603	400M/L	992	775	442	7.0	1.90	2.5	95.0	94.9	93.5	0.85	0.82	0.76	101.45	3776	15	33	63	188
500	*670	400M/L	992	861	491	7.0	1.90	2.5	95.0	94.9	93.5	0.85	0.82	0.76	112.22	4011	15	33	63	188
560	*750	400M/L	992	965	550	7.0	1.90	2.5	95.0	94.9	93.5	0.85	0.82	0.76	125.44	4161	15	33	63	188
630	*845	450M/L	993	1085	618	7.0	1.90	2.5	95.0	94.9	93.5	0.85	0.82	0.76	187.163	4600	15	33	63	188
710	*952	450M/L	993	1223	696	7.0	1.90	2.5	95.0	94.9	93.5	0.85	0.82	0.76	206.873	4765	15	33	63	188
800	*1072	450M/L	993	1378	785	7.0	1.90	2.5	95.0	94.3	92.8	0.85	0.82	0.76	228.293	5125	15	33	63	188

\*Temperature rise limited to class "F" (95K)

#### Note :

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## High Efficiency TEFC SC Motors - IE2

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-2, 8-Pole conforms to IS 12615 ,IS 15999-1,IEC60034-1,IEC60034-30

### Performance Table for 8 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	630	0.58	0.19	3.0	1.7	2.0	39.8	37.2	36.3	0.72	0.60	0.48	0.0034	7/10	15	30	63	188
0.18	0.25	80	700	0.76	0.25	3.0	1.7	2.0	45.9	45.5	45.2	0.72	0.60	0.48	0.0107	10/17	15	30	63	188
0.25	0.33	80	700	1.1	0.35	5.2	1.7	2.0	50.6	45.9	44.2	0.65	0.55	0.45	0.0107	11/19	15	30	63	188
0.37	0.50	90S	680	1.4	0.53	3.0	1.7	2.0	56.1	50.1	45.9	0.65	0.55	0.45	0.0134	14	15	30	63	188
0.55	0.75	90L	680	1.9	0.79	3.0	1.7	2.0	61.7	60.0	48.0	0.65	0.55	0.45	0.0175	17/28	15	30	63	188
0.75	1.0	100L	710	2.3	1.03	4.0	1.8	2.2	66.2	66.0	65.04	0.7	0.6	0.45	0.0473	19/31	10	20	42	125
1.1	1.5	100L	700	3.1	1.53	4.0	1.7	2.0	70.8	70.0	69.0	0.7	0.6	0.45	0.0526	20/32	10	20	42	125
1.5	2.0	112M	700	4.0	2.09	4.5	2.0	2.3	74.1	73.8	70.0	0.7	0.6	0.45	0.0794	35/45	10	20	42	125
2.2	3.0	132S	715	6.1	3.00	5.5	1.8	2.3	77.6	77.0	76.5	0.65	0.59	0.46	0.144	65	10	20	42	125
3	4.0	132M	710	8.0	4.12	6.0	1.7	2.3	80	78.1	77.0	0.65	0.59	0.46	0.186	75	10	20	42	125
3.7	5.0	160M	720	8.8	5.01	5.5	1.5	2.0	81.4	81.0	80.0	0.72	0.67	0.56	0.257	105	10	20	42	125
4	5.5	160M	710	9.1	5.49	6.0	1.8	2.4	81.9	81.0	80.0	0.75	0.7	0.6	0.276	79	10	20	42	125
5.5	7.5	160M	720	12.2	7.44	5.5	1.5	2.0	83.8	83.0	80.5	0.75	0.7	0.6	0.351	117	10	20	42	125
7.5	10	160L	720	16.3	10.1	5.5	1.5	2.0	85.3	84.6	83.0	0.75	0.7	0.6	0.463	138	10	20	42	125
9.3	12.5	180L	725	19.7	12.5	5.5	1.8	2.3	86.3	85.2	83.2	0.76	0.7	0.6	1.059	167	10	22	42	125
11	15	180L	730	23.5	14.7	6.0	2.0	2.5	86.9	85.5	84.5	0.75	0.7	0.55	1.182	174	10	22	42	125
15	20	200L	720	31.6	20.3	6.5	1.9	2.4	88	87.2	85.0	0.75	0.7	0.55	1.267	243	12	27	50	150
18.5	25	225S	710	38.7	25.4	6.0	2.2	2.5	88.6	87.6	86.0	0.75	0.7	0.55	3.0696	290	12	27	50	150
22	30	225M	725	42.9	29.6	5.5	2.2	2.5	89.1	88.0	86.5	0.8	0.78	0.7	3.565	300	12	27	50	150
30	40	250M	730	60.4	40.0	6.0	2.1	2.4	89.8	89.0	87.5	0.77	0.72	0.62	4.281	515	12	27	50	150
37	50	280S	740	73.1	48.7	7.0	1.9	2.4	90.3	90.0	89	0.78	0.75	0.65	6.444	610	15	33	63	188
45	60	280M	730	88.5	60.0	6.5	2.3	2.6	90.7	89.7	87.7	0.78	0.75	0.65	7.754	680	15	33	63	188
55	75	315S	735	105	72.9	6.0	1.8	2.3	91	90.8	90.0	0.8	0.76	0.67	14.704	905	15	33	63	188
75	100	315M	735	146	99.4	6.0	1.6	2.1	91.6	90.5	89.5	0.78	0.75	0.68	17.434	1010	15	33	63	188
90	120	315L	735	175	119.3	6.0	1.6	2.1	91.9	90.8	89.6	0.78	0.75	0.68	20.407	1070	15	33	63	188
110	150	315L	735	213	145.8	6.0	1.8	2.4	92.3	92.0	91.8	0.78	0.75	0.68	25.07	1150	15	33	63	188
125	170	315L	735	241	165.6	6.0	1.9	2.5	92.5	92.0	91.0	0.78	0.75	0.68	28.344	1240	15	33	63	188
132	180	315L	735	254	174.9	6.0	1.7	2.1	92.6	91.6	90.6	0.78	0.75	0.68	29.984	1810	15	33	63	188
150	200	355L	740	288	197	6.0	1.70	2.1	92.9	91.5	91.2	0.78	0.75	0.68	48.816	1850	15	33	63	188
160	215	355L	740	307	211	6.0	1.70	2.1	93.0	92.5	91.5	0.78	0.75	0.68	51.996	1860	15	33	63	188
180	240	355L	740	344	237	6.0	1.70	2.1	93.3	93	91.0	0.78	0.75	0.68	57.356	1930	15	33	63	188
200	270	355L	742	382	263	6.0	1.70	2.1	93.5	92.6	91.2	0.78	0.75	0.68	63.626	2080	15	33	63	188
250	335	355L	742	477	328	6.0	1.70	2.0	93.5	92.6	91.6	0.78	0.75	0.68	78.556	2130	15	33	63	188
315	425	355L	742	601	413	6.0	1.70	2.1	93.5	92.5	91.9	0.78	0.75	0.68	96.5	2460	15	33	63	188
355	475	400M/L	740	677	467	6.0	1.80	2.2	93.5	93.2	92.0	0.78	0.74	0.68	102.6	3365	15	33	63	188
375	503	400M/L	740	715	494	6.0	1.80	2.2	93.5	93.2	92.0	0.78	0.74	0.68	108.38	4015	15	33	63	188
400	536	400M/L	740	763	526	6.0	1.80	2.2	93.5	93.2	92.0	0.78	0.74	0.68	115	4185	15	33	63	188
450	603	400M/L	740	858	592	6.0	1.80	2.2	93.5	93.2	92.0	0.78	0.74	0.68	129.3	4520	15	33	63	188
500	*670	450M/L	741	954	657	6.0	1.80	2.5	93.5	93.2	92.0	0.78	0.76	0.7	143.33	6697	15	33	63	188
560	*750	450M/L	741	1068	736	6.0	1.80	2.5	93.5	93.3	92.1	0.78	0.76	0.7	160	7012	15	33	63	188
630	*845	450M/L	741	1202	828	6.0	1.80	2.5	93.5	93.3	92.1	0.78	0.76	0.7	180	7332	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Premium Efficiency "Supremo Series" TEFC SC Motors - IE3

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-3, 2-Pole conforms to IS 12615 ,IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	2750	0.39	0.043	6.5	2	2.5	60.8	60	56.7	0.7	0.64	0.55	0.00084	5/6	10	20	42	125
0.18	0.25	63	2750	0.58	0.064	6.5	2	2.5	65.9	63	58	0.65	0.64	0.55	0.001	6/7	10	20	42	125
0.25	0.33	63	2750	0.7	0.089	6.5	2	2.5	69.7	68.9	65.6	0.7	0.64	0.6	0.0013	6/8	10	20	42	125
0.37	0.5	71	2750	0.9	0.131	4.5	2.5	2.8	73.8	73	72	0.8	0.7	0.6	0.0018	8/11	10	20	42	125
0.55	0.75	71	2760	1.2	0.194	6	3	3.3	77.8	77	73.7	0.8	0.74	0.64	0.0025	9/13	10	20	42	125
0.75	1	80	2850	1.6	0.256	7	2.6	2.9	80.7	80.7	77.5	0.82	0.76	0.61	0.007	11/15	10	20	42	125
1.1	1.5	80	2850	2.3	0.376	7	2.5	2.8	82.7	82.7	82	0.8	0.7	0.6	0.007	12/17	10	20	42	125
1.5	2	90S	2820	3.1	0.518	7	2.3	2.6	84.2	84	83.5	0.8	0.7	0.6	0.0084	18/26	10	20	42	125
2.2	3	90L	2840	4.3	0.755	7.7	2.5	2.75	85.9	84.5	84	0.82	0.78	0.68	0.0114	19/27	10	20	42	125
3	4	100L	2840	5.8	1.029	7.7	2.5	2.9	87.1	87	85	0.82	0.8	0.68	0.0247	22/30	8	16	33	100
3.7	5	100L	2865	7.1	1.258	7.7	2.7	2.9	87.8	87.5	86.3	0.83	0.8	0.68	0.0296	22/31	8	16	33	100
4	5.5	112M	2865	7.6	1.36	6	2.7	2.9	88.1	87.5	86.3	0.83	0.8	0.68	0.0347	33/44	8	16	33	100
5.5	7.5	132S	2945	10.2	1.819	7	2	2.5	89.2	89	87	0.84	0.82	0.75	0.0854	49/71	8	16	33	100
7.5	10	132S	2930	13.6	2.493	7	2.25	2.6	90.1	90.1	89.8	0.85	0.82	0.74	0.099	54/75	8	16	33	100
9.3	12.5	160M	2940	16.2	3.081	7.7	2.5	2.9	90.7	90.5	88.5	0.88	0.88	0.86	0.191	110	10	22	42	125
11	15	160M	2950	19.1	3.632	7.7	2.25	2.9	91.2	91.2	90.5	0.88	0.86	0.82	0.209	124	10	22	42	125
15	20	160M	2950	25.5	4.953	7.7	2	2.6	91.9	91.9	91	0.89	0.89	0.83	0.264	130	10	22	42	125
18.5	25	160L	2950	31.7	6.108	7.7	2.3	2.7	92.4	92	91	0.88	0.87	0.84	0.312	144	10	22	42	125
22	30	180M	2940	36.3	7.288	7.7	2.25	2.6	92.7	92.5	91.8	0.91	0.9	0.86	0.436	185	10	22	42	125
30	40	200L	2960	49.7	9.872	7.7	2.5	3	93.3	92.5	91.6	0.9	0.89	0.85	0.548	250	12	27	50	150
37	50	200L	2960	60.4	12.18	7.7	2.5	3	93.7	93.2	92.1	0.91	0.88	0.83	0.685	270	12	27	50	150
45	60	225M	2960	72.4	14.81	7.7	2.6	3	94	93.8	92.9	0.92	0.91	0.9	1.223	340	12	27	50	150
55	75	250M	2965	89.2	18.07	7.7	2	2.4	94.3	93.4	92.5	0.91	0.9	0.89	2.077	475	12	27	50	150
75	100	280S	2970	121	24.6	7.7	1.95	2.55	94.7	93.5	92.5	0.91	0.89	0.89	3.703	710	15	33	63	188
90	120	280M	2980	145	29.42	7.7	2	2.4	95	94.2	92.7	0.91	0.91	0.87	5.204	740	15	33	63	188
110	150	315S	2980	177	35.95	7.7	1.95	2.5	95.2	94.7	93.7	0.91	0.9	0.88	7.944	850	15	33	63	188
125	170	315M	2980	201	40.86	7.7	1.95	2.5	95.3	94.7	93.7	0.91	0.9	0.88	9.784	880	15	33	63	188
132	180	315M	2980	212	43.14	7.7	1.95	2.5	95.4	94.8	93.8	0.91	0.9	0.88	9.784	910	15	33	63	188
160	215	315L	2980	256	52.3	7.7	1.8	2.4	95.6	95.3	94.5	0.91	0.9	0.89	11.351	1080	15	33	63	188
180	240	315L	2980	284	58.83	7.7	2	2.4	95.7	95.4	94.9	0.92	0.9	0.89	12.32	1110	15	33	63	188
200	270	315L	2980	316	65.37	7.7	2	2.4	95.8	95.5	95	0.92	0.9	0.89	12.6	1150	15	33	63	188
250	335	355M	2984	399	81.6	7.7	1.85	2.4	95.8	95.1	94.5	0.91	0.9	0.89	26.456	2038	15	33	63	188
315	425	355L	2984	503	102.8	7.7	1.8	2.4	95.8	95.1	94.5	0.91	0.9	0.89	33.315	2300	15	33	63	188
355	475	355L	2985	567	115.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	37.54	2485	15	33	63	188
375	503	355L	2985	598	122.4	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	39.68	2515	15	33	63	188
400	536	355L	2985	638	130.5	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	42.32	2590	15	33	63	188
450	603	355L	2985	718	146.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	47.62	2864	15	33	63	188
500	*670	355L	2985	798	163.1	7.7	1.7	2.5	95.8	95.5	94	0.91	0.9	0.89	52.91	2971	15	33	63	188
560	*750	400M/L	2985	894	182.7	7.7	1.7	2.5	95.8	95.6	94.2	0.91	0.9	0.89	53	4360	15	33	63	188
630	*845	400M/L	2985	1005	205.6	7.7	1.7	2.5	95.8	95.6	94.3	0.91	0.9	0.89	57.3	4615	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Premium Efficiency "Supremo Series" TEFC SC Motors - IE3

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-3, 4-Pole conforms to IS 12615 ,IS 15999-1,IEC60034-1,IEC60034-30

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	63	1315	0.4	0.09	5	2.0	2.5	64.8	63.5	46.7	0.65	0.58	0.45	0.0013	5/6	15	30	63	188
0.18	0.25	63	1345	0.6	0.13	5	2.0	2.5	69.9	68.0	62.0	0.65	0.60	0.45	0.0015	6/7	15	30	63	188
0.25	0.33	71	1400	0.7	0.17	5.5	2.0	2.6	73.5	68.5	64.8	0.72	0.65	0.52	0.0049	8/11	10	20	42	125
0.37	0.50	71	1400	1.0	0.26	5.5	2.5	3.0	77.3	76.5	73.2	0.7	0.68	0.55	0.0052	8/11	10	20	42	125
0.55	0.75	80	1410	1.2	0.38	5.5	2.5	3.0	80.8	80.0	79.0	0.76	0.72	0.56	0.014	10/15	10	20	42	125
0.75	1.0	80	1415	1.6	0.52	5.5	2.3	2.8	82.5	80.4	78.5	0.80	0.73	0.59	0.014	12/16	10	20	42	125
1.1	1.5	90S	1420	2.4	0.75	6	2.4	3.0	84.1	83.5	82.0	0.77	0.68	0.54	0.018	17/24	10	20	42	125
1.5	2.0	90L	1415	3.1	1.03	6	2.6	3.0	85.3	83.5	82.5	0.78	0.72	0.62	0.021	18/28	10	20	42	125
2.2	3.0	100L	1430	4.4	1.50	6	2.2	2.7	86.7	86.2	85.8	0.8	0.72	0.62	0.041	25/33	8	16	33	100
3	4.0	100L	1435	5.9	2.04	6	2.4	2.8	87.7	86.4	85.4	0.8	0.72	0.62	0.041	26/35	8	16	33	100
3.7	5.0	112M	1450	7.3	2.49	6	2.2	2.8	88.4	87.5	86.5	0.80	0.75	0.68	0.060	35/46	8	16	33	100
4	5.5	112M	1440	7.9	2.71	7	2.5	2.9	88.6	87.5	86.5	0.80	0.75	0.66	0.062	38/48	8	16	33	100
5.5	7.5	132S	1450	10.7	3.69	7	2.3	2.7	89.6	88.8	87.0	0.80	0.75	0.67	0.13	55/74	8	16	33	100
7.5	10.0	132M	1455	14.1	5.02	7	2.3	2.7	90.4	89.8	88.5	0.82	0.78	0.69	0.17	65/86	8	16	33	100
9.3	12.5	160M	1460	16.9	6.20	7	2.0	2.5	91.0	90.0	89.1	0.84	0.8	0.72	0.273	115	10	22	42	125
11	15	160M	1460	20.4	7.34	7	2.2	2.8	91.4	91.0	90.5	0.82	0.78	0.7	0.332	137	10	22	42	125
15	20	160L	1465	27.0	9.97	7	2.2	2.8	92.1	91.0	90.4	0.84	0.82	0.75	0.425	145	10	22	42	125
18.5	25	180M	1470	32.7	12.26	7.5	2.2	2.8	92.6	91.8	90.8	0.85	0.83	0.75	0.846	188	10	22	42	125
22	30	180L	1470	38.7	14.58	7.5	2.2	2.8	93.0	92.2	91.2	0.85	0.82	0.75	0.914	198	10	22	42	125
30	40	200L	1470	52.5	19.88	7.5	2.4	2.8	93.6	92.6	92.0	0.85	0.82	0.74	1.174	265	12	27	50	150
37	50	225S	1475	64.5	24.43	6.5	2.3	2.7	93.9	93.1	92.8	0.85	0.82	0.76	1.83	348	12	27	50	150
45	60	225M	1475	79.1	29.72	6.5	2.3	2.9	94.2	93.4	92.4	0.84	0.82	0.75	2.1	372	12	27	50	150
55	75	250M	1480	95.2	36.20	6.5	2.0	2.6	94.6	93.6	92.8	0.85	0.82	0.73	2.806	484	12	27	50	150
75	100	280S	1482	128	49.29	7.7	2.2	2.8	95.0	94.8	94.1	0.86	0.84	0.78	5.514	715	15	33	63	188
90	120	280M	1485	153	59.03	7.7	2.2	2.8	95.2	95.0	94.6	0.86	0.84	0.78	6.084	745	15	33	63	188
110	150	315S	1485	187	72.15	7.5	2.0	2.6	95.4	95.2	95.0	0.86	0.85	0.8	8.897	862	15	33	63	188
125	170	315S	1485	212	81.99	7.7	2.0	2.5	95.5	95.2	94.8	0.86	0.83	0.78	9.6	980	15	33	63	188
132	180	315M	1485	218	86.58	7.7	2.0	2.5	95.6	95.2	94.8	0.86	0.84	0.81	9.6	1005	15	33	63	188
160	215	315L	1485	264	104.59	7.7	2.0	2.6	95.8	95.5	95.1	0.88	0.84	0.80	11.74	1090	15	33	63	188
180	240	315L	1485	297	118.06	7.7	2.2	2.8	95.9	95.7	95.4	0.88	0.86	0.83	14.54	1130	15	33	63	188
200	270	315L	1485	322	131.18	7.5	2.0	2.6	96.0	95.9	95.6	0.9	0.87	0.86	15	1170	15	33	63	188
250	335	355M	1485	407	164	7.7	2.0	2.5	96.0	95.2	94.3	0.89	0.88	0.82	27.14	1875	15	33	63	188
315	425	355L	1485	513	207	7.7	2.0	2.4	96.0	95.7	94.4	0.89	0.88	0.82	34.19	1990	15	33	63	188
355	475	355L	1485	578	233	7.7	2.1	2.5	96.0	95.1	94.5	0.89	0.88	0.82	38.53	2340	15	33	63	188
375	503	355L	1485	611	246	7.7	2.1	2.5	96.0	95.2	94.5	0.89	0.88	0.82	40.71	2390	15	33	63	188
400	536	355L	1490	651	261	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	43.42	2420	15	33	63	188
450	603	355L	1490	733	294	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	48.852	2552	15	33	63	188
500	*670	355L	1490	814	327	7.7	2.1	2.4	96.0	95.5	94.7	0.89	0.88	0.82	54.28	2735	15	33	63	188
560	*750	400M/L	1490	902	366	7.7	2.0	2.5	96.0	95.5	94.8	0.90	0.88	0.85	115	4190	15	33	63	188
630	*845	400M/L	1490	1014	412	7.7	2.0	2.5	96.0	95.6	94.9	0.90	0.88	0.85	129	4460	15	33	63	188
710	*952	400M/L	1490	1143	464	7.7	2.0	2.5	96.0	95.6	94.9	0.90	0.88	0.85	146.26	4705	15	33	63	188
800	*1072	450M/L	1493	1288	522	7.7	2.1	2.5	96.0	95.7	94.2	0.90	0.88	0.84	158.98	6542	15	33	63	188
900	*1206	450M/L	1493	1449	587	7.7	2.1	2.5	96.0	95.7	94.3	0.90	0.88	0.84	177.28	6902	15	33	63	188
1000	*1340	450M/L	1493	1610	652	7.7	2.1	2.5	96.0	95.7	94.3	0.90	0.88	0.84	195	7212	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Premium Efficiency "Supremo Series" TEFC SC Motors - IE3

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-3, 6-Pole conforms to IS 12615 ,IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 6 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	71	880	0.53	0.13	6.5	1.9	2.3	57.7	56.6	53.6	0.55	0.51	0.42	0.0043	7/9	10	20	42	125
0.18	0.25	71	890	0.68	0.20	6.5	1.9	2.3	63.9	63.1	59.8	0.58	0.54	0.45	0.0043	8/11	10	20	42	125
0.25	0.33	71	900	0.84	0.27	6.5	1.9	2.3	68.6	67.8	64.5	0.60	0.56	0.47	0.0047	9/12	10	20	42	125
0.37	0.5	80	905	1.1	0.40	4	1.9	2.3	73.5	73.0	70.4	0.65	0.60	0.48	0.0097	10/16	10	20	42	125
0.55	0.75	80	935	1.5	0.57	4.5	1.95	2.5	77.2	75.0	71.0	0.67	0.60	0.48	0.014	12/17	10	20	42	125
0.75	1	90S	930	2.10	0.79	4.5	1.95	2.5	78.9	78.1	75.6	0.63	0.54	0.41	0.0191	17/26	10	20	42	125
1.1	1.5	90L	930	3.00	1.15	4.5	2	2.6	81.0	80.6	78.5	0.63	0.54	0.41	0.022	19/28	10	20	42	125
1.5	2	100L	940	3.5	1.55	5	2	2.5	82.5	82.0	78.5	0.72	0.62	0.5	0.063	25/34	10	20	42	125
2.2	3	112M	960	5.0	2.23	5.5	1.9	2.4	84.3	84.0	82.8	0.73	0.62	0.47	0.0882	34/44	10	20	42	125
3.0	4	132S	945	6.60	3.09	5.5	1.7	2.1	86.6	84.8	83.0	0.73	0.70	0.60	0.141	77	10	20	42	125
3.7	5	132S	955	7.6	3.77	5.5	1.9	2.4	86.5	86.0	85.5	0.78	0.70	0.60	0.176	70	10	20	42	125
4.0	5.5	132M	960	8.0	4.06	6	1.8	2.2	86.8	86.0	85	0.80	0.74	0.62	0.188	80	10	20	42	125
5.5	7.5	132M	960	11.1	5.58	6	1.9	2.4	88.0	87.0	85.5	0.78	0.7	0.60	0.223	64/84	10	20	42	125
7.5	10	160M	970	14.3	7.53	5.5	1.8	2.2	89.1	88.0	87.6	0.82	0.8	0.7	0.406	120	10	22	42	125
9.3	12.5	160L	970	17.6	9.34	6	1.8	2.2	89.8	88.7	88.4	0.82	0.8	0.7	0.496	127	10	22	42	125
11	15	160L	970	20.7	11.05	6	1.8	2.2	90.3	89.5	89	0.82	0.8	0.7	0.563	144	10	22	42	125
15	20	180L	985	28.2	14.83	7.5	2.2	2.6	91.2	91.0	90.5	0.81	0.8	0.71	1.304	205	10	22	42	125
18.5	25	200L	980	33.0	18.39	7.5	2	2.4	91.7	91.5	91	0.85	0.82	0.73	1.346	250	10	22	42	125
22	30	200L	970	39.1	22.09	7.5	2	2.4	92.2	92.0	91.5	0.85	0.82	0.75	1.638	278	12	27	50	150
30	40	225M	985	52.2	29.66	7	2.5	2.9	92.9	92.1	92.0	0.86	0.84	0.76	3.55	362	12	27	50	150
37	50	250M	985	64.9	36.59	6	2	2.4	93.3	92.5	92.2	0.85	0.82	0.78	5.233	495	12	27	50	150
45	60	280S	985	78.6	44.50	7.5	2.2	2.8	93.7	93.2	93	0.85	0.82	0.74	7.618	685	12	27	50	150
55	75	280M	985	95.7	54.39	7.5	2.15	2.55	94.1	93.3	92.8	0.85	0.83	0.8	9.141	710	15	33	63	188
75	100	315S	990	128	73.79	7.5	2.15	2.8	94.6	94.0	93.8	0.86	0.83	0.80	12.21	925	15	33	63	188
90	120	315M	990	153	88.55	6	1.8	2.2	94.9	94.5	94.2	0.86	0.83	0.80	17.36	960	15	33	63	188
110	150	315M	990	187	108.22	7.5	1.95	2.35	95.1	94.8	94.6	0.86	0.83	0.80	21.20	1105	15	33	63	188
125	170	315L	990	212	122.98	7.5	1.95	2.35	95.2	94.4	93.8	0.86	0.84	0.82	24.10	1160	15	33	63	188
132	180	315L	990	224	129.87	7.7	1.95	2.55	95.4	95.2	94.9	0.86	0.84	0.82	25.40	1190	15	33	63	188
160	215	355L	990	271	157.41	7.7	1.95	2.55	95.6	95.3	95	0.86	0.85	0.80	41.50	1820	15	33	63	188
180	240	355L	990	304	177	7.7	2.0	2.4	95.7	94.9	94.2	0.86	0.83	0.8	47.09	1890	15	33	63	188
200	270	355L	990	338	197	7.7	2.0	2.4	95.8	95.0	94.3	0.86	0.83	0.8	52.98	1970	15	33	63	188
250	335	355L	990	422	246	7.7	2.0	2.4	95.8	95.0	94.4	0.86	0.83	0.8	66.22	2110	15	33	63	188
315	425	355L	990	532	310	7.7	2.0	2.5	95.8	95.3	94.5	0.86	0.83	0.8	83.44	2500	15	33	63	188
355	475	355L	990	599	349	7.7	2.0	2.5	95.8	95.3	94.6	0.86	0.83	0.8	94.03	2900	15	33	63	188
375	503	355L	990	633	369	7.7	2.0	2.5	95.8	95.3	94.0	0.86	0.83	0.8	99.33	3389	15	33	63	188
400	536	355L	992	675	393	7.7	2.0	2.5	95.8	95.4	94.5	0.86	0.83	0.8	105.96	3535	15	33	63	188
450	603	400M/L	994	759.9	440.9	7.5	1.9	2.5	95.8	95.4	93.9	0.86	0.84	0.8	119	4030	15	33	63	188
500	*670	400M/L	994	844	490	7.5	1.9	2.5	95.8	95.4	93.9	0.86	0.84	0.80	132	5200	15	33	63	188
560	*750	400M/L	994	945.6	548.7	7.5	1.9	2.5	95.8	95.4	93.9	0.86	0.84	0.8	147.84	4550	15	33	63	188
630	*845	450M/L	994	1064	617	7.5	1.9	2.5	95.8	95.5	94.0	0.86	0.84	0.80	165	6412	15	33	63	188
710	*952	450M/L	994	1199	696	7.5	1.9	2.5	95.8	95.5	94.0	0.86	0.84	0.80	210	6697	15	33	63	188
800	*1072	450M/L	994	1351	784	7.5	1.9	2.5	95.8	95.5	94.0	0.86	0.84	0.80	236	7015	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Premium Efficiency "Supremo Series" TEFC SC Motors - IE3

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-3, 8-Pole conforms to IS 12615 ,IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 8 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	71	640	0.66	0.18	5.5	1.8	2.2	50.7	48	44.0	0.50	0.42	0.36	0.0039	8/10	15	30	63	188
0.18	0.25	80	680	0.82	0.26	4.0	1.8	2.2	58.7	56.1	53.2	0.52	0.47	0.40	0.0123	11/18	15	30	63	188
0.25	0.33	80	650	1.00	0.37	5.5	1.8	2.2	64.1	62.2	58.1	0.54	0.50	0.42	0.0123	13/19	15	30	63	188
0.37	0.5	90S	675	1.4	0.53	4.0	1.8	2.2	69.3	67	62.1	0.54	0.48	0.38	0.0154	15/25	15	30	63	188
0.55	0.75	90L	675	1.7	0.79	4.0	1.8	2.2	73.0	71.7	67.2	0.60	0.56	0.48	0.0201	17/28	15	30	63	188
0.75	1	100L	685	2.2	1.07	4.5	1.8	2.3	75.0	73.8	70.2	0.62	0.58	0.48	0.0543	23/32	10	20	42	125
1.1	1.5	100L	685	3.1	1.56	6.5	1.8	2.3	77.7	75.8	73.2	0.64	0.60	0.52	0.0604	28/36	10	20	42	125
1.5	2	112M	690	3.9	2.12	4.5	1.8	2.3	79.7	78.1	75.8	0.68	0.6	0.52	0.0674	36/47	10	20	42	125
2.2	3	132S	710	5.5	3.02	4.5	1.8	2.3	81.9	80.1	78.2	0.68	0.6	0.52	0.165	78	10	20	42	125
3	4	132M	705	7.4	4.14	7.0	1.8	2.3	83.5	81.1	78.2	0.68	0.6	0.52	0.213	87	10	20	42	125
3.7	5	160M	720	8.5	5.01	5.5	1.8	2.3	84.5	83.5	81.2	0.72	0.65	0.55	0.295	108	10	22	42	125
4	5.5	160M	720	9.1	5.41	7.0	1.8	2.3	84.8	83.2	80.6	0.72	0.65	0.55	0.317	95	10	22	42	125
5.5	7.5	160M	720	11.8	7.44	5.5	1.8	2.3	86.2	84.8	82.8	0.75	0.7	0.6	0.403	120	10	22	42	125
7.5	10	160L	720	15.9	10.1	6.0	1.8	2.3	87.3	85.6	83.8	0.75	0.7	0.6	0.532	129	10	22	42	125
9.3	12.5	180L	720	19.6	12.6	7.0	1.8	2.3	88.1	87.4	85.5	0.74	0.7	0.6	1.217	173	10	22	42	125
11	15	180L	725	23.0	14.8	6.0	1.9	2.4	88.6	87.2	85.2	0.74	0.7	0.62	1.359	180	10	22	42	125
15	20	200L	725	31.1	20.2	7.0	2.0	2.5	89.6	89	88.8	0.75	0.71	0.64	1.457	250	12	27	50	150
18.5	25	225S	730	37.1	24.7	6.5	2.0	2.3	90.1	89.5	89	0.77	0.74	0.64	2.46	295	12	27	50	150
22	30	225M	730	43.3	29.4	6.0	2.0	2.4	90.6	90.6	90	0.78	0.75	0.7	4.099	310	12	27	50	150
30	40	250M	730	58.6	40.0	6.5	2.1	2.5	91.3	91.3	91	0.78	0.75	0.70	5.37	545	12	27	50	150
37	50	280S	735	70.1	49.0	6.5	1.9	2.4	91.8	91.8	91.5	0.8	0.77	0.7	7.41	630	15	33	63	188
45	60	280M	735	84.9	59.6	6.5	1.9	2.4	92.2	92.2	91.5	0.8	0.77	0.7	8.917	695	15	33	63	188
55	75	315S	735	103	72.9	6.5	2.0	2.5	92.5	92.5	92	0.8	0.77	0.7	11.97	915	15	33	63	188
75	100	315M	740	140	98.7	6.5	2.0	2.5	93.1	93.1	93	0.8	0.77	0.7	16.32	1065	15	33	63	188
90	120	315L	740	168	118.5	6.5	2.0	2.5	93.4	93.2	92.8	0.8	0.77	0.7	19.58	1110	15	33	63	188
110	150	315L	740	204	144.8	7.0	2.0	2.5	93.7	93.5	93	0.80	0.77	0.7	24.00	1130	15	33	63	188
125	170	315L	740	231	164.5	7.0	2.0	2.5	94.0	93	93.0	0.8	0.77	0.7	27.20	1170	15	33	63	188
132	180	315L	740	243	173.7	7.0	2.0	2.5	94.3	94.2	93.8	0.80	0.77	0.7	29.00	1890	15	33	63	188
160	215	355L	740	294	211	7.0	1.9	2.3	94.6	94.4	94.0	0.80	0.77	0.7	59.79	2018	15	33	63	188
180	240	355L	740	331	237	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	65.95	2110	15	33	63	188
200	270	355L	740	368	263	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	67.68	2203	15	33	63	188
250	335	355L	740	460	329	7.0	1.8	2.25	94.6	94.3	94.0	0.80	0.77	0.7	84.6	2130	15	33	63	188
315	425	355L	741	579	414	7.0	1.7	2.1	94.6	94.3	94.0	0.80	0.77	0.7	106.59	2780	15	33	63	188
355	475	400M/L	741	653	467	7.0	1.8	2.2	94.6	94.3	94.0	0.80	0.77	0.7	119	3840	15	33	63	188
375	503	400M/L	741	689	493	7.0	1.8	2.2	94.6	94.3	94.0	0.80	0.77	0.7	125.7	3985	15	33	63	188
400	536	400M/L	741	735	526	7.0	1.8	2.2	94.6	94.3	94.0	0.80	0.77	0.7	134.08	4145	15	33	63	188
450	603	400M/L	741	827	591	7.0	1.8	2.2	94.6	94.3	94.0	0.80	0.77	0.7	150	4295	15	33	63	188
500	*670	450M/L	742	919	656	7.0	1.8	2.5	94.6	94.3	94.0	0.80	0.77	0.7	166.6	6277	15	33	63	188
560	*750	450M/L	742	1029	735	7.0	1.8	2.5	94.6	94.3	94.0	0.80	0.77	0.7	185	6512	15	33	63	188
630	*845	450M/L	742	1158	827	7.0	1.8	2.5	94.6	94.3	94.0	0.80	0.77	0.7	200	7122	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Super Premium Efficiency "Ultimo Series" TEFC SC Motors - IE4

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-4, 2-Pole conforms to IS 12615 ,IS 15999-1,IEC60034-1,IEC60034-30

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	80	2800	0.29	0.04	7.3	2.1	2.4	66.5	66.5	65	0.86	0.8	0.68	0.00096	7/13	10	20	42	125
0.18	0.25	80	2820	0.41	0.06	7.3	2.1	2.4	70.8	70.8	70	0.86	0.8	0.68	0.0011	8/14	10	20	42	125
0.25	0.33	80	2830	0.54	0.09	7.3	2.1	2.4	74.3	74.3	71	0.87	0.81	0.7	0.0014	8/14	10	20	42	125
0.37	0.5	80	2840	0.76	0.13	6.5	2.5	2.8	78.1	78.1	75.0	0.87	0.82	0.71	0.0020	9/16	10	20	42	125
0.55	0.75	80	2855	1.1	0.19	7.8	2.2	2.6	81.5	81.5	80	0.88	0.82	0.71	0.0028	9/16	10	20	42	125
0.75	1	80	2860	1.4	0.26	7.8	2.2	2.5	83.5	83.5	80	0.88	0.82	0.72	0.008	12/16	10	20	42	125
1.1	1.5	80	2900	2.0	0.37	7.8	2.2	2.6	85.2	85.2	83	0.88	0.83	0.72	0.008	13/17	10	20	42	125
1.5	2	90S	2900	3	0.51	7.8	2.2	2.6	86.5	86.5	85	0.87	0.80	0.73	0.0096	18/27	10	20	42	125
2.2	3	90L	2900	4.0	0.74	8.9	2.5	2.75	88	88	87.5	0.88	0.81	0.73	0.0131	19/28	10	20	42	125
3	4	100L	2900	5.5	1.03	8.9	2.5	2.9	89.1	89.1	87.0	0.85	0.78	0.66	0.0284	24/31	8	16	33	100
3.7	5	100L	2900	6.8	1.26	8.9	2.4	2.9	89.7	89.7	87.7	0.85	0.78	0.68	0.034	24/31	8	16	33	100
4	5.5	112M	2915	7.5	1.36	8.9	2.5	3	90	90	89	0.82	0.80	0.71	0.0399	46	8	16	33	100
5.5	7.5	132S	2920	9.5	1.83	8.9	2.2	2.6	90.9	90.9	89.0	0.89	0.86	0.82	0.0982	76	8	16	33	100
7.5	10	132S	2925	12.8	2.50	8.9	2.2	2.6	91.7	91.7	89.9	0.89	0.85	0.82	0.113	83	8	16	33	100
9.3	12.5	160M	2945	15.8	3.08	8.9	2	2.4	92.2	92.2	90	0.89	0.87	0.83	0.2190	124	10	22	42	125
11	15	160M	2950	18.8	3.63	8.9	1.7	2.1	92.6	92.6	90.5	0.88	0.86	0.82	0.240	135	10	22	42	125
15	20	160M	2955	24.9	4.94	8.9	2	2.6	93.3	93.3	91.2	0.9	0.89	0.85	0.303	138	10	22	42	125
18.5	25	160L	2955	31.6	6.10	8.9	2.3	2.7	93.7	93.7	91.1	0.87	0.85	0.76	0.358	150	10	22	42	125
22	30	180M	2960	37.0	7.24	8.9	2.5	2.8	94	94	92	0.88	0.86	0.81	0.501	210	10	22	42	125
30	40	200L	2960	49.6	9.87	8.9	2.5	3	94.5	94.5	93	0.89	0.88	0.85	0.630	265	12	27	50	150
37	50	200L	2960	59.7	12.18	8.9	2.5	3	94.8	94.8	92.2	0.91	0.87	0.78	0.787	178	12	27	50	150
45	60	225M	2960	71.6	14.81	8.9	2.1	2.5	95.0	95	93.2	0.92	0.91	0.90	1.406	370	12	27	50	150
55	75	250M	2975	88.2	18.01	8.9	2	2.5	95.3	95.3	94	0.91	0.90	0.87	2.388	582	12	27	50	150
75	100	280S	2970	121	24.60	8.9	2.1	2.55	95.6	95.6	93	0.9	0.86	0.77	4.258	750	15	33	63	188
90	120	280M	2975	144	29.47	8.9	2.1	2.5	95.8	95.8	94	0.91	0.9	0.89	5.98	780	15	33	63	188
110	150	315S	2975	175	36.01	8.9	2	2.5	96	96	94.1	0.91	0.87	0.81	9.135	968	15	33	63	188
125	170	315M	2980	199	40.86	8.9	2	2.5	96.2	96.2	94.3	0.91	0.87	0.78	11.251	992	15	33	63	188
132	180	315M	2980	210	43.14	8.9	2	2.5	96.2	96.2	94.7	0.91	0.88	0.87	11.251	1005	15	33	63	188
160	215	315L	2980	251	52.30	8.9	2	2.4	96.3	96.3	94.8	0.92	0.88	0.87	13.053	1180	15	33	63	188
180	240	315L	2980	282	58.83	8.9	2	2.4	96.5	96.5	94.8	0.92	0.90	0.89	14.168	1210	15	33	63	188
200	270	315L	2980	313	65.37	8.9	2	2.4	96.5	96.5	95.0	0.92	0.90	0.89	14.49	1450	15	33	63	188
250	335	355L	2985	396	82	8.9	1.9	2.4	96.5	96.5	94.5	0.91	0.88	0.81	30.424	2080	15	33	63	188
315	425	355L	2985	499	103	8.9	1.8	2.4	96.5	96.5	94.5	0.91	0.89	0.81	38.312	2238	15	33	63	188
355	475	355L	2985	562	116	8.9	1.8	2.5	96.5	96.5	93.8	0.91	0.86	0.81	43.17	2485	15	33	63	188
375	503	355L	2985	588	122	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	45.287	2550	15	33	63	188
400	536	355L	2985	627	131	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	48.66	2590	15	33	63	188
450	603	355L	2985	705	147	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	54.763	2864	15	33	63	188
500	*670	355L	2985	784	163	8.9	1.8	2.5	96.5	96.5	94.0	0.92	0.88	0.82	58.2	2971	15	33	63	188
560	*750	400M/L	2985	897	183	8.9	1.8	2.5	96.5	96.5	94.2	0.90	0.87	0.79	56	4360	15	33	63	188
630	*845	400M/L	2985	1009	206	8.9	1.8	2.5	96.5	96.5	94.3	0.90	0.87	0.79	58.55	4615	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Super Premium Efficiency "Ultimo Series" TEFC SC Motors - IE4

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-4, 4 Pole conforms to IS 12615, IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	1390	0.32	0.08	6.5	2	2.5	69.8	69	53.0	0.75	0.65	0.45	0.0015	8/14	15	30	63	188
0.18	0.25	80	1395	0.45	0.13	6.5	2	2.5	74.7	74.7	69.0	0.75	0.67	0.48	0.0020	8/14	15	30	63	188
0.25	0.33	80	1400	0.60	0.17	6.5	2	2.6	77.9	77.9	70	0.75	0.67	0.5	0.0037	9/15	10	20	42	125
0.37	0.5	80	1410	0.84	0.26	7	2.2	2.7	81.1	81.1	76	0.76	0.68	0.52	0.0045	12	10	20	42	125
0.55	0.75	80	1420	1.18	0.38	7	2.2	2.7	83.9	83.3	80.0	0.77	0.7	0.52	0.0102	13/17	10	20	42	125
0.75	1	80	1440	1.58	0.51	7	2.5	3	85.7	85.7	82	0.77	0.7	0.53	0.0114	14/18	10	20	42	125
1.1	1.5	90S	1445	2.44	0.74	7	2.5	3	87.2	87.2	85.0	0.72	0.65	0.51	0.0185	18/25	10	20	42	125
1.5	2	90L	1450	3.24	1.01	7	2.2	2.75	88.2	88.2	86	0.73	0.68	0.52	0.0198	20/29	10	20	42	125
2.2	3	100L	1455	4.44	1.47	8.3	2	2.5	89.5	89.5	88	0.77	0.70	0.58	0.0383	35	8	16	33	100
3	4	100L	1455	6.00	2.01	8.3	2	2.55	90.4	90.4	89	0.77	0.7	0.58	0.052	37	8	16	33	100
3.7	5	112M	1460	6.91	2.47	8.3	2.2	2.8	90.9	90.9	88.5	0.82	0.75	0.65	0.0752	52	8	16	33	100
4	5.5	112M	1460	7.45	2.67	8.3	2.3	2.7	91.1	91.1	89.6	0.82	0.77	0.64	0.1	57	8	16	33	100
5.5	7.5	132S	1460	9.91	3.67	8.3	2.3	2.7	91.9	91.9	90.3	0.85	0.78	0.67	0.1228	78	8	16	33	100
7.5	10	132M	1460	13.41	5.00	8.3	2.3	2.7	92.6	92.6	91	0.85	0.78	0.68	0.1584	88	8	16	33	100
9.3	12.5	160M	1465	16.56	6.18	8.3	2	2.5	93.0	93.0	91.5	0.84	0.8	0.72	0.313	130	10	22	42	125
11	15	160M	1465	20.25	7.31	8.3	2.15	2.8	93.3	93.3	91.9	0.81	0.78	0.7	0.381	145	10	22	42	125
15	20	160L	1465	27.44	9.97	8.3	2.2	2.8	93.9	93.9	92	0.81	0.8	0.75	0.488	150	10	22	42	125
18.5	25	180M	1475	31.77	12.22	8.3	2.2	2.8	94.2	94.2	93	0.86	0.83	0.75	0.972	205	10	22	42	125
22	30	180L	1475	37.66	14.53	8.3	2.2	2.7	94.5	94.5	93.3	0.86	0.82	0.75	1.051	250	10	22	42	125
30	40	200L	1480	51.14	19.74	8.3	2.3	2.7	94.9	94.9	93.7	0.86	0.82	0.72	1.35	280	12	27	50	150
37	50	225S	1475	62.87	24.43	8.3	2.2	2.7	95.2	95.2	94.1	0.86	0.82	0.76	2.104	387	12	27	50	150
45	60	225M	1475	76.31	29.72	8.3	2.2	2.7	95.4	95.4	94.4	0.86	0.84	0.75	2.415	425	12	27	50	150
55	75	250M	1480	92.97	36.20	8.3	2	2.6	95.7	95.7	94.8	0.86	0.85	0.8	3.226	572	12	27	50	150
75	100	280S	1485	126.38	49.19	8.9	2.1	2.6	96.0	96	95.2	0.86	0.84	0.78	6.341	825	15	33	63	188
90	120	280M	1485	151.50	59.03	8.9	2.2	2.8	96.1	96.1	95	0.86	0.84	0.77	6.996	793	15	33	63	188
110	150	315S	1485	182.66	72.15	8.9	2	2.6	96.3	96.3	95.5	0.87	0.85	0.81	10.231	980	15	33	63	188
125	170	315S	1485	209.76	81.99	8.9	2	2.5	96.4	96.4	95	0.86	0.83	0.78	11.04	1160	15	33	63	188
132	180	315M	1485	221.51	86.58	8.9	2	2.5	96.4	96.4	95.8	0.86	0.84	0.81	11.04	1165	15	33	63	188
160	215	315L	1490	267.94	104.59	8.9	2	2.6	96.6	96.6	95.2	0.86	0.83	0.76	13.501	1322	15	33	63	188
180	240	315L	1485	294.58	118.06	8.9	2	2.75	96.6	96.6	96	0.88	0.86	0.83	16.721	1460	15	33	63	188
200	270	315L	1485	323.30	131.18	8.9	2	2.55	96.7	96.7	96	0.89	0.87	0.86	17.25	1995	15	33	63	188
250	335	355M	1485	409	164	8.9	2.0	2.5	96.7	96.7	94.3	0.88	0.87	0.82	31.211	1895	15	33	63	188
315	425	355L	1485	509	207	8.9	2.0	2.45	96.7	96.7	94.4	0.89	0.86	0.80	39.318	2390	15	33	63	188
355	475	355L	1485	574	233	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.86	0.80	44.309	2480	15	33	63	188
375	500	355L	1485	606	246	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.84	0.80	46.816	2495	15	33	63	188
400	536	355L	1490	647	261	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.85	0.82	49.933	2552	15	33	63	188
450	603	355L	1490	727	294	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.86	0.81	56.179	2735	15	33	63	188
500	*670	355L	1490	808	327	8.9	2.1	2.4	96.7	96.7	94.7	0.89	0.85	0.82	62.422	3190	15	33	63	188
560	*750	355L	1490	895	366	8.9	2.0	2.5	96.7	96.7	94.8	0.90	0.86	0.85	112.95	3490	15	33	63	188
630	*845	400M/L	1490	1007	412	8.9	2.0	2.5	96.7	96.7	94.9	0.90	0.86	0.86	127.068	4790	15	33	63	188
710	*952	400M/L	1490	1135	464	8.9	2.0	2.5	96.7	96.7	94.9	0.90	0.86	0.86	143.204	4850	15	33	63	188
800	*1072	450M/L	1493	1293	522	8.9	2.1	2.5	96.7	96.7	94.2	0.89	0.87	0.85	148	6542	15	33	63	188
900	*1206	450M/L	1493	1455	587	8.9	2.1	2.5	96.7	96.7	94.3	0.89	0.87	0.84	166.5	6902	15	33	63	188
1000	*1340	450M/L	1493	1616	652	8.9	2.1	2.5	96.7	96.7	94.3	0.89	0.88	0.85	185	7212	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Super Premium Efficiency "Ultimo Series" TEFC SC Motors - IE4

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-4, 6 Pole conforms to IS 12615, IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 6 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	880	0.43	0.13	7	1.9	2.3	64.9	64.9	60.8	0.6	0.56	0.47	0.0049	8/14	10	20	42	125
0.18	0.25	80	890	0.60	0.20	7	1.9	2.3	70.1	70.1	60	0.60	0.54	0.45	0.0049	9/15	10	20	42	125
0.25	0.33	80	900	0.78	0.27	7	1.9	2.3	74.1	74.1	64.5	0.60	0.56	0.47	0.0054	10/17	10	20	42	125
0.37	0.5	80	925	0.98	0.39	7.3	1.8	2.3	78	78.0	70.4	0.67	0.62	0.48	0.0111	12/18	10	20	42	125
0.55	0.75	80	930	1.39	0.58	7.3	1.8	2.3	80.9	80.9	71.0	0.68	0.61	0.48	0.016	14/20	10	20	42	125
0.75	1	90S	940	1.97	0.79	7.3	1.95	2.5	82.7	82.7	80	0.64	0.53	0.39	0.0219	15/24	10	20	42	125
1.1	1.5	90L	945	2.83	1.16	7.3	2	2.6	84.5	84.5	80	0.64	0.54	0.4	0.0253	21/29	10	20	42	125
1.5	2	100L	950	3.42	1.57	7.3	2	2.5	85.9	85.9	83	0.71	0.63	0.48	0.072	35	10	20	42	125
2.2	3	112M	950	4.80	2.26	8.3	1.9	2.4	87.4	87.4	85	0.73	0.67	0.54	0.101	50	10	20	42	125
3.0	4	132S	950	6.28	3.08	8.3	1.7	2.1	88.6	88.6	84.0	0.75	0.70	0.60	0.162	78	10	20	42	125
3.7	5	132S	955	7.69	3.77	8.3	1.9	2.4	89.3	89.3	87	0.75	0.70	0.60	0.202	76	10	20	42	125
4.0	5.5	132M	955	8.18	4.08	8.3	1.8	2.2	89.5	89.5	87	0.76	0.73	0.61	0.216	83	10	20	42	125
5.5	7.5	132M	960	11.12	5.58	8.3	1.9	2.4	90.5	90.5	88	0.76	0.73	0.61	0.256	99	10	20	42	125
7.5	10	160M	965	13.61	7.57	8.3	1.8	2.2	91.3	91.3	88	0.84	0.8	0.73	0.466	132	10	22	42	125
9.3	12.5	160L	965	16.76	9.39	8.3	1.8	2.2	91.9	91.9	89	0.84	0.8	0.73	0.57	135	10	22	42	125
11	15	160L	965	19.51	11.10	8.3	1.8	2.2	92.3	92.3	89	0.85	0.81	0.74	0.647	161	10	22	42	125
15	20	180L	980	27.06	14.91	8.3	2.2	2.6	92.9	92.9	90.5	0.83	0.75	0.61	1.499	198	10	22	42	125
18.5	25	200L	980	31.67	18.39	8.3	2	2.4	93.4	93.4	91	0.87	0.85	0.76	1.547	270	12	27	50	150
22	30	200L	980	37.55	21.87	8.3	2	2.4	93.7	93.7	91.5	0.87	0.85	0.78	1.883	282	12	27	50	150
30	40	225M	985	50.35	29.66	8.3	2.5	2.9	94.2	94.2	92	0.88	0.85	0.79	4.082	380	12	27	50	150
37	50	250M	985	63.34	36.59	8.3	2	2.4	94.5	94.5	92.2	0.86	0.84	0.72	6.0179	475	12	27	50	150
45	60	280S	985	77.69	44.50	8.3	2.2	2.8	94.8	94.8	93	0.85	0.83	0.78	8.76	780	15	33	63	188
55	75	280M	985	94.66	54.39	8.3	2	2.5	95.1	95.1	93.2	0.85	0.83	0.78	10.512	792	15	33	63	188
75	100	315S	990	128.67	73.79	8.9	2.1	2.6	95.4	95.4	93.8	0.85	0.85	0.85	15.61	942	15	33	63	188
90	120	315M	990	152.29	88.55	8.9	1.8	2.2	95.6	95.6	94.2	0.86	0.85	0.80	18.76	980	15	33	63	188
110	150	315L	985	185.75	108.77	8.9	1.9	2.3	95.8	95.8	94.6	0.86	0.85	0.80	22.88	1110	15	33	63	188
125	170	315L	990	210.86	122.98	8.9	1.95	2.35	95.9	95.9	94	0.86	0.85	0.8	26	1178	15	33	63	188
132	180	315L	990	222.43	129.87	8.9	1.9	2.5	96	96	94.9	0.86	0.85	0.78	27.456	1820	15	33	63	188
160	215	355L	990	269	157.41	8.9	1.9	2.5	96.2	96.2	95	0.86	0.82	0.77	36.736	1890	15	33	63	188
180	240	355L	990	301.4	177.09	8.9	1.9	2.5	96.6	96.6	95	0.86	0.82	0.78	41.329	1990	15	33	63	188
200	270	355L	990	334.9	196.77	8.9	1.8	2.4	96.6	96.6	95	0.86	0.83	0.77	45.921	2110	15	33	63	188
250	335	355L	990	419	246	8.9	2.0	2.4	96.6	96.6	94.4	0.86	0.82	0.78	57.401	2138	15	33	63	188
315	425	355L	990	528	310	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.83	0.78	72.325	2900	15	33	63	188
355	475	355L	990	594	349	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.84	0.77	76	3389	15	33	63	188
375	503	355L	990	621	369	8.9	2.0	2.5	96.6	96.6	93.8	0.87	0.84	0.78	81.79	3585	15	33	63	188
400	536	355L	990	662	394	8.9	2.0	2.5	96.6	96.6	93.9	0.87	0.84	0.78	87.24	4030	15	33	63	188
450	603	400M/L	993	772	441	8.9	2.0	2.5	96.6	96.6	94.5	0.84	0.79	0.70	98.14	5200	15	33	63	188
500	*670	400M/L	993	857	490	8.9	2.0	2.5	96.6	96.6	94.5	0.84	0.80	0.70	109.44	4550	15	33	63	188
560	*750	400M/L	993	960	549	8.9	2.0	2.5	96.6	96.6	94.5	0.84	0.79	0.70	122.52	6112	15	33	63	188
630	*845	450M/L	995	1055	617	8.9	1.9	2.5	96.6	96.6	94.0	0.86	0.8	0.77	180.5	6190	15	33	63	188
710	*952	450M/L	995	1189	695	8.9	1.9	2.5	96.6	96.6	94.0	0.86	0.8	0.77	213	6250	15	33	63	188
800	*1072	450M/L	995	1340	783	8.9	1.9	2.5	96.6			0.86	0.8	0.77	240.3	7015	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## Super Premium Efficiency "Ultimo Series" TEFC SC Motors - IE4

3 Phase Squirrel Cage Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:70K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l., Duty S1, Efficiency class IE-4, 8 Pole conforms to IS 12615, IS 15999-1, IEC60034-1, IEC60034-30

**Performance Table for 8 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	645	0.51	0.18	6.0	1.8	2.2	62.3	62.3	58.2	0.53	0.42	0.36	0.0044	9/16	15	30	63	188
0.18	0.25	80	650	0.65	0.27	6.0	1.8	2.2	67.2	67.2	63.1	0.57	0.49	0.39	0.0141	10/17	15	30	63	188
0.25	0.33	80	690	0.85	0.35	6.5	1.8	2.2	70.8	70.8	66.5	0.58	0.49	0.41	0.0141	12/18	15	30	63	188
0.37	0.5	90S	680	1.15	0.63	6.5	1.7	2.1	74.3	74.3	70.2	0.6	0.48	0.38	0.0177	13/19	15	30	63	188
0.55	0.75	90L	680	1.58	0.64	6.5	1.8	2.2	77.0	77.0	72.5	0.63	0.58	0.48	0.0231	15/26	15	30	63	188
0.75	1	100L	700	1.99	1.04	6.5	1.9	2.3	78.4	78.4	75.5	0.67	0.57	0.43	0.057	22/31	10	20	42	125
1.1	1.5	100L	700	2.83	1.53	6.5	1.9	2.3	80.8	80.8	77.5	0.67	0.55	0.42	0.0694	27/36	10	20	42	125
1.5	2	112M	700	3.66	2.09	6.5	1.9	2.3	82.6	82.6	80	0.69	0.65	0.56	0.0775	48	10	20	42	125
2.2	3	132S	710	5.17	3.02	7.8	1.8	2.3	84.5	84.5	82	0.7	0.60	0.47	0.189	75	10	20	42	125
3	4	132S	710	6.94	4.12	7.8	1.8	2.3	85.9	85.9	84	0.7	0.60	0.52	0.244	85	10	20	42	125
3.7	5	160M	710	7.80	5.08	7.8	1.7	2.2	86.8	86.8	83.5	0.76	0.6	0.5	0.339	122	10	22	42	125
4	5.5	160M	710	8.3	5.49	7.8	1.8	2.2	87.1	87.1	85	0.77	0.6	0.5	0.364	104	10	22	42	125
5.5	7.5	160M	715	11.3	7.49	7.8	1.8	2.3	88.3	88.3	85	0.77	0.62	0.52	0.463	124	10	22	42	125
7.5	10	160L	715	15.2	10.2	7.8	1.8	2.3	89.3	89.3	86	0.77	0.6	0.58	0.611	137	10	22	42	125
9.3	12.5	180L	725	18.9	12.5	7.8	1.8	2.3	89.9	89.9	88	0.76	0.69	0.55	1.399	182	10	22	42	125
11	15	180L	725	22.3	14.8	7.8	1.9	2.4	90.4	90.4	88	0.76	0.69	0.6	1.562	19	10	22	42	125
15	20	200L	730	30.5	20.0	7.8	1.8	2.3	91.2	91.2	88.8	0.75	0.68	0.55	1.675	263	12	27	50	150
18.5	25	225S	730	36.9	24.7	7.8	1.8	2.3	91.7	91.7	90	0.76	0.74	0.63	4.059	310	12	27	50	150
22	30	225M	730	42.6	29.4	7.8	1.9	2.4	92.1	92.1	89.2	0.78	0.74	0.65	4.713	378	12	27	50	150
30	40	250M	735	57.7	39.8	7.8	2.1	2.5	92.7	92.7	90.3	0.78	0.74	0.66	5.661	397	12	27	50	150
37	50	280S	735	69	49.0	7.8	2.0	2.5	93.1	93.1	90.7	0.8	0.75	0.71	8.521	630	15	33	63	188
45	60	280M	735	84.8	59.6	7.8	1.9	2.4	93.4	93.4	91.0	0.79	0.74	0.66	10.254	760	15	33	63	188
55	75	315S	735	106.1	72.9	7.8	1.9	2.4	93.7	93.7	91.3	0.77	0.76	0.72	19.445	971	15	33	63	188
75	100	315M	735	142	99.4	7.8	2.0	2.5	94.2	94.2	91.5	0.78	0.76	0.69	23.056	997	15	33	63	188
90	120	315L	740	167.9	118.5	7.8	2.0	2.5	94.4	94.4	92.5	0.79	0.77	0.7	26.97	1080	15	33	63	188
110	150	315L	740	204.6	144.8	7.8	2.0	2.5	94.7	94.7	92.1	0.79	0.77	0.7	33.154	1130	15	33	63	188
125	170	315L	740	232	164.5	7.8	2.0	2.5	94.9	94.9	92.0	0.79	0.77	0.69	37.484	1890	15	33	63	188
132	180	315L	740	244.7	173.7	7.8	1.9	2.4	95	95	93	0.79	0.76	0.67	39.653	2018	15	33	63	188
160	215	355L	740	300	211	7.8	1.9	2.3	95.1	95.1	94.0	0.78	0.74	0.62	65.769	2110	15	33	63	188
180	240	355L	740	337	237	7.8	1.9	2.3	95.4	95.4	94.0	0.78	0.74	0.62	72.545	2150	15	33	63	188
200	270	355L	740	369	263	7.8	1.9	2.2	95.4	95.4	94.0	0.79	0.75	0.63	75.00	2340	15	33	63	188
250	335	355L	740	461	329	7.8	1.8	2.2	95.4	95.4	94.2	0.79	0.75	0.65	88.35	2500	15	33	63	188
315	425	355L	741	581	414	7.8	1.7	2.1	95.4	95.4	93.0	0.79	0.75	0.68	111.37	2780	15	33	63	188
355	475	400M/L	741	672	467	7.8	1.8	2.2	95.4	95.4	94.2	0.77	0.73	0.67	125.51	3840	15	33	63	188
375	503	400M/L	741	710	493	7.8	1.8	2.1	95.4	95.4	94.2	0.77	0.73	0.67	132.58	3980	15	33	63	188
400	536	400M/L	741	758	526	7.8	1.8	2.1	95.4	95.4	94.0	0.77	0.75	0.67	141.41	4295	15	33	63	188
450	603	400M/L	742	852	591	7.8	1.7	2.1	95.4	95.4	94.5	0.77	0.73	0.68	158.62	6277	15	33	63	188
500	*670	450M/L	742	947	656	7.8	1.8	2.5	95.4	95.4	93.9	0.77	0.75	0.69	176.24	6310	15	33	63	188
560	*750	450M/L	742	1061	735	7.8	1.8	2.4	95.4	95.4	93.9	0.77	0.75	0.7	197	6530	15	33	63	188
630	*845	450M/L	742	1193	827	7.8	1.8	2.5	95.4	95.4	94.2	0.77	0.75	0.7	220	7150	15	33	63	188

\*Temperature rise limited to class "F" (95K)

**Note :**

- A) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication.
- B) All performance figures are subject to IS15999-1/IEC 60034-1 tolerances.
- C) Frame 63 to 132 are with Aluminium Body
- D) Frame 160 to 450 are with CI Body

## General arrangement Drawing/Dimensions - Foot Mounted (B3) Standard, Brake & Crane & Hoist Duty Motors as per IS : 1231 & IS 8223

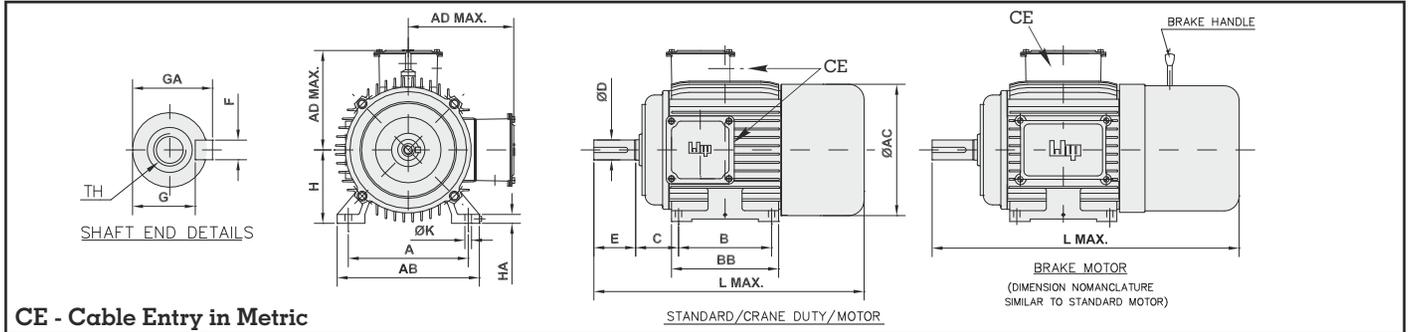


Table No. - 09

Frame Size	CONT.	H	C	A	AB	HA	ØK	B	BB	AD MAX	ØAC	ØD	E	F	G	GA	TH	L MAX		CE X Nos.	For Brake Motor		For 1Ø Motor		
																		IE2	IE3/IE4		L	AD	AD	L	
63	CI	63	40	100	120	8	7	80	97	120	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	280	290	--	--
63	ALPDC	63	40	100	118	8	7	80	97	120	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	290	290	--	--
71	CI	71	45	112	132	9	7	90	112	125	140	14j6	30	5	11.0	16.0	M5	275	275	M16-2	125	330	340	--	--
71	ALPDC	71	45	112	133	9	7	90	110	125	140	14j6	30	5	11.0	16.0	M5	270	270	M16-2	130	325	340	119	302
80	CI	80	50	125	151	10	10	100	124	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	375	160	375
80	ALPDC	80	50	125	160	12	10	100	125	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	375	160	375
90S	CI	90	56	140	170	10	10	100	127	175	178	24j6	50	8	20.0	27.0	M8	355	355	M25-2	165	430	430	--	--
90S	ALPDC	90	56	140	184	12	10	100	130	175	178	24j6	50	8	20.0	27.0	M8	355	355	M25-2	160	430	430	--	--
90L	CI	90	56	140	170	10	10	125	150	175	178	24j6	50	8	20.0	27.0	M8	380	380	M25-2	165	453	453	165	395
90L	ALPDC	90	56	140	184	12	10	125	155	175	178	24j6	50	8	20.0	27.0	M8	380	380	M25-2	160	453	453	--	--
100L	CI	100	63	160	197	13	12	140	170	180	192	28j6	60	8	24.0	31.0	M10	410	410	M32-2	185	490	490	165	430
100L	ALPDC	100	63	160	194	11	17	140	186	180	192	28j6	60	8	24.0	31.0	M10	410	410	M32-2	185	490	510	--	--
112M	CI	112	70	190	230	15	12	140	170	195	224	28j6	60	8	24.0	31.0	M10	445	445	M32-2	185	560	560	--	--
112M	ALPDC	112	70	190	225	12	12	140	172	195	224	28j6	60	8	24.0	31.0	M10	445	445	M32-2	195	560	560	--	--
132S	CI	132	89	216	256	16	12	140	167	215	257	38k6	80	10	33.0	41.0	M12	500	525	M32-2	215	660	660	--	--
132M	CI	132	89	216	256	16	12	178	205	215	257	38k6	80	10	33.0	41.0	M12	550	550	M32-2	215	660	660	--	--
132M(N)	CI	132	89	216	256	16	12	178	245	215	257	38k6	80	10	33.0	41.0	M12	550	590	M32-2	215	680	680	--	--
160M	CI	160	108	254	304	26	14.5	210	260	260	308	42k6	110	12	37.0	45.0	M16	640	680	M40-2	260	760	850	--	--
160L	CI	160	108	254	304	26	14.5	254	304	260	308	42k6	110	12	37.0	45.0	M16	700	700	M40-2	260	805	850	--	--
180M	CI	180	121	279	340	26	14.5	241	279	285	357	48k6	110	14	42.5	51.5	M16	720	750	M40-2	270	842	895	--	--
180L	CI	180	121	279	340	26	14.5	279	318	285	357	48k6	110	14	42.5	51.5	M16	725	750	M40-2	270	842	900	--	--
200L	CI	200	133	318	385	35	18.5	305	350	300	382	55m6	110	16	49.0	59.0	M20	800	850	M40-2	340	963	1020	--	--
225S(2P)	CI	225	149	356	440	35	18.5	286	370	380	448	55m6	110	16	49.0	59.0	M20	890	890	M50-2	--	--	--	--	--
225S(4,6,8 P)	CI	225	149	356	440	35	18.5	286	370	380	448	60m6	140	18	53.0	64.0	M20	890	890	M50-2	--	--	--	--	--
225M(2P)	CI	225	149	356	440	35	18.5	311	370	380	448	55m6	110	16	49.0	59.0	M20	890	890	M50-2	--	--	--	--	--
225M(4,6,8 P)	CI	225	149	356	440	35	18.5	311	370	380	448	60m6	140	18	53.0	64.0	M20	890	960	M50-2	--	--	--	--	--
250M (2P)	CI	250	168	406	500	43	24	349	425	450	510	60m6	140	18	53.0	64.0	M20	1050	1100	M50-2	--	--	--	--	--
250M (4,6,8 P)	CI	250	168	406	500	43	24	349	425	450	510	65m6	140	18	58.0	69.0	M20	1050	1100	M50-2	--	--	--	--	--
280S (2P)	CI	280	190	457	540	43	24	368	515	480	570	65m6	140	18	58.0	69.0	M20	1165	1200	M63-2	--	--	--	--	--
280S(4,6,8 P)	CI	280	190	457	540	43	24	368	515	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2	--	--	--	--	--
280M (2 P)	CI	280	190	457	540	43	24	419	515	480	570	65m6	140	18	58.0	69.0	M20	1165	1200	M63-2	--	--	--	--	--
280M (4,6,8 P)	CI	280	190	457	540	43	24	419	515	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2	--	--	--	--	--
315S (2 P)	CI	315	216	508	620	50	28	406	546	535	658	65m6	140	18	58.0	69.0	M20	1190	1190	M63-2	--	--	--	--	--
315S (4,6,8 P)	CI	315	216	508	620	50	28	406	546	535	658	80m6	170	22	71.0	85.0	M20	1250	1250	M63-2	--	--	--	--	--
315M (2 P)	CI	315	216	508	620	50	28	457	640	535	658	65m6	140	18	58.0	69.0	M20	1350	1375	M63-2	--	--	--	--	--
315M (4,6,8 P)	CI	315	216	508	620	50	28	457	640	535	658	80m6	170	22	71.0	85.0	M20	1400	1400	M63-2	--	--	--	--	--
315L (2 P)	CI	315	216	508	620	50	28	508	640	535	658	65m6	140	18	58.0	69.0	M20	1375	1375	M63-2	--	--	--	--	--
315L (4,6,8 P)	CI	315	216	508	620	50	28	508	640	535	658	80m6	170	22	71.0	85.0	M20	1400	1400	M63-2	--	--	--	--	--
355S (2 P)	CI	355	254	610	730	51	28	500	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2	--	--	--	--	--
355S (4,6,8 P)	CI	355	254	610	730	51	28	500	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2	--	--	--	--	--
355M (2P)	CI	355	254	610	730	51	28	560	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2	--	--	--	--	--
355M (4,6,8 P)	CI	355	254	610	730	51	28	560	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2	--	--	--	--	--
355L (2 P)	CI	355	254	610	730	51	28	630	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2	--	--	--	--	--
355L (4,6,8 P)	CI	355	254	610	730	51	28	630	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2	--	--	--	--	--
400	CI	400	315	686	836	52	35	800/900	1100	1100	900	110m6	210	28	100	116	M24	2500	2500	M63-2	--	--	--	--	--
450	CI	450	315	800	1000	59	42	900/1000/1250	1430	920	1040	120m6	210	32	109	127	M24	2650	2650	M63-2	--	--	--	--	--

## General arrangement Drawing/Dimensions - Flange Mounted (B5) Standard, Brake & Crane & Hoist Duty Motors (B-5 Mounting) as per IS:2223

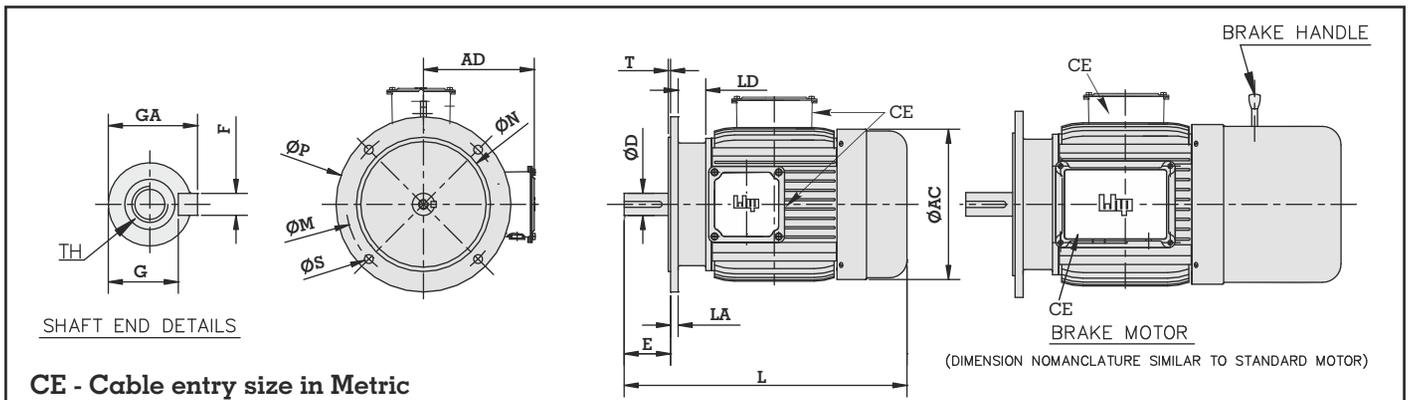


Table No. - 10

Frame Size	Cont.	Flange No.	ØM ±0.3	j6 ØN	ØP	ØS X NO.	T	LA	LD	AD MAX	ØAC	ØD	E	F	G	GA	TH	L MAX		CE X Nos.	For Brake Motor			For Single Phase Motor	
																		IE 2	IE3/IE4		AD Max	L Max		AD	L
																						IE 2	IE3/IE4		
63	CI	F115B	115	95	140	10 X 4	3	10	10	120	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	290	290	---	---
63	ALPDC	F115B	115	95	140	10 X 4	3	10	10	125	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	290	290	---	---
71	CI	F130B	130	110	160	10 X 4	3.5	10	10	125	140	14j6	30	5	11	16	M5	275	315	M16-2	125	330	370	---	---
71	ALPDC	F130B	130	110	160	10 X 4	3.5	10	20	125	140	14j6	30	5	11	16	M5	270	310	M16-2	130	325	365	119	302
80	CI	F165B	165	130	200	12 X 4	3.5	11	16	120	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	375	120	---
80	ALPDC	F165B	165	130	200	12 X 4	3.5	11	16	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	410	114	348
90S	CI	F165B	165	130	200	12 X 4	3.5	10	19	175	178	24j6	50	8	20	27	M8	355	355	M25-2	165	430	430	---	---
90S	ALPDC	F165B	165	130	200	12 X 4	3.5	10	19	175	178	24j6	50	8	20	27	M8	355	355	M25-2	160	430	430	---	---
90L	CI	F165B	165	130	200	12 X 4	3.5	10	19	175	178	24j6	50	8	20	27	M8	380	380	M25-2	165	453	453	165	395
90L	ALPDC	F165B	165	130	200	12 X 4	3.5	10	19	175	178	24j6	50	8	20	27	M8	380	380	M25-2	160	453	453	---	---
100L	CI	F215B	215	180	250	15 X 4	4	12	20	180	195	28j6	60	8	24	31	M10	405	410	M32-2	185	490	490	185	430
100L	ALPDC	F215B	215	180	250	15 X 4	4	12	22	180	195	28j6	60	8	24	31	M10	405	410	M32-2	185	490	490	185	430
112M	CI	F215B	215	180	250	15 X 4	4	12	23	195	224	28j6	60	8	24	31	M10	445	445	M32-2	195	560	560	---	---
112M	ALPDC	F215B	215	180	250	15 X 4	4	12	18	195	224	28j6	60	8	24	31	M10	445	445	M32-2	195	560	560	---	---
132S	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	500	525	M32-2	215	660	660	---	---
132M	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	550	550	M32-2	215	660	660	---	---
132M (N)	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	550	590	M32-2	215	680	680	---	---
160M	CI	F300B	300	250	350	19 X 4	5	14	54	260	308	42k6	110	12	37	45	M16	650	710	M40-2	260	800	850	850	---
160L	CI	F300B	300	250	350	19 X 4	5	14	54	260	308	42k6	110	12	37	45	M16	710	810	M40-2	260	850	850	850	---
180M/L	CI	F300B	300	250	350	19 X 4	5	14	72	275	360	48k6	110	14	42.5	51.5	M16	730	825	M40-2	270	850	900	900	---
200L	CI	F350B	350	300	400	19 X 4	5	16	71	340	382	55m6	110	16	49	59	M20	800	900	M40-2	--	--	--	---	---
225S/M (2P)	CI	F400B	400	350	450	19 X 8	5	16	71	380	448	55m6	110	16	49	59	M20	890	890	M50-2	--	--	--	---	---
225S/M (4,6,8P)	CI	F400B	400	350	450	19 X 8	5	16	71	380	448	60m6	140	18	53	64	M20	890	960	M50-2	--	--	--	---	---
250M (2P)	CI	F500B	500	450	550	19 X 8	5	19	65	450	510	60m6	140	18	53	64	M20	1050	1100	M50-2	--	--	--	---	---
250M (4,6,8P)	CI	F500B	500	450	550	19 X 8	5	19	65	450	510	65m6	140	18	58	69	M20	1050	1100	M50-2	--	--	--	---	---
280S/M (2P)	CI	F500B	500	450	550	19 X 8	5	22	93	480	570	65m6	140	18	58	69	M20	1165	1200	M63-2	--	--	--	---	---
280S/M (4,6,8P)	CI	F500B	500	450	550	19 X 8	5	22	93	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2	--	--	--	---	---
315S (2P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	65m6	140	18	58	69	M20	1250	1250	M63-2	--	--	--	---	---
315S (4,6,8P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	80m6	170	22	71	85	M20	1250	1250	M63-2	--	--	--	---	---
315S/M/L (2P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	65m6	140	18	58	69	M20	1375	1375	M63-2	--	--	--	---	---
315S/M/L (4,6,8P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	80m6	170	22	71	85	M20	1400	1400	M63-2	--	--	--	---	---
355S/M/L (2P)	CI	F740B	740	680	800	24 X 8	6	28	45	700	775	80m6	170	22	71	85	M20	1600	1860	M63-2	--	--	--	---	---
355S/M/L (4,6,8P)	CI	F740B	740	680	800	24 X 8	6	28	45	700	775	100m6	210	28	90	106	M24	1620	1900	M63-2	--	--	--	---	---

## General arrangement Drawing/Dimensions - Face Mounted (B14)

Standard, Brake & Crane & Hoist Duty Motors as per IS : 2223

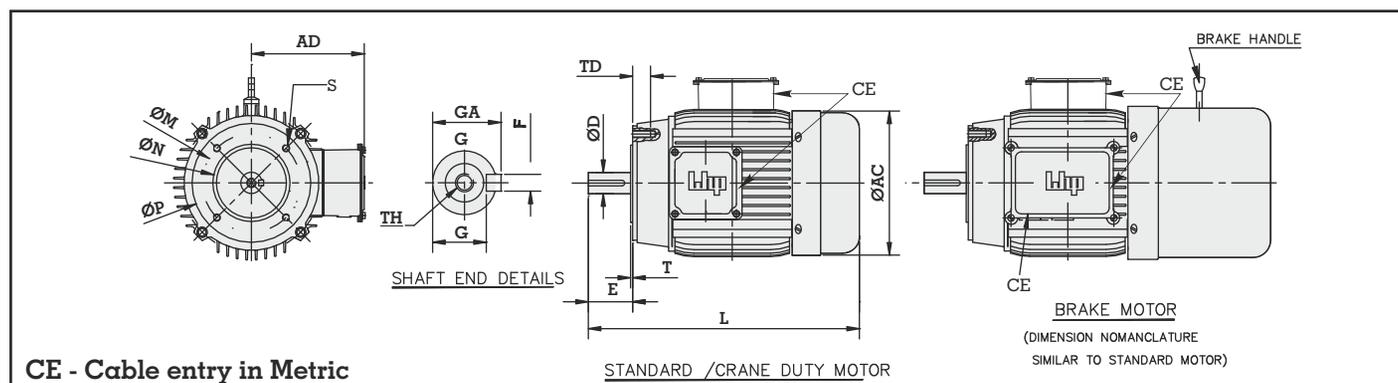


Table No. - 11

Frame Size	Cont.	Flange No.	ØM ±0.3	ØN j6	ØP	S	TD	T	AD MAX	ØAC	ØD	E	F	G	GA	TH	L MAX		CE X Nos.	For Brake Motor			For 1Ø Motor	
																	IE2	IE3/IE4		AD	L		AD	L
																					IE2	IE3/IE4		
63	CI	F75C	75	60	90	M5	6	2.5	120	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	290	290	--	--
63	AL.PDC	F75C	75	60	90	M5	6	2.5	120	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2	120	290	290	--	--
71	CI	F85C	85	70	107	M6	8	2.5	125	140	14j6	30	5	11	16	M5	275	315	M16-2	135	330	370	--	--
71	AL.PDC	F85C	85	70	107	M6	8	2.5	125	140	14j6	30	5	11	16	M5	270	310	M16-2	130	325	365	119	302
80	CI	F100C	100	80	120	M6	8	3	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	415	--	--
80	AL.PDC	F100C	100	80	120	M6	8	3	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2	160	375	410	--	--
90S	CI	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	355	355	M25-2	165	430	430	--	--
90S	AL.PDC	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	355	355	M25-2	160	430	430	--	--
90L	CI	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	380	380	M25-2	165	453	453	165	395
90L	AL.PDC	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	380	380	M25-2	160	453	453	--	--
100L	CI	F130C	130	110	160	M8	10	3.5	180	192	28j6	60	8	24	31	M10	410	410	M32-2	185	490	490	185	430
100L	AL.PDC	F130C	130	110	160	M8	10	3.5	180	192	28j6	60	8	24	31	M10	410	415	M32-2	185	490	490	185	430
112M	CI	F130C	130	110	160	M8	10	3.5	195	224	28j6	60	8	24	31	M10	445	445	M32-2	195	560	560	--	--
112M	AL.PDC	F130C	130	110	160	M8	10	3.5	195	224	28j6	60	8	24	31	M10	445	445	M32-2	195	560	560	--	--
132S	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	500	525	M32-2	215	660	660	--	--
132M	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	550	560	M32-2	215	660	660	--	--
132M(N)	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	550	590	M32-2	215	680	680	--	--

# HAZARDOUS AREA MOTORS



## Hazardous Area Motors - General Technical Information

### Hazardous Areas

Hazardous areas are defined as areas where explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment.

The decision as to whether an area is hazardous as per the

relevant regulations and specifications rests entirely with the user or in case of doubt, with the competent inspecting authority.

IS 5572 & IEC 60079-10-1 classifies the hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present.

### Classification of Hazardous Areas (Gases, Vapors & Dust) & selection of Electrical Equipment.

Classification of these zones and selection of electrical equipment is as under.

Table No. 12

Zone	Classification of area as per ref. Std. IS 5572 /IEC 60079-10-1/EN60079-10-1	Selection of electrical equipment as based on ref. std. IS 5571/ IEC 60079-10-2
Zone '0'	An area in which Hazardous atmosphere is continuously present	Generally, use of electrical equipment is to be avoided. But when this is not practicable, intrinsically safe or pressurized electrical equipment to be used.
Zone '1'	Hazardous atmosphere is likely to be present under normal operating conditions.	For this area, electrical equipment used, must be in flame proof enclosure type Ex(d) conforming to IS/IEC 60079-1.
Zone '2'	In this area hazardous atmosphere is likely to be present only under abnormal operating conditions and for a short period.	Apparatus with type of protection Ex (e) in accordance with I EC 60079-7 may be used without any special enclosure. Apparatus having type of protection Ex ec in accordance with IS/IEC 60079-7 are also permitted for use.



## HAZARDOUS AREA MOTORS

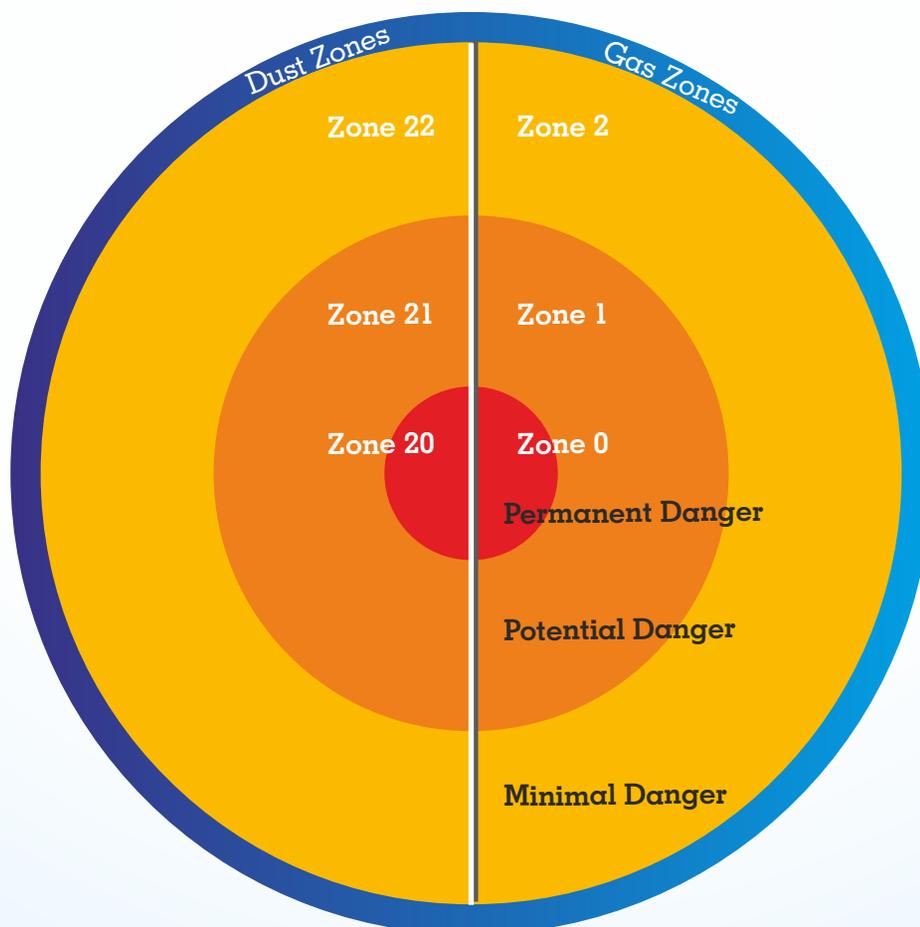
Upto 355 Frame

# HAZARDOUS AREA MOTORS

## Hazardous Area Motors - General Technical Information

Table No. 13

Dust Zone	Classification of area as per ref. Standard IEC 60079-10-2:2015	Selection of electrical equipment as based on ref. standard IS 5571:2009/ IS/IEC 61241/ IEC 61241
Zone '20'	<p>A hazardous atmosphere formed by dust cloud in air is present:</p> <ul style="list-style-type: none"> <li>• Continuously or</li> <li>• For long periods or</li> <li>• Frequently</li> <li>• Dust layer may be formed.</li> </ul>	Generally, use of electrical equipment is to be avoided. But when this is not practicable, intrinsically safe or pressurized electrical equipment with enhanced IP Protection to be used.
Zone '21'	<ul style="list-style-type: none"> <li>• A hazardous atmosphere formed by dust cloud in air is likely to occur in normal operation, but not frequently and only for short periods.</li> <li>• Layers or combustible dust will in general be present</li> </ul>	For this area, electrical equipment used, must be in flame proof enclosure type Ex(d) conforming to IS/IEC 60079-1 with enhanced IP Protection min IP6X
Zone '22'	<ul style="list-style-type: none"> <li>• A hazardous atmosphere formed by dust cloud in air is not likely to occur in normal operation and if so then for a short period only, either</li> <li>• Accumulations and layers of combustible dust are present.</li> </ul>	<p>Apparatus with type of protection Ex (e) in accordance with IEC 60079-7 may be used without any special enclosure.</p> <p>Apparatus having type of protection Ex ec in accordance with IS/IEC 60079-7 are also permitted for use.</p> <p>IP Shall be min IP6X</p>



# HAZARDOUS AREA MOTORS



## Hazardous Area Motors - General Technical Information

### Reference Standards

All motors comply with following standards.

IS/IEC 60079-0 IEC 60079-0 EN 60079-0	Electrical apparatus for Explosive gas atmosphere-part 0 general requirements.
IS/IEC 60079-1 IEC 60079-1 EN 60079-1	Explosive atmosphere Equipment protection by flame proof enclosures Ex'db'
IS/IEC 60079-7 IEC 60079-7 EN 60079-7	Explosive atmosphere Equipment protection by increased safety Ex'ec' & 'eb'
IS/IEC 60079-31 IEC 60079-31 EN 60079-31	Equipment dust ignition protection by enclosure Ex'tb'
IS 5572 IEC 60079-10-1	Classification of Hazardous areas (other than mining) having flammable gases and vapors for electrical installations.
IEC 60079-10-2	Explosive atmospheres . Part 10-2: Classification of areas Explosive dust atmospheres.
IS 5571 IEC 60079-14	Guide for selection and installation of electrical equipment in hazardous areas (other than mines)
IS 12615 IEC 60034-30-1	Line operated three phase AC Motors (ie code) "efficiency classes and performance specification"
IS 4029	Guide for testing three phase induction motors (For Standard TEFC SCR Motors)
IS 15999 - (Part2/Sec1) IEC 60034-2-1	Standard Methods for determining Losses and Efficiency from Tests. (For IE2 Series Motors)
IEC 60034-1	Rotating Electrical Machines-Rating & Performance
IS/IEC 60034-5 IEC 60034-5	Degree of protection provided by the integral design of Rotating Electrical Machines (IP code) : classification
IS 6362 / IEC 60034-6	Designation of method of cooling for Rotating Electrical Machines/Method of cooling (IC code)
IS 12065 / IEC 60034-9	Permissible limits of noise level for Rotating Electrical Machines
IS 12075 IEC 60034-14	Mechanical Vibration of Rotating Electrical Machines

## Hazardous Area Motors - General Technical Information

### TYPES OF PROTECTION ELECTRICAL EQUIPMENT

There are different types of protection for electrical equipment, which are in compliance with the IS/ IEC/ EN 60079-0.- General requirement. This standard contains requirements that apply to more than one type of protection. Each of the types of protection is also designated by a letter which is included in the marking of the equipment specified in IS/ IEC / EN 60079-0 which also guides the marking required for ATEX IEC Ex and national / international requirement.

LHP Manufacturer below type of protection motors.

#### “FLAMEPROOF” Ex db

Enclosure in which the parts which can ignite an explosive gas atmosphere are placed and which can withstand the pressure developed during an internal explosion of an explosive mixture, and which prevents the transmission of the explosion to the explosive gas atmosphere surrounding the enclosure

Equipment is suitable for installation in Zone 1.

#### TYPE OF PROTECTION “INCREASED SAFETY” Ex 'eb'

Type of protection applied to electrical equipment or Ex Components in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and against the occurrence of arcs and sparks.

Equipment is suitable for installation in Zone 2.

#### TYPE OF PROTECTION “INCREASED SAFETY” Ex 'ec' (Formerly “Non-Sparking”)

Type of protection applied to electrical equipment such that, in normal operation and in certain specified regular expected occurrences, it is not capable of igniting a surrounding explosive gas atmosphere.

Former marking of “nA” has been replaced by marking “ec”. Even if the other technical aspects on the product are unchanged and comply with the revised requirements, a change in the marking will be required.

Equipment is suitable for installation in Zone 2 only (whereas all the other types of protection have versions for use in at least Zone 1, if not other Zones as well).

#### PROTECTION BY ENCLOSURE FOR EXPLOSIVE DUST ATMOSPHERES” Ex 'tb'.

Type of protection for explosive dust atmospheres where electrical equipment is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures.

Like gas, combustible dust shall not enter in an enclosure. To meet this requirement, increased ingress Protection is to be provided to enclosure..

LHP is having three types of Hazardous Area Motors in full range : - For Gas & Vapor Hazardous area

- Flame-proof Motors - Ex 'db'
- Increased Safety Motors - (Ex 'ec')
- Increased Safety Motors - (Ex 'eb')

For Dust Hazardous area

- Flame-proof Motors - Ex 'tb' ,
- Increased Safety Motors - Ex 'tc'

### Salient Features

Temperature class :

As per specification IEC 60079-0, the surface temperature is classified based on gas ignition temperature. The surface temperature shall not exceed the gas ignition temperature during motor in service operation. In case of flameproof Ex 'db', 'db eb' motor only external surface temperature shall be considered and for Increased safety Ex 'ec' and Increased Safety motors Ex 'eb' external as well as internal temperature considered.

### Classification of maximum surface temperatures for Group II electrical equipment

Temperature Class	Maximum surface temperature °C
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Temperature class wrt max ambient temperature for LHP Flameproof Ex 'd', 'db eb',

Frame Size	*Temperature class **Max. Ambient temp. °C		
	*T6/T85 °C	*T5/T100 °C	*T4/T135 °C
AD 63	**50	**60	–
AD 71	**50	**60	–
AD 80	**50	**60	–
AD 90S/L	**50	**60	–
AD 100L	**50	**60	–
AD 112M	**40	**50	**60
AD 132S/M	**40	**50	**60
AD 160M/L	–	–	**60
AD 180M/L	–	–	**60
AD 200L	–	**50	**60
AD 225S/M	–	**50	**60
AD 250M	–	**50	**60
AD 280S/M	–	**50	**60
AD 315S/M/L	–	**50	**60
AD 355S/M/L	–	**40	**50/**60

Temperature class wrt max ambient temperature of 50°C for LHP Increased safety Ex 'ec' and Increased Safety Ex 'eb' motors is T3.

# HAZARDOUS AREA MOTORS



## Hazardous Area Motors - General Technical Information

### Statutory and regulatory Approvals / Certifications:-

Hazardous Motors needs mandatorily statutory and regulatory authorities approval before put in market. These statutory and regulatory authorities approves the equipment based on the test reports from their approved test laborites.

### Testing laboratories for Indian approvals

- Electronics Regional Test Laboratory, Kolkata
- Karandikar Laboratory Pvt. Ltd, Mumbai
- Central Institute of Mining and Fuel Research, Dhanbad

### Indian Statutory and regulatory Approvals / Certifications based on the test report issued by above test laboratories.

- Bureau of Indian Standards, Delhi
- Petroleum and Explosives Safety Organization (PESO), Nagpur
- Directorate General of Mines Safety (DGMS), Dhanbad.

### International Statutory approvals

- IEC Ex / CE ATEX certification for complete range of Flame-Proof Ex 'db' & Increased safety Ex 'ec' motors from BASSEFA FIMCO FINLAND.

### LHP Hazardous area motors, gas/ dust group, zone and selection guide

For correct selection of equipment in hazardous area, a area classification by experts shall be done based on the hazardous gas or vapour (IEC 60079-10- 1 standard) or by a hazardous dust (IEC 60079-10-2 e standard)

Zones 20, 21 and 22 are the corresponding areas for a dust hazard, but additionally take account of layers of dust that may be moved up to form a cloud.

### SELECTION AND INSTALLATION IEC 60079-14

Based on the Area classification, appropriate equipment must be selected, so that the best protected equipment is used in Zone 0 or Zone 20, but the minimum protected equipment is used only in Zone 2 or Zone 22

Gas / Dust Group	Zone	EPL	Permitted Ex motor type	Eg Marking
I	No zone	Mb	Flameproof Ex 'db'	Ex db I T3 Mb (T amb=-20 ≤ Tα ≤ +60)°C
IIA/IIIB	1	Gb	Flameproof Ex 'db'	Ex db IIIB T4 Gb (T amb=-20 ≤ Tα ≤ +60)°C
IIA/IIIB	2	Gc	Flameproof Ex 'db eb' Increased Safety Ex 'eb' Ex 'ec'	Ex db eb IIIB T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C Ex eb IIIB T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C Ex ec IIIB T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C
IIC	1	Gb	Flameproof Ex 'db'	Ex db IIC T4 Gb (T amb=-20 ≤ Tα ≤ +60)°C
IIC	2	Gc	Flameproof Ex 'db eb' Increased Safety Ex 'eb' Ex 'ec'	Ex db eb IIC T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C Ex eb IIC T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C Ex ec IIC T3 Gc (T amb=-20 ≤ Tα ≤ +60)°C
IIIA/IIIB	21/22	Db	Flameproof Ex 'tb'	Ex tb IIIB T 135°C Db (T amb=-20 ≤ Tα ≤ +60)°C
IIIA/IIIB	21/22	Dc	Increased Safety Ex 'tc'	Ex tc IIIB T135°C Dc IP66 (T amb=-20≤Tα≤+60)°C
IIIC	21/22	Db	Flameproof Ex 'tb'	Ex tb IIIC T 135°C Db (T amb=-20 ≤ Tα ≤ +60)°C
IIIC	21/22	Dc	Ex 'tc'	Ex tb IIIC T135°C Db (T amb=-20 ≤ Tα ≤ +60)°C

### Hazardous area motors operation on VVVF Power supply.

As per National and International specification IS: 5571 - Guide for selection and installation of Electrical equipment in hazardous area- other than mines and IEC 60079-14 Explosive atmosphere- part 14- Electrical installation, Design, selection and erection , combined testing of motor and inverter shall be conducted to determine temperature class of motor. This test is required due to

- High harmonics from inverter resulting increase in temperature
- Speed variation affecting cooling of motor surface

Statutory authority approval is required for such motors before installation of motor and inverter in field.

In addition to above user shall take precaution for

- Installation of filters / reactor at inverter output to reduce the peak voltages at motor input terminals due to large cable length between motor and inverter and high switching frequency. System integrator shall ensure the peak voltage at motor terminal shall be less than specified.
- Use of insulated bearings or insulated bearing housings in end shield to prevent bearing failures specially in motors above 280 frame sizes.

# HAZARDOUS AREA MOTORS



## Hazardous Area Motors - General Technical Information

**Table No. 14 - Frame wise Bearing sizes**

Frame size	Pole	DE Bearing Size	NDE Bearing Size
63	2 to 8	6201 2Z	6201 2Z
71	2 to 8	6203 2Z	6203 2Z
80	2 to 8	6204 2Z	6204 2Z
90	2 to 8	6205 2Z	6204 2Z
100	2 to 8	6206 2Z	6206 2Z
112	2 to 8	6306 2Z	6206 2Z
132	2	6208 2Z	6208 2Z
132	4 to 8	6308 2Z	6208 2Z
160	2	6209 2Z	6209 2Z
160	4 to 8	6309 2Z	6209 2Z
180	2	6210 2Z	6210 2Z
160	4 to 8	6310 2Z	6210 2Z
200	2	6212 2Z	6212 2Z
200	4 to 8	6312 2Z	6212 2Z
225	2	6213 2Z	6213 2Z
225	4 to 8	6313 2Z	6312 2Z
250	2	6214 2Z	6214 2Z
250	4 to 8	6314 2Z	6214 2Z
280	2	6316	6316
280	4 to 8	6318	6316
315	2	6218	6218
315	4 to 8	6319	6218
355	2	6218	6218
355	4 to 8	6322	6319

**Table No. 15 - Maximum Cable entry hole cable O.D. In (mm) accommodation in Terminal Box for Flame-proof Motors**

Frame Size	Cable Entry	Max. Permissible	Stud Size
63	M16-2 Nos.	2Rx3Cx1.5mm <sup>2</sup>	M4
71	M16-2 Nos.	2Rx3Cx1.5mm <sup>2</sup>	M4
80	M20-2 Nos.	2Rx3Cx2.5mm <sup>2</sup>	M4
90	M25-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M5
100	M25-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M5
112	M32-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M6
132	M32-2 Nos.	2Rx3Cx16mm <sup>2</sup>	M6
160	M40-2 Nos.	2Rx3Cx70mm <sup>2</sup>	M8
180	M40-2 Nos.	2Rx3Cx95mm <sup>2</sup>	M10
200	M40-2 Nos.	2Rx3Cx95mm <sup>2</sup>	M10
225	M50-2 Nos.	2Rx3Cx150mm <sup>2</sup>	M10
250	M50-2 Nos.	2Rx3Cx185mm <sup>2</sup>	M12
280	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M12
315	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M12
355	M63-2 Nos.	2Rx3Cx240mm <sup>2</sup>	M16

**Note :** Customer should specify exact cable OD in mm to select proper cable entry.

## Energy Efficient Flameproof Motors - IE2

**Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE2, 2-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	63	2750	0.43	0.04	4.0	2.7	3.0	53.6	53.6	52.0	0.72	0.65	0.55	0.00084	11	10	20	42	125
0.18	0.25	63	2750	0.58	0.06	4.0	2.2	2.6	60.4	60.4	60.0	0.72	0.65	0.55	0.00094	11	10	20	42	125
0.25	0.33	63	2750	0.75	0.09	4.0	2.5	2.8	64.8	59.0	53.0	0.72	0.66	0.56	0.00104	12	10	20	42	125
0.37	0.5	71	2750	1	0.13	5.0	2.4	2.8	69.5	69.5	66.0	0.74	0.67	0.57	0.0015	16	10	20	42	125
0.55	0.75	71	2760	1.4	0.19	5.0	2.9	3.5	74.1	74.1	72.4	0.74	0.73	0.61	0.0017	17	10	20	42	125
0.75	1	80	2805	1.7	0.26	5.5	2.5	2.8	77.4	77.4	76.0	0.78	0.74	0.60	0.005	23	10	20	42	125
1.1	1.5	80	2820	2.5	0.38	5.5	2.7	3.0	79.6	79.6	79.0	0.78	0.76	0.62	0.006	24	10	20	42	125
1.5	2	90S	2810	3.2	0.52	5.5	2.3	2.7	81.3	81.3	80.3	0.79	0.78	0.65	0.008	32	10	20	42	125
2.2	3	90L	2816	4.7	0.76	6.0	2.3	2.7	83.2	83.0	82.5	0.78	0.77	0.64	0.010	36	10	20	42	125
3	4	100L	2840	5.9	1.03	7.0	2.4	2.8	84.6	84.6	83.8	0.84	0.81	0.74	0.024	47	8	16	33	100
3.7	5	100L	2870	7.1	1.26	7.0	2.9	3.0	85.5	85.5	84.0	0.85	0.82	0.7	0.025	48	8	16	33	100
4	5.5	112M	2865	7.5	1.36	5.5	1.7	2.1	85.8	85.8	84.8	0.86	0.83	0.74	0.031	67	8	16	33	100
5.5	7.5	132S	2925	10.3	1.83	6.5	2.0	2.5	87.0	87.0	85.0	0.85	0.8	0.72	0.071	99	8	16	33	100
7.5	10	132S	2940	13.9	2.48	7.0	2.2	2.6	88.1	88.0	86.8	0.85	0.82	0.75	0.082	106	8	16	33	100
9.3	12.5	160M	2930	16.5	3.09	6.0	1.8	2.2	88.9	88.9	88.0	0.88	0.86	0.84	0.183	153	10	22	42	125
11	15	160M	2930	19.9	3.66	6.0	1.9	2.3	89.4	89.4	88.5	0.86	0.85	0.84	0.187	155	10	22	42	125
15	20	160M	2955	26.9	4.94	7.0	2.2	2.5	90.3	90.3	88.0	0.86	0.85	0.84	0.231	160	10	22	42	125
18.5	25	160L	2950	31.5	6.11	7.0	1.9	2.3	90.9	90.9	89.0	0.90	0.88	0.85	0.231	184	10	22	42	125
22	30	180M	2940	37.2	7.29	7.0	2.5	2.9	91.3	91.3	89.3	0.9	0.88	0.86	0.042	230	10	22	42	125
30	40	200L	2965	50.4	9.85	7.0	2.9	3.2	92.0	91.0	89.5	0.9	0.88	0.85	0.542	295	12	27	50	150
37	50	200L	2960	62.5	12.2	7.0	2.5	2.8	92.5	92.0	91.8	0.89	0.88	0.87	0.618	310	12	27	50	150
45	60	225M	2965	73.2	14.8	7.0	2.3	2.7	92.9	92.9	91.0	0.92	0.9	0.89	1.223	410	12	27	50	150
55	75	250M	2965	94.4	18.1	7.0	1.8	2.3	93.2	92.2	91.2	0.87	0.85	0.82	1.454	530	12	27	50	150
75	100	280S	2965	128	24.6	7.0	2.0	2.5	93.8	93.0	91.0	0.87	0.86	0.81	2.794	740	15	33	50	150
90	120	280M	2970	151	29.5	7.0	1.8	2.3	94.1	93.8	92.0	0.88	0.87	0.85	3.98	780	15	33	50	150
110	150	315S	2980	184	36.0	7.0	1.7	2.1	94.3	94.3	93.8	0.88	0.87	0.86	7.31	1050	15	33	50	150
125	170	315M	2980	204	40.9	7.0	1.8	2.3	94.5	94.5	93.0	0.90	0.89	0.84	8.48	1090	15	33	50	150
132	180	315M	2980	216	43.1	6.5	1.9	2.3	94.6	94.6	93.0	0.90	0.88	0.85	8.48	1105	15	33	50	150
160	215	315L	2980	255	52.3	7.0	1.9	2.3	94.8	94.8	94.5	0.92	0.91	0.88	9.73	1190	15	33	63	188
180	240	315L	2985	293	58.7	7.0	2.0	2.4	94.9	94.5	93.5	0.90	0.88	0.85	10.45	1230	15	33	50	150
200	270	315L	2985	325	65.3	7.0	2.0	2.4	95.0	94.6	93.0	0.90	0.88	0.85	11.66	1400	15	33	50	150
250	335	355L	2984	411	82	7.0	1.8	2.2	95.0	94.5	92.7	0.89	0.86	0.8	19.97	1865	15	33	63	188
315	425	355L	2984	518	103	7.0	1.8	2.2	95.0	94.6	92.8	0.89	0.86	0.8	23.28	1953	15	33	63	188
355	475	355L	2984	578	116	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.8	28.38	2250	15	33	63	188
375	503	355L	2985	610	122	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.81	29.75	2420	15	33	63	188
400	536	355L	2985	651	131	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	31.89	2754	15	33	63	188
450	603	355L	2985	732	147	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	35.23	2978	15	33	63	188
500	*670	355L	2985	805	163	7.0	1.8	2.5	95.0	94.7	93.1	0.91	0.88	0.81	38.66	2954	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Flameproof Motors - IE2

**Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE2, 4-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	1325	0.4	0.09	3.5	2.0	2.5	59.1	58.0	55.0	0.69	0.56	0.48	0.0013	12	15	30	63	188
0.18	0.25	63	1325	0.60	0.13	3.5	2.0	2.5	64.7	63.5	60.0	0.65	0.62	0.52	0.0015	12	15	30	63	188
0.25	0.33	71	1400	0.75	0.17	5.0	2.4	2.8	68.5	68.0	62.0	0.68	0.65	0.50	0.0037	17	10	20	42	125
0.37	0.50	71	1400	0.98	0.26	5.0	2.5	2.8	72.7	72.0	68.0	0.72	0.65	0.50	0.0043	17	10	20	42	125
0.55	0.75	80	1415	1.3	0.38	5.5	2.5	2.8	77.1	75.6	73.0	0.76	0.73	0.55	0.012	23	10	20	42	125
0.75	1.0	80	1410	1.7	0.52	5.5	2.5	2.8	79.6	76.5	75.0	0.78	0.74	0.60	0.013	24	10	20	42	125
1.1	1.5	90S	1410	2.4	0.76	5.5	2.3	2.6	81.4	79.0	78.0	0.78	0.72	0.54	0.014	35	10	20	42	125
1.5	2.0	90L	1420	3.2	1.03	6.0	2.5	2.8	82.8	82.0	81.3	0.79	0.70	0.57	0.018	36	10	20	42	125
2.2	3.0	100L	1425	4.8	1.50	6.0	2.2	2.6	84.3	83.3	82.5	0.76	0.70	0.60	0.033	48	8	16	33	100
3	4.0	100L	1430	6.5	2.04	6.0	2.3	2.6	85.5	82.0	81.5	0.75	0.7	0.63	0.039	50	8	16	33	100
3.7	5.0	112M	1430	7.3	2.52	6.0	2.5	2.9	86.3	85.5	85.0	0.82	0.77	0.67	0.052	67	8	16	33	100
4	5.5	112M	1430	7.8	2.72	6.0	2.6	2.9	86.6	85.8	85.0	0.82	0.78	0.68	0.054	68	8	16	33	100
5.5	7.5	132S	1455	10.6	3.68	7.0	2.4	2.8	87.7	87.5	86.5	0.82	0.76	0.68	0.121	100	8	16	33	100
7.5	10.0	132M	1450	14.0	5.04	7.0	2.3	2.8	88.7	88.5	88.0	0.84	0.78	0.70	0.135	108	8	16	33	100
9.3	12.5	160M	1450	17.2	6.25	7.0	2.2	2.5	89.3	88.8	88.0	0.84	0.78	0.65	0.248	165	10	22	42	125
11	15	160M	1460	20.0	7.34	7.0	2.0	2.5	89.8	89.6	89.3	0.85	0.83	0.74	0.256	168	10	22	42	125
15	20	160L	1460	27.1	10	7.0	2.0	2.5	90.6	90.5	90.0	0.85	0.82	0.74	0.332	180	10	22	42	125
18.5	25	180M	1465	33.2	12.3	7.0	2.4	2.7	91.2	91.0	90.8	0.85	0.82	0.75	0.732	225	10	22	42	125
22	30	180L	1470	38.4	14.6	7.0	2.2	2.6	91.6	91.3	90.8	0.87	0.84	0.77	0.805	245	10	22	42	125
30	40	200L	1470	51.4	19.9	7.0	2.2	2.6	92.3	91.7	91.0	0.88	0.85	0.79	1.091	320	12	27	50	150
37	50	225S	1470	63.8	24.5	7.0	2.5	3.0	92.7	92.3	91.6	0.87	0.84	0.75	1.627	375	12	27	50	150
45	60	225M	1470	76.4	29.8	7.0	2.3	2.9	93.1	92.5	92.0	0.88	0.84	0.79	1.875	418	12	27	50	150
55	75	250M	1475	96.3	36.3	7.0	2.0	2.6	93.5	93.2	92.4	0.85	0.84	0.76	2.562	535	12	27	50	150
75	100	280S	1480	129	49.4	7.0	2.0	2.6	94.0	93.5	92.2	0.86	0.82	0.76	4.564	746	15	33	63	188
90	120	280M	1480	155	59.2	7.0	2.2	2.6	94.2	94.0	93.4	0.86	0.84	0.79	4.564	795	15	33	63	188
110	150	315S	1485	184	72.1	6.5	2.0	2.5	94.5	94.3	94.0	0.88	0.86	0.82	10.17	1104	15	33	63	188
125	170	315M	1485	209	82.0	6.5	2.0	2.5	94.6	94.2	94.0	0.88	0.86	0.83	11.55	1140	15	33	63	188
132	180	315M	1485	220	86.6	6.0	2.0	2.5	94.7	94.3	94.0	0.88	0.86	0.83	12.19	1170	15	33	63	188
160	215	315L	1485	267	104.9	7.0	2.2	2.7	94.9	93.8	93.0	0.88	0.86	0.80	14.77	1270	15	33	63	188
180	240	315L	1488	300	117.8	7.0	1.8	2.4	95.0	94.0	93.0	0.88	0.86	0.82	16.20	1290	15	33	63	188
200	270	315L	1490	329	130.7	6.0	2.0	2.6	95.1	95.0	94.8	0.89	0.88	0.84	20.00	1480	15	33	63	188
250	335	355L	1485	416	164	7.0	2.20	2.5	95.1	94.8	93.9	0.88	0.86	0.82	27.186	1950	15	33	63	188
315	425	355L	1485	524	207	7.0	2.20	2.5	95.1	94.6	94.0	0.88	0.86	0.83	33.546	2060	15	33	63	188
355	475	355L	1485	590	233	7.0	2.20	2.5	95.1	94.5	93.1	0.88	0.86	0.83	37.036	2300	15	33	63	188
375	503	355L	1485	616	246	7.0	2.20	2.5	95.1	94.9	93.5	0.89	0.86	0.83	38.786	2484	15	33	63	188
400	536	355L	1485	657	262	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.86	0.83	41.236	2796	15	33	63	188
450	603	355L	1485	740	295	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.87	0.84	45.896	2857	15	33	63	188
500	*670	355L	1485	822	328	7.0	2.10	2.4	95.1	94.6	93.2	0.89	0.87	0.84	49.956	3540	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Flameproof Motors - IE2

**Ex db IIC & Ex tb IIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE2, 6-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 6 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	880	0.5	0.13	4.0	1.9	2.3	50.6	49.6	48.1	0.68	0.62	0.45	0.0036	12	10	20	42	125
0.18	0.25	71	890	0.7	0.20	4.0	1.9	2.3	56.6	54.5	45.2	0.65	0.55	0.45	0.0036	14	10	20	42	125
0.25	0.33	71	900	0.9	0.27	4.5	1.9	2.3	61.6	60.0	55.0	0.65	0.55	0.45	0.0046	15	10	20	42	125
0.37	0.5	80	910	1.1	0.40	4.5	1.9	2.3	67.6	67.6	66.0	0.71	0.66	0.53	0.0097	23	10	20	42	125
0.55	0.75	80	930	1.5	0.58	4.5	2.0	2.5	73.1	72.0	68.0	0.72	0.64	0.5	0.0118	24	10	20	42	125
0.75	1.0	90S	910	2.0	0.80	4.5	1.7	2.1	75.9	73.2	70.0	0.68	0.64	0.55	0.0134	32	10	20	42	125
1.1	1.5	90L	910	2.9	1.18	4.5	2.0	2.6	78.1	77.2	76.0	0.68	0.61	0.47	0.0175	37	10	20	42	125
1.5	2.0	100L	940	3.8	1.55	5.0	1.9	2.3	79.8	78.2	77.0	0.69	0.64	0.52	0.0502	47	10	20	42	125
2.2	3.0	112M	950	5.2	2.26	5.5	2.0	2.4	81.8	81.8	80.5	0.72	0.69	0.55	0.0794	68	10	20	42	125
3	4.0	132S	950	6.6	3.08	6.0	1.8	2.2	83.3	82.8	81.8	0.76	0.70	0.55	0.128	85	10	20	42	125
3.7	5.0	132S	945	8.0	3.81	6.0	1.6	2.0	84.3	84.0	83.8	0.76	0.72	0.6	0.136	97	10	20	42	125
4	5.5	132S	955	8.8	4.08	7.0	1.9	2.3	84.6	84.0	83.5	0.75	0.69	0.58	0.153	105	10	20	42	125
5.5	7.5	132M	960	11.4	5.58	6.0	1.7	2.1	86	85.4	82.6	0.78	0.74	0.62	0.177	110	10	20	42	125
7.5	10	160M	970	14.6	7.53	6.0	1.8	2.2	87.2	86.5	84.0	0.82	0.78	0.70	0.361	142	10	22	42	125
9.3	12.5	160L	960	17.9	9.44	6.0	1.7	2.1	88.1	88.0	87.5	0.82	0.78	0.70	0.316	172	10	22	42	125
11	15	160L	960	21.0	11.2	5.5	1.8	2.2	88.7	87.7	87.0	0.82	0.78	0.70	0.463	174	10	22	42	125
15	20	180L	980	28.4	14.9	6.0	2.2	2.9	89.7	89.3	89.0	0.82	0.77	0.65	0.978	230	10	22	42	125
18.5	25	200L	975	33.5	18.5	7.0	1.6	2.0	90.4	90.0	87.6	0.85	0.83	0.72	1.171	305	10	22	42	125
22	30	200L	980	39.6	21.9	7.0	2.5	3.0	90.9	90.5	90.0	0.85	0.83	0.72	1.477	332	12	27	50	150
30	40	225M	980	53.5	29.8	5.5	2.3	2.9	91.7	91.5	91.0	0.85	0.84	0.78	3.018	295	12	27	50	150
37	50	250M	980	66.5	36.8	6.0	1.8	2.2	92.2	92.0	91.7	0.84	0.82	0.75	3.887	525	12	27	50	150
45	60	280S	985	79.5	44.5	7.0	2.0	2.4	92.7	92.5	91.5	0.85	0.83	0.8	6.704	745	15	33	63	188
55	75	280M	980	96.7	54.7	6.5	2.5	3.0	93.1	92.5	91.0	0.85	0.83	0.80	8.792	880	15	33	63	188
75	100	315S	990	131	73.8	6.0	2.2	2.8	93.7	93.3	93.0	0.85	0.83	0.80	11.424	1048	15	33	63	188
90	120	315M	990	157	88.5	7.0	2.0	2.6	94	93.8	93.5	0.85	0.83	0.81	14.704	1090	15	33	63	188
110	150	315M	990	189	108.2	7.0	2.0	2.5	94.3	94.2	94.0	0.86	0.84	0.81	18.524	1150	15	33	63	188
125	170	315M	990	216	123.0	7.0	1.7	2.1	94.5	94.5	94.3	0.85	0.83	0.82	21.794	1195	15	33	63	188
132	180	315L	990	226	129.9	7.0	2.0	2.5	94.6	94.2	93.0	0.86	0.84	0.80	21.794	1250	15	33	63	188
160	215	355L	990	276	157.4	7.0	2.0	2.5	94.8	94.0	93.0	0.85	0.82	0.80	38.50	2300	15	33	63	188
180	240	355L	990	310	177	7.0	1.80	2.2	94.9	94.5	93.5	0.85	0.83	0.78	43.536	3165	15	33	63	188
200	270	355L	990	345	197	7.0	1.80	2.2	95.0	94.8	93.6	0.85	0.83	0.78	47.766	2370	15	33	63	188
250	335	355L	990	431	246	7.0	1.80	2.3	95.0	94.8	93.2	0.85	0.82	0.76	58.33	3165	15	33	63	188
315	425	355L	991	543	310	7.0	1.80	2.2	95.0	94.5	93.0	0.85	0.82	0.77	72.206	2370	15	33	63	188
355	475	355L	991	612	349	7.0	1.80	2.2	95.0	94.8	93.4	0.85	0.82	0.77	80.666	2640	15	33	63	188
375	503	355L	991	646	369	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	84.896	2770	15	33	63	188
400	536	355L	991	689	393	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	90.186	2850	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Flameproof Motors - IE2

**Ex db IIC & Ex tb IIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE2, 8-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 8 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	630	0.58	0.19	3.0	1.7	2.0	39.8	37.2	36.3	0.72	0.60	0.48	0.0034	19	15	30	63	188
0.18	0.25	80	700	0.76	0.25	3.0	1.7	2.0	45.9	45.5	45.2	0.72	0.60	0.48	0.0107	23	15	30	63	188
0.25	0.33	80	700	1.1	0.35	5.2	1.7	2.0	50.6	45.9	44.2	0.65	0.55	0.45	0.0107	25	15	30	63	188
0.37	0.50	90S	680	1.4	0.53	3.0	1.7	2.0	56.1	50.1	45.9	0.65	0.55	0.45	0.0134	52	15	30	63	188
0.55	0.75	90L	680	1.9	0.79	3.0	1.7	2.0	61.7	60.0	48.0	0.65	0.55	0.45	0.0175	37	15	30	63	188
0.75	1.0	100L	710	2.3	1.03	4.0	1.8	2.2	66.2	66.0	65.04	0.7	0.6	0.45	0.0473	46	10	20	42	125
1.1	1.5	100L	700	3.1	1.53	4.0	1.7	2.0	70.8	70.0	69.0	0.7	0.6	0.45	0.0526	52	10	20	42	125
1.5	2.0	112M	700	4.0	2.09	4.5	2.0	2.3	74.1	73.8	70.0	0.7	0.6	0.45	0.0794	67	10	20	42	125
2.2	3.0	132S	715	6.1	3.00	5.5	1.8	2.3	77.6	77.0	76.5	0.65	0.59	0.46	0.144	96	10	20	42	125
3	4.0	132M	710	8.0	4.12	6.0	1.7	2.3	80	78.1	77.0	0.65	0.59	0.46	0.186	105	10	20	42	125
3.7	5.0	160M	720	8.8	5.01	5.5	1.5	2.0	81.4	81.0	80.0	0.72	0.67	0.56	0.257	142	10	20	42	125
4	5.5	160M	710	9.1	5.49	6.0	1.8	2.4	81.9	81.0	80.0	0.75	0.7	0.6	0.276	150	10	20	42	125
5.5	7.5	160M	720	12.2	7.44	5.5	1.5	2.0	83.8	83.0	80.5	0.75	0.7	0.6	0.351	146	10	20	42	125
7.5	10	160M	720	16.3	10.1	5.5	1.5	2.0	85.3	84.6	83.0	0.75	0.7	0.6	0.463	152	10	20	42	125
9.3	12.5	180L	725	19.7	12.5	5.5	1.8	2.3	86.3	85.2	83.2	0.76	0.7	0.6	1.059	244	10	22	42	125
11	15	180L	730	23.5	14.7	6.0	2.0	2.5	86.9	85.5	84.5	0.75	0.7	0.55	1.182	250	10	22	42	125
15	20	200L	720	31.6	20.3	6.5	1.9	2.4	88	87.2	85.0	0.75	0.7	0.55	1.267	292	12	27	50	150
18.5	25	225S	710	38.7	25.4	6.0	2.2	2.5	88.6	87.6	86.0	0.75	0.7	0.55	3.0696	370	12	27	50	150
22	30	225M	725	42.9	29.6	5.5	2.2	2.5	89.1	88.0	86.5	0.8	0.78	0.7	3.565	376	12	27	50	150
30	40	250M	730	60.4	40.0	6.0	2.1	2.4	89.8	89.0	87.5	0.77	0.72	0.62	4.281	560	12	27	50	150
37	50	280S	740	73.1	48.7	7.0	1.9	2.4	90.3	90.0	89	0.78	0.75	0.65	6.444	730	15	33	63	188
45	60	280M	730	88.5	60.0	6.5	2.3	2.6	90.7	89.7	87.7	0.78	0.75	0.65	7.754	751	15	33	63	188
55	75	315S	735	105	72.9	6.0	1.8	2.3	91	90.8	90.0	0.8	0.76	0.67	14.704	1075	15	33	63	188
75	100	315M	735	146	99.4	6.0	1.6	2.1	91.6	90.5	89.5	0.78	0.75	0.68	17.434	1485	15	33	63	188
90	120	315L	735	175	119.3	6.0	1.6	2.1	91.9	90.8	89.6	0.78	0.75	0.68	20.407	1158	15	33	63	188
110	150	315L	735	213	145.8	6.0	1.8	2.4	92.3	92.0	91.8	0.78	0.75	0.68	25.07	1275	15	33	63	188
125	170	315L	735	241	165.6	6.0	1.9	2.5	92.5	92.0	91.0	0.78	0.75	0.68	28.344	1300	15	33	63	188
132	180	315L	735	254	174.9	6.0	1.7	2.1	92.6	91.6	90.6	0.78	0.75	0.68	29.984	2780	15	33	63	188
150	200	355L	740	288	197	6.0	1.70	2.1	92.9	91.5	91.2	0.78	0.75	0.68	48.816	3202	15	33	63	188
160	215	355L	740	307	211	6.0	1.70	2.1	93.0	92.5	91.5	0.78	0.75	0.68	51.996	2643	15	33	63	188
180	240	355L	740	344	237	6.0	1.70	2.1	93.3	93	91.0	0.78	0.75	0.68	57.356	2720	15	33	63	188
200	270	355L	742	382	263	6.0	1.70	2.1	93.5	92.6	91.2	0.78	0.75	0.68	63.626	2800	15	33	63	188
250	335	355L	742	477	328	6.0	1.70	2.0	93.5	92.6	91.6	0.78	0.75	0.68	78.556	2954	15	33	63	188
315	425	355L	742	601	413	6.0	1.70	2.1	93.5	92.5	91.9	0.78	0.75	0.68	96.5	3520	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Premium Efficiency "Supremo Series" Flameproof Motors - IE3

**Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE3, 2-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 2 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	2750	0.39	0.043	6.5	2	2.5	60.8	60	56.7	0.7	0.64	0.55	0.00084	12	10	20	42	125
0.18	0.25	63	2750	0.58	0.064	6.5	2	2.5	65.9	63	58	0.65	0.64	0.55	0.001	12	10	20	42	125
0.25	0.33	63	2750	0.7	0.089	6.5	2	2.5	69.7	68.9	65.6	0.7	0.64	0.6	0.0013	12	10	20	42	125
0.37	0.5	71	2750	0.9	0.131	4.5	2.5	2.8	73.8	73	72	0.8	0.7	0.6	0.0018	16	10	20	42	125
0.55	0.75	71	2760	1.2	0.194	6	3	3.3	77.8	77	73.7	0.8	0.74	0.64	0.0025	17	10	20	42	125
0.75	1	80	2850	1.6	0.256	7	2.6	2.9	80.7	80.7	77.5	0.82	0.76	0.61	0.007	24	10	20	42	125
1.1	1.5	80	2850	2.3	0.376	7	2.5	2.8	82.7	82.7	82	0.8	0.7	0.6	0.007	25	10	20	42	125
1.5	2	90S	2820	3.1	0.518	7	2.3	2.6	84.2	84	83.5	0.8	0.7	0.6	0.0084	33	10	20	42	125
2.2	3	90L	2840	4.3	0.755	7.7	2.5	2.75	85.9	84.5	84	0.82	0.78	0.68	0.0114	37	10	20	42	125
3	4	100L	2840	5.8	1.029	7.7	2.5	2.9	87.1	87	85	0.82	0.8	0.68	0.0247	48	8	16	33	100
3.7	5	100L	2865	7.1	1.258	7.7	2.7	2.9	87.8	87.5	86.3	0.83	0.8	0.68	0.0296	49	8	16	33	100
4	5.5	112M	2865	7.6	1.36	6	2.7	2.9	88.1	87.5	86.3	0.83	0.8	0.68	0.0347	69	8	16	33	100
5.5	7.5	132S	2945	10.2	1.819	7	2	2.5	89.2	89	87	0.84	0.82	0.75	0.0854	106	8	16	33	100
7.5	10	132S	2930	13.6	2.493	7	2.25	2.6	90.1	90.1	89.8	0.85	0.82	0.74	0.099	114	8	16	33	100
9.3	12.5	160M	2940	16.2	3.081	7.7	2.5	2.9	90.7	90.5	88.5	0.88	0.88	0.86	0.191	156	10	22	42	125
11	15	160M	2950	19.1	3.632	7.7	2.25	2.9	91.2	91.2	90.5	0.88	0.86	0.82	0.209	168	10	22	42	125
15	20	160M	2950	25.5	4.953	7.7	2	2.6	91.9	91.9	91	0.89	0.89	0.83	0.264	170	10	22	42	125
18.5	25	160L	2950	31.7	6.108	7.7	2.3	2.7	92.4	92	91	0.88	0.87	0.84	0.312	186	10	22	42	125
22	30	180M	2940	36.3	7.288	7.7	2.25	2.6	92.7	92.5	91.8	0.91	0.9	0.86	0.436	245	10	22	42	125
30	40	200L	2960	49.7	9.872	7.7	2.5	3	93.3	92.5	91.6	0.9	0.89	0.85	0.548	310	12	27	50	150
37	50	200L	2960	60.4	12.18	7.7	2.5	3	93.7	93.2	92.1	0.91	0.88	0.83	0.685	315	12	27	50	150
45	60	225M	2960	72.4	14.81	7.7	2.6	3	94	93.8	92.9	0.92	0.91	0.9	1.223	425	12	27	50	150
55	75	250M	2965	89.2	18.07	7.7	2	2.4	94.3	93.4	92.5	0.91	0.9	0.89	2.077	535	12	27	50	150
75	100	280S	2970	121	24.6	7.7	1.95	2.55	94.7	93.5	92.5	0.91	0.89	0.89	3.703	780	15	33	63	188
90	120	280M	2980	145	29.42	7.7	2	2.4	95	94.2	92.7	0.91	0.91	0.87	5.204	795	15	33	63	188
110	150	315S	2980	177	35.95	7.7	1.95	2.5	95.2	94.7	93.7	0.91	0.9	0.88	7.944	1080	15	33	63	188
125	170	315S	2980	201	40.86	7.7	1.95	2.5	95.3	94.7	93.7	0.91	0.9	0.88	9.784	1120	15	33	63	188
132	180	315M	2980	212	43.14	7.7	1.95	2.5	95.4	94.8	93.8	0.91	0.9	0.88	9.784	1140	15	33	63	188
160	215	315L	2980	256	52.3	7.7	1.8	2.4	95.6	95.3	94.5	0.91	0.9	0.89	11.351	1240	15	33	63	188
180	240	315L	2980	284	58.83	7.7	2	2.4	95.7	95.4	94.9	0.92	0.9	0.89	12.32	1280	15	33	63	188
200	270	315L	2980	316	65.37	7.7	2	2.4	95.8	95.5	95	0.92	0.9	0.89	12.6	1460	15	33	63	188
250	335	355M	2984	399	81.6	7.7	1.85	2.4	95.8	95.1	94.5	0.91	0.9	0.89	26.456	1930	15	33	63	188
315	425	355L	2984	503	102.8	7.7	1.8	2.4	95.8	95.1	94.5	0.91	0.9	0.89	33.315	2030	15	33	63	188
355	475	355L	2985	567	115.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	37.54	2140	15	33	63	188
375	503	355L	2985	598	122.4	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	39.68	2500	15	33	63	188
400	536	355L	2985	638	130.5	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	42.32	2750	15	33	63	188
450	603	355L	2985	718	146.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	47.62	2900	15	33	63	188
500	*670	355L	2985	798	163.1	7.7	1.7	2.5	95.8	95.5	94	0.91	0.9	0.89	52.91	3020	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Premium Efficiency "Supremo Series" Flameproof Motors - IE3

Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE3, 4-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 4 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	63	1315	0.4	0.09	5	2.0	2.5	64.8	63.5	46.7	0.65	0.58	0.45	0.0013	12	15	30	63	188
0.18	0.25	63	1345	0.6	0.13	5	2.0	2.5	69.9	68.0	62.0	0.65	0.60	0.45	0.0015	12	15	30	63	188
0.25	0.33	71	1400	0.7	0.17	5.5	2.0	2.6	73.5	68.5	64.8	0.72	0.65	0.52	0.0049	17	10	20	42	125
0.37	0.5	71	1400	1.0	0.26	5.5	2.5	3.0	77.3	76.5	73.2	0.7	0.68	0.55	0.0052	17	10	20	42	125
0.55	0.75	80	1410	1.2	0.38	5.5	2.5	3.0	80.8	80.0	79.0	0.76	0.72	0.56	0.014	24	10	20	42	125
0.75	1	80	1415	1.6	0.52	5.5	2.3	2.8	82.5	80.4	78.5	0.80	0.73	0.59	0.014	24	10	20	42	125
1.1	1.5	90S	1420	2.4	0.75	6	2.4	3.0	84.1	83.5	82.0	0.77	0.68	0.54	0.018	36	10	20	42	125
1.5	2	90L	1415	3.1	1.03	6	2.6	3.0	85.3	83.5	82.5	0.78	0.72	0.62	0.021	37	10	20	42	125
2.2	3	100L	1430	4.4	1.50	6	2.2	2.7	86.7	86.2	85.8	0.8	0.72	0.62	0.041	49	8	16	33	100
3	4	100L	1435	5.9	2.04	6	2.4	2.8	87.7	86.4	85.4	0.8	0.72	0.62	0.041	51	8	16	33	100
3.7	5	112M	1450	7.3	2.49	6	2.2	2.8	88.4	87.5	86.5	0.80	0.75	0.68	0.060	72	8	16	33	100
4	5.5	112M	1440	7.9	2.71	7	2.5	2.9	88.6	87.5	86.5	0.80	0.75	0.66	0.062	80	8	16	33	100
5.5	7.5	132S	1450	10.7	3.69	7	2.3	2.7	89.6	88.8	87.0	0.80	0.75	0.67	0.13	108	8	16	33	100
7.5	10	132M	1455	14.1	5.02	7	2.3	2.7	90.4	89.8	88.5	0.82	0.78	0.69	0.17	116	8	16	33	100
9.3	12.5	160M	1460	16.9	6.20	7	2.0	2.5	91.0	90.0	89.1	0.84	0.8	0.72	0.273	175	10	22	42	125
11	15	160M	1460	20.4	7.34	7	2.2	2.8	91.4	91.0	90.5	0.82	0.78	0.7	0.332	178	10	22	42	125
15	20	160L	1465	27.0	9.97	7	2.2	2.8	92.1	91.0	90.4	0.84	0.82	0.75	0.425	184	10	22	42	125
18.5	25	180M	1470	32.7	12.26	7.5	2.2	2.8	92.6	91.8	90.8	0.85	0.83	0.75	0.846	252	10	22	42	125
22	30	180L	1470	38.7	14.58	7.5	2.2	2.8	93.0	92.2	91.2	0.85	0.82	0.75	0.914	264	10	22	42	125
30	40	200L	1470	52.5	19.88	7.5	2.4	2.8	93.6	92.6	92.0	0.85	0.82	0.74	1.174	330	12	27	50	150
37	50	225S	1475	64.5	24.43	6.5	2.3	2.7	93.9	93.1	92.8	0.85	0.82	0.76	1.83	397	12	27	50	150
45	60	225M	1475	79.1	29.72	6.5	2.3	2.9	94.2	93.4	92.4	0.84	0.82	0.75	2.1	430	12	27	50	150
55	75	250M	1480	95.2	36.20	6.5	2.0	2.6	94.6	93.6	92.8	0.85	0.82	0.73	2.806	540	12	27	50	150
75	100	280S	1482	128	49.29	7.7	2.2	2.8	95.0	94.8	94.1	0.86	0.84	0.78	5.514	791	15	33	63	188
90	120	280M	1485	153	59.03	7.7	2.2	2.8	95.2	95.0	94.6	0.86	0.84	0.78	6.084	810	15	33	63	188
110	150	315S	1485	187	72.15	7.5	2.0	2.6	95.4	95.2	95.0	0.86	0.85	0.8	8.897	1150	15	33	63	188
125	170	315S	1485	212	81.99	7.7	2.0	2.5	95.5	95.2	94.8	0.86	0.83	0.78	9.6	1160	15	33	63	188
132	180	315M	1485	218	86.58	7.7	2.0	2.5	95.6	95.2	94.8	0.88	0.85	0.81	9.6	1190	15	33	63	188
160	215	315L	1490	264	104.59	7.7	2.2	2.8	95.8	95.5	95.1	0.88	0.88	0.85	11.74	1310	15	33	63	188
180	240	315L	1485	297	118.06	7.7	2.2	2.8	95.9	95.7	95.4	0.88	0.86	0.83	14.54	1330	15	33	63	188
200	270	315L	1485	322	131.18	7.5	2.0	2.6	96.0	95.9	95.6	0.9	0.87	0.86	15	1510	15	33	63	188
250	335	355M	1485	407	164	7.7	2.0	2.5	96.0	95.2	94.3	0.89	0.88	0.82	27.14	2020	15	33	63	188
315	425	355L	1485	513	207	7.7	2.0	2.4	96.0	95.7	94.4	0.89	0.88	0.82	34.19	2130	15	33	63	188
355	475	355L	1485	578	233	7.7	2.1	2.5	96.0	95.1	94.5	0.89	0.88	0.82	38.53	2260	15	33	63	188
375	503	355L	1485	611	246	7.7	2.1	2.5	96.0	95.2	94.5	0.89	0.88	0.82	40.71	2480	15	33	63	188
400	536	355L	1490	651	261	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	43.42	2620	15	33	63	188
450	603	355L	1490	733	294	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	48.852	2870	15	33	63	188
500	*670	355L	1490	814	327	7.7	2.1	2.4	96.0	95.5	94.7	0.89	0.88	0.82	54.28	2950	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Premium Efficiency "Supremo Series" Flameproof Motors - IE3

Ex db IIC & Ex tb IIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb: 50°C, Rise: 70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE3, 6-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 6 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	880	0.53	0.13	6.5	1.9	2.3	57.7	56.6	53.6	0.55	0.51	0.42	0.0043	15	10	20	42	125
0.18	0.25	71	890	0.68	0.20	6.5	1.9	2.3	63.9	63.1	59.8	0.58	0.54	0.45	0.0043	18	10	20	42	125
0.25	0.33	71	900	0.84	0.27	6.5	1.9	2.3	68.6	67.8	64.5	0.60	0.56	0.47	0.0047	22	10	20	42	125
0.37	0.5	80	905	1.1	0.40	4	1.9	2.3	73.5	73.0	70.4	0.65	0.60	0.48	0.0097	24	10	20	42	125
0.55	0.75	80	935	1.5	0.57	4.5	1.95	2.5	77.2	75.0	71.0	0.67	0.60	0.48	0.014	24	10	20	42	125
0.75	1	90S	930	2.10	0.79	4.5	1.95	2.5	78.9	78.1	75.6	0.63	0.54	0.41	0.0191	33	10	20	42	125
1.1	1.5	90L	930	3.00	1.15	4.5	2	2.6	81.0	80.6	78.5	0.63	0.54	0.41	0.022	38	10	20	42	125
1.5	2	100L	940	3.5	1.55	5	2	2.5	82.5	82.0	78.5	0.72	0.62	0.5	0.063	49	10	20	42	125
2.2	3	112M	960	5.0	2.23	5.5	1.9	2.4	84.3	84.0	82.8	0.73	0.62	0.47	0.0882	73	10	20	42	125
3.0	4	132S	945	6.60	3.09	5.5	1.7	2.1	86.6	84.8	83.0	0.73	0.70	0.60	0.141	102	10	20	42	125
3.7	5	132S	955	7.6	3.77	5.5	1.9	2.4	86.5	86.0	85.5	0.78	0.70	0.60	0.176	105	10	20	42	125
4.0	5.5	132S	960	8.0	4.06	6	1.8	2.2	86.8	86.0	85	0.80	0.74	0.62	0.188	112	10	20	42	125
5.5	7.5	132M	960	11.1	5.58	6	1.9	2.4	88.0	87.0	85.5	0.78	0.7	0.60	0.223	115	10	20	42	125
7.5	10	160M	970	14.3	7.53	5.5	1.8	2.2	89.1	88.0	87.6	0.82	0.8	0.7	0.406	148	10	22	42	125
9.3	12.5	160L	970	17.6	9.34	6	1.8	2.2	89.8	88.7	88.4	0.82	0.8	0.7	0.496	178	10	22	42	125
11	15	160L	970	20.7	11.05	6	1.8	2.2	90.3	89.5	89	0.82	0.8	0.7	0.563	180	10	22	42	125
15	20	180L	985	28.2	14.83	7.5	2.2	2.6	91.2	91.0	90.5	0.81	0.8	0.71	1.304	245	10	22	42	125
18.5	25	200L	980	33.0	18.39	7.5	2	2.4	91.7	91.5	91	0.85	0.82	0.73	1.346	324	10	22	42	125
22	30	200L	970	39.1	22.09	7.5	2	2.4	92.2	92.0	91.5	0.85	0.82	0.75	1.638	345	12	27	50	150
30	40	225M	985	52.2	29.66	7	2.5	2.9	92.9	92.1	92	0.86	0.84	0.76	3.55	410	12	27	50	150
37	50	250M	985	64.9	36.59	6	2	2.4	93.3	92.5	92.2	0.85	0.82	0.78	5.233	565	12	27	50	150
45	60	280S	985	78.6	44.50	7.5	2.2	2.8	93.7	93.2	93	0.85	0.82	0.74	7.618	755	12	27	50	150
55	75	280M	985	95.7	54.39	7.5	2.15	2.55	94.1	93.3	92.8	0.85	0.83	0.8	9.141	886	15	33	63	188
75	100	315S	990	128	73.79	7.5	2.15	2.8	94.6	94.0	93.8	0.86	0.83	0.80	12.21	1080	15	33	63	188
90	120	315M	990	153	88.55	6	1.8	2.2	94.9	94.5	94.2	0.86	0.83	0.80	17.36	1160	15	33	63	188
110	150	315L	990	187	108.22	7.5	1.95	2.35	95.1	94.8	94.6	0.86	0.83	0.80	21.20	1540	15	33	63	188
125	170	315L	990	212	122.98	7.5	1.95	2.35	95.2	94.4	93.8	0.86	0.84	0.82	24.00	1310	15	33	63	188
132	180	315L	990	224	129.87	7.7	1.95	2.55	95.4	95.2	94.9	0.86	0.84	0.82	25.34	1390	15	33	63	188
160	215	355L	990	271	157.41	7.7	1.95	2.55	95.6	95.3	95	0.86	0.85	0.80	41.50	3065	15	33	63	188
180	240	355L	990	304	177	7.7	2.0	2.4	95.7	94.9	94.2	0.86	0.83	0.8	47.09	2630	15	33	63	188
200	270	355L	990	338	197	7.7	2.0	2.4	95.8	95.0	94.3	0.86	0.83	0.8	52.98	2790	15	33	63	188
250	335	355L	990	422	246	7.7	2.0	2.4	95.8	95.0	94.4	0.86	0.83	0.8	66.22	2920	15	33	63	188
315	425	355L	990	532	310	7.7	2.0	2.5	95.8	95.3	94.5	0.86	0.83	0.8	83.44	3054	15	33	63	188
355	475	355L	990	599	349	7.7	2.0	2.5	95.8	95.3	94.6	0.86	0.83	0.8	94.03	3310	15	33	63	188
375	503	355L	990	633	369	7.7	2.0	2.5	95.8	95.3	94.0	0.86	0.83	0.8	99.33	3590	15	33	63	188
400	536	355L	992	675	393	7.7	2.0	2.5	95.8	95.4	94.5	0.86	0.83	0.8	105.96	3720	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Premium Efficiency "Supremo Series" Flameproof Motors - IE3

Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE3, 8-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 8 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	640	0.66	0.18	5.5	1.8	2.2	50.7	48	44.0	0.50	0.42	0.36	0.0039	21	15	30	63	188
0.18	0.25	80	680	0.82	0.26	4.0	1.8	2.2	58.7	56.1	53.2	0.52	0.47	0.40	0.0123	24	15	30	63	188
0.25	0.33	80	650	1.00	0.37	5.5	1.8	2.2	64.1	62.2	58.1	0.54	0.50	0.42	0.0123	28	15	30	63	188
0.37	0.5	90S	675	1.4	0.53	4.0	1.8	2.2	69.3	67	62.1	0.54	0.48	0.38	0.0154	34	15	30	63	188
0.55	0.75	90L	675	1.7	0.79	4.0	1.8	2.2	73.0	71.7	67.2	0.60	0.56	0.48	0.0201	40	15	30	63	188
0.75	1	100L	685	2.2	1.07	4.5	1.8	2.3	75.0	73.8	70.2	0.62	0.58	0.48	0.0543	45	10	20	42	125
1.1	1.5	100L	685	3.1	1.56	6.5	1.8	2.3	77.7	75.8	73.2	0.64	0.60	0.52	0.0604	47	10	20	42	125
1.5	2	112M	690	3.9	2.12	4.5	1.8	2.3	79.7	78.1	75.8	0.68	0.6	0.52	0.0674	67	10	20	42	125
2.2	3	132S	710	5.5	3.02	4.5	1.8	2.3	81.9	80.1	78.2	0.68	0.6	0.52	0.165	105	10	20	42	125
3	4	132M	705	7.4	4.14	7.0	1.8	2.3	83.5	81.1	78.2	0.68	0.6	0.52	0.213	118	10	20	42	125
3.7	5	160M	720	8.5	5.01	5.5	1.8	2.3	84.5	83.5	81.2	0.72	0.65	0.55	0.295	200	10	22	42	125
4	5.5	160M	720	9.1	5.41	7.0	1.8	2.3	84.8	83.2	80.6	0.72	0.65	0.55	0.317	150	10	22	42	125
5.5	7.5	160M	720	11.8	7.44	5.5	1.8	2.3	86.2	84.8	82.8	0.75	0.7	0.6	0.403	150	10	22	42	125
7.5	10	160L	720	15.9	10.1	6.0	1.8	2.3	87.3	85.6	83.8	0.75	0.7	0.6	0.532	150	10	22	42	125
9.3	12.5	180L	720	19.6	12.6	7.0	1.8	2.3	88.1	87.4	85.5	0.75	0.7	0.6	1.217	248	10	22	42	125
11	15	180L	725	23.0	14.8	6.0	1.9	2.4	88.6	87.2	85.2	0.75	0.7	0.62	1.359	250	10	22	42	125
15	20	200L	725	31.1	20.2	7.0	2.0	2.5	89.6	89	88.8	0.75	0.71	0.64	1.457	298	12	27	50	150
18.5	25	225S	730	37.1	24.7	6.5	2.0	2.3	90.1	89.5	89	0.77	0.74	0.64	2.46	380	12	27	50	150
22	30	225M	730	43.3	29.4	6.0	2.0	2.4	90.6	90.6	90	0.78	0.75	0.7	4.099	390	12	27	50	150
30	40	250M	730	58.6	40.0	6.5	2.1	2.5	91.3	91.3	91	0.78	0.75	0.70	5.37	570	12	27	50	150
37	50	280S	735	70.1	49.0	6.5	1.9	2.4	91.8	91.8	91.5	0.8	0.77	0.7	7.41	750	15	33	63	188
45	60	280M	735	84.9	59.6	6.5	1.9	2.4	92.2	92.2	91.5	0.8	0.77	0.7	8.917	780	15	33	63	188
55	75	315S	735	103	72.9	6.5	2.0	2.5	92.5	92.5	92	0.8	0.77	0.7	11.97	1090	15	33	63	188
75	100	315M	740	140	98.7	6.5	2.0	2.5	93.1	93.1	93	0.8	0.77	0.7	16.32	1485	15	33	63	188
90	120	315L	740	168	118.5	6.5	2.0	2.5	93.4	93.2	92.8	0.8	0.77	0.7	19.58	1570	15	33	63	188
110	150	315L	740	204	144.8	7.0	2.0	2.5	93.7	93.5	93	0.80	0.77	0.7	24.00	1275	15	33	63	188
125	170	315L	740	231	164.5	7.0	2.0	2.5	94.0	93	93.0	0.8	0.77	0.7	27.27	1350	15	33	63	188
132	180	315L	740	243	173.7	7.0	2.0	2.5	94.3	94.2	93.8	0.80	0.77	0.7	29.00	1490	15	33	63	188
160	215	355L	740	294	211	7.0	1.9	2.3	94.6	94.4	94.0	0.80	0.77	0.7	59.79	2238	15	33	63	188
180	240	355L	740	331	237	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	65.95	2485	15	33	63	188
200	270	355L	740	368	263	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	67.68	2590	15	33	63	188
250	335	355L	740	460	329	7.0	1.8	2.25	94.6	94.3	94.0	0.80	0.77	0.7	84.6	2864	15	33	63	188
315	425	355L	741	579	414	7.0	1.7	2.1	94.6	94.3	94.0	0.80	0.77	0.7	106.59	2971	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Super Premium Efficiency "Ultimo Series" Flameproof Motors - IE4

**Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE4, 2-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 2 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	80	2800	0.29	0.04	7.3	2.1	2.4	66.5	66.5	65	0.86	0.8	0.68	0.00096	21	10	20	42	125
0.18	0.25	80	2820	0.41	0.06	7.3	2.1	2.4	70.8	70.8	70	0.86	0.8	0.68	0.0011	22	10	20	42	125
0.25	0.33	80	2830	0.54	0.09	7.3	2.1	2.4	74.3	74.3	71	0.87	0.81	0.7	0.0014	22	10	20	42	125
0.37	0.5	80	2840	0.76	0.13	6.5	2.5	2.8	78.1	78.1	75.0	0.87	0.82	0.71	0.0020	16	10	20	42	125
0.55	0.75	80	2810	1.1	0.19	7.8	2.2	2.6	81.5	81.5	80	0.88	0.82	0.71	0.0028	17	10	20	42	125
0.75	1	80	2860	1.4	0.26	7.8	2.2	2.5	83.5	83.5	80	0.88	0.82	0.72	0.008	25	10	20	42	125
1.1	1.5	80	2870	2.0	0.37	7.8	2.2	2.6	85.2	85.2	83	0.88	0.83	0.72	0.008	26	10	20	42	125
1.5	2	90S	2850	3	0.51	7.8	2.2	2.6	86.5	86.5	85	0.87	0.80	0.73	0.0096	35	10	20	42	125
2.2	3	90L	2900	4.0	0.74	8.9	2.5	2.75	88	88	87.5	0.88	0.81	0.73	0.0131	38	10	20	42	125
3	4	100L	2840	5.5	1.03	8.9	2.5	2.9	89.1	89.1	87.0	0.85	0.78	0.66	0.0284	49	8	16	33	100
3.7	5	100L	2865	6.8	1.26	8.9	2.7	2.9	89.7	89.7	87.7	0.85	0.78	0.68	0.034	50	8	16	33	100
4	5.5	112M	2870	7.5	1.36	8.9	2.5	3	90	90	89	0.82	0.80	0.71	0.0399	70	8	16	33	100
5.5	7.5	132S	2920	9.5	1.83	8.9	2.2	2.6	90.9	90.9	89.0	0.89	0.86	0.82	0.0982	110	8	16	33	100
7.5	10	132S	2925	12.8	2.50	8.9	2.2	2.6	91.7	91.7	89.9	0.89	0.85	0.82	0.113	115	8	16	33	100
9.3	12.5	160M	2945	15.8	3.08	8.9	2	2.4	92.2	92.2	90	0.89	0.87	0.83	0.2190	170	10	22	42	125
11	15	160M	2950	18.8	3.63	8.9	1.7	2.1	92.6	92.6	90.5	0.88	0.86	0.82	0.240	174	10	22	42	125
15	20	160M	2955	24.9	4.94	8.9	2	2.6	93.3	93.3	91.2	0.9	0.89	0.85	0.303	180	10	22	42	125
18.5	25	160L	2955	31.6	6.10	8.9	2.3	2.7	93.7	93.7	91.1	0.87	0.85	0.76	0.358	186	10	22	42	125
22	30	180M	2960	37.0	7.24	8.9	2.5	2.8	94	94	92	0.88	0.86	0.81	0.501	252	10	22	42	125
30	40	200L	2960	49.6	9.87	8.9	2.5	3	94.5	94.5	93	0.89	0.88	0.85	0.630	325	12	27	50	150
37	50	200L	2960	59.7	12.18	8.9	2.5	3	94.8	94.8	92.2	0.91	0.87	0.78	0.787	335	12	27	50	150
45	60	225M	2960	71.6	14.81	8.9	2.1	2.5	95.0	95	93.2	0.92	0.91	0.90	1.40600	442	12	27	50	150
55	75	250M	2975	88.2	18.01	8.9	2	2.5	95.3	95.3	94	0.91	0.90	0.87	2.38800	550	12	27	50	150
75	100	280S	2970	121	24.60	8.9	2.1	2.55	95.6	95.6	93	0.9	0.86	0.77	4.25800	790	15	33	63	188
90	120	280M	2975	144	29.47	8.9	2.1	2.5	95.8	95.8	94	0.91	0.9	0.89	5.98	810	15	33	63	188
110	150	315S	2975	175	36.01	8.9	2	2.5	96	96	94.1	0.91	0.87	0.81	9.135	1110	15	33	63	188
125	170	315M	2980	199	40.86	8.9	2	2.5	96.2	96.2	94.3	0.91	0.87	0.78	11.251	1235	15	33	63	188
132	180	315M	2980	210	43.14	8.9	2	2.5	96.2	96.2	94.7	0.91	0.88	0.87	11.251	1328	15	33	63	188
160	215	315L	2980	251	52.30	8.9	2	2.4	96.3	96.3	94.8	0.92	0.88	0.87	13.053	1370	15	33	63	188
180	240	315L	2980	282	58.83	8.9	2	2.4	96.5	96.5	94.8	0.92	0.90	0.89	14.168	1390	15	33	63	188
200	270	315L	2980	313	65.37	8.9	2	2.4	96.5	96.5	95.0	0.92	0.90	0.89	14.49	1460	15	33	63	188
250	335	355L	2985	396	82	8.9	1.9	2.4	96.5	96.5	94.5	0.91	0.88	0.81	30.424	2130	15	33	63	188
315	425	355L	2985	499	103	8.9	1.8	2.4	96.5	96.5	94.5	0.91	0.89	0.81	38.312	2500	15	33	63	188
355	475	355L	2985	562	116	8.9	1.8	2.5	96.5	96.5	93.8	0.91	0.86	0.81	43.17	2750	15	33	63	188
375	503	355L	2985	588	122	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	45.287	2900	15	33	63	188
400	536	355L	2985	627	131	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	48.66	3020	15	33	63	188
450	603	355L	2985	705	147	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	54.763	3156	15	33	63	188
500	*670	355L	2985	784	163	8.9	1.8	2.5	96.5	96.5	94.0	0.92	0.88	0.82	58.2	3510	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Super Premium Efficiency "Ultimo Series" Flameproof Motors - IE4

Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE4, 4-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 4 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	1390	0.32	0.08	6.5	2	2.5	69.8	69	53.0	0.75	0.65	0.45	0.0015	22	15	30	63	188
0.18	0.25	80	1395	0.45	0.13	6.5	2	2.5	74.7	74.7	69.0	0.75	0.67	0.48	0.0020	22	15	30	63	188
0.25	0.33	80	1400	0.60	0.17	6.5	2	2.6	77.9	77.9	70	0.75	0.67	0.5	0.0037	24	10	20	42	125
0.37	0.5	80	1410	0.84	0.26	7	2.2	2.7	81.1	81.1	76	0.76	0.68	0.52	0.0045	17	10	20	42	125
0.55	0.75	80	1420	1.18	0.38	7	2.2	2.7	83.9	83.3	80.0	0.77	0.7	0.52	0.0102	24	10	20	42	125
0.75	1	80	1440	1.58	0.51	7	2.5	3	85.7	85.7	82	0.77	0.7	0.53	0.0114	26	10	20	42	125
1.1	1.5	90S	1445	2.44	0.74	7	2.5	3	87.2	87.2	85.0	0.72	0.65	0.51	0.0185	37	10	20	42	125
1.5	2	90L	1450	3.24	1.01	7	2.2	2.75	88.2	88.2	86	0.73	0.68	0.52	0.0198	37	10	20	42	125
2.2	3	100L	1455	4.44	1.47	8.3	2	2.5	89.5	89.5	88	0.77	0.70	0.58	0.0383	50	8	16	33	100
3	4	100L	1455	6.00	2.01	8.3	2	2.55	90.4	90.4	89	0.77	0.7	0.58	0.052	75	8	16	33	100
3.7	5	112M	1460	6.91	2.47	8.3	2.2	2.8	90.9	90.9	88.5	0.82	0.75	0.65	0.0752	75	8	16	33	100
4	5.5	112M	1460	7.45	2.67	8.3	2.3	2.7	91.1	91.5	89.6	0.82	0.77	0.64	0.1	92	8	16	33	100
5.5	7.5	132S	1460	9.91	3.67	8.3	2.3	2.7	91.9	91.9	90.3	0.84	0.78	0.67	0.1228	115	8	16	33	100
7.5	10	132M	1460	13.41	5.00	8.3	2.3	2.7	92.6	92.6	91	0.84	0.78	0.68	0.1584	117	8	16	33	100
9.3	12.5	160M	1465	16.56	6.18	8.3	2	2.5	93.0	93.0	91.5	0.84	0.8	0.72	0.313	182	10	22	42	125
11	15	160M	1465	20.25	7.31	8.3	2.15	2.8	93.3	93.3	91.9	0.81	0.78	0.7	0.381	184	10	22	42	125
15	20	160L	1465	27.44	9.97	8.3	2.2	2.8	93.9	93.9	92	0.81	0.8	0.75	0.488	188	10	22	42	125
18.5	25	180M	1475	31.77	12.22	8.3	2.2	2.8	94.2	94.2	93	0.86	0.83	0.75	0.972	262	10	22	42	125
22	30	180L	1475	37.66	14.53	8.3	2.2	2.7	94.5	94.5	93.3	0.86	0.82	0.75	1.051	275	10	22	42	125
30	40	200L	1480	51.14	19.74	8.3	2.3	2.7	94.9	94.9	93.7	0.86	0.82	0.72	1.35	340	12	27	50	150
37	50	225S	1475	62.87	24.43	8.3	2.2	2.7	95.2	95.2	94.1	0.86	0.82	0.76	2.104	410	12	27	50	150
45	60	225M	1475	76.31	29.72	8.3	2.2	2.7	95.4	95.4	94.4	0.86	0.84	0.75	2.415	455	12	27	50	150
55	75	250M	1480	92.97	36.20	8.3	2	2.6	95.7	95.7	94.8	0.86	0.85	0.8	3.226	570	12	27	50	150
75	100	280S	1485	126.38	49.19	8.9	2.1	2.6	96.0	96	95.2	0.86	0.84	0.78	6.341	805	15	33	63	188
90	120	280M	1485	151.50	59.03	8.9	2.2	2.8	96.1	96.1	95	0.86	0.84	0.77	6.996	875	15	33	63	188
110	150	315S	1485	182.66	72.15	8.9	2	2.6	96.3	96.3	95.5	0.87	0.85	0.81	10.231	1205	15	33	63	188
125	170	315M	1485	209.76	81.99	8.9	2	2.5	96.4	96.4	95	0.86	0.83	0.78	11.04	1310	15	33	63	188
132	180	315M	1485	221.51	86.58	8.9	2	2.5	96.4	96.4	95.8	0.86	0.84	0.81	11.04	1225	15	33	63	188
160	215	315L	1490	267.94	104.59	8.9	2	2.6	96.6	96.6	95.2	0.86	0.83	0.76	13.501	1445	15	33	63	188
180	240	315L	1485	294.58	118.06	8.9	2	2.75	96.6	96.6	96	0.88	0.86	0.83	16.721	1460	15	33	63	188
200	270	315L	1485	323.30	131.18	8.9	2	2.55	96.7	96.7	96	0.89	0.87	0.86	17.25	1620	15	33	63	188
250	335	355M	1485	409	164	8.9	2.0	2.5	96.7	96.7	94.3	0.88	0.87	0.82	31.211	3054	15	33	63	188
315	425	355L	1485	509	207	8.9	2.0	2.45	96.7	96.7	94.4	0.89	0.86	0.80	39.318	3160	15	33	63	188
355	475	355L	1485	574	233	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.86	0.80	44.309	3446	15	33	63	188
375	500	355L	1485	606	246	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.84	0.80	46.816	3090	15	33	63	188
400	536	355L	1490	647	261	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.85	0.82	49.933	3515	15	33	63	188
450	603	355L	1490	727	294	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.86	0.81	56.179	3560	15	33	63	188
500	*670	355L	1490	808	327	8.9	2.1	2.4	96.7	96.7	94.7	0.89	0.85	0.82	62.422	3620	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Super Premium Efficiency "Ultimo Series" Flameproof Motors - IE4

Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE4, 6-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 6 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	880	0.43	0.13	7	1.9	2.3	64.9	64.9	60.8	0.6	0.56	0.47	0.0049	22	10	20	42	125
0.18	0.25	80	890	0.60	0.20	7	1.9	2.3	70.1	70.1	60	0.60	0.54	0.45	0.0049	24	10	20	42	125
0.25	0.33	80	900	0.78	0.27	7	1.9	2.3	74.1	74.1	64.5	0.60	0.56	0.47	0.0054	25	10	20	42	125
0.37	0.5	80	925	0.98	0.39	7.3	1.8	2.3	78	78.0	70.4	0.67	0.62	0.48	0.0111	24	10	20	42	125
0.55	0.75	80	925	1.39	0.58	7.3	1.8	2.3	80.9	80.9	71.0	0.68	0.61	0.48	0.016	24	10	20	42	125
0.75	1	90S	925	1.97	0.79	7.3	1.95	2.5	82.7	82.7	80	0.64	0.53	0.39	0.0219	28	10	20	42	125
1.1	1.5	90L	925	2.83	1.16	7.3	2	2.6	84.5	84.5	80	0.64	0.54	0.4	0.0253	34	10	20	42	125
1.5	2	100L	930	3.42	1.57	7.3	2	2.5	85.9	85.9	83	0.71	0.63	0.48	0.072	50	10	20	42	125
2.2	3	112M	950	4.80	2.26	8.3	1.9	2.4	87.4	87.4	85	0.73	0.67	0.54	0.101	68	10	20	42	125
3.0	4	132S	950	6.28	3.08	8.3	1.7	2.1	88.6	88.6	84.0	0.75	0.70	0.60	0.162	117	10	20	42	125
3.7	5	132S	955	7.69	3.77	8.3	1.9	2.4	89.3	89.3	87	0.75	0.70	0.60	0.202	108	10	20	42	125
4.0	5.5	132M	955	8.18	4.08	8.3	1.8	2.2	89.5	89.5	87	0.76	0.73	0.61	0.216	117	10	20	42	125
5.5	7.5	132M	960	11.12	5.58	8.3	1.9	2.4	90.5	90.5	88	0.76	0.73	0.61	0.256	140	10	20	42	125
7.5	10	160M	965	13.61	7.57	8.3	1.8	2.2	91.3	91.3	88	0.84	0.8	0.73	0.466	184	10	22	42	125
9.3	12.5	160L	965	16.76	9.39	8.3	1.8	2.2	91.9	91.9	89	0.84	0.8	0.73	0.57	196	10	22	42	125
11	15	160L	965	19.51	11.10	8.3	1.8	2.2	92.3	92.3	89	0.85	0.81	0.74	0.647	200	10	22	42	125
15	20	180L	980	27.06	14.91	8.3	2.2	2.6	92.9	92.9	90.5	0.83	0.75	0.61	1.499	248	10	22	42	125
18.5	25	200L	980	31.67	18.39	8.3	2	2.4	93.4	93.4	91	0.87	0.85	0.76	1.547	310	12	27	50	150
22	30	200L	980	37.55	21.87	8.3	2	2.4	93.7	93.7	91.5	0.87	0.85	0.78	1.883	332	12	27	50	150
30	40	225M	985	50.35	29.66	8.3	2.5	2.9	94.2	94.2	92	0.88	0.85	0.79	4.082	415	12	27	50	150
37	50	250M	985	63.34	36.59	8.3	2	2.4	94.5	94.5	92.2	0.86	0.84	0.72	6.0179	502	12	27	50	150
45	60	280S	985	77.69	44.50	8.3	2.2	2.8	94.8	94.8	93	0.85	0.83	0.78	8.76	750	15	33	63	188
55	75	280M	985	94.66	54.39	8.3	2	2.5	95.1	95.1	93.2	0.85	0.83	0.78	10.512	870	15	33	63	188
75	100	315S	990	128.67	73.79	8.9	2.1	2.6	95.4	95.4	93.8	0.85	0.85	0.85	15.61	1150	15	33	63	188
90	120	315M	990	152.29	88.55	8.9	1.8	2.2	95.6	95.6	94.2	0.86	0.85	0.80	18.76	1195	15	33	63	188
110	150	315L	985	185.75	108.77	8.9	1.9	2.3	95.8	95.8	94.6	0.86	0.85	0.80	22.88	1320	15	33	63	188
125	170	315L	990	210.86	122.98	8.9	1.95	2.35	95.9	95.9	94	0.86	0.85	0.8	26	1405	15	33	63	188
132	180	315L	990	222.43	129.87	8.9	1.9	2.5	96	96	94.9	0.86	0.85	0.78	27.456	2520	15	33	63	188
160	215	355L	990	269	157.41	8.9	1.9	2.5	96.2	96.2	95	0.86	0.82	0.77	36.736	3080	15	33	63	188
180	240	355L	990	301.4	177.09	8.9	1.9	2.5	96.6	96.6	95	0.86	0.82	0.78	41.329	3120	15	33	63	188
200	270	355L	990	334.9	196.77	8.9	1.8	2.4	96.6	96.6	95	0.86	0.83	0.77	45.921	3340	15	33	63	188
250	335	355L	990	419	246	8.9	2.0	2.4	96.6	96.6	94.4	0.86	0.82	0.78	57.401	3440	15	33	63	188
315	425	355L	990	528	310	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.83	0.78	72.325	3510	15	33	63	188
355	475	355L	990	594	349	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.84	0.77	76	3620	15	33	63	188
375	503	355L	990	621	369	8.9	2.0	2.5	96.6	96.6	93.8	0.87	0.84	0.78	81.79	3695	15	33	63	188
400	536	355L	990	662	394	8.9	2.0	2.5	96.6	96.6	93.9	0.87	0.84	0.78	87.24	3750	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Super Premium Efficiency "Ultimo Series" Flameproof Motors - IE4

**Ex db IIC & Ex tb IIIC (Gas & Dust) & Ex d eb IIC; PESO, ATEX & IECEx (Ex d motor & Ex e terminal box)**

3 Phase Squirrel Cage Flameproof Ex d, Ex de, Ex db & Ex tb induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temp. rise limited to class B (Amb:50°C, Rise:70K), Degree of protection IP-55 to 66, altitude upto 1000mtrs. above m.s.l, Duty S1, efficiency class IE4, 8-Pole conforms to IS12615, IS15999-1, IEC60034-1, IEC60034-30, IEC60079-0, IEC-60079-1

### Performance Table for 8 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	80	645	0.51	0.18	6.0	1.8	2.2	62.3	62.3	58.2	0.53	0.42	0.36	0.0044	24	15	30	63	188
0.18	0.25	80	650	0.65	0.27	6.0	1.8	2.2	67.2	67.2	63.1	0.57	0.49	0.39	0.0141	25	15	30	63	188
0.25	0.33	80	690	0.85	0.35	6.5	1.8	2.2	70.8	70.8	66.5	0.58	0.49	0.41	0.0141	27	15	30	63	188
0.37	0.5	90S	680	1.15	0.63	6.5	1.7	2.1	74.3	74.3	70.2	0.6	0.48	0.38	0.0177	27	15	30	63	188
0.55	0.75	90L	680	1.58	0.64	6.5	1.8	2.2	77.0	77.0	72.5	0.63	0.58	0.48	0.0231	29	15	30	63	188
0.75	1	100L	700	1.99	1.04	6.5	1.9	2.3	78.4	78.4	75.5	0.67	0.57	0.43	0.057	42	10	20	42	125
1.1	1.5	100L	700	2.83	1.53	6.5	1.9	2.3	80.8	80.8	77.5	0.67	0.55	0.42	0.0694	55	10	20	42	125
1.5	2	112M	700	3.66	2.09	6.5	1.9	2.3	82.6	82.6	80	0.69	0.65	0.56	0.0775	78	10	20	42	125
2.2	3	132S	710	5.17	3.02	7.8	1.8	2.3	84.5	84.5	82	0.7	0.60	0.47	0.189	107	10	20	42	125
3	4	132S	710	6.94	4.12	7.8	1.8	2.3	85.9	85.9	84	0.7	0.60	0.52	0.244	128	10	20	42	125
3.7	5	160M	710	7.80	5.08	7.8	1.7	2.2	86.8	86.8	83.5	0.76	0.6	0.5	0.339	150	10	22	42	125
4	5.5	160M	710	8.3	5.49	7.8	1.8	2.2	87.1	87.1	85	0.77	0.6	0.5	0.364	170	10	22	42	125
5.5	7.5	160M	715	11.3	7.49	7.8	1.8	2.3	88.3	88.3	85	0.77	0.62	0.52	0.463	182	10	22	42	125
7.5	10	160L	715	15.2	10.2	7.8	1.8	2.3	89.3	89.3	86	0.77	0.6	0.58	0.611	205	10	22	42	125
9.3	12.5	180L	725	18.9	12.5	7.8	1.8	2.3	89.9	89.9	88	0.76	0.69	0.55	1.399	265	10	22	42	125
11	15	180L	725	22.3	14.8	7.8	1.9	2.4	90.4	90.4	88	0.76	0.69	0.6	1.562	302	10	22	42	125
15	20	200L	730	30.5	20.0	7.8	1.8	2.3	91.2	91.2	88.8	0.75	0.68	0.55	1.675	380	12	27	50	150
18.5	25	225S	730	36.9	24.7	7.8	1.8	2.3	91.7	91.7	90	0.76	0.74	0.63	4.059	420	12	27	50	150
22	30	225M	730	42.6	29.4	7.8	1.9	2.4	92.1	92.1	89.2	0.78	0.74	0.65	4.713	495	12	27	50	150
30	40	250M	735	57.7	39.8	7.8	2.1	2.5	92.7	92.7	90.3	0.78	0.74	0.66	5.661	540	12	27	50	150
37	50	280S	735	69	49.0	7.8	2.0	2.5	93.1	93.1	90.7	0.8	0.75	0.71	8.521	720	15	33	63	188
45	60	280M	735	84.8	59.6	7.8	1.9	2.4	93.4	93.4	91.0	0.79	0.74	0.66	10.254	870	15	33	63	188
55	75	315S	735	106.1	72.9	7.8	1.9	2.4	93.7	93.7	91.3	0.77	0.76	0.72	19.445	1170	15	33	63	188
75	100	315M	735	142	99.4	7.8	2.0	2.5	94.2	94.2	91.5	0.78	0.76	0.69	23.056	1195	15	33	63	188
90	120	315L	740	167.9	118.5	7.8	2.0	2.5	94.4	94.4	92.5	0.79	0.77	0.7	26.97	1580	15	33	63	188
110	150	315L	740	204.6	144.8	7.8	2.0	2.5	94.7	94.7	92.1	0.79	0.77	0.7	33.154	1375	15	33	63	188
125	170	315L	740	232	164.5	7.8	2.0	2.5	94.9	94.9	92.0	0.79	0.77	0.69	37.484	1410	15	33	63	188
132	180	315L	740	244.7	173.7	7.8	1.9	2.4	95	95	93	0.79	0.76	0.67	39.653	1470	15	33	63	188
160	215	355L	740	300	211	7.8	1.9	2.3	95.1	95.1	94.0	0.78	0.74	0.62	65.769	3090	15	33	63	188
180	240	355L	740	337	237	7.8	1.9	2.3	95.4	95.4	94.0	0.78	0.74	0.62	72.545	3110	15	33	63	188
200	270	355L	740	369	263	7.8	1.9	2.2	95.4	95.4	94.0	0.79	0.75	0.63	75.00	3349	15	33	63	188
250	335	355L	740	461	329	7.8	1.8	2.2	95.4	95.4	94.2	0.79	0.75	0.65	88.35	3510	15	33	63	188
315	425	355L	741	581	414	7.8	1.7	2.1	95.4	95.4	93.0	0.79	0.75	0.68	111.37	3590	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE2

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE2 2-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	2750	0.43	0.04	4.0	2.7	3.0	53.6	53.6	52.0	0.72	0.65	0.55	0.00084	5/6	10	20	42	125
0.18	0.25	63	2750	0.58	0.06	4.0	2.2	2.6	60.4	60.4	60.0	0.72	0.65	0.55	0.00094	6/7	10	20	42	125
0.25	0.33	63	2750	0.75	0.09	4.0	2.5	2.8	64.8	59.0	53.0	0.72	0.66	0.56	0.00104	6/8	10	20	42	125
0.37	0.5	71	2750	1	0.13	5.0	2.4	2.8	69.5	69.5	66.0	0.74	0.67	0.57	0.0015	7/10	10	20	42	125
0.55	0.75	71	2760	1.4	0.19	5.0	2.9	3.5	74.1	74.1	72.4	0.74	0.73	0.61	0.0017	7/11	10	20	42	125
0.75	1	80	2805	1.7	0.26	5.5	2.5	2.8	77.4	77.4	76.0	0.78	0.74	0.60	0.005	10/14	10	20	42	125
1.1	1.5	80	2820	2.5	0.38	5.5	2.7	3.0	79.6	79.6	79.0	0.78	0.76	0.62	0.006	11/15	10	20	42	125
1.5	2	90S	2810	3.2	0.52	5.5	2.3	2.7	81.3	81.3	80.3	0.79	0.78	0.65	0.008	17/25	10	20	42	125
2.2	3	90L	2816	4.7	0.76	6.0	2.3	2.7	83.2	83.0	82.5	0.78	0.77	0.64	0.010	18/26	10	20	42	125
3	4	100L	2840	5.9	1.03	7.0	2.4	2.8	84.6	84.6	83.8	0.84	0.81	0.74	0.024	21/28	8	16	33	100
3.7	5	100L	2870	7.1	1.26	7.0	2.9	3.0	85.5	85.5	84.0	0.85	0.82	0.7	0.025	22/30	8	16	33	100
4	5.5	112M	2865	7.5	1.36	5.5	1.7	2.1	85.8	85.8	84.8	0.86	0.83	0.74	0.031	30/42	8	16	33	100
5.5	7.5	132S	2925	10.3	1.83	6.5	2.0	2.5	87.0	87.0	85.0	0.85	0.8	0.72	0.071	48/61	8	16	33	100
7.5	10	132S	2940	13.9	2.48	7.0	2.2	2.6	88.1	88.0	86.8	0.85	0.82	0.75	0.082	49/68	8	16	33	100
9.3	12.5	160M	2930	16.5	3.09	6.0	1.8	2.2	88.9	88.9	88.0	0.88	0.86	0.84	0.183	102	10	22	42	125
11	15	160M	2930	19.9	3.66	6.0	1.9	2.3	89.4	89.4	88.5	0.86	0.85	0.84	0.187	118	10	22	42	125
15	20	160M	2955	26.9	4.94	7.0	2.2	2.5	90.3	90.3	88.0	0.86	0.85	0.84	0.231	125	10	22	42	125
18.5	25	160L	2950	31.5	6.11	7.0	1.9	2.3	90.9	90.9	89.0	0.90	0.88	0.85	0.231	140	10	22	42	125
22	30	180M	2940	37.2	7.29	7.0	2.5	2.9	91.3	91.3	89.3	0.9	0.88	0.86	0.042	181	10	22	42	125
30	40	200L	2965	50.4	9.85	7.0	2.9	3.2	92.0	91.0	89.5	0.9	0.88	0.85	0.542	245	12	27	50	150
37	50	200L	2960	62.5	12.2	7.0	2.5	2.8	92.5	92.0	91.8	0.89	0.88	0.87	0.618	260	12	27	50	150
45	60	225M	2965	73.2	14.8	7.0	2.3	2.7	92.9	92.9	91.0	0.92	0.9	0.89	1.223	330	12	27	50	150
55	75	250M	2965	94.4	18.1	7.0	1.8	2.3	93.2	92.2	91.2	0.87	0.85	0.82	1.454	465	12	27	50	150
75	100	280S	2965	128	24.6	7.0	2.0	2.5	93.8	93.0	91.0	0.87	0.86	0.81	2.794	650	15	33	50	150
90	120	280M	2970	151	29.5	7.0	1.8	2.3	94.1	93.8	92.0	0.88	0.87	0.85	3.98	720	15	33	50	150
110	150	315S	2980	184	36.0	7.0	1.7	2.1	94.3	94.3	93.8	0.88	0.87	0.86	7.31	800	15	33	50	150
125	170	315M	2980	204	40.9	7.0	1.8	2.3	94.5	94.5	93.0	0.90	0.89	0.84	8.48	840	15	33	50	150
132	180	315M	2980	216	43.1	6.5	1.9	2.3	94.6	94.6	93.0	0.90	0.88	0.85	8.48	860	15	33	50	150
160	215	315L	2980	255	52.3	7.0	1.9	2.3	94.8	94.8	94.5	0.92	0.91	0.88	9.73	1050	15	33	63	188
180	240	315L	2985	293	58.7	7.0	2.0	2.4	94.9	94.5	93.5	0.90	0.88	0.85	10.45	1070	15	33	50	150
200	270	315L	2985	325	65.3	7.0	2.0	2.4	95.0	94.6	93.0	0.90	0.88	0.85	11.66	1085	15	33	50	150
250	335	355L	2984	411	82	7.0	1.8	2.2	95.0	94.5	92.7	0.89	0.86	0.8	19.97	1740	15	33	63	188
315	425	355L	2984	518	103	7.0	1.8	2.2	95.0	94.6	92.8	0.89	0.86	0.8	23.28	1890	15	33	63	188
355	475	355L	2984	578	116	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.8	28.38	2725	15	33	63	188
375	503	355L	2985	610	122	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.87	0.81	29.75	2279	15	33	63	188
400	536	355L	2985	651	131	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	31.89	2372	15	33	63	188
450	603	355L	2985	732	147	7.0	1.8	2.5	95.0	94.6	93.0	0.90	0.88	0.81	35.23	2544	15	33	63	188
500	*670	355L	2985	805	163	7.0	1.8	2.5	95.0	94.7	93.1	0.91	0.88	0.81	38.66	2640	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE2

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE2 4-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	1325	0.4	0.09	3.5	2.0	2.5	59.1	58.0	55.0	0.69	0.56	0.48	0.0013	5/6	15	30	63	188
0.18	0.25	63	1325	0.60	0.13	3.5	2.0	2.5	64.7	63.5	60.0	0.65	0.62	0.52	0.0015	6/7	15	30	63	188
0.25	0.33	71	1400	0.75	0.17	5.0	2.4	2.8	68.5	68.0	62.0	0.68	0.65	0.50	0.0037	8/11	10	20	42	125
0.37	0.50	71	1400	0.98	0.26	5.0	2.5	2.8	72.7	72.0	68.0	0.72	0.65	0.50	0.0043	8/11	10	20	42	125
0.55	0.75	80	1415	1.3	0.38	5.5	2.5	2.8	77.1	75.6	73.0	0.76	0.73	0.55	0.012	9/15	10	20	42	125
0.75	1.0	80	1410	1.7	0.52	5.5	2.5	2.8	79.6	76.5	75.0	0.78	0.74	0.60	0.013	11/16	10	20	42	125
1.1	1.5	90S	1410	2.4	0.76	5.5	2.3	2.6	81.4	79.0	78.0	0.78	0.72	0.54	0.014	14/23	10	20	42	125
1.5	2.0	90L	1420	3.2	1.03	6.0	2.5	2.8	82.8	82.0	81.3	0.79	0.70	0.57	0.018	17/27	10	20	42	125
2.2	3.0	100L	1425	4.8	1.50	6.0	2.2	2.6	84.3	83.3	82.5	0.76	0.70	0.60	0.033	20/28	8	16	33	100
3	4.0	100L	1430	6.5	2.04	6.0	2.3	2.6	85.5	82.0	81.5	0.75	0.7	0.63	0.039	24/34	8	16	33	100
3.7	5.0	112M	1430	7.3	2.52	6.0	2.5	2.9	86.3	85.5	85.0	0.82	0.77	0.67	0.052	32/44	8	16	33	100
4	5.5	112M	1430	7.8	2.72	6.0	2.6	2.9	86.6	85.8	85.0	0.82	0.78	0.68	0.054	36/46	8	16	33	100
5.5	7.5	132S	1455	10.6	3.68	7.0	2.4	2.8	87.7	87.5	86.5	0.82	0.76	0.68	0.121	53/69	8	16	33	100
7.5	10.0	132M	1450	14.0	5.04	7.0	2.3	2.8	88.7	88.5	88.0	0.84	0.78	0.70	0.135	58/74	8	16	33	100
9.3	12.5	160M	1450	17.2	6.25	7.0	2.2	2.5	89.3	88.8	88.0	0.84	0.78	0.65	0.248	107	10	22	42	125
11	15	160M	1460	20.0	7.34	7.0	2.0	2.5	89.8	89.6	89.3	0.85	0.83	0.74	0.256	120	10	22	42	125
15	20	160L	1460	27.1	10	7.0	2.0	2.5	90.6	90.5	90.0	0.85	0.82	0.74	0.332	140	10	22	42	125
18.5	25	180M	1465	33.2	12.3	7.0	2.4	2.7	91.2	91.0	90.8	0.85	0.82	0.75	0.732	163	10	22	42	125
22	30	180L	1470	38.4	14.6	7.0	2.2	2.6	91.6	91.3	90.8	0.87	0.84	0.77	0.805	186	10	22	42	125
30	40	200L	1470	51.4	19.9	7.0	2.2	2.6	92.3	91.7	91.0	0.88	0.85	0.79	1.091	260	12	27	50	150
37	50	225S	1470	63.8	24.5	7.0	2.5	3.0	92.7	92.3	91.6	0.87	0.84	0.75	1.627	310	12	27	50	150
45	60	225M	1470	76.4	29.8	7.0	2.3	2.9	93.1	92.5	92.0	0.88	0.84	0.79	1.875	340	12	27	50	150
55	75	250M	1475	96.3	36.3	7.0	2.0	2.6	93.5	93.2	92.4	0.85	0.84	0.76	2.562	472	12	27	50	150
75	100	280S	1480	129	49.4	7.0	2.0	2.6	94.0	93.5	92.2	0.86	0.82	0.76	4.564	660	15	33	63	188
90	120	280M	1480	155	59.2	7.0	2.2	2.6	94.2	94.0	93.4	0.86	0.84	0.79	4.564	730	15	33	63	188
110	150	315S	1485	184	72.1	6.5	2.0	2.5	94.5	94.3	94.0	0.88	0.86	0.82	10.17	810	15	33	63	188
125	170	315M	1485	209	82.0	6.5	2.0	2.5	94.6	94.2	94.0	0.88	0.86	0.83	11.55	890	15	33	63	188
132	180	315M	1485	220	86.6	6.0	2.0	2.5	94.7	94.3	94.0	0.88	0.86	0.83	12.19	910	15	33	63	188
160	215	315L	1485	267	104.9	7.0	2.2	2.7	94.9	93.8	93.0	0.88	0.86	0.80	14.77	1060	15	33	63	188
180	240	315L	1488	300	117.8	7.0	1.8	2.4	95.0	94.0	93.0	0.88	0.86	0.82	16.20	1080	15	33	63	188
200	270	315L	1490	329	130.7	6.0	2.0	2.6	95.1	95.0	94.8	0.89	0.88	0.84	20.00	1100	15	33	63	188
250	335	355L	1485	416	164	7.0	2.20	2.5	95.1	94.8	93.9	0.88	0.86	0.82	27.186	1860	15	33	63	188
315	425	355L	1485	524	207	7.0	2.20	2.5	95.1	94.6	94.0	0.88	0.86	0.83	33.546	1930	15	33	63	188
355	475	355L	1485	590	233	7.0	2.20	2.5	95.1	94.5	93.1	0.88	0.86	0.83	37.036	1970	15	33	63	188
375	503	355L	1485	616	246	7.0	2.20	2.5	95.1	94.9	93.5	0.89	0.86	0.83	38.786	2204	15	33	63	188
400	536	355L	1485	657	262	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.86	0.83	41.236	2270	15	33	63	188
450	603	355L	1485	740	295	7.0	2.10	2.5	95.1	94.6	93.2	0.89	0.87	0.84	45.896	2552	15	33	63	188
500	*670	355L	1485	822	328	7.0	2.10	2.4	95.1	94.6	93.2	0.89	0.87	0.84	49.956	2954	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE2

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE2 6-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 6 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg.m <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	71	880	0.5	0.13	4.0	1.9	2.3	50.6	49.6	48.1	0.68	0.62	0.45	0.0036	6/9	10	20	42	125
0.18	0.25	71	890	0.7	0.20	4.0	1.9	2.3	56.6	54.5	45.2	0.65	0.55	0.45	0.0036	7/10	10	20	42	125
0.25	0.33	71	900	0.9	0.27	4.5	1.9	2.3	61.6	60.0	55.0	0.65	0.55	0.45	0.0046	8/11	10	20	42	125
0.37	0.5	80	910	1.1	0.40	4.5	1.9	2.3	67.6	67.6	66.0	0.71	0.66	0.53	0.0097	9/15	10	20	42	125
0.55	0.75	80	930	1.5	0.58	4.5	2.0	2.5	73.1	72.0	68.0	0.72	0.64	0.5	0.0118	11/16	10	20	42	125
0.75	1.0	90S	910	2.0	0.80	4.5	1.7	2.1	75.9	73.2	70.0	0.68	0.64	0.55	0.0134	15/25	10	20	42	125
1.1	1.5	90L	910	2.9	1.18	4.5	2.0	2.6	78.1	77.2	76.0	0.68	0.61	0.47	0.0175	18/27	10	20	42	125
1.5	2.0	100L	940	3.8	1.55	5.0	1.9	2.3	79.8	78.2	77.0	0.69	0.64	0.52	0.0502	21/33	10	20	42	125
2.2	3.0	112M	950	5.2	2.26	5.5	2.0	2.4	81.8	81.8	80.5	0.72	0.69	0.55	0.0794	32/42	10	20	42	125
3	4.0	132S	950	6.6	3.08	6.0	1.8	2.2	83.3	82.8	81.8	0.76	0.70	0.55	0.128	60	10	20	42	125
3.7	5.0	132S	945	8.0	3.81	6.0	1.6	2.0	84.3	84.0	83.8	0.76	0.72	0.6	0.136	65	10	20	42	125
4	5.5	132S	955	8.8	4.08	7.0	1.9	2.3	84.6	84.0	83.5	0.75	0.69	0.58	0.153	75	10	20	42	125
5.5	7.5	132M	960	11.4	5.58	6.0	1.7	2.1	86	85.4	82.6	0.78	0.74	0.62	0.177	80	10	20	42	125
7.5	10	160M	970	14.6	7.53	6.0	1.8	2.2	87.2	86.5	84.0	0.82	0.78	0.70	0.361	110	10	22	42	125
9.3	12.5	160L	960	17.9	9.44	6.0	1.7	2.1	88.1	88.0	87.5	0.82	0.78	0.70	0.316	122	10	22	42	125
11	15	160L	960	21.0	11.2	5.5	1.8	2.2	88.7	87.7	87.0	0.82	0.78	0.70	0.463	141	10	22	42	125
15	20	180L	980	28.4	14.9	6.0	2.2	2.9	89.7	89.3	89.0	0.82	0.77	0.65	0.978	195	10	22	42	125
18.5	25	200L	975	33.5	18.5	7.0	1.6	2.0	90.4	90.0	87.6	0.85	0.83	0.72	1.171	235	10	22	42	125
22	30	200L	980	39.6	21.9	7.0	2.5	3.0	90.9	90.5	90.0	0.85	0.83	0.72	1.477	250	12	27	50	150
30	40	225M	980	53.5	29.8	5.5	2.3	2.9	91.7	91.5	91.0	0.85	0.84	0.78	3.018	355	12	27	50	150
37	50	250M	980	66.5	36.8	6.0	1.8	2.2	92.2	92.0	91.7	0.84	0.82	0.75	3.887	475	12	27	50	150
45	60	280S	985	79.5	44.5	7.0	2.0	2.4	92.7	92.5	91.5	0.85	0.83	0.8	6.704	615	15	33	63	188
55	75	280M	980	96.7	54.7	6.5	2.5	3.0	93.1	92.5	91.0	0.85	0.83	0.80	8.792	705	15	33	63	188
75	100	315S	990	131	73.8	6.0	2.2	2.8	93.7	93.3	93.0	0.85	0.83	0.80	11.424	885	15	33	63	188
90	120	315M	990	157	88.5	7.0	2.0	2.6	94	93.8	93.5	0.85	0.83	0.81	14.704	930	15	33	63	188
110	150	315M	990	189	108.2	7.0	2.0	2.5	94.3	94.2	94.0	0.86	0.84	0.81	18.524	1093	15	33	63	188
125	170	315M	990	216	123.0	7.0	1.7	2.1	94.5	94.5	94.3	0.85	0.83	0.82	21.794	1120	15	33	63	188
132	180	315L	990	226	129.9	7.0	2.0	2.5	94.6	94.2	93.0	0.86	0.84	0.80	21.794	1130	15	33	63	188
160	215	355L	990	276	157.4	7.0	2.0	2.5	94.8	94.0	93.0	0.85	0.82	0.80	38.50	1780	15	33	63	188
180	240	355L	990	310	177	7.0	1.80	2.2	94.9	94.5	93.5	0.85	0.83	0.78	43.536	1850	15	33	63	188
200	270	355L	990	345	197	7.0	1.80	2.2	95.0	94.8	93.6	0.85	0.83	0.78	47.766	1935	15	33	63	188
250	335	355L	990	431	246	7.0	1.80	2.3	95.0	94.8	93.2	0.85	0.82	0.76	58.33	2065	15	33	63	188
315	425	355L	991	543	310	7.0	1.80	2.2	95.0	94.5	93.0	0.85	0.82	0.77	72.206	2300	15	33	63	188
355	475	355L	991	612	349	7.0	1.80	2.2	95.0	94.8	93.4	0.85	0.82	0.77	80.666	2484	15	33	63	188
375	503	3355L	991	646	369	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	84.896	2643	15	33	63	188
400	536	355L	991	689	393	7.0	1.80	2.2	95.0	94.9	93.5	0.85	0.82	0.76	90.186	2654	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE2

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE2 8-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

### Performance Table for 8 Pole Motors

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	630	0.58	0.19	3.0	1.7	2.0	39.8	37.2	36.3	0.72	0.60	0.48	0.0034	7/10	15	30	63	188
0.18	0.25	80	700	0.76	0.25	3.0	1.7	2.0	45.9	45.5	45.2	0.72	0.60	0.48	0.0107	10/17	15	30	63	188
0.25	0.33	80	700	1.1	0.35	5.2	1.7	2.0	50.6	45.9	44.2	0.65	0.55	0.45	0.0107	11/19	15	30	63	188
0.37	0.50	90S	680	1.4	0.53	3.0	1.7	2.0	56.1	50.1	45.9	0.65	0.55	0.45	0.0134	14	15	30	63	188
0.55	0.75	90L	680	1.9	0.79	3.0	1.7	2.0	61.7	60.0	48.0	0.65	0.55	0.45	0.0175	17/28	15	30	63	188
0.75	1.0	100L	710	2.3	1.03	4.0	1.8	2.2	66.2	66.0	65.04	0.7	0.6	0.45	0.0473	19/31	10	20	42	125
1.1	1.5	100L	700	3.1	1.53	4.0	1.7	2.0	70.8	70.0	69.0	0.7	0.6	0.45	0.0526	20/32	10	20	42	125
1.5	2.0	112M	700	4.0	2.09	4.5	2.0	2.3	74.1	73.8	70.0	0.7	0.6	0.45	0.0794	35/45	10	20	42	125
2.2	3.0	132S	715	6.1	3.00	5.5	1.8	2.3	77.6	77.0	76.5	0.65	0.59	0.46	0.144	65	10	20	42	125
3	4.0	132M	710	8.0	4.12	6.0	1.7	2.3	80	78.1	77.0	0.65	0.59	0.46	0.186	75	10	20	42	125
3.7	5.0	160M	720	8.8	5.01	5.5	1.5	2.0	81.4	81.0	80.0	0.72	0.67	0.56	0.257	105	10	20	42	125
4	5.5	160M	710	9.1	5.49	6.0	1.8	2.4	81.9	81.0	80.0	0.75	0.7	0.6	0.276	79	10	20	42	125
5.5	7.5	160M	720	12.2	7.44	5.5	1.5	2.0	83.8	83.0	80.5	0.75	0.7	0.6	0.351	117	10	20	42	125
7.5	10	160L	720	16.3	10.1	5.5	1.5	2.0	85.3	84.6	83.0	0.75	0.7	0.6	0.463	138	10	20	42	125
9.3	12.5	180L	725	19.7	12.5	5.5	1.8	2.3	86.3	85.2	83.2	0.76	0.7	0.6	1.059	167	10	22	42	125
11	15	180L	730	23.5	14.7	6.0	2.0	2.5	86.9	85.5	84.5	0.75	0.7	0.55	1.182	174	10	22	42	125
15	20	200L	720	31.6	20.3	6.5	1.9	2.4	88	87.2	85.0	0.75	0.7	0.55	1.267	243	12	27	50	150
18.5	25	225S	710	38.7	25.4	6.0	2.2	2.5	88.6	87.6	86.0	0.75	0.7	0.55	3.0696	290	12	27	50	150
22	30	225M	725	42.9	29.6	5.5	2.2	2.5	89.1	88.0	86.5	0.8	0.78	0.7	3.565	300	12	27	50	150
30	40	250M	730	60.4	40.0	6.0	2.1	2.4	89.8	89.0	87.5	0.77	0.72	0.62	4.281	515	12	27	50	150
37	50	280M	740	73.1	48.7	7.0	1.9	2.4	90.3	90.0	89.0	0.78	0.75	0.65	6.444	610	15	33	63	188
45	60	280M	730	88.5	60.0	6.5	2.3	2.6	90.7	89.7	87.7	0.78	0.75	0.65	7.754	680	15	33	63	188
55	75	315S	735	105	72.9	6.0	1.8	2.3	91	90.8	90.0	0.8	0.76	0.67	14.704	905	15	33	63	188
75	100	315M	735	146	99.4	6.0	1.6	2.1	91.6	90.5	89.5	0.78	0.75	0.68	17.434	1010	15	33	63	188
90	120	315L	735	175	119.3	6.0	1.6	2.1	91.9	90.8	89.6	0.78	0.75	0.68	20.407	1070	15	33	63	188
110	150	315L	735	213	145.8	6.0	1.8	2.4	92.3	92.0	91.8	0.78	0.75	0.68	25.07	1150	15	33	63	188
125	170	315L	735	241	165.6	6.0	1.9	2.5	92.5	92.0	91.0	0.78	0.75	0.68	28.344	1240	15	33	63	188
132	180	315L	735	254	174.9	6.0	1.7	2.1	92.6	91.6	90.6	0.78	0.75	0.68	29.984	1810	15	33	63	188
150	200	355L	740	288	197	6.0	1.70	2.1	92.9	91.5	91.2	0.78	0.75	0.68	48.816	1850	15	33	63	188
160	215	355L	740	307	211	6.0	1.70	2.1	93.0	92.5	91.5	0.78	0.75	0.68	51.996	1860	15	33	63	188
180	240	355L	740	344	237	6.0	1.70	2.1	93.3	93	91.0	0.78	0.75	0.68	57.356	1930	15	33	63	188
200	270	355L	742	382	263	6.0	1.70	2.1	93.5	92.6	91.2	0.78	0.75	0.68	63.626	2080	15	33	63	188
250	335	355L	742	477	328	6.0	1.70	2.0	93.5	92.6	91.6	0.78	0.75	0.68	78.556	2130	15	33	63	188
315	425	355L	742	601	413	6.0	1.70	2.1	93.5	92.5	91.9	0.78	0.75	0.68	96.5	2460	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE3

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE3 2-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	2750	0.39	0.043	6.5	2	2.5	60.8	60	56.7	0.7	0.64	0.55	0.00084	5/6	10	20	42	125
0.18	0.25	63	2750	0.58	0.064	6.5	2	2.5	65.9	63	58	0.65	0.64	0.55	0.001	6/7	10	20	42	125
0.25	0.33	63	2750	0.7	0.089	6.5	2	2.5	69.7	68.9	65.6	0.7	0.64	0.6	0.0013	6/8	10	20	42	125
0.37	0.5	71	2750	0.9	0.131	4.5	2.5	2.8	73.8	73	72	0.8	0.7	0.6	0.0018	8/11	10	20	42	125
0.55	0.75	71	2760	1.2	0.194	6	3	3.3	77.8	77	73.7	0.8	0.74	0.64	0.0025	9/13	10	20	42	125
0.75	1	80	2850	1.6	0.256	7	2.6	2.9	80.7	80.7	77.5	0.82	0.76	0.61	0.007	11/15	10	20	42	125
1.1	1.5	80	2850	2.3	0.376	7	2.5	2.8	82.7	82.7	82	0.8	0.7	0.6	0.007	12/17	10	20	42	125
1.5	2	90S	2820	3.1	0.518	7	2.3	2.6	84.2	84	83.5	0.8	0.7	0.6	0.0084	18/26	10	20	42	125
2.2	3	90L	2840	4.3	0.755	7.7	2.5	2.75	85.9	84.5	84	0.82	0.78	0.68	0.0114	19/27	10	20	42	125
3	4	100L	2840	5.8	1.029	7.7	2.5	2.9	87.1	87	85	0.82	0.8	0.68	0.0247	22/30	8	16	33	100
3.7	5	100L	2865	7.1	1.258	7.7	2.7	2.9	87.8	87.5	86.3	0.83	0.8	0.68	0.0296	22/31	8	16	33	100
4	5.5	112M	2865	7.6	1.36	6	2.7	2.9	88.1	87.5	86.3	0.83	0.8	0.68	0.0347	33/44	8	16	33	100
5.5	7.5	132S	2945	10.2	1.819	7	2	2.5	89.2	89	87	0.84	0.82	0.75	0.0854	49/71	8	16	33	100
7.5	10	132S	2930	13.6	2.493	7	2.25	2.6	90.1	90.1	89.8	0.85	0.82	0.74	0.099	54/75	8	16	33	100
9.3	12.5	160M	2940	16.2	3.081	7.7	2.5	2.9	90.7	90.5	88.5	0.88	0.88	0.86	0.191	110	10	22	42	125
11	15	160M	2950	19.1	3.632	7.7	2.25	2.9	91.2	91.2	90.5	0.88	0.86	0.82	0.209	124	10	22	42	125
15	20	160M	2950	25.5	4.953	7.7	2	2.6	91.9	91.9	91	0.89	0.89	0.83	0.264	130	10	22	42	125
18.5	25	160L	2950	31.7	6.108	7.7	2.3	2.7	92.4	92	91	0.88	0.87	0.84	0.312	144	10	22	42	125
22	30	180M	2940	36.3	7.288	7.7	2.25	2.6	92.7	92.5	91.8	0.91	0.9	0.86	0.436	185	10	22	42	125
30	40	200L	2960	49.7	9.872	7.7	2.5	3	93.3	92.5	91.6	0.9	0.89	0.85	0.548	250	12	27	50	150
37	50	200L	2960	60.4	12.18	7.7	2.5	3	93.7	93.2	92.1	0.91	0.88	0.83	0.685	270	12	27	50	150
45	60	225M	2960	72.4	14.81	7.7	2.6	3	94	93.8	92.9	0.92	0.91	0.9	1.223	340	12	27	50	150
55	75	250M	2965	89.2	18.07	7.7	2	2.4	94.3	93.4	92.5	0.91	0.9	0.89	2.077	475	12	27	50	150
75	100	280S	2970	121	24.6	7.7	1.95	2.55	94.7	93.5	92.5	0.91	0.89	0.89	3.703	710	15	33	63	188
90	120	280M	2980	145	29.42	7.7	2	2.4	95	94.2	92.7	0.91	0.91	0.87	5.204	740	15	33	63	188
110	150	315S	2980	177	35.95	7.7	1.95	2.5	95.2	94.7	93.7	0.91	0.9	0.88	7.944	850	15	33	63	188
125	170	315M	2980	201	40.86	7.7	1.95	2.5	95.3	94.7	93.7	0.91	0.9	0.88	9.784	880	15	33	63	188
132	180	315M	2980	212	43.14	7.7	1.95	2.5	95.4	94.8	93.8	0.91	0.9	0.88	9.784	910	15	33	63	188
160	215	315L	2980	256	52.3	7.7	1.8	2.4	95.6	95.3	94.5	0.91	0.9	0.89	11.351	1080	15	33	63	188
180	240	315L	2980	284	58.83	7.7	2	2.4	95.7	95.4	94.9	0.92	0.9	0.89	12.32	1110	15	33	63	188
200	270	315L	2980	316	65.37	7.7	2	2.4	95.8	95.5	95	0.92	0.9	0.89	12.6	1150	15	33	63	188
250	335	355M	2984	399	81.6	7.7	1.85	2.4	95.8	95.1	94.5	0.91	0.9	0.89	26.456	2038	15	33	63	188
315	425	355L	2984	503	102.8	7.7	1.8	2.4	95.8	95.1	94.5	0.91	0.9	0.89	33.315	2300	15	33	63	188
355	475	355L	2985	567	115.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	37.54	2485	15	33	63	188
375	503	355L	2985	598	122.4	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	39.68	2515	15	33	63	188
400	536	355L	2985	638	130.5	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	42.32	2590	15	33	63	188
450	603	355L	2985	718	146.8	7.7	1.7	2.5	95.8	95.4	93.8	0.91	0.9	0.89	47.62	2864	15	33	63	188
500	*670	355L	2985	798	163.1	7.7	1.7	2.5	95.8	95.5	94	0.91	0.9	0.89	52.91	2971	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE3

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE3 4-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	63	1315	0.4	0.09	5	2.0	2.5	64.8	63.5	46.7	0.65	0.58	0.45	0.0013	5/6	15	30	63	188
0.18	0.25	63	1345	0.6	0.13	5	2.0	2.5	69.9	68.0	62.0	0.65	0.60	0.45	0.0015	6/7	15	30	63	188
0.25	0.33	71	1400	0.7	0.17	5.5	2.0	2.6	73.5	68.5	64.8	0.72	0.65	0.52	0.0049	8/11	10	20	42	125
0.37	0.5	71	1400	1.0	0.26	5.5	2.5	3.0	77.3	76.5	73.2	0.7	0.68	0.55	0.0052	8/11	10	20	42	125
0.55	0.75	80	1410	1.2	0.38	5.5	2.5	3.0	80.8	80.0	79.0	0.76	0.72	0.56	0.014	10/15	10	20	42	125
0.75	1	80	1415	1.6	0.52	5.5	2.3	2.8	82.5	80.4	78.5	0.80	0.73	0.59	0.014	12/16	10	20	42	125
1.1	1.5	90S	1420	2.4	0.75	6	2.4	3.0	84.1	83.5	82.0	0.77	0.68	0.54	0.018	17/24	10	20	42	125
1.5	2	90L	1415	3.1	1.03	6	2.6	3.0	85.3	83.5	82.5	0.78	0.72	0.62	0.021	18/28	10	20	42	125
2.2	3	100L	1430	4.4	1.50	6	2.2	2.7	86.7	86.2	85.8	0.8	0.72	0.62	0.041	25/33	8	16	33	100
3	4	100L	1435	5.9	2.04	6	2.4	2.8	87.7	86.4	85.4	0.8	0.72	0.62	0.041	26/35	8	16	33	100
3.7	5	112M	1450	7.3	2.49	6	2.2	2.8	88.4	87.5	86.5	0.80	0.75	0.68	0.060	35/46	8	16	33	100
4	5.5	112M	1440	7.9	2.71	7	2.5	2.9	88.6	87.5	86.5	0.80	0.75	0.66	0.062	38/48	8	16	33	100
5.5	7.5	132S	1450	10.7	3.69	7	2.3	2.7	89.6	88.8	87.0	0.80	0.75	0.67	0.13	55/74	8	16	33	100
7.5	10	132M	1455	14.1	5.02	7	2.3	2.7	90.4	89.8	88.5	0.82	0.78	0.69	0.17	65/86	8	16	33	100
9.3	12.5	160M	1460	16.9	6.20	7	2.0	2.5	91.0	90.0	89.1	0.84	0.8	0.72	0.273	115	10	22	42	125
11	15	160M	1460	20.4	7.34	7	2.2	2.8	91.4	91.0	90.5	0.82	0.78	0.7	0.332	137	10	22	42	125
15	20	160L	1465	27.0	9.97	7	2.2	2.8	92.1	91.0	90.4	0.84	0.82	0.75	0.425	145	10	22	42	125
18.5	25	180M	1470	32.7	12.26	7.5	2.2	2.8	92.6	91.8	90.8	0.85	0.83	0.75	0.846	188	10	22	42	125
22	30	180L	1470	38.7	14.58	7.5	2.2	2.8	93.0	92.2	91.2	0.85	0.82	0.75	0.914	198	10	22	42	125
30	40	200L	1470	52.5	19.88	7.5	2.4	2.8	93.6	92.6	92.0	0.85	0.82	0.74	1.174	265	12	27	50	150
37	50	225S	1475	64.5	24.43	6.5	2.3	2.7	93.9	93.1	92.8	0.85	0.82	0.76	1.83	348	12	27	50	150
45	60	225M	1475	79.1	29.72	6.5	2.3	2.9	94.2	93.4	92.4	0.84	0.82	0.75	2.1	372	12	27	50	150
55	75	250M	1480	95.2	36.20	6.5	2.0	2.6	94.6	93.6	92.8	0.85	0.82	0.73	2.806	484	12	27	50	150
75	100	280S	1482	128	49.29	7.7	2.2	2.8	95.0	94.8	94.1	0.86	0.84	0.78	5.514	715	15	33	63	188
90	120	280M	1485	153	59.03	7.7	2.2	2.8	95.2	95.0	94.6	0.86	0.84	0.78	6.084	745	15	33	63	188
110	150	315S	1485	187	72.15	7.5	2.0	2.6	95.4	95.2	95.0	0.86	0.85	0.8	8.897	862	15	33	63	188
125	170	315M	1485	212	81.99	7.7	2.0	2.5	95.5	95.2	94.8	0.86	0.83	0.78	9.6	980	15	33	63	188
132	180	315M	1485	218	86.58	7.7	2.0	2.5	95.6	95.2	94.8	0.88	0.85	0.81	9.6	1005	15	33	63	188
160	215	315L	1490	264	104.59	7.7	2.2	2.8	95.8	95.5	95.1	0.88	0.88	0.85	11.74	1090	15	33	63	188
180	240	315L	1485	297	118.06	7.7	2.2	2.8	95.9	95.7	95.4	0.88	0.86	0.83	14.54	1130	15	33	63	188
200	270	315L	1485	322	131.18	7.5	2.0	2.6	96.0	95.9	95.6	0.9	0.87	0.86	15	1170	15	33	63	188
250	335	355M	1485	407	164	7.7	2.0	2.5	96.0	95.2	94.3	0.89	0.88	0.82	27.14	1875	15	33	63	188
315	425	355L	1485	513	207	7.7	2.0	2.4	96.0	95.7	94.4	0.89	0.88	0.82	34.19	1990	15	33	63	188
355	475	355L	1485	578	233	7.7	2.1	2.5	96.0	95.1	94.5	0.89	0.88	0.82	38.53	2340	15	33	63	188
375	503	355L	1485	611	246	7.7	2.1	2.5	96.0	95.2	94.5	0.89	0.88	0.82	40.71	2390	15	33	63	188
400	536	355L	1490	651	261	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	43.42	2420	15	33	63	188
450	603	355L	1490	733	294	7.7	2.1	2.5	96.0	95.5	94.6	0.89	0.88	0.82	48.852	2552	15	33	63	188
500	*670	355L	1490	814	327	7.7	2.1	2.4	96.0	95.5	94.7	0.89	0.88	0.82	54.28	2735	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE3

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE3 6-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 6 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	880	0.53	0.13	6.5	1.9	2.3	57.7	56.6	53.6	0.55	0.51	0.42	0.0043	7/9	10	20	42	125
0.18	0.25	71	890	0.68	0.20	6.5	1.9	2.3	63.9	63.1	59.8	0.58	0.54	0.45	0.0043	8/11	10	20	42	125
0.25	0.33	71	900	0.84	0.27	6.5	1.9	2.3	68.6	67.8	64.5	0.60	0.56	0.47	0.0047	9/12	10	20	42	125
0.37	0.5	80	905	1.1	0.40	4	1.9	2.3	73.5	73.0	70.4	0.65	0.60	0.48	0.0097	10/16	10	20	42	125
0.55	0.75	80	935	1.5	0.57	4.5	1.95	2.5	77.2	75.0	71.0	0.67	0.60	0.48	0.014	12/17	10	20	42	125
0.75	1	90S	930	2.10	0.79	4.5	1.95	2.5	78.9	78.1	75.6	0.63	0.54	0.41	0.0191	17/26	10	20	42	125
1.1	1.5	90L	930	3.00	1.15	4.5	2	2.6	81.0	80.6	78.5	0.63	0.54	0.41	0.022	19/28	10	20	42	125
1.5	2	100L	940	3.5	1.55	5	2	2.5	82.5	82.0	78.5	0.72	0.62	0.5	0.063	25/34	10	20	42	125
2.2	3	112M	960	5.0	2.23	5.5	1.9	2.4	84.3	84.0	82.8	0.73	0.62	0.47	0.0882	34/44	10	20	42	125
3.0	4	132S	945	6.60	3.09	5.5	1.7	2.1	86.6	84.8	83.0	0.73	0.70	0.60	0.141	77	10	20	42	125
3.7	5	132S	955	7.6	3.77	5.5	1.9	2.4	86.5	86.0	85.5	0.78	0.70	0.60	0.176	70	10	20	42	125
4.0	5.5	132S	960	8.0	4.06	6	1.8	2.2	86.8	86.0	85	0.80	0.74	0.62	0.188	80	10	20	42	125
5.5	7.5	132M	960	11.1	5.58	6	1.9	2.4	88.0	87.0	85.5	0.78	0.7	0.60	0.223	64/84	10	20	42	125
7.5	10	160M	970	14.3	7.53	5.5	1.8	2.2	89.1	88.0	87.6	0.82	0.8	0.7	0.406	120	10	22	42	125
9.3	12.5	160L	970	17.6	9.34	6	1.8	2.2	89.8	88.7	88.4	0.82	0.8	0.7	0.496	127	10	22	42	125
11	15	160L	970	20.7	11.05	6	1.8	2.2	90.3	89.5	89	0.82	0.8	0.7	0.563	144	10	22	42	125
15	20	180L	985	28.2	14.83	7.5	2.2	2.6	91.2	91.0	90.5	0.81	0.8	0.71	1.304	205	10	22	42	125
18.5	25	200L	980	33.0	18.39	7.5	2	2.4	91.7	91.5	91	0.85	0.82	0.73	1.346	250	10	22	42	125
22	30	200L	970	39.1	22.09	7.5	2	2.4	92.2	92.0	91.5	0.85	0.82	0.75	1.638	278	12	27	50	150
30	40	225M	985	52.2	29.66	7	2.5	2.9	92.9	92.1	92	0.86	0.84	0.76	3.55	362	12	27	50	150
37	50	250M	985	64.9	36.59	6	2	2.4	93.3	92.5	92.2	0.85	0.82	0.78	5.233	495	12	27	50	150
45	60	280S	985	78.6	44.50	7.5	2.2	2.8	93.7	93.2	93	0.85	0.82	0.74	7.618	685	12	27	50	150
55	75	280M	985	95.7	54.39	7.5	2.15	2.55	94.1	93.3	92.8	0.85	0.83	0.8	9.141	710	15	33	63	188
75	100	315S	990	128	73.79	7.5	2.15	2.8	94.6	94.0	93.8	0.86	0.83	0.80	12.21	925	15	33	63	188
90	120	315M	990	153	88.55	6	1.8	2.2	94.9	94.5	94.2	0.86	0.83	0.80	17.36	960	15	33	63	188
110	150	315M	990	187	108.22	7.5	1.95	2.35	95.1	94.8	94.6	0.86	0.83	0.80	21.20	1105	15	33	63	188
125	170	315M	990	212	122.98	7.5	1.95	2.35	95.2	94.4	93.8	0.86	0.84	0.82	24.00	1160	15	33	63	188
132	180	315L	990	224	129.87	7.7	1.95	2.55	95.4	95.2	94.9	0.86	0.84	0.82	25.34	1190	15	33	63	188
160	215	315L	990	271	157.41	7.7	1.95	2.55	95.6	95.3	95	0.86	0.85	0.80	41.50	1820	15	33	63	188
180	240	355L	990	304	177	7.7	2.0	2.4	95.7	94.9	94.2	0.86	0.83	0.8	47.09	1890	15	33	63	188
200	270	355L	990	338	197	7.7	2.0	2.4	95.8	95.0	94.3	0.86	0.83	0.8	52.98	1970	15	33	63	188
250	335	355L	990	422	246	7.7	2.0	2.4	95.8	95.0	94.4	0.86	0.83	0.8	66.22	2110	15	33	63	188
315	425	355L	990	532	310	7.7	2.0	2.5	95.8	95.3	94.5	0.86	0.83	0.8	83.44	2500	15	33	63	188
355	475	355L	990	599	349	7.7	2.0	2.5	95.8	95.3	94.6	0.86	0.83	0.8	94.03	2900	15	33	63	188
375	503	355L	990	633	369	7.7	2.0	2.5	95.8	95.3	94.0	0.86	0.83	0.8	99.33	3389	15	33	63	188
400	536	355L	992	675	393	7.7	2.0	2.5	95.8	95.4	94.5	0.86	0.83	0.8	105.96	3535	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE3

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE3 8-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 8 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	71	640	0.66	0.18	5.5	1.8	2.2	50.7	48	44.0	0.50	0.42	0.36	0.0039	8/10	15	30	63	188
0.18	0.25	80	680	0.82	0.26	4.0	1.8	2.2	58.7	56.1	53.2	0.52	0.47	0.40	0.0123	11/18	15	30	63	188
0.25	0.33	80	650	1.00	0.37	5.5	1.8	2.2	64.1	62.2	58.1	0.54	0.50	0.42	0.0123	13/19	15	30	63	188
0.37	0.5	90S	675	1.4	0.53	4.0	1.8	2.2	69.3	67	62.1	0.54	0.48	0.38	0.0154	15/25	15	30	63	188
0.55	0.75	90L	675	1.7	0.79	4.0	1.8	2.2	73.0	71.7	67.2	0.60	0.56	0.48	0.0201	17/28	15	30	63	188
0.75	1	100L	685	2.2	1.07	4.5	1.8	2.3	75.0	73.8	70.2	0.62	0.58	0.48	0.0543	23/32	10	20	42	125
1.1	1.5	100L	685	3.1	1.56	6.5	1.8	2.3	77.7	75.8	73.2	0.64	0.60	0.52	0.0604	28/36	10	20	42	125
1.5	2	112M	690	3.9	2.12	4.5	1.8	2.3	79.7	78.1	75.8	0.68	0.6	0.52	0.0674	36/47	10	20	42	125
2.2	3	132S	710	5.5	3.02	4.5	1.8	2.3	81.9	80.1	78.2	0.68	0.6	0.52	0.165	78	10	20	42	125
3	4	132M	705	7.4	4.14	7.0	1.8	2.3	83.5	81.1	78.2	0.68	0.6	0.52	0.213	87	10	20	42	125
3.7	5	160M	720	8.5	5.01	5.5	1.8	2.3	84.5	83.5	81.2	0.72	0.65	0.55	0.295	108	10	22	42	125
4	5.5	160M	720	9.1	5.41	7.0	1.8	2.3	84.8	83.2	80.6	0.72	0.65	0.55	0.317	95	10	22	42	125
5.5	7.5	160M	720	11.8	7.44	5.5	1.8	2.3	86.2	84.8	82.8	0.75	0.7	0.6	0.403	120	10	22	42	125
7.5	10	160L	720	15.9	10.1	6.0	1.8	2.3	87.3	85.6	83.8	0.75	0.7	0.6	0.532	129	10	22	42	125
9.3	12.5	180L	720	19.6	12.6	7.0	1.8	2.3	88.1	87.4	85.5	0.75	0.7	0.6	1.217	173	10	22	42	125
11	15	180L	725	23.0	14.8	6.0	1.9	2.4	88.6	87.2	85.2	0.75	0.7	0.62	1.359	180	10	22	42	125
15	20	200L	725	31.1	20.2	7.0	2.0	2.5	89.6	89	88.8	0.75	0.71	0.64	1.457	250	12	27	50	150
18.5	25	225S	730	37.1	24.7	6.5	2.0	2.3	90.1	89.5	89	0.77	0.74	0.64	2.46	295	12	27	50	150
22	30	225M	730	43.3	29.4	6.0	2.0	2.4	90.6	90.6	90	0.78	0.75	0.7	4.099	310	12	27	50	150
30	40	250M	730	58.6	40.0	6.5	2.1	2.5	91.3	91.3	91	0.78	0.75	0.70	5.37	545	12	27	50	150
37	50	280S	735	70.1	49.0	6.5	1.9	2.4	91.8	91.8	91.5	0.8	0.77	0.7	7.41	630	15	33	63	188
45	60	280M	735	84.9	59.6	6.5	1.9	2.4	92.2	92.2	91.5	0.8	0.77	0.7	8.917	695	15	33	63	188
55	75	315S	735	103	72.9	6.5	2.0	2.5	92.5	92.5	92	0.8	0.77	0.7	11.97	915	15	33	63	188
75	100	315M	740	140	98.7	6.5	2.0	2.5	93.1	93.1	93	0.8	0.77	0.7	16.32	1065	15	33	63	188
90	120	315L	740	168	118.5	6.5	2.0	2.5	93.4	93.2	92.8	0.8	0.77	0.7	19.58	1110	15	33	63	188
110	150	315L	740	204	144.8	7.0	2.0	2.5	93.7	93.5	93	0.80	0.77	0.7	24.00	1130	15	33	63	188
125	170	315L	740	231	164.5	7.0	2.0	2.5	94.0	93	93.0	0.8	0.77	0.7	27.27	1170	15	33	63	188
132	180	315L	740	243	173.7	7.0	2.0	2.5	94.3	94.2	93.8	0.80	0.77	0.7	29.00	1890	15	33	63	188
160	215	355L	740	294	211	7.0	1.9	2.3	94.6	94.4	94.0	0.80	0.77	0.7	59.79	2018	15	33	63	188
180	240	355L	740	331	237	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	65.95	2110	15	33	63	188
200	270	355L	740	368	263	7.0	1.9	2.3	94.6	94.3	94.0	0.80	0.77	0.7	67.68	2203	15	33	63	188
250	335	355L	740	460	329	7.0	1.8	2.25	94.6	94.3	94.0	0.80	0.77	0.7	84.6	2130	15	33	63	188
315	425	355L	741	579	414	7.0	1.7	2.1	94.6	94.3	94.0	0.80	0.77	0.7	106.59	2780	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE4

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE4 2-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 2 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	2800	0.29	0.04	7.3	2.1	2.4	66.5	66.5	65	0.86	0.8	0.68	0.00096	7/13	10	20	42	125
0.18	0.25	80	2820	0.41	0.06	7.3	2.1	2.4	70.8	70.8	70	0.86	0.8	0.68	0.0011	8/14	10	20	42	125
0.25	0.33	80	2830	0.54	0.09	7.3	2.1	2.4	74.3	74.3	71	0.87	0.81	0.7	0.0014	8/14	10	20	42	125
0.37	0.5	80	2840	0.76	0.13	6.5	2.5	2.8	78.1	78.1	75.0	0.87	0.82	0.71	0.0020	9/16	10	20	42	125
0.55	0.75	80	2810	1.1	0.19	7.8	2.2	2.6	81.5	81.5	80	0.88	0.82	0.71	0.0028	9/16	10	20	42	125
0.75	1	80	2860	1.4	0.26	7.8	2.2	2.5	83.5	83.5	80	0.88	0.82	0.72	0.008	12/16	10	20	42	125
1.1	1.5	80	2870	2.0	0.37	7.8	2.2	2.6	85.2	85.2	83	0.88	0.83	0.72	0.008	13/17	10	20	42	125
1.5	2	90S	2850	3	0.51	7.8	2.2	2.6	86.5	86.5	85	0.87	0.80	0.73	0.0096	18/27	10	20	42	125
2.2	3	90L	2900	4.0	0.74	8.9	2.5	2.75	88	88	87.5	0.88	0.81	0.73	0.0131	19/28	10	20	42	125
3	4	100L	2840	5.5	1.03	8.9	2.5	2.9	89.1	89.1	87.0	0.85	0.78	0.66	0.0284	24/31	8	16	33	100
3.7	5	100L	2865	6.8	1.26	8.9	2.7	2.9	89.7	89.7	87.7	0.85	0.78	0.68	0.034	24/31	8	16	33	100
4	5.5	112M	2870	7.5	1.36	8.9	2.5	3	90	90	89	0.82	0.80	0.71	0.0399	46	8	16	33	100
5.5	7.5	132S	2920	9.5	1.83	8.9	2.2	2.6	90.9	90.9	89.0	0.89	0.86	0.82	0.0982	76	8	16	33	100
7.5	10	132S	2925	12.8	2.50	8.9	2.2	2.6	91.7	91.7	89.9	0.89	0.85	0.82	0.113	83	8	16	33	100
9.3	12.5	160M	2945	15.8	3.08	8.9	2	2.4	92.2	92.2	90	0.89	0.87	0.83	0.2190	124	10	22	42	125
11	15	160M	2950	18.8	3.63	8.9	1.7	2.1	92.6	92.6	90.5	0.88	0.86	0.82	0.240	135	10	22	42	125
15	20	160M	2955	24.9	4.94	8.9	2	2.6	93.3	93.3	91.2	0.9	0.89	0.85	0.303	138	10	22	42	125
18.5	25	160L	2955	31.6	6.10	8.9	2.3	2.7	93.7	93.7	91.1	0.87	0.85	0.76	0.358	150	10	22	42	125
22	30	180M	2960	37.0	7.24	8.9	2.5	2.8	94	94	92	0.88	0.86	0.81	0.501	210	10	22	42	125
30	40	200L	2960	49.6	9.87	8.9	2.5	3	94.5	94.5	93	0.89	0.88	0.85	0.630	265	12	27	50	150
37	50	200L	2960	59.7	12.18	8.9	2.5	3	94.8	94.8	92.2	0.91	0.87	0.78	0.787	178	12	27	50	150
45	60	225M	2960	71.6	14.81	8.9	2.1	2.5	95.0	95	93.2	0.92	0.91	0.90	1.40600	370	12	27	50	150
55	75	250M	2975	88.2	18.01	8.9	2	2.5	95.3	95.3	94	0.91	0.90	0.87	2.38800	582	12	27	50	150
75	100	280S	2970	121	24.60	8.9	2.1	2.55	95.6	95.6	93	0.9	0.86	0.77	4.25800	750	15	33	63	188
90	120	280M	2975	144	29.47	8.9	2.1	2.5	95.8	95.8	94	0.91	0.9	0.89	5.98	780	15	33	63	188
110	150	315S	2975	175	36.01	8.9	2	2.5	96	96	94.1	0.91	0.87	0.81	9.135	968	15	33	63	188
125	170	315M	2980	199	40.86	8.9	2	2.5	96.2	96.2	94.3	0.91	0.87	0.78	11.251	992	15	33	63	188
132	180	315M	2980	210	43.14	8.9	2	2.5	96.2	96.2	94.7	0.91	0.88	0.87	11.251	1005	15	33	63	188
160	215	315L	2980	251	52.30	8.9	2	2.4	96.3	96.3	94.8	0.92	0.88	0.87	13.053	1180	15	33	63	188
180	240	315L	2980	282	58.83	8.9	2	2.4	96.5	96.5	94.8	0.92	0.90	0.89	14.168	1210	15	33	63	188
200	270	315L	2980	313	65.37	8.9	2	2.4	96.5	96.5	95.0	0.92	0.90	0.89	14.49	1450	15	33	63	188
250	335	355L	2985	396	82	8.9	1.9	2.4	96.5	96.5	94.5	0.91	0.88	0.81	30.424	2080	15	33	63	188
315	425	355L	2985	499	103	8.9	1.8	2.4	96.5	96.5	94.5	0.91	0.89	0.81	38.312	2238	15	33	63	188
355	475	355L	2985	562	116	8.9	1.8	2.5	96.5	96.5	93.8	0.91	0.86	0.81	43.17	2485	15	33	63	188
375	503	355L	2985	588	122	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	45.287	2550	15	33	63	188
400	536	355L	2985	627	131	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	48.66	2590	15	33	63	188
450	603	355L	2985	705	147	8.9	1.8	2.5	96.5	96.5	93.8	0.92	0.88	0.82	54.763	2864	15	33	63	188
500	*670	355L	2985	784	163	8.9	1.8	2.5	96.5	96.5	94.0	0.92	0.88	0.82	58.2	2971	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE4

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE4 4-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 4 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	1390	0.32	0.08	6.5	2	2.5	69.8	69	53.0	0.75	0.65	0.45	0.0015	8/14	15	30	63	188
0.18	0.25	80	1395	0.45	0.13	6.5	2	2.5	74.7	74.7	69.0	0.75	0.67	0.48	0.0020	8/14	15	30	63	188
0.25	0.33	80	1400	0.60	0.17	6.5	2	2.6	77.9	77.9	70	0.75	0.67	0.5	0.0037	9/15	10	20	42	125
0.37	0.5	80	1410	0.84	0.26	7	2.2	2.7	81.1	81.1	76	0.76	0.68	0.52	0.0045	12	10	20	42	125
0.55	0.75	80	1420	1.18	0.38	7	2.2	2.7	83.9	83.3	80.0	0.77	0.7	0.52	0.0102	13/17	10	20	42	125
0.75	1	80	1440	1.58	0.51	7	2.5	3	85.7	85.7	82	0.77	0.7	0.53	0.0114	14/18	10	20	42	125
1.1	1.5	90S	1445	2.44	0.74	7	2.5	3	87.2	87.2	85.0	0.72	0.65	0.51	0.0185	18/25	10	20	42	125
1.5	2	90L	1450	3.24	1.01	7	2.2	2.75	88.2	88.2	86	0.73	0.68	0.52	0.0198	20/29	10	20	42	125
2.2	3	100L	1455	4.44	1.47	8.3	2	2.5	89.5	89.5	88	0.77	0.70	0.58	0.0383	35	8	16	33	100
3	4	100L	1455	6.00	2.01	8.3	2	2.55	90.4	90.4	89	0.77	0.7	0.58	0.052	37	8	16	33	100
3.7	5	112M	1460	6.91	2.47	8.3	2.2	2.8	90.9	90.9	88.5	0.82	0.75	0.65	0.0752	52	8	16	33	100
4	5.5	112M	1460	7.45	2.67	8.3	2.3	2.7	91.1	91.5	89.6	0.82	0.77	0.64	0.1	57	8	16	33	100
5.5	7.5	132S	1460	9.91	3.67	8.3	2.3	2.7	91.9	91.9	90.3	0.84	0.78	0.67	0.1228	78	8	16	33	100
7.5	10	132M	1460	13.41	5.00	8.3	2.3	2.7	92.6	92.6	91	0.84	0.78	0.68	0.1584	88	8	16	33	100
9.3	12.5	160M	1465	16.56	6.18	8.3	2	2.5	93.0	93.0	91.5	0.84	0.8	0.72	0.313	130	10	22	42	125
11	15	160M	1465	20.25	7.31	8.3	2.15	2.8	93.3	93.3	91.9	0.81	0.78	0.7	0.381	145	10	22	42	125
15	20	160L	1465	27.44	9.97	8.3	2.2	2.8	93.9	93.9	92	0.81	0.8	0.75	0.488	150	10	22	42	125
18.5	25	180M	1475	31.77	12.22	8.3	2.2	2.8	94.2	94.2	93	0.86	0.83	0.75	0.972	205	10	22	42	125
22	30	180L	1475	37.66	14.53	8.3	2.2	2.7	94.5	94.5	93.3	0.86	0.82	0.75	1.051	250	10	22	42	125
30	40	200L	1480	51.14	19.74	8.3	2.3	2.7	94.9	94.9	93.7	0.86	0.82	0.72	1.35	280	12	27	50	150
37	50	225S	1475	62.87	24.43	8.3	2.2	2.7	95.2	95.2	94.1	0.86	0.82	0.76	2.104	387	12	27	50	150
45	60	225M	1475	76.31	29.72	8.3	2.2	2.7	95.4	95.4	94.4	0.86	0.84	0.75	2.415	425	12	27	50	150
55	75	250M	1480	92.97	36.20	8.3	2	2.6	95.7	95.7	94.8	0.86	0.85	0.8	3.226	572	12	27	50	150
75	100	280S	1485	126.38	49.19	8.9	2.1	2.6	96.0	96	95.2	0.86	0.84	0.78	6.341	825	15	33	63	188
90	120	280M	1485	151.50	59.03	8.9	2.2	2.8	96.1	96.1	95	0.86	0.84	0.77	6.996	793	15	33	63	188
110	150	315S	1485	182.66	72.15	8.9	2	2.6	96.3	96.3	95.5	0.87	0.85	0.81	10.231	980	15	33	63	188
125	170	315M	1485	209.76	81.99	8.9	2	2.5	96.4	96.4	95	0.86	0.83	0.78	11.04	1160	15	33	63	188
132	180	315M	1485	221.51	86.58	8.9	2	2.5	96.4	96.4	95.8	0.86	0.84	0.81	11.04	1165	15	33	63	188
160	215	315L	1490	267.94	104.59	8.9	2	2.6	96.6	96.6	95.2	0.86	0.83	0.76	13.501	1322	15	33	63	188
180	240	315L	1485	294.58	118.06	8.9	2	2.75	96.6	96.6	96	0.88	0.86	0.83	16.721	1460	15	33	63	188
200	270	315L	1485	323.30	131.18	8.9	2	2.55	96.7	96.7	96	0.89	0.87	0.86	17.25	1995	15	33	63	188
250	335	355M	1485	409	164	8.9	2.0	2.5	96.7	96.7	94.3	0.88	0.87	0.82	31.211	1895	15	33	63	188
315	425	355L	1485	509	207	8.9	2.0	2.45	96.7	96.7	94.4	0.89	0.86	0.80	39.318	2390	15	33	63	188
355	475	355L	1485	574	233	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.86	0.80	44.309	2480	15	33	63	188
375	500	355L	1485	606	246	8.9	2.1	2.5	96.7	96.7	94.5	0.89	0.84	0.80	46.816	2495	15	33	63	188
400	536	355L	1490	647	261	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.85	0.82	49.933	2552	15	33	63	188
450	603	355L	1490	727	294	8.9	2.1	2.5	96.7	96.7	94.6	0.89	0.86	0.81	56.179	2735	15	33	63	188
500	*670	355L	1490	808	327	8.9	2.1	2.4	96.7	96.7	94.7	0.89	0.85	0.82	62.422	3190	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
 2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE4

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE4 6-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 6 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kg <sup>m</sup> <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (PU.)	3/4L (PU.)	1/2L (PU.)						
0.12	0.16	80	880	0.43	0.13	7	1.9	2.3	64.9	64.9	60.8	0.6	0.56	0.47	0.0049	8/14	10	20	42	125
0.18	0.25	80	890	0.60	0.20	7	1.9	2.3	70.1	70.1	60	0.60	0.54	0.45	0.0049	9/15	10	20	42	125
0.25	0.33	80	900	0.78	0.27	7	1.9	2.3	74.1	74.1	64.5	0.60	0.56	0.47	0.0054	10/17	10	20	42	125
0.37	0.5	80	925	0.98	0.39	7.3	1.8	2.3	78	78.0	70.4	0.67	0.62	0.48	0.0111	12/18	10	20	42	125
0.55	0.75	80	925	1.39	0.58	7.3	1.8	2.3	80.9	80.9	71.0	0.68	0.61	0.48	0.016	14/20	10	20	42	125
0.75	1	90S	925	1.97	0.79	7.3	1.95	2.5	82.7	82.7	80	0.64	0.53	0.39	0.0219	15/24	10	20	42	125
1.1	1.5	90L	925	2.83	1.16	7.3	2	2.6	84.5	84.5	80	0.64	0.54	0.4	0.0253	21/29	10	20	42	125
1.5	2	100L	930	3.42	1.57	7.3	2	2.5	85.9	85.9	83	0.71	0.63	0.48	0.072	35	10	20	42	125
2.2	3	112M	950	4.80	2.26	8.3	1.9	2.4	87.4	87.4	85	0.73	0.67	0.54	0.101	50	10	20	42	125
3.0	4	132S	950	6.28	3.08	8.3	1.7	2.1	88.6	88.6	84.0	0.75	0.70	0.60	0.162	78	10	20	42	125
3.7	5	132S	955	7.69	3.77	8.3	1.9	2.4	89.3	89.3	87	0.75	0.70	0.60	0.202	76	10	20	42	125
4.0	5.5	132M	955	8.18	4.08	8.3	1.8	2.2	89.5	89.5	87	0.76	0.73	0.61	0.216	83	10	20	42	125
5.5	7.5	132M	960	11.12	5.58	8.3	1.9	2.4	90.5	90.5	88	0.76	0.73	0.61	0.256	99	10	20	42	125
7.5	10	160M	965	13.61	7.57	8.3	1.8	2.2	91.3	91.3	88	0.84	0.8	0.73	0.466	132	10	22	42	125
9.3	12.5	160L	965	16.76	9.39	8.3	1.8	2.2	91.9	91.9	89	0.84	0.8	0.73	0.57	135	10	22	42	125
11	15	160L	965	19.51	11.10	8.3	1.8	2.2	92.3	92.3	89	0.85	0.81	0.74	0.647	161	10	22	42	125
15	20	180L	980	27.06	14.91	8.3	2.2	2.6	92.9	92.9	90.5	0.83	0.75	0.61	1.499	198	10	22	42	125
18.5	25	200L	980	31.67	18.39	8.3	2	2.4	93.4	93.4	91	0.87	0.85	0.76	1.547	270	12	27	50	150
22	30	200L	980	37.55	21.87	8.3	2	2.4	93.7	93.7	91.5	0.87	0.85	0.78	1.883	282	12	27	50	150
30	40	225M	985	50.35	29.66	8.3	2.5	2.9	94.2	94.2	92	0.88	0.85	0.79	4.082	380	12	27	50	150
37	50	250M	985	63.34	36.59	8.3	2	2.4	94.5	94.5	92.2	0.86	0.84	0.72	6.0179	475	12	27	50	150
45	60	280S	985	77.69	44.50	8.3	2.2	2.8	94.8	94.8	93	0.85	0.83	0.78	8.76	780	15	33	63	188
55	75	280M	985	94.66	54.39	8.3	2	2.5	95.1	95.1	93.2	0.85	0.83	0.78	10.512	792	15	33	63	188
75	100	315S	990	128.67	73.79	8.9	2.1	2.6	95.4	95.4	93.8	0.85	0.85	0.85	15.61	942	15	33	63	188
90	120	315M	990	152.29	88.55	8.9	1.8	2.2	95.6	95.6	94.2	0.86	0.85	0.80	18.76	980	15	33	63	188
110	150	315L	985	185.75	108.77	8.9	1.9	2.3	95.8	95.8	94.6	0.86	0.85	0.80	22.88	1110	15	33	63	188
125	170	315L	990	210.86	122.98	8.9	1.95	2.35	95.9	95.9	94	0.86	0.85	0.8	26	1178	15	33	63	188
132	180	315L	990	222.43	129.87	8.9	1.9	2.5	96	96	94.9	0.86	0.85	0.78	27.456	1820	15	33	63	188
160	215	355L	990	269	157.41	8.9	1.9	2.5	96.2	96.2	95	0.86	0.82	0.77	36.736	1890	15	33	63	188
180	240	355L	990	301.4	177.09	8.9	1.9	2.5	96.6	96.6	95	0.86	0.82	0.78	41.329	1990	15	33	63	188
200	270	355L	990	334.9	196.77	8.9	1.8	2.4	96.6	96.6	95	0.86	0.83	0.77	45.921	2110	15	33	63	188
250	335	355L	990	419	246	8.9	2.0	2.4	96.6	96.6	94.4	0.86	0.82	0.78	57.401	2138	15	33	63	188
315	425	355L	990	528	310	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.83	0.78	72.325	2900	15	33	63	188
355	475	355L	990	594	349	8.9	2.0	2.5	96.6	96.6	93.8	0.86	0.84	0.77	76	3389	15	33	63	188
375	503	355L	990	621	369	8.9	2.0	2.5	96.6	96.6	93.8	0.87	0.84	0.78	81.79	3585	15	33	63	188
400	536	355L	990	662	394	8.9	2.0	2.5	96.6	96.6	93.9	0.87	0.84	0.78	87.24	4030	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances.  
2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

## Energy Efficient Increased Safety Ex 'ec' & Ex 'eb' Motors-IE4

3 Phase Squirrel Cage Ex 'ec' & Ex 'eb' Increased Safety Induction motors suitable for 415 V  $\pm$  10%, 50Hz  $\pm$  5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb:50°C, Rise:60K), Line operated with DOL starting, Degree of protection IP-55, altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE4 8-Pole, conforms to IS 12615, IS/IEC 60034-1, IEC 60034-1 and Efficiency testing according to IEC:60034-2-1, IS/IEC 60079-0, IS/IEC 60079-7, Zone 2 of Gas Group II, Temp. Class T3.

**Performance Table for 8 Pole Motors**

kW	HP	Frame	Rated Speed RPM	Rated Current Amps.	Rated Torque Kgm.	Starting Current % of Rtd Current	Starting Torque % of Rtd Torque	Pull out Torque % of Rtd Torque	Efficiency			Power Factor			Rotor GD <sup>2</sup> Kgm <sup>2</sup>	Approx Net Wt. (Kg) AL/CI	TWT Hot in sec.	TWT Cold in sec.	Th (Min)	Tc (Min)
									FL	3/4L	1/2L	FL (P.U.)	3/4L (P.U.)	1/2L (P.U.)						
0.12	0.16	80	645	0.51	0.18	6.0	1.8	2.2	62.3	62.3	58.2	0.53	0.42	0.36	0.0044	9/16	15	30	63	188
0.18	0.25	80	650	0.65	0.27	6.0	1.8	2.2	67.2	67.2	63.1	0.57	0.49	0.39	0.0141	10/17	15	30	63	188
0.25	0.33	80	690	0.85	0.35	6.5	1.8	2.2	70.8	70.8	66.5	0.58	0.49	0.41	0.0141	12/18	15	30	63	188
0.37	0.5	90S	680	1.15	0.63	6.5	1.7	2.1	74.3	74.3	70.2	0.6	0.48	0.38	0.0177	13/19	15	30	63	188
0.55	0.75	90L	680	1.58	0.64	6.5	1.8	2.2	77.0	77.0	72.5	0.63	0.58	0.48	0.0231	15/26	15	30	63	188
0.75	1	100L	700	1.99	1.04	6.5	1.9	2.3	78.4	78.4	75.5	0.67	0.57	0.43	0.057	22/31	10	20	42	125
1.1	1.5	100L	700	2.83	1.53	6.5	1.9	2.3	80.8	80.8	77.5	0.67	0.55	0.42	0.0694	27/36	10	20	42	125
1.5	2	112M	700	3.66	2.09	6.5	1.9	2.3	82.6	82.6	80	0.69	0.65	0.56	0.0775	48	10	20	42	125
2.2	3	132S	710	5.17	3.02	7.8	1.8	2.3	84.5	84.5	82	0.7	0.60	0.47	0.189	75	10	20	42	125
3	4	132S	710	6.94	4.12	7.8	1.8	2.3	85.9	85.9	84	0.7	0.60	0.52	0.244	85	10	20	42	125
3.7	5	160M	710	7.80	5.08	7.8	1.7	2.2	86.8	86.8	83.5	0.76	0.6	0.5	0.339	122	10	22	42	125
4	5.5	160M	710	8.3	5.49	7.8	1.8	2.2	87.1	87.1	85	0.77	0.6	0.5	0.364	104	10	22	42	125
5.5	7.5	160M	715	11.3	7.49	7.8	1.8	2.3	88.3	88.3	85	0.77	0.62	0.52	0.463	124	10	22	42	125
7.5	10	160L	715	15.2	10.2	7.8	1.8	2.3	89.3	89.3	86	0.77	0.6	0.58	0.611	137	10	22	42	125
9.3	12.5	180L	725	18.9	12.5	7.8	1.8	2.3	89.9	89.9	88	0.76	0.69	0.55	1.399	182	10	22	42	125
11	15	180L	725	22.3	14.8	7.8	1.9	2.4	90.4	90.4	88	0.76	0.69	0.6	1.562	19	10	22	42	125
15	20	200L	730	30.5	20.0	7.8	1.8	2.3	91.2	91.2	88.8	0.75	0.68	0.55	1.675	263	12	27	50	150
18.5	25	225S	730	36.9	24.7	7.8	1.8	2.3	91.7	91.7	90	0.76	0.74	0.63	4.059	310	12	27	50	150
22	30	225M	730	42.6	29.4	7.8	1.9	2.4	92.1	92.1	89.2	0.78	0.74	0.65	4.713	378	12	27	50	150
30	40	250M	735	57.7	39.8	7.8	2.1	2.5	92.7	92.7	90.3	0.78	0.74	0.66	5.661	397	12	27	50	150
37	50	280S	735	69	49.0	7.8	2.0	2.5	93.1	93.1	90.7	0.8	0.75	0.71	8.521	630	15	33	63	188
45	60	280M	735	84.8	59.6	7.8	1.9	2.4	93.4	93.4	91.0	0.79	0.74	0.66	10.254	760	15	33	63	188
55	75	315S	735	106.1	72.9	7.8	1.9	2.4	93.7	93.7	91.3	0.77	0.76	0.72	19.445	971	15	33	63	188
75	100	315M	735	142	99.4	7.8	2.0	2.5	94.2	94.2	91.5	0.78	0.76	0.69	23.056	997	15	33	63	188
90	120	315L	740	167.9	118.5	7.8	2.0	2.5	94.4	94.4	92.5	0.79	0.77	0.7	26.97	1080	15	33	63	188
110	150	315L	740	204.6	144.8	7.8	2.0	2.5	94.7	94.7	92.1	0.79	0.77	0.7	33.154	1130	15	33	63	188
125	170	315L	740	232	164.5	7.8	2.0	2.5	94.9	94.9	92.0	0.79	0.77	0.69	37.484	1890	15	33	63	188
132	180	315L	740	244.7	173.7	7.8	1.9	2.4	95	95	93	0.79	0.76	0.67	39.653	2018	15	33	63	188
160	215	355L	740	300	211	7.8	1.9	2.3	95.1	95.1	94.0	0.78	0.74	0.62	65.769	2110	15	33	63	188
180	240	355L	740	337	237	7.8	1.9	2.3	95.4	95.4	94.0	0.78	0.74	0.62	72.545	2150	15	33	63	188
200	270	355L	740	369	263	7.8	1.9	2.2	95.4	95.4	94.0	0.79	0.75	0.63	75.00	2340	15	33	63	188
250	335	355L	740	461	329	7.8	1.8	2.2	95.4	95.4	94.2	0.79	0.75	0.65	88.35	2500	15	33	63	188
315	425	355L	741	581	414	7.8	1.7	2.1	95.4	95.4	93.0	0.79	0.75	0.68	111.37	2780	15	33	63	188

\*Temperature rise limited to class "F" (95K)

Note : 1) Due to policy of continual development and improvement, the right is reserved to supply products which may differ slightly from those in this publication. All performance figures are subject to IS/IEC 60034-1 tolerances, 355 frame will have uni directional for CW rotation as viewed from DE. for CCW direction please explicitly specify in the order.

2) Clause no. 4.2 of IEC 60079-0 : 2011 Equipment marked IIB is suitable for applications requiring Group IIA equipment. Similarly, equipment marked IIC is suitable for applications requiring Group IIA or Group IIB equipment.

# HAZARDOUS AREA MOTORS



## Dimensions of Foot Mounted Flameproof Motor - Gas Group - IIA, IIB & IIC (B3 Mounting as per IS : 1231)

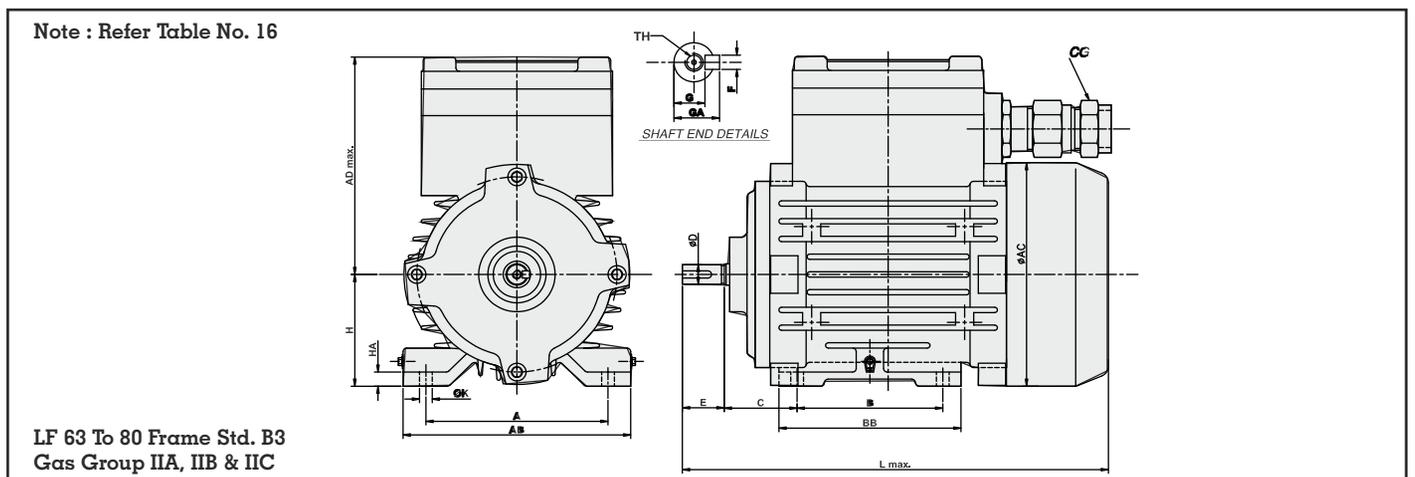
**Table No. 16**

Frame Size	H 0.5	C	A	AB	HA	ØK	B	BB	AD MAX	AD* MAX	ØAC	ØD	E	F	G	GA	TH	I. MAX IE2/IE3/IE4	I. MAX For Brake Motor IE2/IE3/IE4	CG (METRIC) X NOS.
63	63	40	100	125	8	7	80	100	130	125	130	11j6	23	4	8.5	12.5	M4	240	350	M16 X 2
71	71	45	112	142	10	7	90	115	135	135	145	14j6	30	5	11.0	16.0	M5	285	372	M16 X 2
80	80	50	125	151	12	10	100	144	150	145	180	19j6	40	6	15.5	21.5	M6	310	420	M20 X 2
90S	90	56	140	180	12	10	100	180	200	-	195	24j6	50	8	20.0	27.0	M8	390	530	M25 X 2
90L	90	56	140	180	12	10	125	180	200	-	195	24j6	50	8	20.0	27.0	M8	390	530	M25 X 2
100L	100	63	160	208	13	12	140	200	215	-	217	28j6	60	8	24.0	31.0	M10	430	550	M25 X 2
112M	112	70	190	240	15	12	140	210	350	-	224	28j6	60	8	24.0	31.0	M10	480	620	M32 X 2
132S	132	89	216	265	16	12	140	290	320	-	272	38k6	80	10	33.0	41.0	M12	630	790	M32 X 2
132M	132	89	216	265	16	12	178	290	320	-	272	38k6	80	10	33.0	41.0	M12	630	790	M32 X 2
160M	160	108	254	314	18	14.5	210	340	350	320	322	42k6	110	12	37.0	45.0	M16	750	920	M40 X 2
160L	160	108	254	314	18	14.5	254	340	350	320	322	42k6	110	12	37.0	45.0	M16	750	920	M40 X 2
180M	180	121	279	340	26	14.5	241	340	415	360	382	48k6	110	14	42.5	51.5	M16	760	960	M40 X 2
180L	180	121	279	340	26	14.5	279	340	415	360	382	48k6	110	14	42.5	51.5	M16	760	960	M40 X 2
200L	200	133	318	380	25	18.5	305	410	390	390	382	55m6	110	16	49.0	59.0	M20	850	--	M40 X 2
225S (2P)	225	149	356	440	32	18.5	286	375	435	-	448	55m6	110	16	49.0	59.0	M20	890	--	M50 X 2
225S (4,6&8P)	225	149	356	440	32	18.5	286	375	435	-	448	60m6	140	18	53.0	64.0	M20	900	--	M50 X 2
225M (2P)	225	149	356	440	32	18.5	311	375	435	-	448	55m6	110	16	49.0	59.0	M20	890	--	M50 X 2
225M (4,6&8P)	225	149	356	440	32	18.5	311	375	435	-	448	60m6	140	18	53.0	64.0	M20	900	--	M50 X 2
250M (2P)	250	168	406	500	35	24	349	425	530	525	510	60m6	140	18	53.0	64.0	M20	1050	--	M50 X 2
250M (4,6&8P)	250	168	406	500	35	24	349	425	530	525	510	65m6	140	18	58.0	69.0	M20	1050	--	M50 X 2
280M (2P)	280	190	457	540	40	24	419	490	555	-	570	65m6	140	18	58.0	69.0	M20	1200	--	M63 X 2
280M (4,6&8P)	280	190	457	540	40	24	419	490	555	-	570	75m6	140	20	67.5	79.5	M20	1200	--	M63 X 2
315S (2P)	315	216	508	620	50	28	406	600	575	-	658	65m6	140	18	58.0	69.0	M20	1420	--	M63 X 2
315S (4,6&8P)	315	216	508	620	50	28	406	600	575	-	658	80m6	170	22	71.0	85.0	M20	1470	--	M63 X 2
315M (2P)	315	216	508	620	50	28	457	600	575	-	658	65m6	140	18	58.0	69.0	M20	1420	--	M63 X 2
315M (4,6&8P)	315	216	508	620	50	28	457	600	575	-	658	80m6	170	22	71.0	85.0	M20	1470	--	M63 X 2
315 (2P)	315	216	508	620	50	28	508	640	575	-	658	65m6	140	18	58.0	69.0	M20	1420	--	M63 X 2
315L (4,6&8P)	315	216	508	620	50	28	508	640	575	-	658	80m6	170	22	71.0	85.0	M20	1470	--	M63 X 2
355 (2P)	355	254	610	730	51	28	630	780	900	-	775	80m6	170	22	71.0	85.0	M20	2150	--	M63 X 2
355 (4P)	355	254	610	730	51	28	630	780	900	-	775	100m6	210	28	90.0	106.0	M24	2150	--	M63 X 2

\* MARKED DIMENSION IS FOR GAS GROUP IIC APPLICATION MOTOR & OTHER DIMENSIONS ARE SAME AS ABOVE.

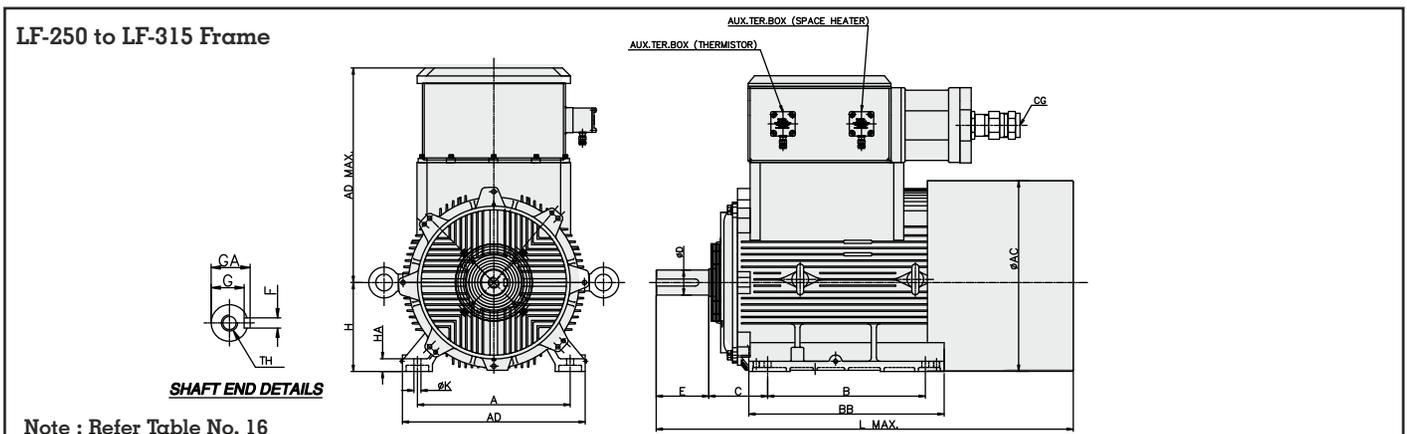
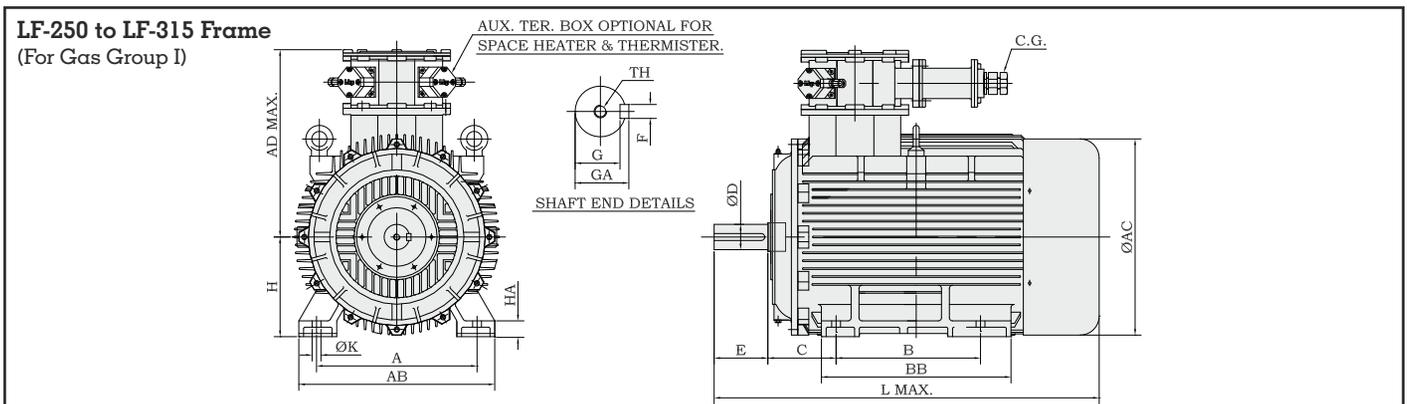
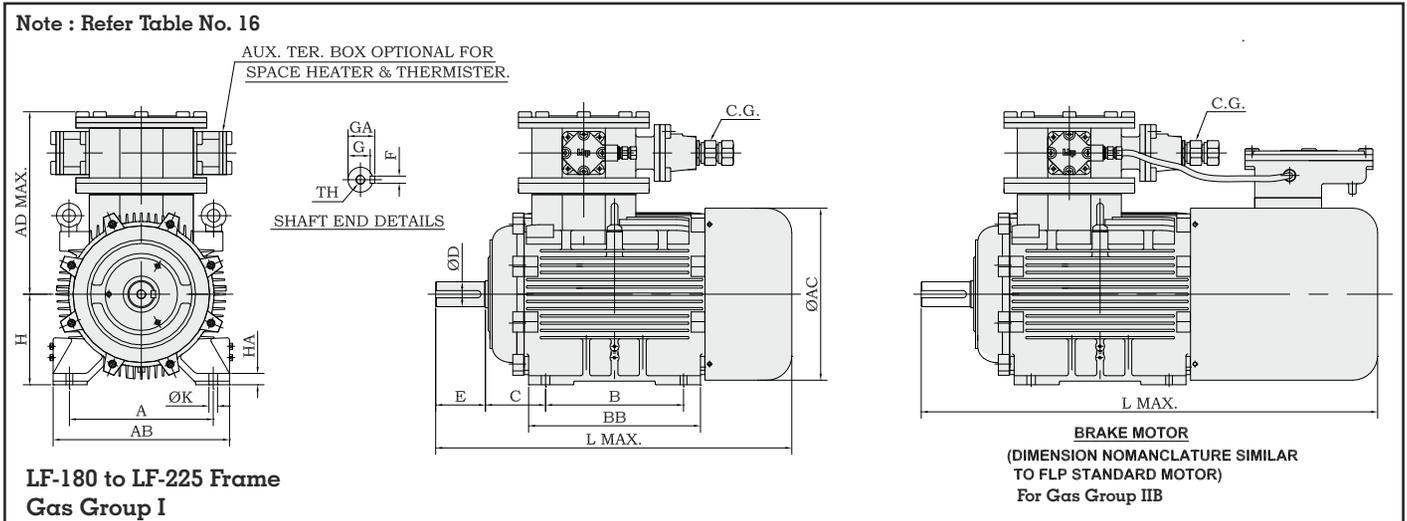
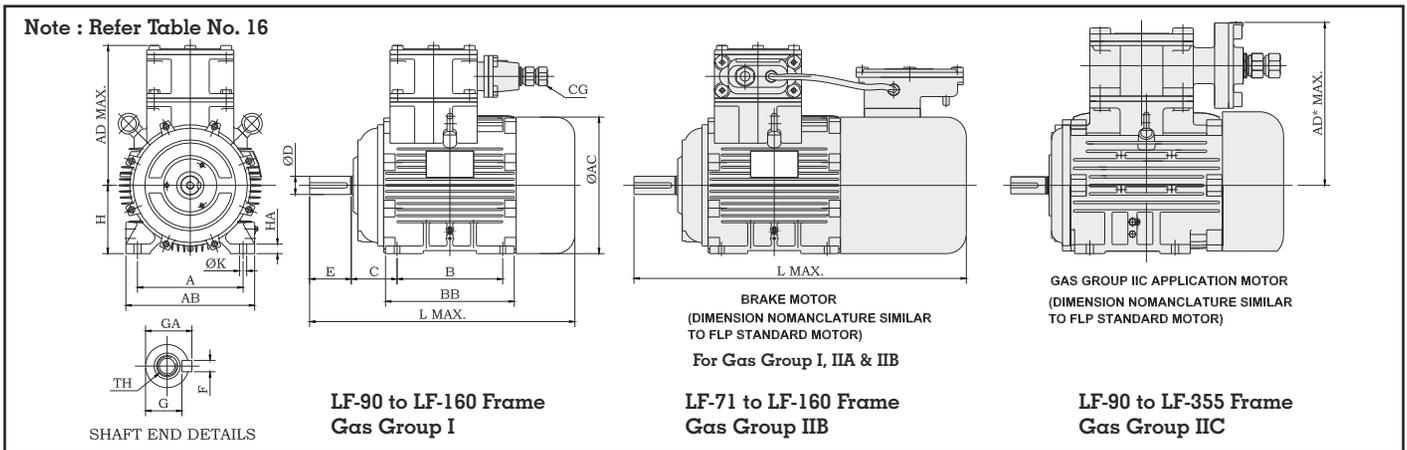
Note :

- 1) Cable Gland size may be changed according to cable size as per customer requirement.
- 2) By default T. Box will be at Top, however RHTB or LHTB can be given if requested specifically.



# HAZARDOUS AREA MOTORS

## Dimensions of Foot Mounted Flame-Proof Motors (B-3 Mounting) as per IS : 1231



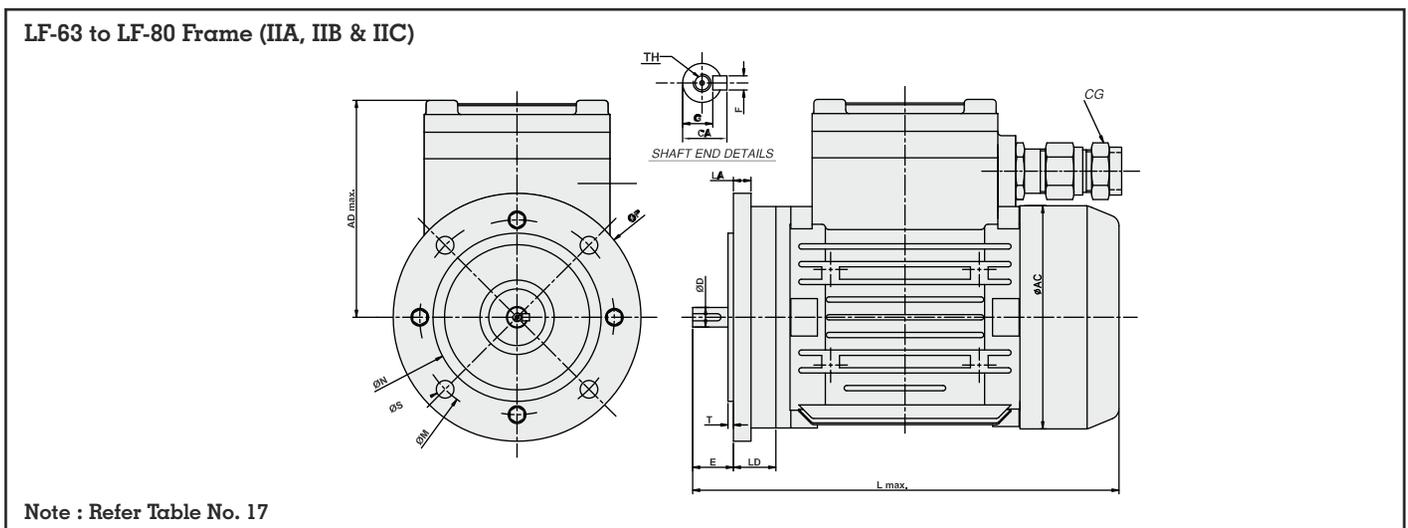
## 18.0 Dimensions For Flange Mounted Motors (B5 Mounting) as per IS-2223

**Table No. 17**

Frame Size	Flange No.	ØM ±0.3	ØN j6	ØP MIN	ØS X NO.	T	LA	LD	AD MAX	AD* MAX	ØAC	ØD	E	F	G	GA	TH	L MAX IE2/IE3/IE4	BRAKE MOTOR L MAX IE2/IE3/IE4	CG (METRIC) X NOS
63	F115B	115	95	140	10X4	3	10	-	125	125	130	11j6	23	4	8.5	12.5	M4	270	350	M16 X 2
71	F130B	130	110	160	10X4	3.5	10	19	135	135	145	14j6	30	5	11	16	M5	290	372	M16 X 2
80	F165B	165	130	200	12X4	3.5	10	16	150	145	180	19j6	40	6	15.5	21.5	M6	310	420	M20 X 2
90S/L	F165B	165	130	200	12X4	3.5	10	23	200	-	195	24j6	50	8	20	27	M8	390	530	M25 X 2
100L	F215B	215	180	250	15X4	4	11	26	215	215	219	28j6	60	8	24	31	M10	430	550	M25 X 2
112M	F215B	215	180	250	15X4	4	11	27	300	-	224	28j6	60	8	24	31	M10	480	620	M32 X 2
132S/M	F265B	265	230	300	15X4	4	12	34	320	-	272	38k6	80	10	33	41	M12	630	790	M32 X 2
160M/L	F300B	300	250	350	19X4	5	15	35	350	350	312	42k6	110	12	37	45	M16	750	950	M40 X 2
180M/L	F300B	300	250	350	19X4	5	16	55	425	425	382	48k6	110	14	42.5	51.5	M16	760	960	M40 X 2
200L	F350B	350	300	400	19X4	5	18	52	390	390	382	55m6	110	16	49	59	M20	870	---	M40 X 2
225S/M (2P)	F400B	400	350	450	19X8	5	16	48	435	-	448	55m6	110	16	49	59	M20	860	---	M50 X 2
225S/M (4,6&8P)	F400B	400	350	450	19X8	5	16	48	435	-	448	60m6	140	18	53	64	M20	900	---	M50 X 2
250M (2P)	F500B	500	450	550	19X8	5	22	55	530	525	510	60m6	140	18	53	64	M20	1050	---	M50 X 2
250M (4,6&8P)	F500B	500	450	550	19X8	5	22	55	530	525	510	65m6	140	18	58	69	M20	1050	---	M50 X 2
280S/M (2P)	F500B	500	450	550	19X8	5	22	50	555	-	570	65m6	140	18	58	69	M20	1200	---	M63 X 2
280S/M/L (4,6&8P)	F500B	500	450	550	19X8	5	22	50	555	-	570	75m6	140	20	67.5	79.5	M20	1200	---	M63 X 2
315S/M/L (2P)	F600B	600	550	660	24X8	6	22	45	575	-	658	65m6	140	18	58	69	M20	1420	---	M63 X 2
315S/M/L (4,6&8P)	F600B	600	550	660	24X8	6	22	45	575	-	658	80m6	170	22	71	85	M20	1470	---	M63 X 2
355 (2P)	F740B	740	680	800	24X8	6	28	45	900	-	775	80m6	170	22	71	85	M20	2150	---	M63 X 2
355 (4P)	F740B	740	680	800	24X8	6	28	45	900	-	775	110m6	210	28	90	106	M24	2150	---	M63 X 2

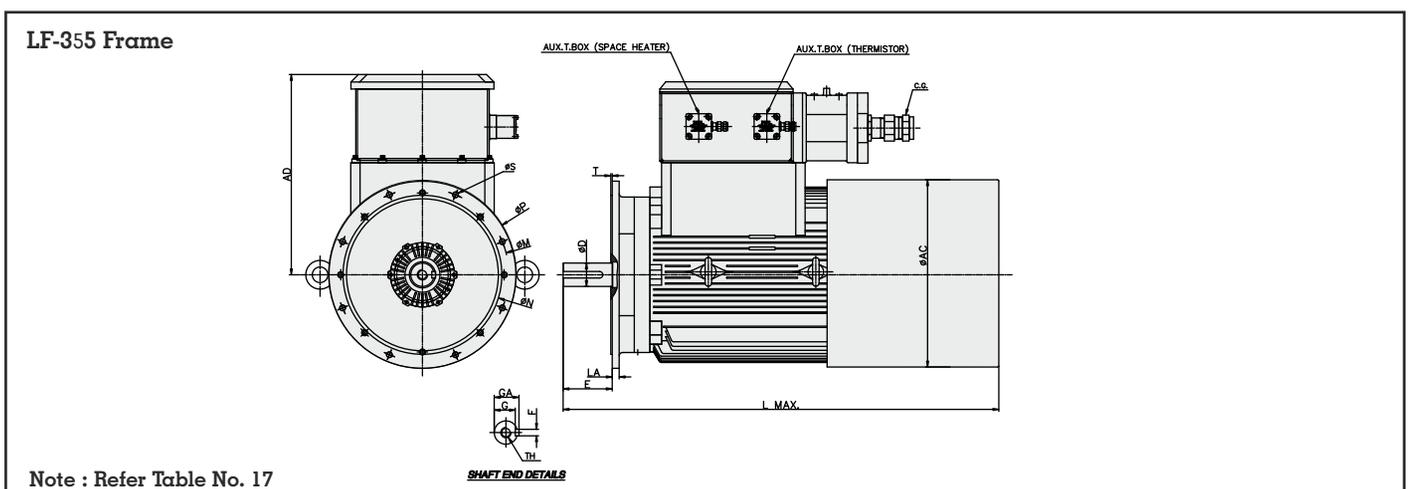
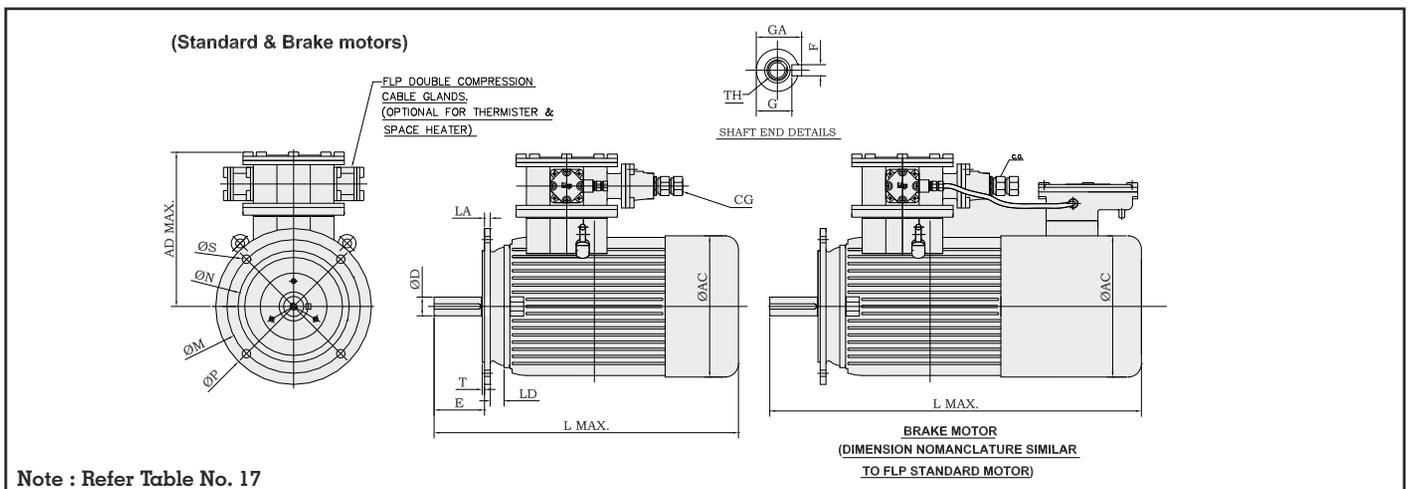
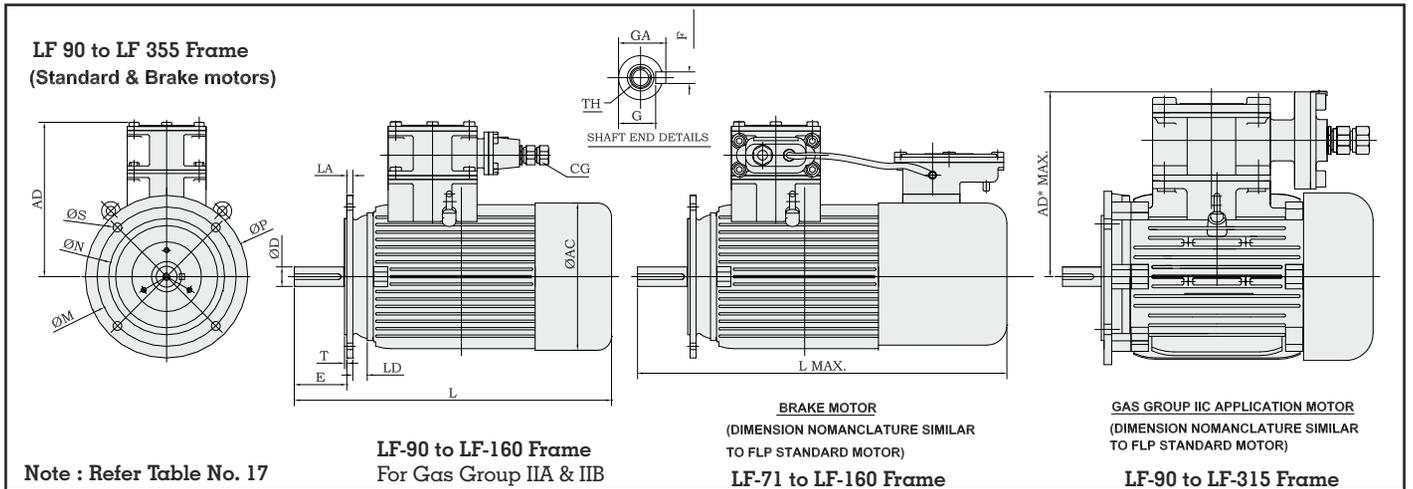
\* MARKED DIMENSION IS FOR GAS GROUP IIC APPLICATION MOTOR & OTHER DIMENSIONS ARE SAME AS ABOVE.

Note : Cable Gland size may be changed according to cable size as per customer requirement.



# HAZARDOUS AREA MOTORS

## 18.0 Dimensions of Flange Mounted Flame-Proof Motors (B-5 Mounting) as per IS:2223



# HAZARDOUS AREA MOTORS

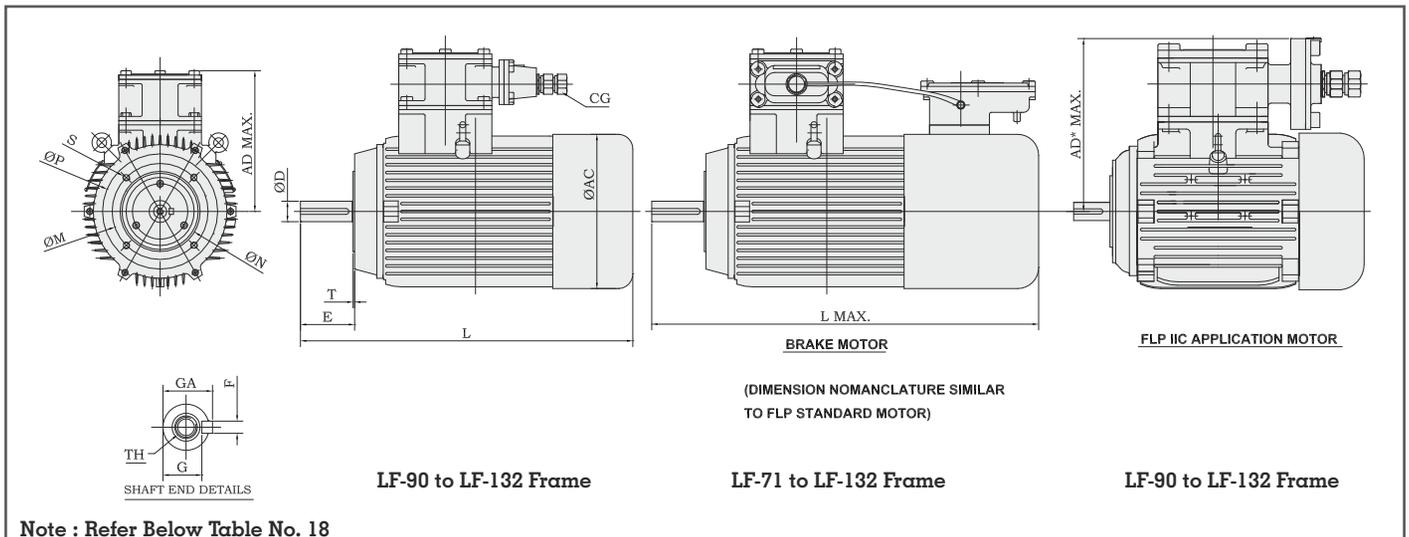
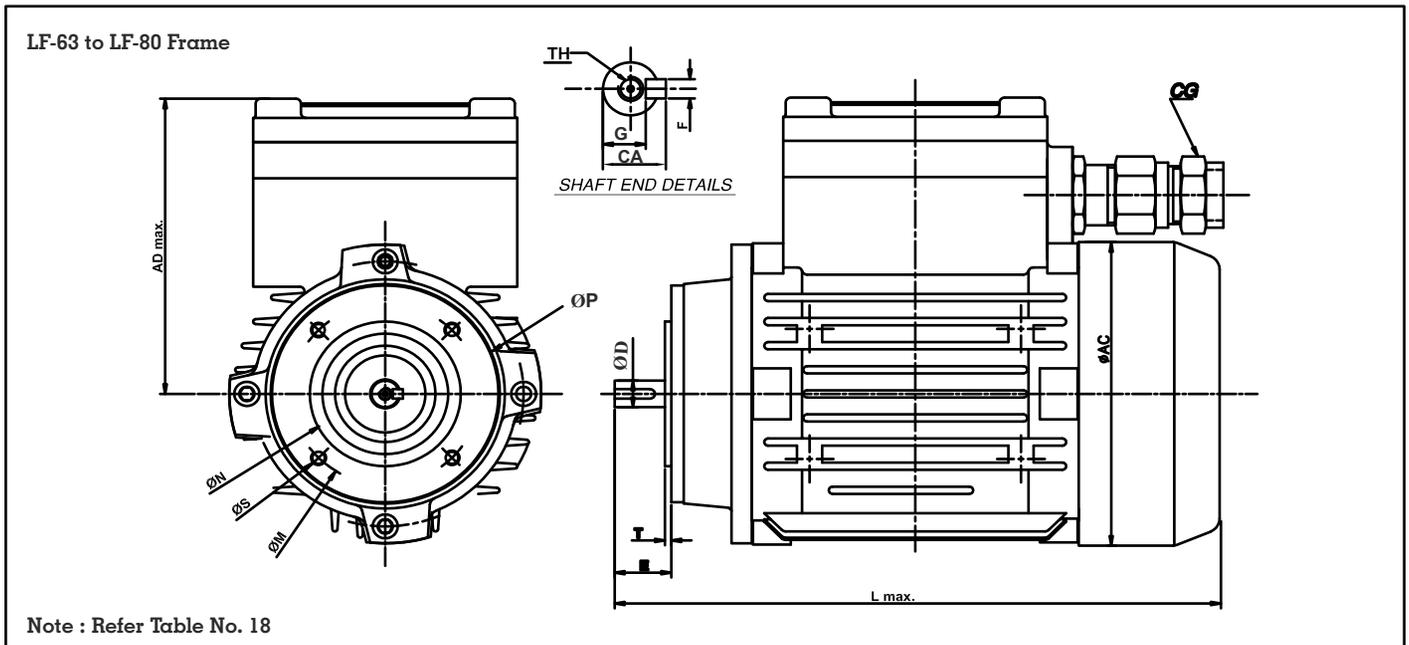


## 19.0 Dimensions of Face Mounted Flame-Proof Motors (B-14 Mounting) as per IS : 2223

Table No.18

Frame Size	Flange No.	ØM 0.3	ØN j6	ØP MIN	S	T	AD MAX	AD* MAX	ØAC	OD	E	F	G	GA	TH	L MAX IE1/IE2/IE3	BRAKE MOTOR L MAX IE1/IE2/IE3	CG (METRIC) X NO.S
63	F75C	75	60	90	M5	2.5	125	125	130	11j6	23	4	8.5	12.5	M4	250	350	M16 X 2
71	F85C	85	70	105	M6	2.5	135	135	145	14j6	30	5	11	16	M5	285	375	M16 X 2
80	F100C	100	80	120	M6	3	150	145	180	19j6	40	6	15.5	21.5	M6	310	420	M20 X 2
90S/L	F115C	115	95	140	M8	3.5	200		195	24j6	50	8	20	27	M8	390	530	M25 X 2
100L	F130C	130	110	160	M8	3.5	215	215	219	28j6	60	8	24	31	M10	480	550	M25 X 2
112M	F130C	130	110	160	M8	3.5	300		224	28j6	60	8	24	31	M10	480	620	M32 X 2
132S/M	F165C	165	130	200	M12	3.5	320		272	38k6	80	10	33	41	M12	630	790	M32 X 2

\* Marked dimension is for Gas Group IIC Application Motor & other dimensions are same as above.  
 Note : Cable Gland size may be changed according to cable size as per customer requirement.



## Increased Safety Motors Ex'ec' IE2, IE3 & IE4)

### A. Table No. 19 - Design and constructional features :

No.	Parameters	Standard Features	Optional Features
1	Construction : Motor Frame, End Shields, Flanges, Bearing cover	The components of these motors are made of cast Iron Aluminum having sufficient strength and dimensional stability.	The components fabricated from steel with necessary re-inforcement
2	Winding	Motors are designed with F class insulation & temp. rise is limited to the values specified in IS/IEC 600 79-15 Windings are impregnated with insulating varnish & baked. Overhang of the winding is treated with epoxy gel coat to give mechanical, electrical and thermal stability and strength	H class but temp. rise will be limited to B, F class with special insulating varnish/ impregnating resin with tropical & fungicidal treatment
3	Rotor	Rotors are made of die cast Aluminum with squirrel cage construction.	Copper die cast of brazed rotors
4	Output Rating / Poles	Please refer Page No. 2	As per customers requirement
5	Eye bolts	Eye bolts are made of forged steel	S.S. / Alloy steel
6	Shaft	Shafts are made of carbon steel (40C8 grade IS 2073/EN-8 BS:970)	Shaft with other material like S.S./Alloy steel etc.
7	Shaft extension	Motors are supplied with standard extension on drive end as per IS : 1231 / IS : 2223	Motors with both side extension / special extension.
8	Terminal box Assembly	Terminal box & cover are made of cast iron Aluminum. Box can be rotated through 360° in steps of 90°. Clearance & creepage distances are maintained as per IS / IEC : 60079-15 & IS : 6381. Terminal studs & its accessories are made from brass / s.s. and are nickel plated. Terminal blocks are made from DMC / Epoxy or HD Compressed type-II of IS : 3513 Part-I or P-120 grade Bakelite & are non-hygroscopic. Cable lugs of terminal connections are anti-loosening & are non-loosening & anti-vibration type.	Fabricated from steel. positions like LH. & RH. & Top. - T. studs & its accessories in special material T. blocks in porcelain or special insulating material.
9	Cable Entry	Cable entry will be in metric. For size & number of entries please refer table.	Other entries in BSC & PG type threads with other entry sizes/nos. The clearance & creepage distances
10	Dimensions	Mounting dimensions of motor frame, flangers & shafts are as per IS : 1231 / IS : 2223	Special dimensions with special flanges / frames.
11	Bearings	Motors are designed with single row double shielded deep groove ball bearings and are pre-greased with high temp. grease for life up to 250 frame. For 280 to 315 frame bearing are provided with greasing arrangement Bearing life is 40,000 Hrs.	Motors with other type of bearings (angular contact ball bearings, cylindrical/taper roller bearing etc.) Motors with online greasing arrangement.
12	Mounting & Mounting Position	Motors are offered with foot mounting, flange mounting with B type flange & flange mounting with C type flange mounting. Motors are suitable for horizontal (B3, B5, B6, B7, B8) & vertical (V1, V3, V5, V6, V18, V19) mounting position as per IS : 2253	Motors with special foot/flange for horizontal & vertical mounting
13	Fan	Fan is made from Cast iron / M. S.	Any special material as per requirement.
14	Fan cover	Fan cover is made of M.S. sheet metal pressed / welded.	Made from fabricated steel, S.S.
15	Supply voltage & frequency	Motors are designed for 415V 10% with 50HZ 5% supply	Other on request upto 660V
16	Performance	Performance of motors as mentioned in corresponding tables	Special requirement if any.
17	Duty	S1 (continuous)	Other duties - S1 to S9
18	Method of Starting	Motor up to 5 HP are suitable to DOL starting Motors above 5 HP are suitable for Star Delta connection	As per customer's requirement
19	Method of Cooling	Standard motors are Totally Enclosed Fan Cooled (TEFC)	Totally Enclosed Naturally Cooled (TENC) / Air Over Motors (AOM) or forced cooled with auxiliary blower

# HAZARDOUS AREA MOTORS



## Increased Safety Motors Ex'ec' IE2, IE3 & IE4

### Design and constructional features :

No.	Parameters	Standard Features	Optional Features
20	Surface Temp.	The surface temp. is limited to Lan T3 Temp class (200°C) (Temp. class T3) under normal operating condition to prevent thermal ignition in surrounding explosive atmosphere.	Other temp. class on request.
21	Noise & Vibration	Motors are with noise level maintained as per IS : 12065 & vibration level of normal class as per IS : 12075.	Motors with low noise level & precision class of vibration.
22	Protection	IP : 55 for Motor enclosure & T. Box	Superior protection as per IS : 4691.
23	Environment Condition	Amb. Temp. 45°C, Relative Humidity : 95% max.	Any special environment condition.
24	Space heater	On request.	Space heater & Thermistor provided with separate T Box for connection
25	Hardware	All hardware (fasteners) are Zinc plated to prevent from corrosion.	Special hardware with special Material, grade, type & plating.
26	Drain hole	Drain hole with plug screw on frame to remove condensate water for motor 180 & above frames.	In lower frames drain holes can be given.
27	Paint	Motors are painted with one coat of primer followed by two coats of anti-corrosive paint.	Motors with special paint & shade.

Specifications	
1 Output Range	: 0.12/500 kW (0.16/670 HP)
2 Poles	: 2, 4, 6 & 8
<b>3 Standard Specifications</b>	
Voltage	: 415 V ± 10%
Frequency	: 50 Hz ± 5%
Phase	: 3
Insulation Class	: F
Mounting	: Foot, Flange & face mounted
Ambient Temp.	: 50°C
Efficiency	: IE2/IE3/IE4
Protection	: IP-55
Duty	: S1
Method of cooling	: TEFC
Mounting position	: B3, B5, B14, B34, B35 V1, V3, V5, V6, V18 & V19
Dimensions	: As per IS: 1231/IS-2223
Performance	: As per IS-325, IS/IEC 60034-1
Reference Standards	: IS/IEC 60079-15 (Ex 'nA')
Certification	: Tested by KLPL Kolkata Approved by PESO, Nagpur
Application	: Suitable for zone-2 classification of hazardous area
Temp. Class	: T3

Output (kW/HP)	Increased Safety (Ex 'ec')							
	Pole-wise frame sizes							
	2 Pole	4 Pole	6 Pole	8 Pole	2 Pole	4 Pole	6 Pole	8 Pole
0.12/0.16	71	71	71	-	63	63	71	71
0.18/0.25	71	71	71	80	63	63	71	80
0.25/0.33	71	71	71	80	63	71	71	80
0.37/0.50	71	71	80	90S	71	71	80	90S
0.55/0.75	71	80	80	90L	71	80	80	90L
0.75/1.00	80	80	90S	100L	80	80	90S	100L
1.10/1.50	80	90S	90L	100L	80	90S	90L	100L
1.50/2.00	90S	90L	100L	112M	90S	90L	100L	112M
2.20/3.00	90L	100L	112M	132S	90L	100L	112M	132S
3.70/5.0	100L	112M	132S	160M	100L	112M	132S	160M
5.50/7.50	132S	132S	132M	160M	132S	132S	132M	160M
7.50/10.00	132S	132M	160M	160L	132S	132M	160M	160L
9.30/12.50	132M	160M	160L	180M	132M	160M	160L	180M
11.00/15.00	160M	160M	160L	180L	160M	160M	160L	180L
15.00/20.00	160M	160L	200L	200L	160M	160L	200L	200L
18.50/25.00	160L	180M	200L	225S	160L	180M	200L	225S
22 / 30	180L	180L	225M	225M	180L	180L	225M	225M
30 / 40	200L	200L	225M	250M	200L	200L	225M	250M
37 / 50	225S	225S	250M	280S	200L	225S	250M	280S
45 / 60	250M	225M	280S	280M	225M	225M	280S	280M
55 / 75	250M	250M	280M	315S	250M	250M	280M	315S
75 / 100	280S	280S	315S	315S	280S	280S	315S	315S
90 / 120	280M	280M	315M	315M	280M	280M	315M	315M
110 / 150	315S	315S	315M	315M	315S	315S	315M	315M
125 / 170	315M	315M	-	-	315M	315M	-	-
132 / 180	315M	315M	315L	315L	315M	315M	315L	315L
160 / 215	315L	315L	315L	315L	315L	315L	315L	315L
180 / 250	315L	315L	-	-	315L	315L	-	355L
200 / 270	315L	315L	-	-	315L	315L	355L	355L
235/300					355L	355L	355L	-
250/335					355L	355L	355L	-
315/425					355L	355L	-	-

B. Performance Table for Increased Safety (IE2, IE3 & IE4) motors

Please refer standard Motor (IE2, IE3 & IE4) performance tables.

C. General arrangement - drawing & dimensions

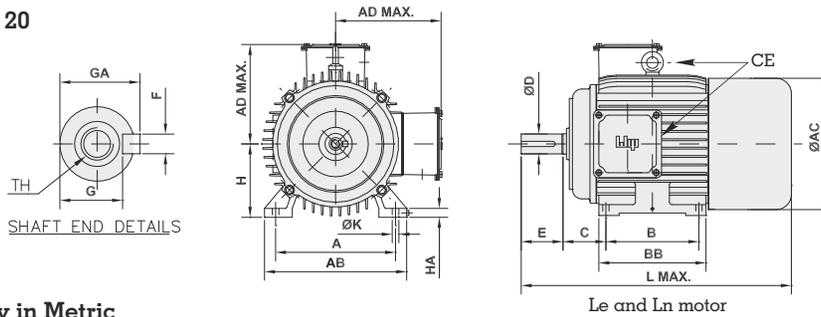
Please refer Page Number 30,31,32.

# HAZARDOUS AREA MOTORS

## General arrangement Drawing/Dimensions - Foot Mounted (B3)

Non-sparking and Increased Safety Motors as per IS : 1231

Refer Table No. 20



CE - Cable Entry in Metric

Le and Ln motor

Table No. 20

Frame Size	CONT.	H	C	A	AB	HA	ØK	B	BB	AD MAX.	ØAC	ØD	E	F	G	GA	TH	L MAX.		CE X Nos.
																		IE2	IE3/IE4	
63	CI	63	40	100	120	8	7	80	97	136	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
63	ALPDC	63	40	100	118	8	7	80	97	130	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
71	CI	71	45	112	132	9	7	90	112	142	140	14j6	30	5	11.0	16.0	M5	275	275	M16-2
71	ALPDC	71	45	112	133	9	7	90	112	140	140	14j6	30	5	11.0	16.0	M5	270	270	M16-2
80	CI	80	50	125	151	10	10	100	124	160	158	19j6	40	6	15.5	21.5	M6	300	300	M20-2
80	ALPDC	80	50	125	160	12	10	100	125	160	158	19j6	40	6	15.5	21.5	M6	300	300	M20-2
90S	CI	90	56	140	170	10	10	100	127	175	178	24j6	50	8	20.0	27.0	M8	355	355	M25-2
90S	ALPDC	90	56	140	184	12.5	10	100	130	175	178	24j6	50	8	20.0	27.0	M8	355	355	M25-2
90L	CI	90	56	140	170	12.5	10	125	150	175	178	24j6	50	8	20.0	27.0	M8	380	380	M25-2
90L	ALPDC	90	56	140	184	11	10	125	155	175	178	24j6	50	8	20.0	27.0	M8	380	380	M25-2
100L	CI	100	63	160	197	13	12	140	170	180	192	28j6	60	8	24.0	31.0	M10	410	410	M32-2
100L	ALPDC	100	63	160	194	15	17	140	186	180	192	28j6	60	8	24.0	31.0	M10	410	410	M32-2
112M	CI	112	70	190	230	15	12	140	170	195	224	28j6	60	8	24.0	31.0	M10	445	445	M32-2
112M	ALPDC	112	70	190	225	12	12	140	172	195	224	28j6	60	8	24.0	31.0	M10	445	445	M32-2
132S	CI	132	89	216	256	16	12	140	167	215	257	38k6	80	10	33.0	41.0	M12	500	525	M32-2
132M	CI	132	89	216	256	16	12	178	205	215	257	38k6	80	10	33.0	41.0	M12	525	525	M32-2
132M(N)	CI	132	89	216	256	16	12	178	245	215	257	38k6	80	10	33.0	41.0	M12	550	610	M32-2
160M	CI	160	108	254	304	26	15	210	260	260	308	42k6	110	12	37.0	45.0	M16	660	672	M40-2
160L	CI	160	108	254	304	26	15	254	304	260	308	42k6	110	12	37.0	45.0	M16	700	690	M40-2
180M	CI	180	121	279	340	26	15	241	279	320	357	48k6	110	14	42.5	51.5	M16	700	750	M40-2
180L	CI	180	121	279	340	26	15	279	318	320	357	48k6	110	14	42.5	51.5	M16	750	800	M40-2
200L	CI	200	133	318	385	35	19	305	350	340	382	55m6	110	16	49.0	59.0	M20	800	850	M40-2
225S(2P)	CI	225	149	356	440	35	19	286	370	380	448	55m6	110	16	49.0	59.0	M20	890	890	M50-2
225S(4,6,8 P)	CI	225	149	356	440	35	19	286	370	380	448	60m6	140	18	53.0	64.0	M20	890	890	M50-2
225M(2P)	CI	225	149	356	440	35	19	311	370	380	448	55m6	110	16	49.0	59.0	M20	890	890	M50-2
225M(4,6,8 P)	CI	225	149	356	440	35	19	311	370	380	448	60m6	140	18	53.0	64.0	M20	890	960	M50-2
250M (2P)	CI	250	168	406	500	43	24	349	425	450	510	60m6	140	18	53.0	64.0	M20	1050	1100	M50-2
250M (4,6,8 P)	CI	250	168	406	500	43	24	349	425	450	510	65m6	140	18	58.0	69.0	M20	1050	1100	M50-2
280S (2P)	CI	280	190	457	540	43	24	368	515	480	570	65m6	140	18	58.0	69.0	M20	1165	1200	M63-2
280S(4,6,8 P)	CI	280	190	457	540	43	24	368	515	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2
280M (2 P)	CI	280	190	457	540	43	24	419	515	480	570	65m6	140	18	58.0	69.0	M20	1165	1200	M63-2
280M (4,6,8 P)	CI	280	190	457	540	43	24	419	515	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2
315S (2 P)	CI	315	216	508	620	50	28	406	546	535	658	65m6	140	18	58.0	69.0	M20	1190	1190	M63-2
315S (4,6,8 P)	CI	315	216	508	620	50	28	406	546	535	658	80m6	170	22	71.0	85.0	M20	1250	1250	M63-2
315M (2 P)	CI	315	216	508	620	50	28	457	640	535	658	65m6	140	18	58.0	69.0	M20	1375	1375	M63-2
315M (4,6,8 P)	CI	315	216	508	620	50	28	457	640	535	658	80m6	170	22	71.0	85.0	M20	1400	1400	M63-2
315L (2 P)	CI	315	216	508	620	50	28	508	640	535	658	65m6	140	18	58.0	69.0	M20	1375	1375	M63-2
315L (4,6,8 P)	CI	315	216	508	620	50	28	508	640	535	658	80m6	170	22	71.0	85.0	M20	1400	1400	M63-2
355S (2 P)	CI	355	254	610	730	51	28	500	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2
355S (4,6,8 P)	CI	355	254	610	730	51	28	500	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2
355M (2P)	CI	355	254	610	730	51	28	560	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2
355M (4,6,8 P)	CI	355	254	610	730	51	28	560	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2
355L (2 P)	CI	355	254	610	730	51	28	630	780	700	775	80m6	170	22	71.0	85.0	M20	1860	1860	M63-2
355L (4,6,8 P)	CI	355	254	610	730	51	28	630	780	700	775	100m6	210	28	90.0	106.0	M24	1900	1900	M63-2

Note :

- 1) Cable Gland size may be changed according to cable size as per customer requirement.
- 2) By default T. Box will be at Top, however RHTB or LHTB can be given if requested specifically.

# HAZARDOUS AREA MOTORS

## General arrangement Drawing/Dimensions - Flange Mounted (B5) Non-sparking and Increased Safety Motors as per IS:2223

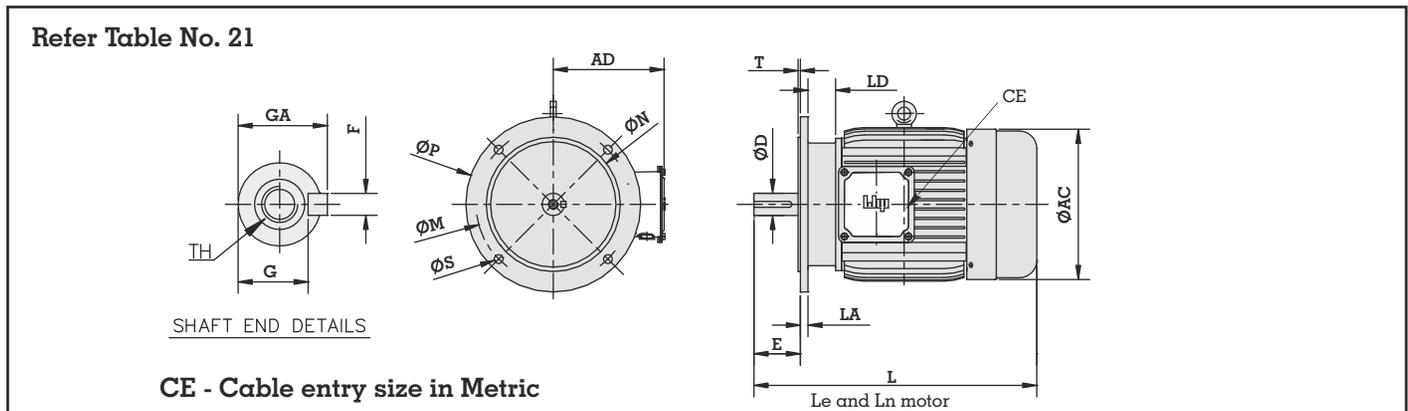


Table No. - 21

Frame Size	Cont.	Flange No.	ØM ±0.3	j6 ØN	ØP	ØS X NO.	T	LA	LD	AD MAX	ØAC	ØD	E	F	G	GA	TH	L MAX		CE X Nos.
																		IE2	IE3 & IE4	
63	CI	F115B	115	95	140	10 X 4	3	10	10	136	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
63	ALPDC	F115B	115	95	140	10 X 4	3	10	10	130	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
71	CI	F130B	130	110	160	10 X 4	3.5	10	10	142	140	14j6	30	5	11	16	M5	275	315	M16-2
71	ALPDC	F130B	130	110	160	10 X 4	3.5	10	20	140	140	14j6	30	5	11	16	M5	270	310	M16-2
80	CI	F165B	165	130	200	12 X 4	3.5	11	16	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2
80	ALPDC	F165B	165	130	200	12 X 4	3.5	11	16	160	158	19j6	40	6	15.5	21.5	M6	300	300	M25-2
90S	CI	F165B	165	130	200	12 X 4	3.5	10	22	175	178	24j6	50	8	20	27	M8	355	355	M25-2
90S	ALPDC	F165B	165	130	200	12 X 4	3.5	10	22	175	178	24j6	50	8	20	27	M8	355	355	M25-2
90L	CI	F165B	165	130	200	12 X 4	3.5	10	22	175	178	24j6	50	8	20	27	M8	380	380	M25-2
90L	ALPDC	F165B	165	130	200	12 X 4	3.5	10	22	175	178	24j6	50	8	20	27	M8	380	380	M25-2
100L	CI	F215B	215	180	250	15 X 4	4	12	20	180	192	28j6	60	8	24	31	M10	410	410	M32-2
100L	ALPDC	F215B	215	180	250	15 X 4	4	12	30	180	194	28j6	60	8	24	31	M10	410	410	M32-2
112M	CI	F215B	215	180	250	15 X 4	4	12	23	195	224	28j6	60	8	24	31	M10	445	445	M32-2
112M	ALPDC	F215B	215	180	250	15 X 4	4	12	18	195	224	28j6	60	8	24	31	M10	445	445	M32-2
132S	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	525	550	M32-2
132M	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	550	550	M32-2
132M (N)	CI	F265B	265	230	300	15 X 4	4	12	47	215	260	38k6	80	10	33	41	M12	550	610	M32-2
160M	CI	F300B	300	250	350	19 X 4	5	14	54	260	312	42k6	110	12	37	45	M16	650	710	M40-2
160L	CI	F300B	300	250	350	19 X 4	5	14	54	260	312	42k6	110	12	37	45	M16	720	810	M40-2
180M/L	CI	F300B	300	250	350	19 X 4	5	14	72	275	360	48k6	110	14	42.5	51.5	M16	750	830	M40-2
200L	CI	F350B	350	300	400	19 X 4	5	16	71	350	382	55m6	110	16	49	59	M20	800	900	M40-2
225S/M (2P)	CI	F400B	400	350	450	19 X 8	5	16	71	380	448	55m6	110	16	49	59	M20	890	890	M50-2
225S/M (4,6,8P)	CI	F400B	400	350	450	19 X 8	5	16	71	380	448	60m6	140	18	53	64	M20	890	960	M50-2
250M (2P)	CI	F500B	500	450	550	19 X 8	5	19	65	450	510	60m6	140	18	53	64	M20	1050	1100	M50-2
250M (4,6,8P)	CI	F500B	500	450	550	19 X 8	5	19	65	450	510	65m6	140	18	58	69	M20	1050	1100	M50-2
280S/M (2P)	CI	F500B	500	450	550	19 X 8	5	22	50	480	570	65m6	140	18	58	69	M20	1165	1200	M63-2
280S/M (4,6,8P)	CI	F500B	500	450	550	19 X 8	5	22	50	480	570	75m6	140	20	67.5	79.5	M20	1165	1200	M63-2
315S (2P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	65m6	140	18	58	69	M20	1250	1400	M63-2
315S (4,6,8P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	80m6	170	22	71	85	M20	1250	1390	M63-2
315S/M/L (2P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	65m6	140	18	58	69	M20	1375	1400	M63-2
315S/M/L (4,6,8P)	CI	F600B	600	550	660	24 X 8	6	22	50	535	658	80m6	170	22	71	85	M20	1390	1390	M63-2
355S/M/L (2P)	CI	F740B	740	680	800	24 X 8	6	28	65	700	775	80m6	170	22	71	85	M20	1590	1860	M63-2
355S/M/L (4,6,8P)	CI	F740B	740	680	800	24 X 8	6	28	65	700	775	100m6	210	28	90	106	M24	1630	1900	M63-2

# HAZARDOUS AREA MOTORS

## General arrangement Drawing/Dimensions - Face Mounted (B14) Non Sparking and Increased Safety Motors as per IS : 2223

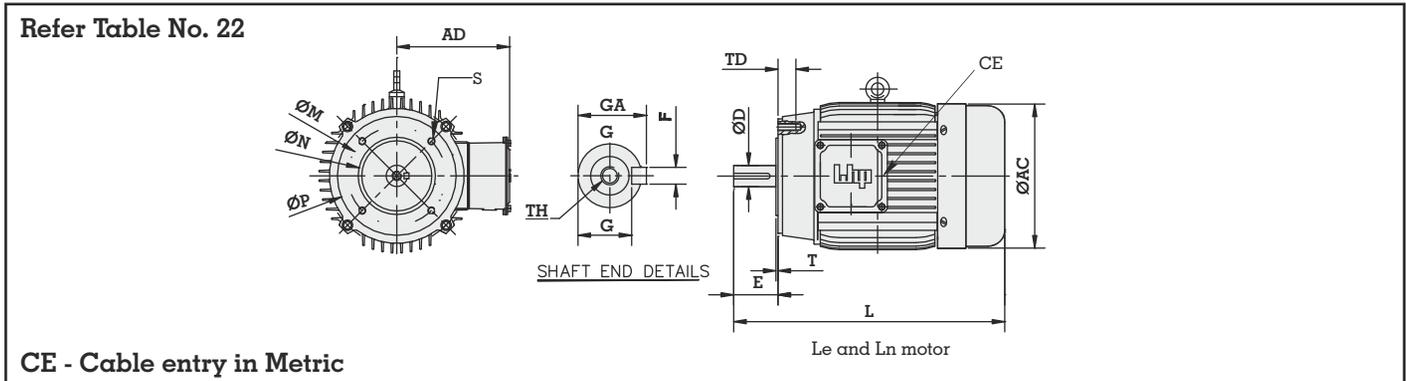


Table No. 22

Frame Size	Cont.	Flange No.	ØM ± 0.3	ØN j6	ØP	S	TD	T	AD MAX	ØAC	ØD	E	F	G	GA	TH	L MAX		CE X Nos.
																	IE2	IE3 & IE4	
63	CI	F75C	75	60	90	M5	6	2.5	136	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
63	AL.PDC	F75C	75	60	90	M5	6	2.5	130	116	11j6	23	4	8.5	12.5	M4	225	225	M16-2
71	CI	F85C	85	70	107	M6	8	2.5	142	140	14j6	30	5	11	16	M5	275	315	M16-2
71	AL.PDC	F85C	85	70	107	M6	8	2.5	140	140	14j6	30	5	11	16	M5	270	310	M16-2
80	CI	F100C	100	80	120	M6	8	3	160	158	19j6	40	6	15.5	21.5	M6	290	290	M20-2
80	AL.PDC	F100C	100	80	120	M6	8	3	160	158	19j6	40	6	15.5	21.5	M6	290	290	M20-2
90S	CI	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	365	405	M25-2
90S	AL.PDC	F115C	115	95	140	M8	10	3	166	178	24j6	50	8	20	27	M8	360	400	M25-2
90L	CI	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	395	435	M25-2
90L	AL.PDC	F115C	115	95	140	M8	10	3	175	178	24j6	50	8	20	27	M8	360	400	M25-2
100L	CI	F130C	130	110	160	M8	10	3.5	180	195	28j6	60	8	24	31	M10	405	405	M25-2
100L	AL.PDC	F130C	130	110	160	M8	10	3.5	180	195	28j6	60	8	24	31	M10	405	405	M25-2
112M	CI	F130C	130	110	160	M8	10	3.5	195	224	28j6	60	8	24	31	M10	445	445	M32-2
112M	AL.PDC	F130C	130	110	160	M8	10	3.5	195	224	28j6	60	8	24	31	M10	445	445	M32-2
132S	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	500	525	M32-2
132M	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	525	550	M32-2
132M(N)	CI	F165C	165	130	200	M12	14	3.5	215	260	38k6	80	10	33	41	M12	550	610	M32-2

# CRANE DUTY MOTORS

## Crane Duty Motors - General Technical Information

### Duty

The term duty defines the load cycle to which the machine is subjected, including, if applicable, starting, electric braking, no-load and rest de-energized periods, and including their durations and sequence in time. Duty considered as generic term, for example, can be classified as continuous duty, short-time duty or periodic duty. The percentage ratio between the period of loading and the total duration of the duty cycle is defined cyclic duration factor.

### Declaration of duty

It is the responsibility of the purchaser to declare the duty. The purchaser may describe the duty by one of the following

- Numerically, where the load does not vary or where it varies in a known manner;
- As a time sequence graph of the variable quantities;
- By selecting one of the duty type S1 to S10 that is no less onerous than the expected duty.

### Types of Duties

- S1 Continuous running duty
- S2 Short-time duty
- S3 Intermittent periodic duty
- S4 Intermittent periodic duty with starting
- S5 Intermittent periodic duty with electric braking
- S6 Continuous-operation periodic duty
- S7 Continuous-operation periodic duty with electric braking
- S8 Continuous-operation periodic duty with related load/speed changes
- S9 Duty with non-periodic load and speed variations
- S10 Duty with discrete constant loads and speeds

### Diagrams of Duty Cycle

#### S1 Continuous running duty

For a motor suitable to this duty type, the rating at which the machine may be operated for an unlimited period is specified. The duty type S1 is a operation at a constant load maintained for sufficient time to allow the machine to reach thermal equilibrium. The appropriate abbreviation is S1.



## CRANE DUTY MOTORS

Upto 355 Frame



## Crane Duty Motors - General Technical Information

### S2 Short-time duty

For a motor suitable to this duty type, the rating at which the machine, starting at ambient temperature, may be operated for a limited period is specified. This class of rating corresponds to the duty type whose appropriate abbreviation is S2. Operation at constant load for a given time, less than that required to reach thermal equilibrium, followed by a time de-energized and at rest of sufficient duration to re-establish the equilibrium between the machine temperature and that of the coolant temperature. The recommended values for the short time duty are 10, 30, 60 and 90 minutes.

The appropriate abbreviation is S2, followed by an indication of the duration of the duty

Example: S2 10 min

### S3 Intermittent periodic duty

For a motor suitable to this duty type, the rating at which the machine may be operated in a sequence of duty cycles is specified. With this type of duty, the loading cycle does not allow the machine to reach thermal equilibrium.

A sequence of identical duty cycle, each duty cycle consisting of a period of operation at constant load and a rest period, these periods being to attain thermal equilibrium during one duty cycle. In this duty type the starting current does not significantly affect the temperature-rise.

The appropriate abbreviation is S3, followed by cycle duration factor.

Example: S3 25%

### S4 Intermittent periodic duty with starting

A sequence of identical duty cycle; this includes a period of starting, a period of operation at constant load and rest period, which is too short to attain thermal equilibrium during one cycle. The starting affects temperature rise, as load GD2 is higher than rotor GD2 or no .of start/hour is high, in this duty the stopping of motor is obtained either by natural deceleration after disconnection of the electricity supply or by means of braking such a mechanical brake which does not cause additional heating of the windings

The appropriate abbreviation is S4, followed by the cycle duration factor, the moment of inertia of the motor (JM) and the moment of inertia of the load (Jext), both referred to motor shaft.

Example: S4 25% JM = 0.15 kgm<sup>2</sup> Jext = 0.7 kgm<sup>2</sup>

### S5 Intermittent periodic duty with electric braking

A sequence of identical duty cycle, each cycle consisting of a period starting, 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.

The appropriate abbreviation is S5, followed by the cyclic duration factor, the moment of inertia of the motor (JM) and moment of inertia of the load (Jext) both referred to the motor shaft.

Example: S5 25% JM = 0.15 kgm<sup>2</sup> Jext = 0.7 kgm<sup>2</sup>

### S6 Continuous-operation periodic duty

A sequence of identical duty cycles, each cycle consisting of a time of operation at constant load and a time of operation at no-load. There is no time de-energized and at rest. The appropriate abbreviation is S6, followed by the cyclic duration factor.

Example: S6 40%

### S7 Continuous-operation periodic duty with electric braking

A sequence of identical duty cycles each consisting of a period of starting, a period of operating at constant load and a period of electrical braking. There is no rest and de-energized period.

The appropriate abbreviation is S7, followed by the moment of inertia of the motor (JM) and the moment of inertia of the load (Jext), both referred to the motor shaft

Example: S7 JM = 0.4 kgm<sup>2</sup> Jext = 7.5 kgm<sup>2</sup>

### S8 Continuous-operation periodic duty with related load/speed changes

A sequence of identical duty cycles, each cycle consisting of a time of operation at constant load corresponding to a predetermined speed of rotation, followed immediately by one or more times of operation at other constant load corresponding to different speed of rotation (carried out, for example, by means of a change in the number of poles in case of induction motors). There is no time de-energized and at rest. The appropriate abbreviation is S8, followed by the moment of inertia of the motor (JM) and the moment of inertia of the load (Jext), both referred to the motor shaft, together with the load, speed and cyclic duration factor for each speed condition.

Example: S8 JM = 0.5 kgm<sup>2</sup> Jext = 6 kgm<sup>2</sup>

	16 kW	740 RPM	30 %	
				25
kW	980 RPM	30%		
				40
kW	1460 RPM	30%		

### S9 Duty with non-periodic load and speed variations

A duty in which generally load and speed vary non-periodically within the permissible operating range. This duty includes frequently applied overloads that may greatly exceed the reference load

The appropriate abbreviation is S9

### S10 Duty with

The abbreviation S10 is followed by the per unit quantities p/Δt for the respective load and its duration and the per unit quantity TL for the relative thermal life expectancy of the insulation system. The reference value for the thermal life expectancy is the thermal life expectancy at rating for continuous running duty and permissible limits of temperature rise based on duty type S1. For a time de-energized and at rest, the load shall be indicated by the letter r. The value of TL should be rounded off to the nearest multiple of 0.05.

E.g. S10 p/Δt = 1.1/0.4; 1/0.3; 0.9/0.2; r/0.1

TL = 0.6

For this duty type a constant load appropriately selected and based on duty type S1 shall be taken as the reference value 'Pref' for the discrete loads.

# CRANE DUTY MOTORS



## Crane Duty Motors - Brake Selection Chart

2 Pole (For S3 & S4 Duty)

KW	Frame size for 150 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT,Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			Brake Size	Brake Torque (Nm)	Brake SF	Brake Size	Brake Torque (Nm)	Brake SF
CDF								
	25% & 40%	60%						
0.12	63	63	4	1	2.62	4	1	2.62
0.18	63	63	5	2	3.49	5	2	3.49
0.25	63	63	5	2	2.51	5	2	2.51
0.37	63	-	6	5	4.24	6	5	4.24
0.37	-	71	6	5	4.24	6	5	4.24
0.55	71	71	6	5	2.85	6	5	2.85
0.75	71	71	6	5	2.09	8	10	4.19
1.1	80	80	8	10	2.85	8	10	2.85
1.5	90S	-	8	10	2.09	10	20	4.19
1.5	-	80	8	10	2.09	10	20	4.19
2.2	90L	90L	10	20	2.85	10	20	2.85
3	90L	90L	10	20	2.09	12	40	4.19
3.7	100L	100L	12	40	3.39	12	40	3.39
4	100L	-	12	40	3.14	12	40	3.14
4	-	112M	12	40	3.14	12	40	3.14
5.5	100L	-	12	40	2.28	14	60	3.43
5.5	-	132S	12	40	2.28	14	60	3.43
7.5	112M	-	14	60	2.51	14	60	2.51
7.5	-	132S	14	60	2.51	14	60	2.51
9.3	132S	-	14	60	2.03	16	100	3.38
9.3	-	132M	14	60	2.03	16	100	3.38
11	132M	132M	16	100	2.85	16	100	2.85
15	160M	160M	16	100	2.09	18	150	3.14
18.5	160L	160L	18	150	2.55	18	150	2.55
22	160L	160L	18	150	2.14	20	260	3.71
30	180M	-	20	260	2.72	20	260	2.72
30	-	180L	20	260	2.72	20	260	2.72
37	180M	-	20	260	2.21	23	315	2.67
37	-	200L	20	260	2.21	23	315	2.67
45	200L	-	23	315	2.20	25	400	2.79
45	-	225S	23	315	2.20	25	400	2.79

2 Pole (For S3 & S4 Duty)

KW	Frame size for 300 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT,Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			Brake Size	Brake Torque (Nm)	Brake SF	Brake Size	Brake Torque (Nm)	Brake SF
CDF								
	25% & 40%	60%						
0.12	63	63	4	1	2.62	4	1	2.62
0.18	63	63	5	2	3.49	5	2	3.49
0.25	63	63	5	2	2.51	5	2	2.51
0.37	71	71	6	5	4.24	6	5	4.24
0.55	71	71	6	5	2.85	6	5	2.85
0.75	71	-	6	5	2.09	6	5	2.09
0.75	-	80	6	5	2.09	6	5	2.09
1.1	80	80	8	10	2.85	8	10	2.85
1.5	80	-	8	10	2.09	8	10	2.09
1.5	-	90S	8	10	2.09	8	10	2.09
2.2	90S	-	10	20	2.85	10	20	2.85
2.2	-	90L	10	20	2.85	10	20	2.85
3	90L	-	10	20	2.09	10	20	2.09
3	-	100L	10	20	2.09	10	20	2.09
3.7	100L	100L	12	40	3.39	12	40	3.39
4	100L	100L	12	40	3.14	12	40	3.14
5.5	112M	-	12	40	2.28	14	60	3.43
5.5	-	132S	12	40	2.28	14	60	3.43
7.5	132S	-	14	60	2.51	14	60	2.51
7.5	-	132M	14	60	2.51	14	60	2.51
9.3	132M	132M	14	60	2.03	16	100	3.38
11	132M	-	16	100	2.85	16	100	2.85
11	-	160M	16	100	2.85	16	100	2.85
15	160M	-	16	100	2.09	18	150	3.14
15	-	160L	16	100	2.09	18	150	3.14
18.5	160L	160L	18	150	2.55	18	150	2.55
22	160L	-	18	150	2.14	20	260	3.71
22	-	180M	18	150	2.14	20	260	3.71
30	180M	-	20	260	2.72	20	260	2.72
30	-	200L	20	260	2.72	20	260	2.72
37	200L	200L	20	260	2.21	23	315	2.67
45	225S	-	23	315	2.20	25	400	2.79
45	-	225M	23	315	2.20	25	400	2.79

## Crane Duty Motors - Brake Selection Chart

### 4 Pole (For S3 & S4 Duty)

KW	Frame size for 150 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT, Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	63	63	5	2	2.58	5	2	2.58
0.18	63	63	6	5	4.30	6	5	4.30
0.25	63	63	6	5	3.10	6	5	3.10
0.37	71	71	6	5	2.09	8	10	4.19
0.55	71	71	8	10	2.82	8	10	2.82
0.75	80	80	8	10	2.07	10	20	4.13
1.1	80	80	10	20	2.82	10	20	2.82
1.5	90S	90S	10	20	2.07	12	40	4.13
2.2	90L	-	12	40	2.82	12	40	2.82
2.2	-	100L	12	40	2.82	12	40	2.82
3	100L	100L	12	40	2.07	14	60	3.10
3.7	100L	100L	14	60	2.51	14	60	2.51
4	100L	100L	14	60	2.32	12 DB	80	3.10
5.5	112M	-	12 DB	80	2.25	14 DB	120	3.38
5.5	-	132S	16	100	2.82	16	100	2.82
7.5	132S	-	16	100	2.07	18	150	3.10
7.5	-	132M	16	100	2.07	18	150	3.10
9.3	132M	132M	18	150	2.50	18	150	2.50
11	132M	132M	18	150	2.11	16 DB	200	2.82
15	160M	160M	20	260	2.68	20	260	2.68
18.5	160L	160L	20	260	2.18	23	315	2.64
22	160L	-	23	315	2.22	20 DB	520	3.66
22	-	180M	25	400	2.82	25	400	2.82
30	180M	-	25	400	2.07	31	600	3.10
30	-	180L	25	400	2.07	31	600	3.10
37	180M	-	31	600	2.51	31	600	2.51
37	-	200L	31	600	2.51	31	600	2.51
45	200L	-	31	600	2.07	31+	800	2.75
45	-	225S	31	600	2.07	31+	800	2.75

### 4 Pole (For S3 & S4 Duty)

KW	Frame size for 300 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT, Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	63	63	5	2	2.58	5	2	2.58
0.18	63	63	6	5	4.30	6	5	4.30
0.25	63	63	6	5	3.10	6	5	3.10
0.37	71	71	6	5	2.09	8	10	4.19
0.55	71	71	8	10	2.82	8	10	2.82
0.75	80	80	8	10	2.07	10	20	4.13
1.1	80	-	10	20	2.82	10	20	2.82
1.1	-	90S	10	20	2.82	10	20	2.82
1.5	90S	90S	10	20	2.07	12	40	4.13
2.2	-	100L	12	40	2.82	12	40	2.82
2.2	90L	-	12	40	2.82	12	40	2.82
3	100L	100L	12	40	2.07	14	60	3.10
3.7	100L	100L	14	60	2.51	14	60	2.51
4	100L	100L	14	60	2.32	12 DB	80	3.10
5.5	112M	-	12 DB	80	2.25	14 DB	120	3.38
5.5	-	132S	14	80	2.25	16	100	2.82
7.5	-	132M	16	100	2.07	18	150	3.10
7.5	132S	-	16	100	2.07	18	150	3.10
9.3	132M	132M	18	150	2.50	18	150	2.50
11	132M	-	18	150	2.11	16 DB	200	2.82
11	-	160M	18	150	2.11	20	260	3.66
15	-	160L	20	260	2.68	20	260	2.68
15	160M	-	20	260	2.68	20	260	2.68
18.5	160L	160L	20	260	2.18	23	315	2.64
22	160L	-	23	315	2.22	25	400	2.82
22	-	180M	23	315	2.22	25	400	2.82
30	180M	-	25	400	2.07	31	600	3.10
30	-	200L	25	400	2.07	31	600	3.10
37	200L	200L	31	600	2.51	31	600	2.51
45	-	225M	31	600	2.07	31+	800	2.75
45	225S		31	600	2.07	31+	800	2.75

# CRANE DUTY MOTORS



## Crane Duty Motors - Brake Selection Chart

6 Pole (For S3 & S4 Duty)

KW	Frame size for 150 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT, Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	71	71	6	5	4.32	6	5	4.32
0.18	71	71	6	5	2.88	6	5	2.88
0.25	71	71	6	5	2.07	8	10	4.14
0.37	71	71	8	10	2.80	8	10	2.80
0.55	80	80	8	10	1.88	10	20	3.77
0.75	80	-	10	20	2.76	10	20	2.76
0.75	-	90S	10	20	2.76	10	20	2.76
1.1	90S	90S	10	20	1.88	12	40	3.77
1.5	90L	90L	12	40	2.76	12	40	2.76
2.2	100L	100L	14	60	2.83	14	60	2.83
3	112M	112M	14	60	2.07	12 DB	80	2.76
3.7	112M	112M	12 DB	80	2.24	14 DB	120	3.36
4	132S	132S	16	100	2.59	16	100	2.59
5.5	132S	132S	18	150	2.83	18	150	2.83
7.5	132M	132M	18	150	2.07	16 DB	200	2.76
9.3	132M	132M	16 DB	200	2.23	18 DB	300	3.34
11	160L	160L	20	260	2.45	20	260	2.45
15	160L	160L	23	315	2.18	25	400	2.76
18.5	180L	180L	25	400	2.24	31	600	3.36
22	180L	-	31	600	2.83	31	600	2.83
22	-	200L	31	600	2.83	31	600	2.83
30	200L	-	31	600	2.07	31+	800	2.76
30	-	225M	31	600	2.07	31+	800	2.76
37	225M	225M	31+	800	2.24	32A	900	2.52
45	225S	-	32A	900	2.07	42A	1100	2.53
45	-	225M	32A	900	2.07	42A	1100	2.53

6 Pole (For S3 & S4 Duty)

KW	Frame size for 300 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT, Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	71	71	6	5	4.32	6	5	4.32
0.18	71	71	6	5	2.88	6	5	2.88
0.25	71	71	6	5	2.07	8	10	4.14
0.37	71	71	8	10	2.80	8	10	2.80
0.55	80	80	8	10	1.88	10	20	3.77
0.75	80	-	10	20	2.76	10	20	2.76
0.75	-	90S	10	20	2.76	10	20	2.76
1.1	90S	90S	10	20	1.88	12	40	3.77
1.5	90L	90L	12	40	2.76	12	40	2.76
2.2	100L	100L	12	40	1.88	14	60	2.83
3	112M	112M	14	60	2.07	12 DB	80	2.76
3.7	132S	132S	12 DB	80	2.24	14 DB	120	3.36
4	132S	132S	16	100	2.59	16	100	2.59
5.5	132S	-	16	100	1.88	18	150	2.83
5.5	-	132M	16	100	1.88	18	150	2.83
7.5	132M	132M	18	150	2.07	16 DB	200	2.76
9.3	160M	160M	20	260	2.90	20	260	2.90
11	160L	160L	20	260	2.45	20	260	2.45
15	160L	160L	23	315	2.18	25	400	2.76
18.5	180L	180L	25	400	2.24	31	600	3.36
22	200L	200L	25	400	1.88	31	600	2.83
30	225M	225M	31	600	2.07	31+	800	2.76
37	225M	225M	31+	800	2.24	32A	900	2.52
45	225S	-	31+	800	1.84	42A	1100	2.53
45	-	225M	32A	900	2.1	42A	1100	2.53

# CRANE DUTY MOTORS



## Crane Duty Motors - Brake Selection Chart

8 Pole (For S3 & S4 Duty)

KW	Frame size for 150 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT,Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	71	71	6	5	3.27	6	5	3.27
0.18	71	71	6	5	2.18	6	5	2.18
0.25	80	80	8	10	3.14	8	10	3.14
0.37	80	80	8	10	2.12	10	20	4.24
0.55	90S	90S	10	20	2.85	10	20	2.85
0.75	90L	90L	10	20	2.09	12	40	4.19
1.1	100L	100L	12	40	2.85	12	40	2.85
1.5	100L	100L	12	40	2.09	14	60	3.14
2.2	112M	112M	14	60	2.14	12 DB	80	2.85
3	132S	132M	12 DB	80	2.09	16	100	2.62
3.7	132M	132M	16	100	2.12	18	150	3.18
4	132M	132M	18	150	2.94	18	150	2.94
5.5	132M	-	18	150	2.14	16 DB	200	2.85
5.5	-	160M	18	150	2.14	20	260	3.71
7.5	160M	-	20	260	2.72	20	260	2.72
7.5	-	160L	20	260	2.72	20	260	2.72
9.3	160L	160L	20	260	2.19	23	315	2.66
11	160L	-	23	315	2.25	25	400	2.85
11	-	180M	25	400	2.85	25	400	2.85
15	180L	180L	25	400	2.09	20 DB	520	2.72
18.5	180L	-	31	600	2.55	31	600	2.55
18.5	-	200L	31	600	2.55	31	600	2.55
22	200L	-	31	600	2.14	31+	800	2.85
22	-	225S	31	600	2.14	31+	800	2.85
30	225M	225M	31+	800	2.09	32B	1000	2.62
37	225M	-	32B	1000	2.12	42B	1200	2.55
37	-	250M	32B	1000	2.12	42B	1200	2.55
45	250M	250M	42B	1200	2.09	42E	1500	2.62

8 Pole (For S3 & S4 Duty)

KW	Frame size for 300 srts/Hr. IE2,IE3 & IE4		Application & Brake details					
			CT, LT,Conveyor (S.F>2.0)			Hoist & Lift (S.F>2.5)		
			CDF		Brake Size	Brake Torque (Nm)	Brake SF	Brake Size
25% & 40%	60%							
0.12	71	71	6	5	3.27	6	5	3.27
0.18	71	71	6	5	2.18	6	5	2.18
0.25	80	80	8	10	3.14	8	10	3.14
0.37	80	80	8	10	2.12	10	20	4.24
0.55	90S	90S	10	20	2.85	10	20	2.85
0.75	90S	90S	10	20	2.09	12	40	4.19
1.1	100L	100L	12	40	2.85	12	40	2.85
1.5	100L	100L	12	40	2.09	14	60	3.14
2.2	112M	112M	14	60	2.14	12 DB	80	2.85
3	132S	-	16	100	2.62	16	100	2.62
3	-	132M	14 DB	120	3.14	18	150	3.92
3.7	132M	132M	18	150	3.18	18	150	3.18
4	132M	132M	18	150	2.94	18	150	2.94
5.5	160M	160M	20	260	3.71	20	260	3.71
7.5	160M	-	20	260	2.72	20	260	2.72
7.5	-	160L	20	260	2.72	23	315	3.30
9.3	160L	160L	23	315	2.66	25	400	3.38
11	160L	-	25	400	2.85	25	400	2.85
11	-	180M	25	400	2.85	20 DB	520	3.71
15	180L	180L	31	600	3.14	31	600	3.14
18.5	200L	200L	31	600	2.55	31	600	2.55
22	200L	-	31	600	2.14	31+	800	2.85
22	-	225M	31	600	2.14	31+	800	2.85
30	225M	-	31+	800	2.09	32B	1000	2.62
30	-	225M	32B	1000	2.62	42B	1200	3.14
37	250M	250M	32B	1000	2.12	42B	1200	2.55
45	250M	250M	42B	1200	2.09	42E	1500	2.62

# Crane & Hoist Duty Motors with DOL & VFD Starting - IE2

3 Phase Squirrel Cage safe area & Flameproof Ex d, Ex db & Ex tb Induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb: 50°C, Rise: 70K), Degree of protection IP-55 & IP-66, Altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE-2, IV-Pole conforms to IS/IEC 60034-1, IS/IEC 60079-0, IS/IEC 60079-1, IS/IEC 60034-5, IS/IEC 60079-31, IS 12615, Efficiency testing according IS15999-2, IEC60034-30, IEC 60034-1 for Gas & Dust IEC-Ex, ATEX certified by BASEEFA, Temperature class as T4.

**Performance Table for 4 Pole Motors**

Frame	150 Starts / hr.										300 Starts / hr.												
	40% CDF					60% CDF					40% CDF					60% CDF							
KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW Efficiency
63	0.12	0.09	0.43	0.72	54.2	63	0.12	0.10	0.41	0.72	56.1	63	0.12	0.09	0.43	0.72	54.2	63	0.12	0.11	0.4	0.72	57.7
63	0.18	0.13	0.58	0.72	60.3	63	0.18	0.15	0.56	0.72	62.3	63	0.18	0.14	0.55	0.72	63.20	63	0.18	0.16	0.55	0.72	63.20
63	0.25	0.18	0.75	0.72	64.7	63	0.25	0.21	0.73	0.72	66.5	63	0.25	0.19	0.74	0.72	67.10	63	0.25	0.22	0.72	0.72	67.10
71	0.37	0.26	1.0	0.73	68.9	71	0.37	0.31	1.00	0.73	70.8	71	0.37	0.29	1.00	0.73	71.50	71	0.37	0.33	0.99	0.73	71.50
71	0.55	0.39	1.43	0.73	73.3	71	0.55	0.46	1.4	0.73	75.1	71	0.55	0.43	1.41	0.73	75.8	71	0.55	0.49	1.38	0.73	75.8
80	0.75	0.53	1.75	0.77	76.6	80	0.75	0.63	1.72	0.77	78.7	80	0.75	0.58	1.74	0.77	79.4	80	0.75	0.67	1.71	0.77	79.4
80	1.1	0.78	2.52	0.76	79.8	80	1.1	0.92	2.5	0.76	80.6	80	1.1	0.86	2.51	0.76	80.9	80	1.1	0.99	2.49	0.76	80.9
90S	1.5	1.07	3.42	0.75	81.3	90S	1.5	1.26	3.39	0.75	82	90S	1.5	1.17	3.41	0.75	82.3	90S	1.5	1.35	3.38	0.75	82.3
90L	2.2	1.56	5.0	0.74	82.9	100L	2.2	1.85	4.7	0.74	83.6	100L	2.2	1.72	4.97	0.74	83.9	100L	2.2	1.98	4.68	0.78	83.9
100L	3	2.13	6.4	0.77	84.2	100L	3	2.52	6.38	0.77	84.9	100L	3	2.34	6.41	0.77	85.1	100L	3	2.7	6.37	0.77	85.1
100L	3.7	2.63	7.86	0.77	85.0	100L	3.7	3.10	7.81	0.77	85.6	100L	3.7	2.89	7.83	0.77	85.9	100L	3.7	3.33	7.78	0.77	85.9
100L	4	2.84	8.47	0.77	85.3	100L	4	3.36	8.41	0.77	85.9	100L	4	3.12	8.73	0.77	86.7	100L	4	3.60	8.1	0.77	86.7
112M	5.5	3.91	11	0.8	86.5	132S	5.5	4.62	10.85	0.81	87.1	112M	5.5	4.29	11	0.8	86.8	132S	5.5	4.94	10.82	0.81	87.3
132S	7.5	5.33	14.18	0.84	87.6	132M	7.5	6.29	14.1	0.84	88.1	132S	7.5	5.85	14.13	0.84	87.9	132M	7.5	6.74	14	0.84	88.3
132M	9.3	6.60	17.46	0.84	88.2	132M	9.3	7.8	17.35	0.84	88.8	132M	9.3	7.25	17.38	0.84	88.6	132M	9.3	8.36	17.31	0.84	89
132M	11	7.81	20.52	0.84	88.8	132M	11	9.23	20.4	0.84	89.3	132M	11	8.58	20.45	0.84	89.1	160M	11	9.89	20.36	0.84	89.5
160L	15	10.65	27.4	0.85	89.7	160M	15	12.59	27.22	0.85	90.2	160M	15	11.7	27.28	0.85	90.0	160L	15	13.49	27.16	0.85	90.4
160L	18.5	13.14	33.9	0.84	90.3	160M	18.5	15.52	33.78	0.84	90.7	160L	18.5	14.43	33.86	0.84	90.5	160L	18.5	16.63	33.71	0.84	90.9
160L	22	15.62	40.1	0.84	90.9	180M	22	18.46	39.48	0.85	91.2	160L	22	17.16	40	0.84	91.0	180M	22	19.78	39.44	0.85	91.3
180M	30	21.3	53.7	0.85	91.5	180L	30	25.17	53.43	0.85	91.9	180M	30	23.40	53.55	0.85	91.7	200L	30	26.97	53.2	0.85	92.3
200L	37	26.27	65.8	0.85	92.0	200L	37	31.05	64.78	0.86	92.4	200L	37	28.86	64.92	0.86	92.2	200L	37	33.27	64.71	0.86	92.5
200L	45	31.95	78.8	0.86	92.4	225S	45	37.76	77.54	0.87	92.8	225S	45	35.10	77.71	0.87	92.6	225M	45	40.46	77.46	0.87	92.9
225S	55	39.05	94.77	0.87	92.8	225L	55	46.15	94.47	0.87	93.1	225M	55	42.90	94.57	0.87	93.0	250M	55	49.45	94.27	0.87	93.3
250M	75	53.25	128.41	0.87	93.4	250M	75	62.94	128	0.87	93.7	250M	75	58.50	128.13	0.87	93.6	250M	75	67.43	129.35	0.86	93.8
250M	90	63.90	153.6	0.87	93.7	280S	90	75.52	153.1	0.87	94	280S	90	70.20	153.27	0.87	93.9	280S	90	80.92	152.94	0.87	94.1
280S	110	78.11	189.30	0.86	94	280S	110	92.31	188.7	0.86	94.3	280S	110	85.50	188.9	0.86	94.2	280M	110	98.9	188.5	0.86	94.4
280S	125	88.76	217.19	0.85	94.2	280S	125	104.89	216.73	0.85	94.4	280S	125	97.49	216.96	0.85	94.3	280M	125	112.38	216.5	0.85	94.5
280M	132	93.73	229.11	0.85	94.3	280M	132	110.77	228.62	0.85	94.5	280M	132	102.95	228.86	0.85	94.4	280M	132	118.68	228.38	0.85	94.6
280M	150	106.51	262.9	0.84	94.5	280M	150	125.87	262.33	0.84	94.7	280M	150	116.99	262.61	0.84	94.6	315M	150	134.86	262	0.84	94.8
280M	160	113.61	280.41	0.84	94.5	280M	160	134.26	279.82	0.84	94.9	280M	160	127.79	279.82	0.84	94.7	315M	160	143.85	276.24	0.85	94.8
280M	180	127.81	314.8	0.84	94.7	280M	180	151.05	314.14	0.84	94.9	315S	180	140.39	310.77	0.85	94.8	315M	180	161.83	310.44	0.85	94.9
315S	200	142	345.3	0.85	94.8	315S	200	167.8	344.57	0.85	95	315S	200	156.9	344.93	0.85	94.9	315L	200	179.8	344.57	0.85	95
355L	225	159.76	379.13	0.87	94.9	355L	225	188.81	378.33	0.87	95.1	355L	225	175.49	378.33	0.87	95	355L	225	202.29	378.33	0.87	95.1
355L	250	177.51	420.81	0.87	95	355L	250	209.79	420.37	0.87	95.1	355L	250	194.99	420.37	0.87	95.1	355L	250	224.77	420.37	0.87	95.1
355L	315	223.66	523.65	0.88	95.1	355L	315	264.33	523.65	0.88	95.1	355L	315	245.69	523.65	0.88	95.1	355L	315	283.21	523.65	0.88	95.1
355L	355	252.07	590.14	0.88	95.1	355L	355	297.9	590.14	0.88	95.1	355L	355	276.88	590.14	0.88	95.1	355L	355	319.17	590.14	0.88	95.1

Note: - 1. Note:-Due to policy of continual development and improvement the right is reserved to supply products which may differ slightly from those in this publication.

2. All performance figures are subject to IS 15999-1 tolerances.

3. Efficiency value determined by equivalent kw At S1 DUTY as per IS 12615 standard.



# Crane & Hoist Duty Motors with DOL & VFD Starting - IE2

3 Phase Squirrel Cage safe area & Flameproof Ex d, Ex db & Ex tb Induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb: 50°C, Rise: 70K), Degree of protection IP-55 & IP-66, Altitude upto 1000 mtrs. above m.s.l., Duty S1, efficiency class IE-2, VIII-Pole conforms to IS/IEC 60034-1, IS/IEC 60079-0, IS/IEC 60079-1, IS/IEC 60034-5, IS/IEC 60079-31, IS 12615, Efficiency testing according IS15999-2, ,IEC60034-30, IEC 60034-1 for Gas & Dust IEC-Ex , ATEX certified by BASEEFA, Temperature class as T4.

**Performance Table for 8 Pole Motors**

Frame	40% CDF						60% CDF						300 Starts / hr.																	
	Equivalent S1 kW	Current Amp.	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	Current Amp.	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	Current Amp.	PF FL (PU)	Equivalent S1 kW Efficiency	Frame	KW	Equivalent S1 kW	Current Amp.	PF FL (PU)	Equivalent S1 kW Efficiency	Speed RPM	Starting Current % of Rated Current	Starting Torque % of Rated Torque	Pull out Torque % of Rated Torque	Rotor Gd² Kgm²	TWT HOT in sec	TWT COLD in sec	Th (min)
71	0.12	0.09	0.6	0.76	35.2	71	0.12	0.1	0.6	0.76	36.9	71	0.12	0.09	0.62	0.76	35.2	71	0.12	0.11	0.57	0.76	38.4	180	240	0.008	15	30	63	188
71	0.18	0.13	0.81	0.74	41	71	0.18	0.15	0.78	0.74	43.2	71	0.18	0.14	0.80	0.74	44.2	71	0.18	0.16	0.77	0.74	44.2	180	240	0.009	15	30	63	188
80	0.25	0.18	1.2	0.58	45.9	80	0.25	0.21	1.2	0.58	48.1	80	0.25	0.19	1.2	0.58	48.4	80	0.25	0.22	1.2	0.58	48.4	180	240	0.009	15	30	63	188
80	0.37	0.26	1.5	0.58	51.10	80	0.37	0.31	1.5	0.58	53.6	80	0.37	0.29	1.5	0.58	54.5	80	0.37	0.33	1.5	0.58	54.5	180	240	0.011	15	30	63	188
90S	0.55	0.39	2.1	0.60	56.80	90S	0.55	0.46	2.1	0.6	59.2	90S	0.55	0.43	2.1	0.6	60.1	90S	0.55	0.49	2.1	0.6	60.1	180	240	0.011	15	30	63	188
90L	0.75	0.53	2.7	0.6	61.20	90L	0.75	0.63	2.7	0.6	63.7	90S	0.75	0.58	2.7	0.6	64.6	90S	0.75	0.67	2.7	0.6	64.6	180	240	0.014	15	30	63	188
100L	1.1	0.78	3.4	0.67	66.70	100L	1.1	0.92	3.32	0.67	68.8	100L	1.1	0.86	3.36	0.67	69.90	100L	1.1	0.99	3.28	0.67	73.0	180	240	0.023	10	20	42	125
100L	1.5	1.07	4.40	0.67	70.50	100L	1.5	1.26	4.31	0.67	72.3	100L	1.5	1.17	4.36	0.67	73.0	100L	1.5	1.35	4.27	0.67	73.0	180	240	0.027	10	20	42	125
112M	2.2	1.56	6.10	0.68	74.50	112M	2.2	1.85	6	0.68	76.1	112M	2.2	1.72	6	0.68	76.7	112M	2.2	1.98	6	0.68	76.7	180	240	0.03	10	20	42	125
132S	3	2.13	8.85	0.61	77.30	132M	3	2.52	8.69	0.61	78.7	132S	3	2.34	8.76	0.61	78.10	132M	3	2.7	8.64	0.61	79.2	180	240	0.033	10	20	42	125
132M	3.7	2.63	9.70	0.67	79.00	132M	3.7	3.1	9.5	0.67	80.7	132M	3.7	2.89	9.65	0.67	79.70	132M	3.7	3.33	9.60	0.67	80.7	180	240	0.039	10	20	42	125
132M	4	2.84	10.76	0.65	79.6	132M	4	3.36	10.6	0.65	80.8	132M	4	3.12	10.66	0.65	80.30	132M	4	3.6	10.54	0.65	81.2	180	240	0.04	10	20	42	125
132M	5.5	3.91	14.39	0.65	81.8	160M	5.5	4.62	12.49	0.74	82.8	160M	5.5	4.29	12.55	0.74	82.4	160M	5.5	4.94	12.43	0.74	83.2	180	240	0.042	10	20	42	125
160M	7.5	5.33	15.60	0.8	83.6	160L	7.5	6.29	15.43	0.8	84.5	160M	7.5	5.85	15.51	0.8	84.1	160L	7.5	6.74	15.38	0.80	84.8	180	240	0.046	10	20	42	125
160L	9.3	6.6	20.37	0.75	84.7	160L	9.3	7.8	20.18	0.75	85.5	160L	9.3	7.25	20	0.75	85.2	160L	9.3	8.36	20.11	0.75	85.8	180	240	0.05	10	20	42	125
160L	11	7.81	23	0.78	85.5	180M	11	9.23	23.5	0.74	86.2	160L	11	8.58	24	0.74	85.9	180M	11	9.89	23.90	0.74	86.5	180	240	0.052	10	20	42	125
180L	15	10.65	32.50	0.74	86.8	180L	15	12.59	32.7	0.74	87.4	180L	15	11.7	32.3	0.74	87.1	180L	15	13.49	32.00	0.74	87.6	180	240	0.055	10	20	42	125
180L	18.5	13.14	39.70	0.74	87.6	200L	18.5	15.52	39.7	0.74	88.1	200L	18.5	14.43	39.6	0.74	87.9	200L	18.5	16.63	39.40	0.74	88.3	180	240	0.058	10	20	42	125
200L	22	15.62	46.90	0.82	89.0	225M	22	18.46	46.7	0.82	89.4	200L	22	17.16	46.8	0.74	88.4	225M	22	19.78	43	0.80	88.8	180	240	0.06	10	20	42	125
225M	30	21.3	57.20	0.82	89.0	225M	30	25.17	56.9	0.82	89.4	225M	30	23.4	57.1	0.82	89.2	225M	30	26.97	56.80	0.82	89.6	180	240	0.062	10	20	42	125
225M	37	26.27	70.36	0.82	89.5	250M	37	31.05	76.3	0.75	89.9	250M	37	28.86	76.5	0.75	89.7	250M	37	33.27	76.20	0.75	90.1	180	240	0.064	10	20	42	125
250M	45	31.95	92.70	0.75	90	250M	45	37.76	92.4	0.75	90.3	250M	45	35.1	92.5	0.75	90.2	250M	45	40.46	92.20	0.75	90.5	180	240	0.066	10	20	42	125
250M	55	39.05	112.90	0.75	90.4	280M	55	46.15	108.2	0.78	90.7	280S	55	42.9	108.3	0.78	90.6	280S	55	49.45	108	0.78	90.8	180	240	0.068	10	20	42	125
280M	75	53.25	147	0.78	91	315S	75	62.94	146.8	0.78	91.3	280M	75	58.5	146.8	0.78	91.1	315S	75	67.43	146.40	0.78	91.4	180	240	0.07	10	20	42	125
315S	90	63.9	175	0.78	91.3	315M	90	75.52	175.2	0.78	91.6	315S	90	70.2	175.4	0.78	91.5	315M	90	80.92	175	0.78	91.7	180	240	0.072	10	20	42	125
315M	110	78.11	211	0.78	91.7	315L	110	92.31	213	0.78	92	315M	110	85.5	213.7	0.78	91.8	315M	110	98.9	213	0.78	92.1	180	240	0.074	10	20	42	125
315L	125	88.76	242	0.78	91.9	315M	125	104.89	241.8	0.78	92.2	315L	125	97.49	241	0.78	92.1	315L	125	112.38	241.50	0.78	92.3	180	240	0.076	10	20	42	125
315L	132	93.73	255	0.78	92	315M	132	110.77	255	0.78	92.3	315L	132	102.95	255.4	0.78	92.2	315L	132	118.68	254	0.78	92.4	180	240	0.078	10	20	42	125
315L	150	106.51	289.50	0.78	92.2	315L	150	125.87	289	0.78	92.5	315L	150	116.99	289.5	0.78	92.4	315L	150	134.86	289	0.78	92.7	180	240	0.08	10	20	42	125
315L	160	113.61	308.80	0.78	92.3	315L	160	134.26	307.8	0.78	92.7	315L	160	124.79	308.5	0.78	92.5	355L	160	143.85	307.50	0.78	92.8	180	240	0.082	10	20	42	125
315	180	127.81	346.70	0.78	92.6	355M	180	151.05	345.6	0.78	92.9	315L	180	140.39	346.3	0.78	92.7	355L	180	161.83	345.20	0.78	93	180	240	0.084	10	20	42	125
355M	200	142	384.40	0.78	92.8	355L	200	167.8	383.2	0.78	93.1	355M	200	156.9	383.6	0.78	93	355L	200	179.8	383.60	0.78	93.3	180	240	0.086	10	20	42	125
355L	225	159.76	431.50	0.78	93	355L	225	188.81	429.7	0.78	93.4	355L	225	175.49	430.6	0.78	93.2	355L	225	202.29	429.20	0.78	93.5	180	240	0.088	10	20	42	125

Note: - 1. Note:-Due to policy of continual development and improvement the right is reserved to supply products which may differ slightly from those in this publication.

2. All performance figures are subject to IS 15999-1 tolerances.

3. Efficiency value determined by equivalent kw At S1 DUTY as per IS 12615 standard.

# Crane & Hoist Duty Motors with DOL & VFD Starting - IE3

3 Phase Squirrel Cage safe area & Flameproof Ex d, Ex db & Ex tb Induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb: 50°C, Rise: 70K). Degree of protection IP-55 & IP-66, Altitude upto 1000 mtrs. above m.s.l., Duty S1, efficiency class IE-3, IV-Pole conforms to IS/IEC 60034-1, IS/IEC 60079-0, IS/IEC 60079-1, IS/IEC 60034-5, IS/IEC 60079-31, IS 12615, Efficiency testing according to IS 15999-2, IEC 60034-30, IEC 60034-1 for Gas & Dust IEC-Ex, ATEX certified by BASEEFA, Temperature class as T4.

**Performance Table for 4 Pole Motors**

40% CDF										60% CDF										80% CDF										300 Starts / hr.									
150 Starts / hr.										40% CDF										60% CDF										300 Starts / hr.									
Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW	Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW	Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW	Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW	Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent S1 kW	Efficiency	Speed RPM	Starting Current % of Rated Current	Starting Torque % of Rated Torque	Pull out Torque % of Rated Torque	Rotor Gd <sup>2</sup> Kgm <sup>2</sup>	TWT HOT in sec	TWT COLD in sec	Th (min)	Tc (min)	
63	0.12	0.09	0.38	0.72	60.6	63	0.12	0.10	0.37	0.72	62.2	63	0.12	0.09	0.38	0.72	60.6	63	0.12	0.11	0.36	0.72	63.6	63	0.12	0.09	0.38	0.72	1300	300	200	250	0.0015	15	33	63	188		
63	0.18	0.13	0.55	0.69	65.9	63	0.18	0.15	0.54	0.69	67.7	63	0.18	0.14	0.54	0.69	66.90	63	0.18	0.16	0.53	0.69	68.50	63	0.18	0.13	0.55	0.69	1300	300	200	250	0.0015	15	33	63	188		
63	0.25	0.18	0.72	0.69	69.9	63	0.25	0.21	0.70	0.69	71.6	63	0.25	0.19	0.71	0.69	70.50	63	0.25	0.22	0.70	0.69	72.10	63	0.25	0.18	0.72	0.69	1300	300	200	250	0.0016	15	33	63	188		
71	0.37	0.26	0.95	0.73	73.9	71	0.37	0.31	0.93	0.73	75.6	71	0.37	0.29	0.94	0.73	75.00	71	0.37	0.33	0.93	0.73	76.20	71	0.37	0.26	0.95	0.73	1395	450	210	260	0.0033	10	20	42	125		
71	0.55	0.39	1.33	0.74	77.8	71	0.55	0.46	1.31	0.74	79.2	71	0.55	0.43	1.32	0.74	78.6	71	0.55	0.49	1.30	0.74	79.8	71	0.55	0.39	1.33	0.74	1400	600	215	260	0.0036	10	20	42	125		
80	0.75	0.53	1.73	0.75	80.5	80	0.75	0.63	1.70	0.75	82	80	0.75	0.58	1.71	0.75	81.3	80	0.75	0.67	1.69	0.75	82.5	80	0.75	0.53	1.73	0.75	1410	600	210	250	0.0067	10	20	42	125		
80	1.1	0.78	2.52	0.74	82.2	80	1.1	0.92	2.48	0.74	83.4	80	1.1	0.86	2.22	0.74	83.1	80	1.1	0.99	2.47	0.74	83.7	80	1.1	0.78	2.52	0.74	1410	600	210	250	0.0079	10	20	42	125		
90S	1.5	1.07	3.14	0.79	84	90S	1.5	1.26	3.12	0.79	84.6	90S	1.5	1.17	3.13	0.79	84.3	90S	1.5	1.35	3.11	0.79	84.9	90S	1.5	1.07	3.14	0.79	1410	600	220	260	0.0132	10	20	42	125		
90L	2.2	1.56	4.59	0.78	85.4	100L	2.2	1.85	4.94	0.72	86.1	100L	2.2	1.72	4.57	0.78	85.8	100L	2.2	1.98	4.92	0.72	86.4	100L	2.2	1.56	4.59	0.78	1410	600	220	260	0.0170	10	20	42	125		
100L	3	2.13	6.69	0.72	86.6	100L	3	2.52	6.66	0.72	87.1	100L	3	2.34	6.67	0.72	86.9	100L	3	2.7	6.63	0.72	87.4	100L	3	2.13	6.69	0.72	1420	500	200	250	0.0190	8	16	33	100		
100L	3.7	2.63	8.30	0.71	87.3	100L	3.7	3.10	8.26	0.71	87.8	100L	3.7	2.89	8.28	0.71	87.6	100L	3.7	3.33	8.23	0.71	88.1	100L	3.7	2.63	8.30	0.71	1420	500	200	250	0.028	8	16	33	100		
100L	4	2.84	9.09	0.70	87.5	100L	4	3.36	8.00	0.8	88.1	100L	4	3.12	8.02	0.8	87.8	100L	4	3.60	7.98	0.79	88.3	100L	4	2.84	9.09	0.70	1420	550	200	250	0.032	8	16	33	100		
112M	5.5	3.91	11.07	0.78	88.6	132S	5.5	4.62	10.60	0.81	89.1	112M	5.5	4.29	11.05	0.78	88.8	132S	5.5	4.94	10.58	0.81	89.3	112M	5.5	3.91	11.07	0.78	1440	600	230	270	0.063	8	16	33	100		
132S	7.5	5.33	14.39	0.81	89.5	132M	7.5	6.29	14.31	0.81	90	132S	7.5	5.85	14.34	0.81	89.8	132M	7.5	6.76	14.28	0.81	90.2	132S	7.5	5.33	14.39	0.81	1440	650	220	260	0.139	8	16	33	100		
132M	9.3	6.60	17.95	0.8	90.1	132M	9.3	7.8	17.87	0.8	90.5	132M	9.3	7.25	17.91	0.8	90.3	132M	9.3	8.36	17.83	0.8	90.7	132M	9.3	6.60	17.95	0.8	1440	650	220	260	0.155	8	16	33	100		
132M	11	7.81	21.40	0.79	90.5	132M	11	9.23	21.29	0.79	91.0	132M	11	8.58	21.33	0.79	90.8	160M	11	9.89	19.98	0.84	91.2	132M	11	7.81	21.40	0.79	1440	650	220	260	0.155	8	16	33	100		
160M	15	10.65	27.21	0.84	91.3	160M	15	12.59	27.09	0.84	91.7	160M	15	11.7	27.12	0.84	91.6	160L	15	13.49	27.03	0.84	91.9	160M	15	10.65	27.21	0.84	1450	600	220	260	0.212	10	22	42	125		
160L	18.5	13.14	33.38	0.84	91.8	160L	18.5	15.52	33.23	0.84	92.2	160L	18.5	14.43	33.27	0.84	92.1	160L	18.5	16.63	33.16	0.84	92.4	160L	18.5	13.14	33.38	0.84	1450	600	210	250	0.291	10	22	42	125		
160L	22	15.62	39.52	0.84	92.2	180M	22	18.46	38.89	0.85	92.6	160L	22	17.16	38.97	0.85	92.4	180M	22	19.78	38.84	0.85	92.7	160L	22	15.62	39.52	0.84	1455	650	220	260	0.594	10	22	42	125		
180M	30	21.3	52.85	0.85	92.9	180L	30	25.17	52.68	0.85	93.2	180M	30	23.40	52.74	0.85	93.1	200L	30	26.97	52.51	0.85	93.5	180M	30	21.3	52.85	0.85	1455	650	220	260	0.94	10	22	42	125		
180M	37	26.27	65.68	0.84	93.3	200L	37	31.05	63.95	0.86	93.6	200L	37	28.86	64.02	0.86	93.5	200L	37	33.27	63.88	0.86	93.7	200L	37	26.27	65.68	0.84	1465	650	230	270	1.45	10	22	42	125		
200L	45	31.95	77.69	0.86	93.7	225S	45	37.76	78.35	0.85	94	200L	45	35.10	78.52	0.85	93.8	225M	45	40.46	78.27	0.85	94.1	200L	45	31.95	77.69	0.86	1470	650	220	260	1.76	12	27	50	150		
225S	55	39.05	95.77	0.85	94.0	225L	55	46.15	95.46	0.85	94.3	225M	55	42.90	95.56	0.85	94.2	250M	55	49.45	96.49	0.84	94.4	225S	55	39.05	95.77	0.85	1470	650	220	260	3.11	12	27	50	150		
250M	75	53.25	131.44	0.84	94.5	250M	75	62.94	131.17	0.84	94.7	250M	75	58.50	131.31	0.84	94.6	250M	75	67.43	131.03	0.84	94.8	250M	75	53.25	131.44	0.84	1470	650	220	260	5.5	12	27	50	150		
250M	90	63.90	157.23	0.84	94.8	280S	90	75.52	155.06	0.85	95	280S	90	70.20	155.22	0.85	94.9	280S	90	80.92	154.89	0.85	95.1	280S	90	63.90	157.23	0.84	1470	650	220	260	6.6	15	33	63	188		
280S	110	78.11	189.51	0.85	95	280M	110	92.31	189.12	0.85	95.2	280M	110	85.50	189.12	0.85	95.2	280M	110	98.9	188.92	0.85	95.3	280M	110	78.11	189.51	0.85	1465	650	220	260	9.55	15	33	63	188		
280S	125	88.76	217.46	0.84	95.2	280S	125	104.89	217.01	0.84	95.4	280S	125	97.49	217.23	0.84	95.3	280M	125	112.38	216.78	0.84	95.5	280S	125	88.76	217.46	0.84	1470	650	220	260	10.98	15	33	63	188		
280M	132	93.73	229.40	0.84	95.3	280M	132	110.77	228.92	0.84	95.5	280M	132	102.95	229.16	0.84	95.4	280M	132	118.68	228.92	0.84	95.5	280M	132	93.73	229.40	0.84	1470	650	220	260	11.22	15	33	63	188		
280M	150	106.51	260.41	0.84	95.4	280M	150	125.87	259.86	0.84	95.6	280M	150	116.99	260.14	0.84	95.5	315M	150	134.86	259.59	0.84	95.7	280M	150	106.51	260.41	0.84	1470	650	220	260	12.94	15	33	63	188		
280M	160	113.61	277.48	0.84	95.5	280M	160	134.26	276.90	0.84	95.7	280M	160	127.79	277.19	0.84	95.6	315M	160	143.85	258.44	0.9	95.7	280M	160	113.61	277.48	0.84	1470	700	220	260	13.42	15	33	63	188		
280M	180	127.81	311.84	0.84	95.6	280M	180	151.05	311.19	0.84	95.8	315S	180	140.39	290.74	0.9	95.7	315M	180	161.83	290.44	0.9	95.8	280M	180	127.81	311.84	0.84	1475	700	220	260	14.75	15	33	63	188		
315S	200	142	323.05	0.90	95.7	315S	200	167.8	322.37	0.9	95.9	315S	200	156.9	322.37	0.9	95.8	315M	200	179.18	322.37	0.9	95.9	315S	200	142	323.05	0.90	1470	700	220	260	16	15	33	63	188		
355L	225	159.76	367.13	0.89	95.8	355L	225	188.81	366.36	0.89	96	355L	225	175.49	366.75	0.89	95.9	355L	225	202.29	366.36	0.89	96	355L	225	159.76	367.13	0.89	1475	700	225	260	18.5	15	33	63	188		
355L	250	177.51	407.50	0.89	95.9	355L	250	209.79	407.07	0.89	96	355L	250	194.99	407.50	0.89	95.9	355L	250	224.77	407.07	0.89	96	355L	250	177.51													



# Crane & Hoist Duty Motors with DOL & VFD Starting - IE3

3 Phase Squirrel Cage safe area & Flameproof Ex d, Ex db & Ex tb Induction motors suitable for 415V ± 10%, 50Hz ± 5%, Combined variation 10%, Insulation class F with temperature rise limited to class B (Amb: 50°C, Rise: 70K). Degree of protection IP-55 & IP-66, Altitude upto 1000 mtrs. above m.s.l, Duty S1, efficiency class IE-3, VIII-Pole conforms to IS/IEC 60034-1, IS/IEC 60079-0, IS/IEC 60079-1, IS/IEC 60034-5, IS/IEC 60079-31, IS 12615, Efficiency testing according IS15999-2, ,IEC60034-30, IEC 60034-1 for Gas & Dust IEC-Ex, ATEX certified by BASEEFA, Temperature class as T4.

**Performance Table for 8 Pole Motors**

150 Starts / hr.										300 Starts / hr.									
40% CDF					60% CDF					40% CDF					60% CDF				
Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent Efficiency	Frame	KW	Equivalent S1 kW	PF FL (PU)	Equivalent Efficiency
71	0.12	0.09	0.63	0.60	0.60	0.12	0.09	0.63	0.60	71	0.12	0.11	0.57	0.60	71	0.12	0.11	0.57	0.60
71	0.18	0.13	0.82	0.58	0.58	0.18	0.14	0.80	0.58	71	0.18	0.16	0.76	0.58	71	0.18	0.16	0.76	0.58
80	0.25	0.18	0.99	0.6	0.6	0.25	0.21	0.97	0.6	80	0.25	0.22	0.93	0.60	80	0.25	0.22	0.93	0.60
80	0.37	0.26	1.35	0.59	0.59	0.37	0.31	1.30	0.59	80	0.37	0.33	1.28	0.59	80	0.37	0.33	1.28	0.59
90S	0.55	0.39	1.77	0.62	0.62	0.55	0.46	1.73	0.62	90S	0.55	0.49	1.71	0.62	90S	0.55	0.49	1.71	0.62
90L	0.75	0.53	2.35	0.61	0.61	0.75	0.63	2.31	0.61	90S	0.75	0.67	2.30	0.61	90S	0.75	0.67	2.30	0.61
100L	1.1	0.78	3.18	0.64	0.64	1.1	0.92	3.13	0.64	100L	1.1	0.99	3.11	0.64	100L	1.1	0.99	3.11	0.64
100L	1.5	1.07	4.34	0.62	0.62	1.5	1.26	4.28	0.62	100L	1.5	1.35	4.26	0.62	100L	1.5	1.35	4.26	0.62
112M	2.2	1.56	5.63	0.68	0.68	2.2	1.85	5.56	0.68	112M	2.2	1.98	5.54	0.68	112M	2.2	1.98	5.54	0.68
132S	3	2.13	7.40	0.69	0.69	3	2.52	7.32	0.69	132M	3	2.7	7.30	0.69	132M	3	2.7	7.30	0.69
132M	3.7	2.63	9.14	0.68	0.68	3.7	3.1	9.05	0.68	132M	3.7	3.33	9.01	0.68	132M	3.7	3.33	9.01	0.68
132M	4	2.84	9.94	0.68	0.68	4	3.36	9.74	0.68	132M	4	3.6	9.74	0.68	132M	4	3.6	9.74	0.68
132M	5.5	3.91	13.29	0.68	0.68	5.5	4.62	11.79	0.76	160M	5.5	4.94	11.75	0.76	160M	5.5	4.94	11.75	0.76
160M	7.5	5.33	16.18	0.75	0.75	7.5	6.29	16.05	0.75	160L	7.5	6.74	16.01	0.75	160L	7.5	6.74	16.01	0.75
160L	9.3	6.6	19.85	0.75	0.75	9.3	7.8	19.72	0.75	160L	9.3	8.36	19.67	0.75	160L	9.3	8.36	19.67	0.75
160L	11	7.81	23.32	0.75	0.75	11	9.23	24.13	0.72	180M	11	9.89	24.07	0.72	180M	11	9.89	24.07	0.72
180L	15	10.65	32.75	0.72	0.72	15	12.59	32.53	0.72	180L	15	13.49	32.46	0.72	180L	15	13.49	32.46	0.72
180L	18.5	13.14	40.07	0.72	0.72	18.5	15.52	39.30	0.73	200L	18.5	16.63	39.22	0.73	200L	18.5	16.63	39.22	0.73
200L	22	15.62	46.74	0.73	0.73	22	18.46	41.43	0.82	200L	22	19.78	41.33	0.82	200L	22	19.78	41.33	0.82
225M	30	21.3	56.24	0.82	0.82	30	25.17	55.99	0.82	225M	30	26.97	55.87	0.82	225M	30	26.97	55.87	0.82
225M	37	26.27	69.83	0.81	0.81	37	31.05	72.20	0.78	250M	37	33.27	69.45	0.81	250M	37	33.27	69.45	0.81
250M	45	31.95	87.72	0.78	0.78	45	37.76	87.43	0.78	250M	45	40.46	87.34	0.78	250M	45	40.46	87.34	0.78
250M	55	39.05	106.74	0.78	0.78	55	46.15	102.46	0.81	280S	55	49.45	102.35	0.81	280S	55	49.45	102.35	0.81
280M	75	53.25	139.26	0.81	0.81	75	62.94	138.81	0.81	280M	75	67.43	145.86	0.77	280M	75	67.43	145.86	0.77
315S	90	63.9	172.98	0.78	0.78	90	75.52	172.42	0.78	315L	90	80.92	172.24	0.78	315L	90	80.92	172.24	0.78
315M	110	78.11	210.51	0.78	0.78	110	92.31	210.06	0.78	315M	110	98.9	209.83	0.78	315M	110	98.9	209.83	0.78
315L	125	88.76	238.70	0.78	0.78	125	104.89	238.19	0.78	315L	125	112.38	237.94	0.78	315L	125	112.38	237.94	0.78
315L	132	93.73	251.80	0.78	0.78	132	110.77	251.26	0.78	315L	132	118.68	251.00	0.78	315L	132	118.68	251.00	0.78
315L	150	106.51	285.53	0.78	0.78	150	125.87	284.92	0.78	315L	150	134.86	284.62	0.78	315L	150	134.86	284.62	0.78
315L	160	113.61	304.24	0.78	0.78	160	134.26	303.59	0.78	355L	160	143.85	303.27	0.78	355L	160	143.85	303.27	0.78
315	180	127.81	341.90	0.78	0.78	180	151.05	340.81	0.78	315L	180	161.83	340.45	0.78	315L	180	161.83	340.45	0.78
355M	200	142	379.09	0.78	0.78	200	167.8	378.28	0.78	355L	200	179.8	377.48	0.78	355L	200	179.8	377.48	0.78
355L	225	159.76	426.02	0.78	0.78	225	188.81	424.67	0.78	355L	225	202.29	424.22	0.78	355L	225	202.29	424.22	0.78

Note: - 1. Note:-Due to policy of continual development and improvement the right is reserved to supply products which may differ slightly from those in this publication.

2. All performance figures are subject to IS 15999-1 tolerances.

3. Efficiency value determined by equivalent kw At S1 DUTY as per IS 12615 standard.

# BRAKE MOTORS

## Brake Motors - General Technical Information

Brake motors are used where the safe & effective stopping with very short time is desired. The fail safe type electromagnetic brake is mounted on rear side end shield of motor and it works on DC power supply. The braking is applied once the power supply is switched OFF.

LHP Brake motors are manufactured with rectifiers mounted in the motor terminal box which converts the AC power supply to DC for brake operations.

### **BRAKE WORKING PRINCIPLE:-**

The brake consists of two plates in which one is fixed and other is spring loaded. The magnetic coil is located at spring loaded plate side. When the brake coil is energized the plate is pulled to coil side and rotating disc is released to rotate freely in between two plates.

When power supply is disconnected/ switched OFF, the coil de-energizes and spring loaded plates stuck the rotating disc and brake is applied which prevents the rotation of disc.

Braking types are depends on the application. To select correct

type and rating brake, the braking type shall be confirmed in enquiry.

### **BRAKING TORQUE:-**

The torque depends on the load and power required to brake. For general application 150% of motor full load torque is sufficient. In special applications like cranes, hoists, the braking torque shall be min 200% of motor full load torque.

### **RECTIFIER:-**

Half wave rectifiers are used to convert AC Power supply to DC. Normally AC power supply is given from motor terminal. However independent AC power supply shall be used in case VVVF motors application.

### **Brake motors with VVVF operation:-**

When brake motor operated with VVVF, the brake operation depends on the system design. The voltage across motor terminal vary with frequency variation. Hence the independent power supply shall be used for brake operation with synchronization with VVVF operation. Also DC Power supply form VVVF, can be used for brake operation.



## **BRAKE MOTORS**

Upto 355 Frame

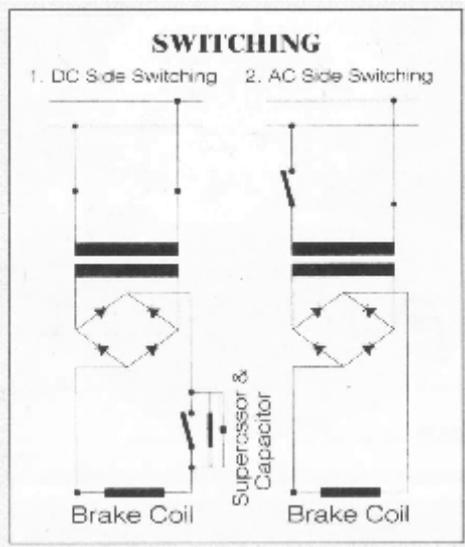
# BRAKE MOTORS

## Brake Motors

Table No. 23 - For optimum performance we suggest to use following Rectifiers (Power supply)

Brake Coil Voltage	AC Input Voltage	Current Rating	Rectifier Type
190 VDC	415 VAC	1.5 Amp	EH 720 HHD
	230 VAC	1.5 Amp	EH 720 AD
96VDC	230 VAC	1.5 Amp	EH 720 CD
	110 VAC	1.5 Amp	EH 720 BD

All RECTIFIERS offered by us are with inbuilt DC switching protection circuit. Use of inferior quality & cheap Rectifiers may damage your costly brake coils.

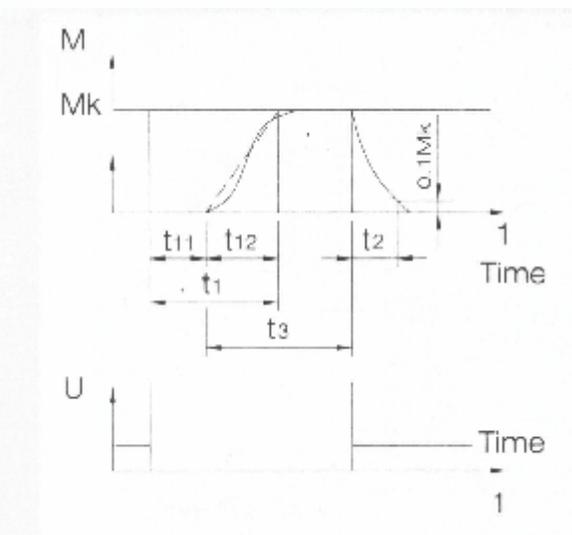


### Switching

Brake coils are operated with DC voltage. Generally when braking time is not critical AC side switching is done. This method is often used with brake motors. Where brake is switched with motor contacts. Due to the inductance of the brake coil, engagement time can be 3-6 times longer than with DC switching. Therefore this arrangement is not suitable for hoist applications. For falling loads such as hoist, lift and cranes, also the high inertia loads, a brake motor to some extent regenerate the supply and hold off the brake. Here it is essential to switch on the DC side of the rectifier. DC side switching requires provision of universal spark suppressor and capacitor to protect the coil and switches against inductive voltages.

For normal rectifier converting AC to DC you can use separate universal spark suppressor and capacitor across the switch. Rectifier supplied by us are designed to include suppressor and capacitor suitable for DC switching.

### Operating Times



t1 Engagement time                      t12 Rise time of brake torque  
t2 Disengagement time                t3 Slipping time  
t1 Delay time

Table No. 24

Brake Size	t11 ms	t12 ms	t1 ms	t2 ms
06	7	10	17	35
08	10	25	35	65
10	10	30	40	90
12	10	40	50	120
14	15	50	65	150
16	20	70	90	180
18	30	80	110	300
20	50	150	200	400
25	70	200	270	500

The engagement times are valid for switching on DC side. The table shows the delay during engagement t11, the rise time of brake torque t12 and the engagement time t1 = t11 + t12. Disengagement time is not influenced by DC or AC side switching. However it can be reduced by suitable excitation or over excitation.

For electrical performance please refer Page No.18 to 29.

## Roller Table Motors - General Technical Information

LHP Roller Table Motors are designed taking into consideration the experience of users in steel plants over the years.

### Applications

- In steel plants for conveying steel billets for processing through roller mills
- Suitable for Geared Motors operating with VVVF source

### Applicable Standards

IPSS No: 1-03-007-14	Specification for ac Roller Table Motors
IEC 60034-1 / IS 5999-1	Specifications for 3 phase induction motors
IS -4691/IEC 60034-5	Degrees of protection provided by enclosure for rotating electrical machinery

Range	Torque : 1Kgm - 75kgm
Pole	4/6/8
Mounting	Standard / Special as per IPSS specifications
Frame	Up to 450L
Voltage	415V AC or (up to 690V)
Frequency	50Hz
Stalled rotor with stand time	Up to 15 minutes max or as per customer requirement
Insulation	H Class
Duty	S3, S4, S1,S5, S6, S7, S8 & S9
Frame with circular fins design	



## ROLLER TABLE MOTORS

Up to 355 Frame

## Application requirement

- Roller table motors are special driving elements for the steel rolling mill industry. Particularly in case of working and conveying roller tables, these motors are subject to extremely hard electrical and mechanical requirements.
- This fact results from the very different modes of operation and cases of load with their variants such as continuous duty, intermittent duty and short-time duty as well as starting duty, electrical braking duty and reversing duty.
- The motors must be suitable to operate under overloads conditions e.g. blockings caused through jammed rolled material. LHP roller table motors have proved functional efficiency and operational reliability.
- Starting from these experiences, LHP has developed various variants of roller table motors adapted to the conditions of the modern drive engineering.
- Generally, the motors are delivered in a robust grey cast iron version. Motors are provided with horizontal / vertical cooling ribs and in case of the heavy type series they are provided with ribs arranged across the axial direction. The housings have a high mechanical resistance and a very good thermal capacity. Motors connection box can be executed on the top, right or left based on requirements. Even terminal box can be arranged at the non-driving side end shield.
- The design torque in Nm given at the motor shaft is calculated by  

$$M = 9550 \times \frac{P}{n}$$
 where P = design output in kW n = speed in RPM
- All LHP motors shall be suitable for ambient temperatures from  $-35^{\circ}\text{C}$  up to  $+70^{\circ}\text{C}$ .

## Special stator winding :

- Motors are suitable for higher ambient temperature requirements. Motors shall be suitable for temperature rise to class B/ class F/ class H insulation based on the requirements
- LHP can supply motors with higher locked rotor withstand time at cold or hot conditions based on applications.
- Motor are with class F insulation as a standard and also can be supplied with class H insulation on request.
- Dual coat class H wires are used for roller table applications to suit high harmonics and peak voltage form invertors.
- Winding joints are strengthened by applying RTV silicon sealant.
- Motor have Vacuum pressure impregnation process with double dipping and baking process to ensure high grade of withstanding capacity.
- Motor frame : FG200 grade cast iron material as standard. MS fabricated construction
- End Shields : CI with FG200 grade or MS fabricated.
- Shaft : EN8 material. EN24 with heat treatment can be given.
- Terminal box : CI or MS.
- Motor shall have aluminum pressure die-casting.
- Motors can be provided with Surface cooled Totally enclosed fan cooled Separately force cooled arrangement
- LHP roller table motors are equipped with antifriction Deep Groove, C3 clearance ball bearings upto 250 frame and open type bearings with re-greasing arrangement for frames 280 and above.
- The bearings have a nominal service life of at least 20,000 hours for maximum permissible load conditions. For motors without additional axial loading, the nominal service life is 40,000 hours for direct coupling.

## Lubrication :

- Life time pre-lubricated for frames upto 250.
- Re-greasing arrangement for frames 280 and above.

## **Finish System**

- Anticorrosive polyurethane paint. Epoxy paint can be provided.
- Standard color
- RAL 7015 Slate-grey

## **Motors shall be suitable for below overload conditions**

- 1.5 times the rated current for 2 min.
- 1.6 times the rated torque for 15 Seconds

## **The following motor protection variants are available on request**

- Motor protection with PTC temperature sensors in the stator winding
- Bimetallic temperature sensors in the stator winding.
- Resistance temperature detectors (RTDs) for monitoring the winding or bearing temperature on request
- Motors can be provided with space heaters on request.
- Motors with encoder can also be supplied on request.
- Motors with electromagnetic brake can be supplied if application demands.

# COOLING TOWER MOTORS



## Cooling Tower Motors - General Technical Information

### Features of LHP Cooling tower motors

- Suitable for outdoor duty application and 100% humid and chemical environment.
- IP 55 Protection to prevent water ingress.
- Anticorrosive paint for better life
- Reliable bearing life L-10 100,000 hours
- Can be operated on VVVF for energy saving between 30 to 50 Hz frequency.
- Can eliminate the gear box, cooling system, shafts, couplings, bearings, resulting in less maintenance.
- Low vibration and noise

Range	Up to 425 HP (315 kW)
R.P.M.	1500, 1000, 750
Pole	4/6/8
Mounting	B5 / Shaft downward position V1
Frame	71 to 355 L
Protection	IP 55
Insulation	F Class
Voltage	415 V, 380 V or as per requirement
Frequency	50 Hz or 60 Hz
Duty	S1
Paint	With Anti corrosive Epoxy paint

### Applicable Standards

IS - 4722	Specifications for rotating electrical machine
IS 60034-1/ IS 15999-1	Specifications for 3 phase induction machine
IS/ IEC 60034 - 5	Degree of protection provided by enclosure for rotating electrical machines
IS/IEC 60034 2-1	Method of determination of efficiency of rotating electrical machines
IS - 2223 (IEC 72 - 1)	Dimensions of 3 phase flange mounted induction motors

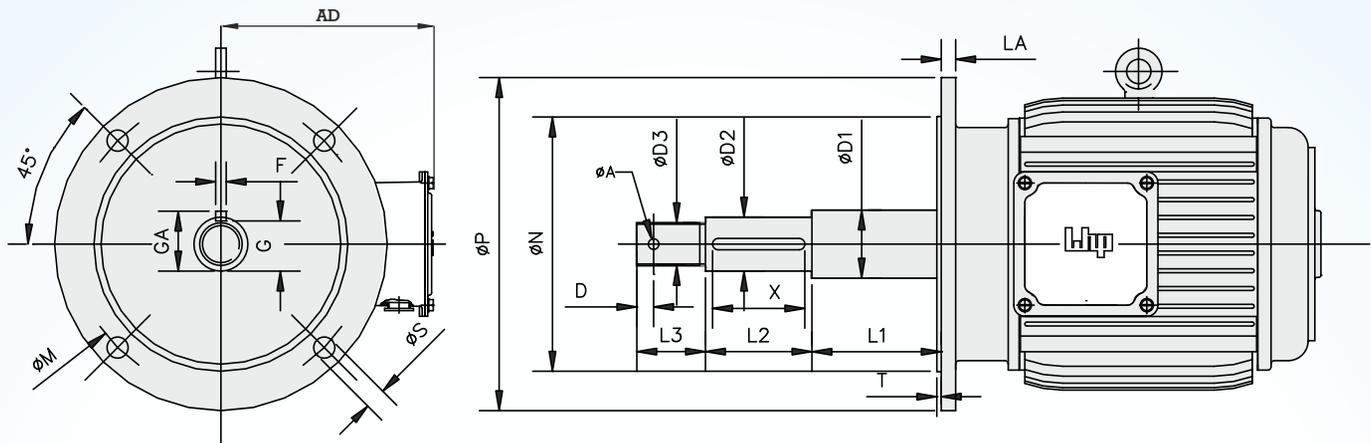


## COOLING TOWER MOTORS

Upto 355 Frame

# COOLING TOWER MOTORS

## Cooling Tower Motors - General arrangement Drawing/Dimensions



Refer Table No.25

Table No. - 25

Frame size	M	N	P	SX NO.	T	LA	LB	AD	F	G	GA	$\phi D1$	L1	D2	L2	D3	L3	X	$\phi A$	B
71	130	110	160	10X4	3.5	10	180	115	5	11	16	15	50	14	40	M12	65	35	4	8
80	165	130	200	12X4	3.5	10	220	120	6	15.5	21.5	20	50	19	55	M16	65	45	4	8
90S	165	130	200	12X4	3.5	10	240	160	8	20	20	25	50	24	55	M16	65	45	5	8
90L	165	130	200	12X4	3.5	10	262	160	8	20	20	25	50	24	55	M16	65	45	5	8
100L	215	180	250	15X4	4.0	11	280	165	8	24	31	30	50	28	55	M24	65	45	5	8
112M	215	180	250	15X4	4.0	11	300	195	8	24	31	30	50	28	55	M24	65	45	5	8
132S	265	230	300	15X4	4.0	12	316	215	10	33	41	40	75	38	75	M30	70	65	5	8
132M	265	230	300	15X4	4.0	12	354	215	10	33	41	40	75	38	75	M30	70	65	5	8
132M(N)	265	230	300	15X4	4.0	12	394	215	10	33	41	40	75	38	75	M30	70	65	5	8
160M	300	250	350	19X4	5.0	13	420	260	12	37	45	45	75	42	75	M30	70	65	5	8
160L	300	250	350	19X4	5.0	13	462	260	12	37	45	45	75	42	75	M30	70	65	5	8
180M/L	300	250	350	19X4	5.0	13	520	270	14	42.5	51.5	50	100	48	120	M30	70	110	5	8
200L	350	300	400	19X4	5.0	15	570	313	16	49	59	60	100	55	120	M30	70	110	5	8
2255/M	400	350	450	19X8	5.0	16	605	370	18	53	64	65	100	60	120	M30	70	110	5	8
250M	500	450	550	19X8	5.0	18	695	415	18	58	69	70	100	65	120	M36	85	110	5	8
280S/M	500	450	550	19X8	5.0	18	785	430	20	67.5	79.5	85	100	75	120	M36	85	110	5	8
315L	600	550	660	24X8	6.0	23	935	525	22	71	85	95	120	80	120	M36	85	154	5	8

For electrical performance please refer Page No.18 to 29.

# ENCODER MOTORS

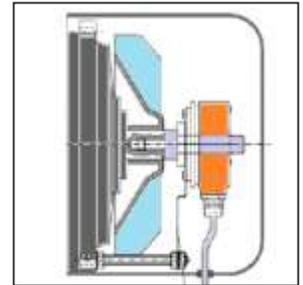


## Encoder Motors

LHP Encoder motors serve applications where exact control of speed (RPM) direction of rotation, exact positioning are required . Hollow shaft encoders feature avoids misalignment and vibration problems during actual application which leads to increased reliability-

### Applications :-

Examples - Conveyors, Windmills, Textiles, Packaging, Printing, Paper plants, Steel Plants, Machine Tools, automation, robotics. Encoder motors are vital for precise speed control, full torque availability at low speeds and positioning.



### Motor Details

Range	Upto 315 Kw
Pole	2,4,6,8
Mounting	Foot ( B3), Flange ( B-5 ), Face ( B-14 ), and combinations
Frame	63 to 355 L
Protection	IP 55
Ambient Temp.	50°C
Frequency range	100 to 60% of Rated Frequency.
Torque	upto 60% of Rated Frequency constant torque application.

### Encoder Details

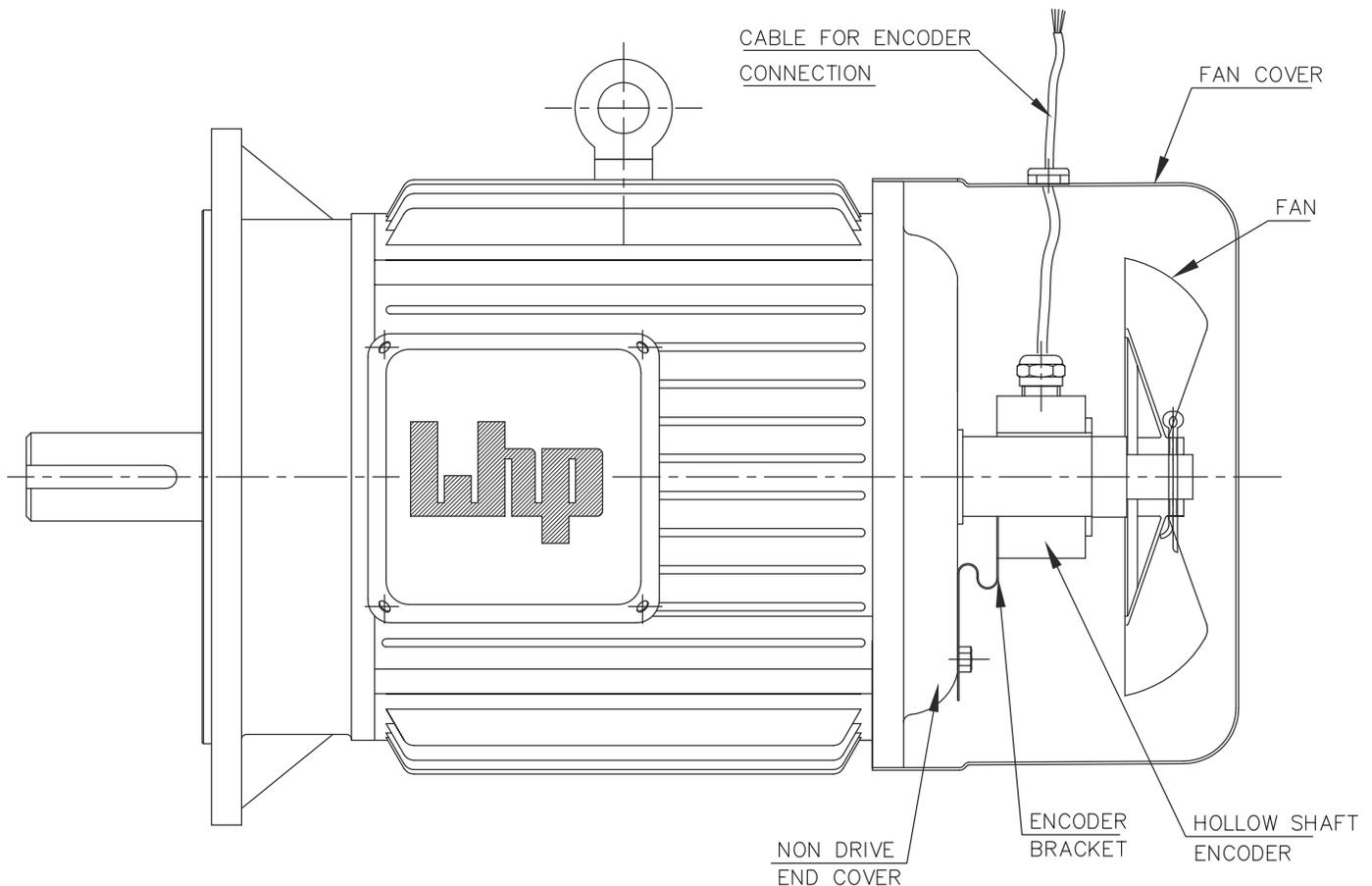
Type	Incremental with Hollow shaft
Max. Speed	6000 RPM
Operating Temperature	40 to 70 degrees C
Protection	IP 67
Type of connection	1m PVC Cable or Plug without mating connector
Resolution (PPR)	1024, 1500, 2000, 2048, 4096 and Max. Upto 5000
Out put	RS 422 / TTL / HTL
Input Voltage	5V or 10V - 30V

### Salient features of Incremental encoders fitted to the LHP Motors

- ✓ The incremental encoders comes with a very sturdy bearing construction with its safety lock design.
- ✓ Very large interlocked bearings and large bearing span ensure critical stability with vibration and tolerance of installation errors.
- ✓ A solid die cast housing and radial shaft seal make the incremental encoder ideal for use along with motor in out door harsh applications.
- ✓ The encoders are integrated under the fan cowl.

## General Drawing

### MOTOR WITH HOLLOW SHAFT ENCODER



**Note :** For motor mounted with encoder, all dimensions will be as per Standard Induction Motor only except total length of motor. Total length will get increase depending on type of motor & encoder.

# OTHER SPECIAL MOTORS

## Motors for Electric Vehicle

Transportation is a must for socioeconomic development, but most of the transportation vehicles power source is IC engine which consumes fossil fuels which have an undesirable impact on environment.

Pollution due to auto exhaust has assumed significant proportion in the developing countries like India, where its contribution is nearly 45 to 75 % of total air pollution in urban area.

In addition to environment impact, looking at fast depletion of traditional energy sources and rising fuel cost, it is essential that we should work on some alternative energy source to overcome these challenges.

Amongst different form of energy, electric energy is finding increasing application due to its cleanliness and ease of control. Today 80% of energy used is in the form of electric energy. For vehicles this energy is going to become most favored alternative energy.

There are two basic types of EVs: all-electric vehicles (AEVs) and plug-in hybrid electric vehicles (PHEVs). AEVs include Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs). In addition to charging from the electrical grid, both types are charged in part by regenerative braking, which generates electricity from some of the energy normally lost when braking.

If this range is not sufficient, a plug-in electric vehicle (PHEV) may be a better choice. PHEVs run on electricity for shorter ranges (6 to 40 miles), then switch over to an internal combustion engine running on gasoline when the battery is depleted. The flexibility of PHEVs allows drivers to use electricity as often as possible while also being able to fuel up with gasoline if needed. Powering the vehicle with electricity from the grid reduces fuel costs, cuts petroleum consumption, and reduces tailpipe emissions compared with conventional vehicles. When driving distances are longer than the all-electric range, PHEVs act like hybrid electric vehicles, consuming less fuel and producing fewer emissions than similar conventional vehicles. Depending on the model, the internal combustion engine may also power the vehicle at other times, such as during rapid acceleration or when using heating or



## MOTORS FOR ELECTRIC VEHICLE

Upto 30 kW

## Motors for Electric Vehicle

air conditioning. PHEVs could also use hydrogen in a fuel cell, biofuels, or other alternative fuels as a back-up instead of gasoline.

### Advantages of electric vehicle:-

- Improved air quality
- Alternative energy
- Low operating cost
- Gearless operation (An Internal Combustion Engine does not develop peak torque until many thousand RPM. Once peak torque is reached, it starts to drop-off quickly. To overcome this narrow torque range, multi-speed transmissions are employed to create gear ratios that keep the engine spinning where it's most effective.)
- High efficiency (Less energy consumption)
- Electric motors are profoundly simple. The motor converts electricity into mechanical power and also acts as a generator, turning mechanical power into electricity (While braking/reducing vehicle speed).
- With an electric motor, instant torque is available at any RPM. The entire rotational force of the motor is available the instant the accelerator is pressed. particularly the torque available at low RPM, eliminates the need for gears.

### TYPES OF VEHICLE

#### Hybrid and Plug-In Electric Vehicles

Hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and all-electric vehicles (EVs) also called electric drive vehicles collectively use electricity either as their primary fuel or to improve the efficiency of conventional vehicle designs.

#### Hybrid Electric Vehicles

HEVs are powered by an internal combustion engine or other propulsion source that runs on conventional or alternative fuel and an electric motor that uses energy stored in a battery. The battery is charged through regenerative braking and by the internal combustion engine and is not plugged in to charge.

### Plug-In Hybrid Electric Vehicles

PHEVs are powered by an internal combustion engine that can run on conventional or alternative fuel and an electric motor that uses energy stored in a battery. The vehicle can be plugged into an electric power source to charge the battery. Some PHEVs are also called extended range electric vehicles (EREVs).

### All-Electric Vehicles

EVs use a battery to store the electric energy that powers the motor. EV batteries are charged by plugging the vehicle into an electric power source. EVs are sometimes referred to as battery electric vehicles (BEVs).

### LHP RANGE OF ELECTRIC VEHICLE MOTORS

LHP is developing Induction Motors for all the three types of vehicles

#### Range

Rated power : 1.5 kW to 30 kW  
(Max power 2 times the rated power)

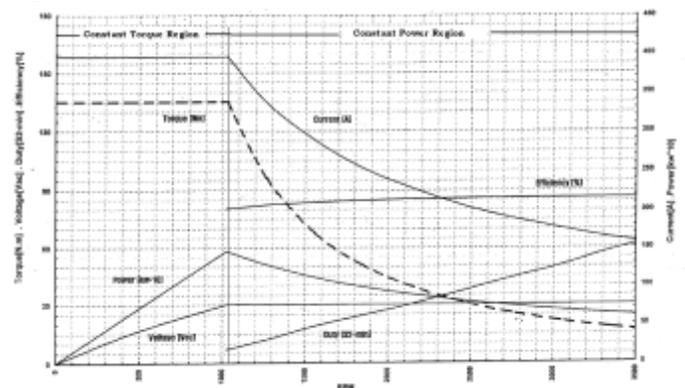
Speed range : up to 7500 rpm

Battery Voltage : 24 to 132 Volts.

No of Poles : 4

Special feature: High acceleration, Small size, Low cost, High reliability.

### -:Typical LHPL Motor Curve:-



# OTHER SPECIAL MOTORS



## Oil Immersed Motor

As one of the leading manufacturers of AC Sq. Cage Induction motors & Gear Motors in standard as well as customer specific ( Non Standard) in India. We offer you a wide product range for almost every applications in many different branches of industry.

Innovative products and our sound technical Competence have made us a reliable partner from more than 40 years. We understand our customers' requirements & needs and provide them best solutions through fast & accurate product developments.

Our competitive engineering team's experience and orientation towards meeting the customer's non standard requirements & needs we provide the foundations for our ambitious strategies.

From our manufacturing units in Solapur (Maharashtra, India) as well as our Pan India & international Marketing & sales offices we deliver LHP products and service to many successful companies across India as well as world.

Hence, LHP is first choice for any specific customer's non std. requirements in Motors.

Special motor design for Oil immersed appliance for Hydraulic Power pack mfg industry.

This brochure provides the information about LHP special frameless Oil Immersed motors mainly used in the Hydraulic Power Pack manufacturing industry.

### The salient technical features of this motors are-

- \* The frameless motor,
- \* Very rugged construction,

- \* Rating upto 7.5 kW ,
- \* Any RPM (Pole),
- \* Standard winging Insulation Class F,
- \* Very compact-space-saving design,
- \* Any mounting as per customer requirement can be given,
- \* Special shaft extension, foot or flange dimension can be given,
- \* MOC of Motor components can be given Cast Iron ,Al. PDC or GDC.
- \* It can be used in many different applications,
- \* Due to oil-immersed motor having better cooling,
- \* Motor's winding insulation is compatible with all types of Hydraulic as well as transformer oil grades,
- \* Maintenance free design,
- \* Very low noise & light weight design,
- \* Very reliable & safe working, state-of-the-art design features,
- \* For connection cable or flying leads can be provided,

### Options variations can be given

- Any common voltages and frequencies,
- Any Specific motor power rating
- Insulation class H
- Special stator design & mounting
- Thermal monitoring by PTC resistor/bimetal switch
- Special flange for pump fitting,
- Shaft bush for pump coupling,
- Second shaft end and flange for connecting an additional pump
- Different shaft ends
- No motor bearing required on pump side(depending on mounting conditions)
- Custom-made fits, tolerances, and balances as required,



## OIL IMMERSED MOTORS

Upto 7.5 kW

# OTHER SPECIAL MOTORS



## Inferno Series Smoke Extraction Motor

LHP presents Inferno Series - High performance Smoke and Heat Extraction Motors to ensure reliable operation during air ventilation under normal condition & smoke and heat extraction in the event of fire.

LHP inferno series comply with EN 12101-3 Standard & are manufactured to relevant international & national standards for electric motors.

### Purpose of Inferno Series (Smoke and Heat Extraction Motors)

- Keep the escape and access routes visibly free from smoke.
- Facilitate fire-fighting operations by creating a smoke-free layer
- Delay and / or prevent back draught, flashover and escalation of fire
- Reduce thermal effects on structural components
- Reduce damage caused by decomposition of products and hot toxic gases

### Overview

Emergency smoke removal systems are installed in a wide variety of building types including: shopping malls, factories, warehouses, theatres, atria and complex buildings, enclosed car parks, road and rail tunnels.

Their value in facilitating the evacuation of people from buildings,

reducing damage and financial loss by preventing smoke logging, reducing roof temperatures, retarding the lateral spread of fire and allowing fire-fighters to locate the source of fire - is firmly established.

### Temperature and time combinations

Inferno Series motor is capable to withstand heat of smoke and fumes produced by a fire for a number of specified temperature and time combinations. Motor designs are available for the two modes of operation:

1. S1 duty, continuous running at normal ambient, plus once only S2 duty short time rating for emergency.
2. S2 duty short time rating for emergency.

When the emergency smoke and fume extraction system is activated, the motor operates for the period of time defined on Nameplate of motor.

EN 12101-3 classifies combinations of temperature and time as shown in the table below.

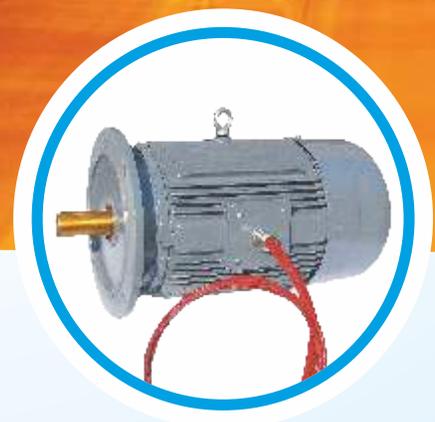
Class	Temperature	Minimum Functioning Period (in minutes)
F180	180	120
F200	200	120
F250	250	120
F300	300	60
F300	300	120
F400	400	120



## Inferno Series

## SMOKE EXTRACTION MOTOR

Upto 350 kW (63 To 355 Frame)



## 20.00 Tolerance on Performance Values & Dimensions

The electrical performance data (for Standard, Crane & Flame-Proof motors) namely current, power factor, efficiency, full load speed and torque at full load, starting torque & pull out torque are given in the table, These values are subjected to the following tolerances. Beside these, values are given for information & guidance.

### Electrical Parameters

i.	Efficiency ( $\eta$ ) :	
	a) By summation of losses :	
	Motors up to 50 kW	-15 percent of (1- $\eta$ )
	Motors above 50 kW	-10 percent of (1- $\eta$ )
	b) By input-Output test	-15 percent of (1- $\eta$ )
ii.	Total losses applicable to motors above 50 kW*	+ 10 percent of the total losses
iii.	Power factor ( $\cos \phi$ )	-1/6 of (1 $\cos \phi$ ) Min. 0.02 and Max. 0.07
iv.	Slip at full load and at working temperature	$\pm$ 20 percent of the guaranteed slip
v.	Breakaway starting current of squirrel cage Induction motors with short-circuit rotor and with any specified starting apparatus.	$\pm$ 20 percent of the guaranteed starting current (no negative tolerance)
vi.	Breakaway torque	- 15 percent to + 25 percent of the guaranteed torque (+ 25 percent may be exceeded by agreement)
vii.	Pull out torque	-10 percent of the guaranteed torque except that after allowing for this tolerance, the torque shall be not less than 1.6 or 1.5 times the rated torque

### Mechanical Parameters

Dimensions		Tolerance
Flame size (H)	63 to 250	0.0 to - 0.5 mm
	280 to 355	0.0 to - 1.0 mm
Diameter $\phi$ of shaft extension :		
(i) 11 to 28 mm		j6
(ii) 32 to 48 mm		k6
(iii) 55 mm and over		m6
Diameter N of Flange spigot :		j6 up to F 740 B
Key width		h9
Width of drive shaft keyway (normal keying)		N9
Key Height :		
(i) Square section		h9
(ii) Rectangular section		h11

## Shipping Specifications

### For Three Phase Standard Induction Motors

Fame Size	Type of Packing	L x B x HT. in mm (Max.)
63	Corrugated Box	245 x 180 x 195
71	Corrugated Box	280 x 195 x 220
80	Corrugated Box	230 x 250 x 250
90	Corrugated Box	425 x 250 x 305
100	Corrugated Box	480 x 320 x 295
112	Corrugated Box	650 x 395 x 480
132	Wooden Box	700 x 495 x 495
160	Wooden Box	875 x 650 x 610
180	Wooden Box	875 x 650 x 610
200/225	Wooden Box	940 x 790 x 790
250	Wooden Box	1170 x 920 x 920
280	Wooden Box	1320 x 970 x 970
315	Wooden Box	1475 x 965 x 1095
355	Wooden Box	2020 x 1225 x 1310

### For Three Phase Flame - Proof Motors

Fame Size	Type of Packing	L x B x HT. in mm (Max.)
80	Wooden Box	580 x 355 x 420
90	Wooden Box	650 x 395 x 480
100	Wooden Box	650 x 395 x 480
112	Wooden Box	700 x 495 x 585
132	Wooden Box	700 x 495 x 585
160	Wooden Box	940 x 790 x 790
180	Wooden Box	940 x 790 x 790
200	Wooden Box	940 x 790 x 790
225	Wooden Box	1070 x 940 x 790
250	Wooden Box	1475 x 965 x 1095
280	Wooden Box	1475 x 965 x 1095
315	Wooden Box	1475 x 965 x 1095

Note : For approximate gross weight of packed products, consider 10% for corrugated & 20% for wooden packing more weight than net weight which is given in individual product performance tables.

## NORTH

### New Delhi

604, 6th Floor, Tolstoy House, 15-17 Tolstoy Marg, New Delhi - 110001  
Mobile No.: +91 91752 29264,  
+91 91752 29337  
Email: delhi.gm@lhpmotor.com,  
delhi.agm@lhpmotor.com

### Jaipur Office

Mobile No.: +91 91752 29591  
Email: jaipur.bm@lhpmotor.com

### Ludhiana Office

Mobile No.: +91 91752 29543  
Email: ludhiana.bm@lhpmotor.com

### Lucknow Office

Mobile No.: +91 91752 29264  
Email: delhi.gm@lhpmotor.com

## EAST

### Kolkata

Godrej Waterside, Office No. 1206,  
Tower No. 2, 12th Floor, Block-DP,  
Sector-V, Salt Lake, Kolkata-700091  
Mobile No.: +91 91752 29621  
+91 91122 03455  
Email: anup.lodh@lhpmotor.com  
kolkata.dm@lhpmotor.com

## WEST

### Ahmedabad

312, 3rd Floor, The Emporio by Kunj,  
Opp 4 D Square Mall,  
Visat Gandhinagar Highway,  
Motera, Ahmedabad-380005  
Mobile No.: +91 90282 50846  
Email: ahmedabad.gm@lhpmotor.com

### Ankleshwar Office

Mobile No.: +91 91122 47155  
Email: hiren.panwala@lhpmotor.com

### Vadodara Office

Mobile No.: +91 90282 50846  
Email: ahmedabad.gm@lhpmotor.com

### Mumbai Office

Lodha Supremus II, Office No. 519,  
Floor No.5, Road No. 22, Wagle  
Industrial Estate, Thane (W) 4000604  
Mobile No.: +91 96045 55599  
+91 90282 50848  
Email: mumbai.gm@lhpmotor.com  
ashutosh.dubey@lhpmotor.com

### Pune Office

502, 5th Floor, G.O. Square, Block A,  
Survey No. 249/250, Nr. Mankar  
Chowk, Wakad, Pune 411057  
Mobile No.: +91 90115 01791  
Email: pune.gm@lhpmotor.com

## CENTRAL

### Bhilai

J-372, Surya Vihar, Junwani,  
Bhilai 490 020  
Mobile No.: +91 90282 50847  
Email: bhilai.gm@lhpmotor.com

### Raipur (Chhattisgarh)

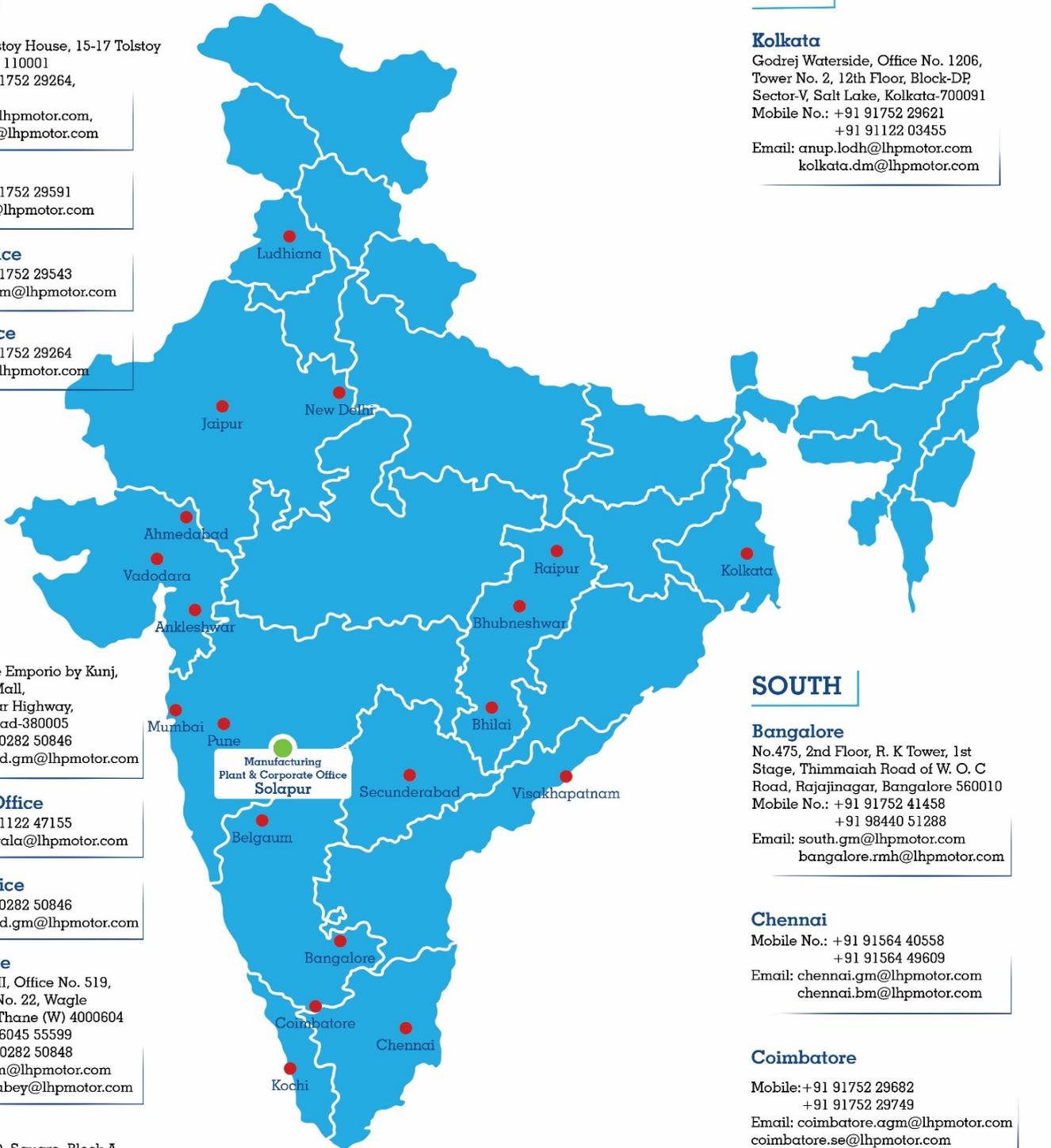
Mobile No.: +91 91564 49608  
Email: raigarh.am@lhpmotor.com

### Bhubneshwar (Odisha)

Mobile No.: +91 9922001356  
Email: odisha.dybm@lhpmotor.com

### Nagpur

Mobile No.: +91 96232 52500  
Email: nagpur@lhpmotor.com



## SOUTH

### Bangalore

No.475, 2nd Floor, R. K Tower, 1st  
Stage, Thimmaiah Road of W. O. C  
Road, Rajajinagar, Bangalore 560010  
Mobile No.: +91 91752 41458  
+91 98440 51288  
Email: south.gm@lhpmotor.com  
bangalore.rmh@lhpmotor.com

### Chennai

Mobile No.: +91 91564 40558  
+91 91564 49609  
Email: chennai.gm@lhpmotor.com  
chennai.bm@lhpmotor.com

### Coimbatore

Mobile: +91 91752 29682  
+91 91752 29749  
Email: coimbatore.agm@lhpmotor.com  
coimbatore.se@lhpmotor.com

### Kochi

7/570-3, Manath Ayyathumoola Road,  
Near Chitrangali Studio,  
Thrikkakara PO., Kochi 682021  
Mobile No.: +91 91752 41458  
+91 94471 67723  
Email : south.gm@lhpmotor.com  
venkedash@yahoo.co.in

### Visakhapatnam

Mobile No.: +91 94407 47275  
Email: msraolhp@gmail.com

### Secunderabad

5-4-104/6, 2nd floor, M. G. Road.  
Ranigunj, Secunderabad 500003  
Mobile No.: +91 9175229644  
+91 9175229671  
Email: secunderabad.bm@lhpmotor.com  
secunderabad.dm@lhpmotor.com



www.lhpmotor.com

## Laxmi Hydraulics Pvt. Ltd.

B11 & B16, M.I.D.C. Chincholi,  
Solapur - 413255 Maharashtra (India)

Email: lhpinidia@lhpmotor.com

Tele.: +91 217 2357001/2/3/4/5