



# STAR ELECTRIC COMPANY



# Three Phase Induction Motors



“STECO” manufacturers a complete range of Energy Efficient Motors conforming to IS: 325.

- Efficiency class **eff2** Improved efficiency

### PRODUCT RANGE

Type	Frame size
Improved efficiency	63 to 160L

### Standards

All motors comply with following Indian and International standards.

IS:325	Three phase induction motors-specification
IS:900	Code of practice for installation and maintenance of Induction motors.
IS:1231	Dimension of Foot mounted A.C. Induction motors.
IS:2223	Dimension of Flange mounted A.C. Induction motors.
IS:4029	Guide for testing Three phase Induction motors.
IS:4691	Degree of protection provided by enclosures for Rotating Electrical Machinery.
IS:6362	Designation of Methods of Cooling for Rotating Electrical machines
IS:12065	Permissible limits of noise level for Rotating Electrical Machines.
IS:12075	Mechanical Vibration of Rotating Electrical machines.
IS:12615	Energy Efficient Induction Motors Three phase Squirrel Cage.

### International Standards

IEC 60034-1,5	Rotating Electrical Machines-Rating and Performance, Degrees of Protection.
IEC 60072	Dimension and output ratings of Rotating Electrical machines.

### ELECTRICAL FEATURES Operating Conditions

#### Supply Conditions (Voltage & Frequency)

Voltage : 415 V  $\pm$  10%  
 Frequency : 50Hz  $\pm$  5%  
 Combined variation :  $\pm$  10%

#### Ambient

Motors are designed for an ambient temperature 50 °C.

#### Altitude

Motors are designed for an altitude upto 1000m above mean sea level.

#### Re-rating factors

The re-rating applicable under different condition of supply voltage, frequency, ambient and altitude are obtained by multiplying following factors





## Variation in supply Voltage & Frequency

Voltage Variation %	Frequency Variation %	Combined Voltage & Frequency Variation %	Permissible output as % of rated value
±10	±5	±10	100
±12.5	±5	±12.5	95
±15	±5	±15	90

The enquiry should be accompanied with following information:

- GD<sup>2</sup> and relevant speed of driven equipment
- Duty cycle/ sequence of operation/no. of starts/hour
- Speed-Torque diagram of driven equipment
- Method of braking (Electrical or Mechanical)

## Variation in Ambient & Altitude

Amb. Temp. (□C)	Permissible output as % of rated value	Altitude above sea Level m	Permissible output as % of rated value
≤30	107	1000	100
30-45	103	1500	97
50	100	2000	94
55	96	2500	90
60	92	3000	86
		3500	82
		4000	77

## Insurance and Endurance

The motors are provided with class F insulation scheme with temperature rise limited to class B. The motors can be used either at ambient temperature of 55°C or overloaded continuously by 10% (service factor =1.1). The temperature rise will be still within the limits of class F.

The slot insulation consists of Nomex-Polyester-Nomex (NPN). All insulation materials used are adequately resistant to the action of microbes and fungi.

## Winding

The stator are wound with enamel covered copper wires and impregnated as given in Table

Frame	INS Class	Type of WDG wires	IMPREG. Process
63-160L	Class 'F'	Modified Polyester Enamel covered	VPI

## Starting Time & Duty Cycle

Motors are designed for continuous (S1) duty. Other type of duty (S2 to S8) can be offered on request. The motors can safely withstand 3 consecutive starts from cold condition and 2 consecutive starts from hot conditions. In applications where more severe starting conditions are encountered, a special enquiry should be made e.g.

- Drives with high inertia e.g. flywheel drives, eccentric presses, large fans, etc.
- Drives involving intermittent duty of motor with frequent starts

## Options

Motors with class 'H' insulation and winding with dual coat wires can be offered on request.



### Thermal Protection (for Winding & Bearing)

PTC Thermistors/thermostats, RTDs etc. can be embedded in stator winding on request.

### Earth Terminals

Two earth terminals are provided, one on the body and another in terminal box.

### Anti-condensation Method

In order to avoid condensation of water inside the motors, they can be heated by connecting a voltage 4 to 10% of rated voltage to the motor terminals. Adequate heating is obtained with current equal to 20-25% of rated motor current. Alternatively any of the methods indicated in IS: 900 for heating stator winding could be adopted.

Motors can also be offered with built in space heaters in frame sizes 90S and above.

## MECHANICAL FEATURES

### Enclosures: (Material & T box location)

Motors are offered with following enclosure

Frame Size	Enclosure Materials	Terminal Box Location
63-80	Cast Iron	TOP
90S-160L	Cast Iron	RHS
	Cast Iron	RHS

Motors of die-cast aluminum enclosures can also be supplied on request.

### Cooling

All motors are Totally Enclosed Fan Cooled (TEFC). The cooling is effected by self driven, bi-directional centrifugal fan protected by fan cover. The type of cooling is IC 411 as per IS: 6362. Motor with natural ventilation (TESC) or with forced cooled arrangement can be offered on request. Forced cooling arrangements can be provided for frame 132S and above.

Cooling type	Cooling Code
TEFC	IC 411
TESC	IC 410
FORCED COOLED	IC 416

### Degree of Protection

All motors have IP55 degree of protection as per IS: 4691. Higher degree of protection such as IP56, IP65 & IP66 can be provided on request. All flanged motors are additionally provided with oil tight shaft protection on driving end side.





## Bearing and Terminal Box details

Frame Size	Bearing nos. C3 Clearance		Terminals		No. & size of cable entries	Max. Cond. Cross Sec area sq.mm	
	DE	NDE	No.	Size			
63	6201 2Z	6201 2Z	3	M4	1 X 3/4"	4	
71	6202 2Z	6202 2Z	3				
80	6004 2Z	6004 2Z	3				
90S,90L	6205 2Z	6205 2Z	3			6	
100L	6206 2Z	6205 2Z	3			2 X 1"	10
112M	6206 2Z	6205 2Z	3				
132S, 132M	6208 2Z	6208 2Z	6	M5			
160M, 160L	6309 2Z	6309 2Z	6			16	

## Roller bearing and insulated bearing

Alternatively motors with insulated bearings on NDE side can be offered from frame size 132S & above on request.

## Grease

Sealed for life bearing (2Z) are filled with grease Unirex N3-ESSO. Others are filled with Lithium based Multipurpose Grease LL3 of Balmer Lawrie. Special high temperature grease can be provided on request.

## Rotor

All motors are fitted with dynamically balanced aluminum die cast squirrel cage rotors.

## Shaft

All motors are provided with single extension in accordance with IS: 1231. The shaft material is C40 (EN8) Steel.

## Balancing and Vibration

Rotors are dynamically balanced with a half sized key in the shaft extension. All motors confirm to normal class of vibration according to IS: 12075.

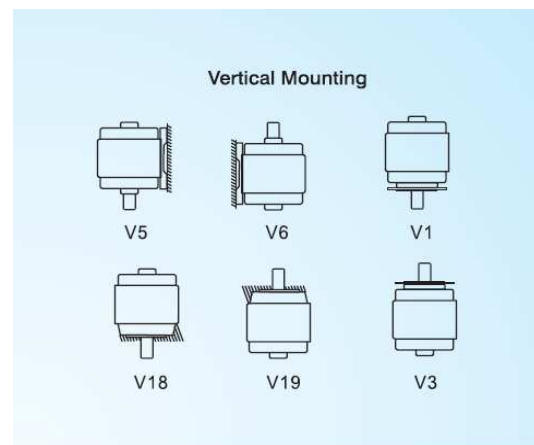
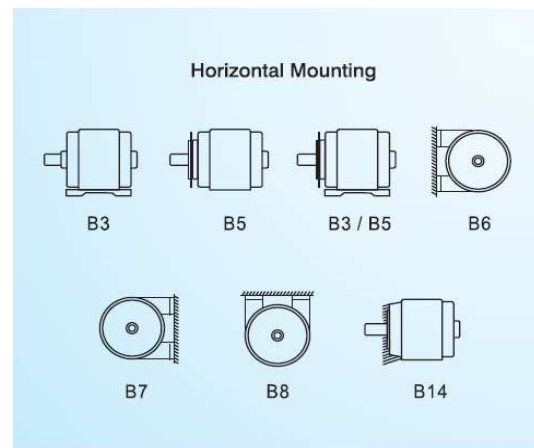
## Noise Level

Motors are designed for noise levels well below the limits specified in IS: 12065.

## Paint

All motors are painted with acrylic paint. Motors used in corrosive atmosphere are painted with Epoxy base paint. Any other shade or material can be offered on request

## Mounting Positions







## TEFC 3 Phase Squirrel Cage Induction Motors – Frame size 63 to 160 L

Voltage : 415 ± 10%  
 Frequency : 50Hz ± 5%  
 Combined Variation: ±10%

Ambient : 50 °C  
 Duty : S1(Continuous)

Ins. Class : F eff2  
 Temp. Rise : B  
 Protection : IP55

**Table 1** **3000 rpm (2-Pole)**

Rated Output		Frame Size IEC	Operating characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>
			Speed RPM	Current Amps.	Rated Torque Kg-m	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio		
kW	HP	FL				3/4L	1/2L	FL	3/4L	1/2L					
0.2	0.3	63	2720	0.57	0.064	0.8	0.66	0.52	58	57	52	3.2	2.7	3	0.00085
0.3	0.4	63	2720	0.66	0.09	0.8	0.75	0.63	65	60	54	3.5	2.4	2.6	0.00099
0.4	0.5	71	2790	0.91	0.13	0.8	0.72	0.6	71	68	62	4	2.3	2.8	0.0015
0.6	0.8	71	2805	1.31	0.19	0.8	0.72	0.58	74	74	71	5	2.7	3	0.0019
0.8	1	80	2830	1.65	0.258	0.8	0.74	0.62	77	76	72	5	2.5	2.8	0.0037
1.1	1.5	80	2840	2.35	0.377	0.8	0.75	0.63	79	79	76	5.9	2.7	3.1	0.0051
1.5	2	90S	2825	3	0.517	0.9	0.83	0.76	81	78	74	5.5	2.7	3	0.0071
2.2	3	90L	2830	4.36	0.757	0.9	0.82	0.74	83	80	76	6	3	3	0.0093
3.7	5	100L	2900	7.05	1.24	0.9	0.8	0.7	85	83	78	6.5	2.8	3	0.0188
5.5	7.5	132S	2920	10.1	1.84	0.9	0.85	0.77	86	85	80	6.5	2.3	3	0.069
7.5	10	132S	2920	13.7	2.5	0.9	0.84	0.76	87	86	82	6.5	2.5	3	0.0820
9.3	13	132M	2920	16.5	3.1	0.9	0.85	0.76	88	86	83	6.5	2.4	2.9	0.098
11	15	160M	2920	19.3	3.67	0.9	0.88	0.85	89	88	86	5.8	2	3	0.134
15	20	160M	2920	25.9	5	0.9	0.89	0.85	90	89	87	6	2	3	0.171
19	25	160L	2920	31.6	6.17	0.9	0.88	0.86	91	90	88	6.5	2	3	0.225





## TEFC 3 Phase Squirrel Cage Induction Motors – Frame size 71 to 160 L

Voltage : 415 ± 10%  
 Frequency : 50Hz ± 5%  
 Combined Variation: ±10%

Ambient : 50 °C  
 Duty : S1(Continuous)

Ins. Class : F  
 Temp. Rise : B  
 Protection : IP55



**Table 3** **1000 rpm (6-Pole)**

Rated Output		Frame Size IEC	Operating characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>
			Speed RPM	Current Amps.	Rated Torque Kg-m	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio		
kW	HP	FL				3/4L	1/2L	FL	3/4L	1/2L					
0.25	0.35	71	875	0.8	0.278	0.7	0.6	0.48	622	62	55	2.6	2	2.3	0.004
0.37	0.5	80	910	1.1	0.396	0.7	0.6	0.48	68	66	61	3	2.1	2.3	0.006
0.55	0.75	80	915	1.56	0.59	0.71	0.62	0.48	69	70	64	4	2.2	2.5	0.008
0.75	1	90S	925	2	0.79	0.72	0.61	0.5	73	70	69	3.4	2	2.5	0.012
1.1	1.5	90L	930	2.8	1.15	0.72	0.61	0.5	76	74	72	4	2.1	2.6	0.016
1.5	2	100L	935	3.76	1.56	0.72	0.64	0.52	77	75	72	3.9	2	2.5	0.025
2.2	3	112M	935	5	2.29	0.77	0.68	0.55	80	80	74	5	2	2.5	0.05
3.7	5	132S	950	8	3.8	0.76	0.63	0.49	85	84	82	5.5	2	2.5	0.13
5.5	7.5	132M	960	11.5	5.58	0.78	0.71	0.59	85	83	78	5.5	2.5	2.75	0.183
7.5	10	160M	960	14.8	7.61	0.8	0.74	0.64	88	88	86	5.4	2	2.5	0.276
9.3	12.5	160L	960	18.4	9.44	0.8	0.74	0.64	88	88	87	5.5	2.1	2.5	0.34
11	15	160L	965	21.6	11.1	0.8	0.77	0.7	88.5	88	87	6	2	2.5	0.4





## TEFC 3 Phase Squirrel Cage Induction Motors – Frame size 90S to 160 L

Voltage : 415 ± 10%  
 Frequency : 50Hz ± 5%  
 Combined Variation: ±10%

Ambient : 50 °C  
 Duty : S1(Continuous)

Ins. Class : F   
 Temp. Rise : B  
 Protection : IP55

**Table 4** **750 rpm (8-Pole)**

Rated Output		Frame Size IEC	Operating characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>
			Speed RPM	Current Amps.	Rated Torque Kg-m	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio		
kW	HP	FL				3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.5	90S	700	1.32	0.515	0.63	0.52	0.41	62	55	48	2.7	1.8	2.1	0.011
0.55	0.75	90L	690	1.81	0.776	0.63	0.55	0.43	67	62	58	2.9	2	2.4	0.014
0.75	1	100L	685	2.05	1.07	0.73	0.63	0.5	70	70	64	3	1.6	1.8	0.023
1.1	1.5	100L	690	2.91	1.55	0.71	0.62	0.48	74	73	71	3.3	1.9	2.3	0.027
1.5	2	112M	705	3.9	2.07	0.7	0.62	0.5	77	77	75	3.8	1.7	2.2	0.051
2.2	3	132S	710	5.5	3.02	0.71	0.6	0.46	78	78	75	3.7	1.6	2	0.099
3.7	5	160M	720	8.1	5.01	0.78	0.74	0.65	82	82	78	4.4	1.8	2	0.217
5.5	7.5	160M	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82	4.8	1.9	2.2	0.299
7.5	10	160L	710	15.6	10.29	0.78	0.74	0.65	86	84	82	5.5	2.1	2.2	0.4