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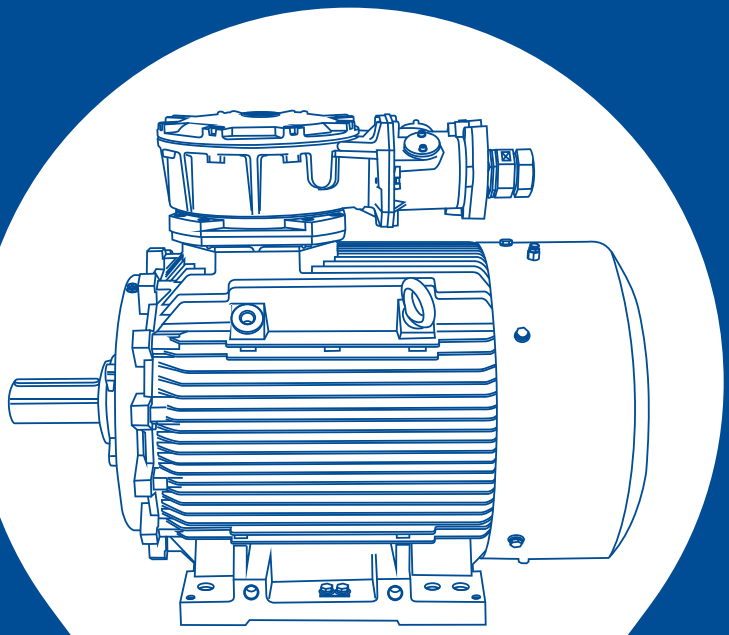
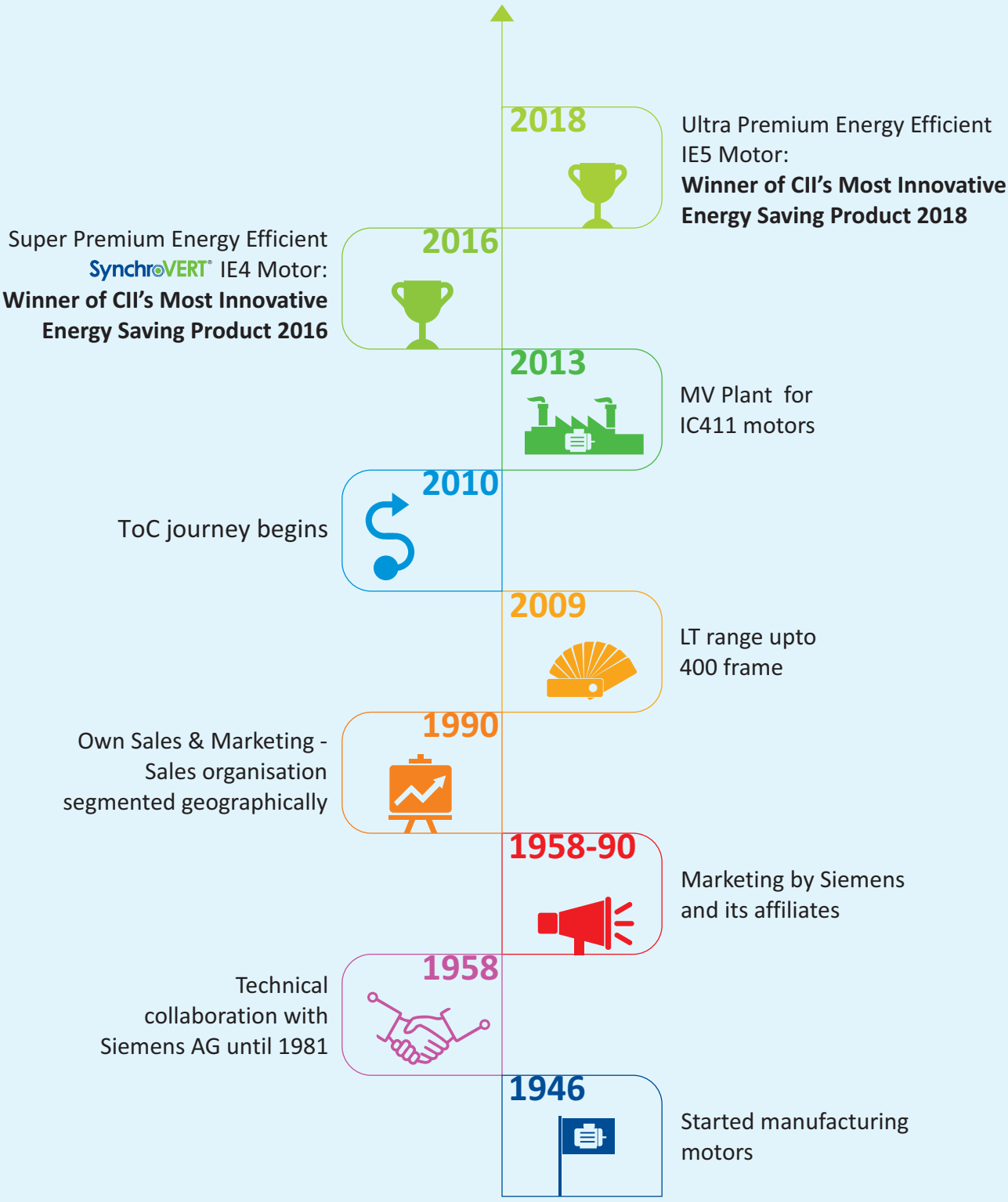
Bharat Bijlee

LV Motors: Hazardous Area Application
IE3 Energy Efficiency Series



April 2023

BHARAT BIJLEE MOTORS: MILESTONES



CONTENT

BHARAT BIJLEE LV HAZARDOUS AREA MOTORS: An Introduction

In specific scenarios, hazardous environment cannot be avoided and hence machines and processes have to be appropriately designed, to not only mitigate the risks but also avoid untoward incidents.

Motors are also used in applications in hazardous areas, thus creating a need for a very specific design suitable to such conditions. Hazardous areas are defined as those where explosive atmosphere is present, or is expected to be present, in quantities which merit the requirement of special precautions. The construction, installation and use of equipment is designed specifically to suit the hazardous environment. 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 and authorized inspecting authority. IS 5572 classifies hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present.

Zone	Classification of area as per IS 5572	Selection of electrical equipment as per IS 16724
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 eb in accordance with IS/IEC 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.

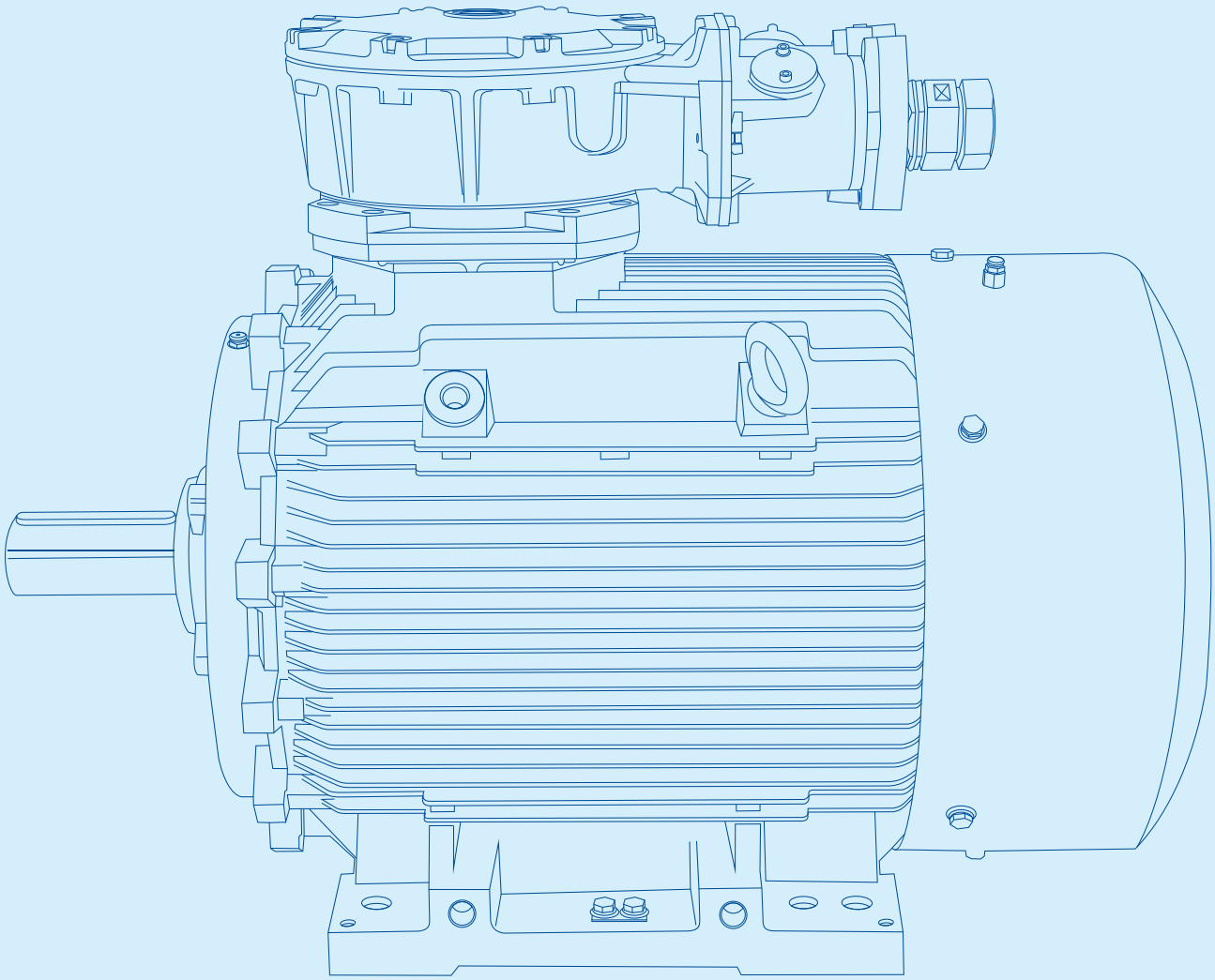
Why Bharat Bijlee?

Bharat Bijlee offers a wide range of hazardous area motors.

- Increased Safety Ex ec and Flame Proof Ex 'd' motors across different efficiency levels
- Flame Proof Ex 'd' motors for Zone '1', '21' & '22' & Increased Safety Ex ec motors for Zone '2' & '22'
- Flame Proof Ex 'd' motors suited for temperature class T4, T5 & T6 and Increased Safety Ex ec motors for temperature class T3
- With major certifications viz. PESO, DGMS
- ATEX / IECEx certification for Flame Proof Ex 'd' motors
- Licensed by BIS as per statutory requirement
- Motors with certified test reports from PESO approved test laboratory
- Accessories and customizations as per customers' requirements adhering to necessary statutory requirements

Bharat Bijlee's motors for hazardous area have been widely used across various sectors such as Oil & Gas, Pharmaceutical, Mining, Chemical & Power and have been successfully working on all possible applications over the years. These motors have been trusted for critical applications that require adherence to extremely stringent norms. Our annual production capacity is backed by an indigenous state-of-the-art manufacturing facility. With rigorous quality checks at various stages in our factory, we deliver some of the finest and most reliable motors in the industry.

FLAME PROOF MOTORS: Type Ex 'd'



FLAME PROOF MOTORS: Type Ex 'd'

A. Technical Information

A.1 Industrial Applications

Coal Mines | Petro Chemicals & Chemicals | Oil Mines & Rigs | Fertilizers | Solvent Extraction Plant | Paints & Varnish Industry | LPG Bottling Plants | Agro Chemicals | Drugs & Pharmaceuticals | General Industry

A.2 Reference Standards

IS/IEC 60079-0	Electrical apparatus for explosive gas atmosphere-Part 0 General Requirements
IS/IEC 60079-1	Electrical apparatus for explosive gas atmosphere-equipment protection by Flame Proof Enclosures "d"
IS 5572	Classification of hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 16724	Explosive atmospheres - Electrical Installations Design, Selection and Erection
IS 15999 : Part 1	Rotating Electrical Machines - Part 1 : Rating and Performance
IS 12615	Line Operated Three Phase A.C. Motors (IE CODE) "Efficiency Classes and Performance Specification"
IS 4029	Guide for testing Three Phase Induction Motors (For Standard TEFC SCR Motors)
IS 4889	Methods of determination of efficiency of Rotating Electric Machines (For Standard TEFC SCR Motors)
IS 15999 - (Part 2/Sec 1)	Standard methods for determining losses and efficiency from tests (For IE Series Motors)
IS/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	Permissible limits of noise level for Rotating Electrical Machines
IS 12075	Mechanical Vibration of Rotating Electrical Machines
IS 8223	Dimension and Output rating of Rotating Electrical Machines
IS 900	Code of practice for installation and maintenance of Induction Motors
IS 1231	Dimensions of Foot Mounted AC Induction Motors
IS 2223	Dimensions of Flange Mounted AC Induction Motors

A.3 Statutory Approvals and Licenses

Motors used in hazardous areas need statutory approvals from various statutory authorities depending upon their area of jurisdiction before marketing. Statutory / Licensing authorities accord their approval / license based on the test reports issued by their recognized test houses such as CIMFR Dhanbad, ERTL (East) Kolkata etc.

Statutory Authority	Scope	Area of Jurisdiction
PESO Approved Test Laboratory	Testing and Certification	
Directorate General of Mines Safety (DGMS), Dhanbad	Approving	Coal Mines
Petroleum & Explosives Safety Organization (PESO), Nagpur (formerly CCoE)	Approving	All areas where explosive liquids/gases are stored and transported
Bureau of Indian Standards (BIS)	Licensing	

All Flame Proof Motors have license mark IS/IEC 60079-1. DGMS identification mark is mandatory for motors used in coal mines.

FLAME PROOF MOTORS: Type Ex 'd'

Technical Information

A.4 Temperature Class

The classification of temperature class T1 to T6 is as mentioned below:

Temperature Class as required by the area classification	Maximum Surface Temperature in °C	Allowable Temperature Classes of equipment
T1	≤ 450	T1 to T6
T2	≤ 300	T2 to T6
T3	≤ 200	T3 to T6
T4	≤ 135	T4 to T6
T5	≤ 100	T5 to T6
T6	≤ 85	T6

The maximum surface temperature under the worst operating condition must not exceed the ignition temperature of gas. The maximum surface temperature refers to that surface which comes in contact with the explosive gas. In case of Flame Proof Ex 'd' motors, this refers to external surface temperature, whereas in case of Increased Safety Ex ec motors, this refers to the internal temperature as well.

Temperature Class of Bharat Bijlee Motors

Frame Size		Temperature Class
IEC Frame Size	Pole	
80	2, 4, 6, 8	T6
90L	2, 4, 6, 8	T5
90L	2(2.2kW) 4(1.5kW) 6(1.1kW)	T6
100L	2, 4, 6, 8	T5
112L	2, 4, 6, 8	T5
132 S/M	2, 4, 6, 8	T5
160M/L	2, 4, 6, 8	T5
180M/L	2, 4, 6, 8	T5
200L	2, 4, 6, 8	T5
225S/M	2, 4	T4
	6, 8	T5
250M	2, 4	T5
	6, 8	T4
280S/M	2, 4, 6, 8	T4
315S/M/L	2, 4, 6, 8	T4

Classification of Hazardous Gases

Bharat Bijlee Flame Proof motors are offered suitable for gas group I, IIA and IIB only. List of hazardous gases, their group specification and ignition temperatures have been specified in IS/IEC 60079-20. Some of the gases are listed in the following table.

Gas Group	Gas or Vapour	Temperature Class
I	Methane (firedamp)	T1
IIA	Industrial Methane*	T1
	Carbon monoxide	T1
	Decane	T3
	Xylene	T1
	Methyl acetate	T1
	Hexane	T3
	Heptane	T3
	Iso-octane	T2
	Propane	T1
	Butane	T2
	Benzene	T1
	Cyclohexane	T2
	Acetone	T1
	Ethyl acetate	T1
	Chloroethylene	T1
	Methanol	T1
	Ethanol	T2
	Butyl acetate	T2
IIB	1,3-Butadiene	T2
	Ethylene	T2
	Diethyl ether	T4
	Ethylene oxide	T2
	Coke-oven Gas	T1
IIC	Hydrogen	T1
	Acetylene	T1

***Note:** Industrial Methane includes Methane mixed with not more than 10% volume of Hydrogen.

FLAME PROOF MOTORS: Type Ex 'd'

Technical Information

A.5 Electrical Features

Standard Operating Conditions

- Voltage: 415V ± 10%
- Frequency: 50 Hz ± 5%
- Combined Variation: ± 10% (absolute sum with maximum frequency variation 5%)
- Ambient: 45°C
- Altitude: upto 1000m above mean sea level

Re-Rating factors applicable under different conditions of Ambient and Altitude

I. Variation in Ambient

Ambient Temperature (°C)	Permissible Output as % of Rated Value
30 to 45	100
50	96
55	92
60	87

II. Variation in Altitude

Altitude above Mean Sea Level (m)	Permissible Output as % of Rated Value
1000	100
1500	97
2000	94
2500	90
3000	86
3500	82
4000	77

Method of Starting

kW Rating	Method of Starting	No. of Leads
Upto & including 1.5 kW	DOL	3 (Internal Star Connection)
Above 1.5 kW	DOL or Star / Delta	6

Starting Current Measurement of Bharat Bijlee Motors

Induction motor starting current is generally 6 to 7 times the full load current of the motor. This is a characteristic feature of the motor and though undesirable, it is inevitable in the design of the motor.

Measurement of this starting current at rated voltage becomes difficult since it demands higher capacity of the supply system as well as use of appropriate CTs in the circuit of meters. Generally a fraction of rated starting current is passed in the motor due to capacity constraints. This current is extrapolated to rated voltage.

kW Range	Measurement at % of Voltage to Rated Voltage
0.12 kW to 90 kW	70 %
90 kW to 200 kW	60 %

Duty, Starting Time and Number of Consecutive Starts

For load $GD^2 \leq$ Motor GD^2, the motors can safely withstand 3 consecutive starts from cold condition and 2 consecutive starts from hot condition. In application where more severe starting conditions are encountered, a special enquiry should be made to our Sales Office. e.g.

- Drives with high inertia e.g flywheel drives, eccentric presses, large fans, etc.
- Drives involving intermittent duty of motors with frequent starts e.g. rolling mills, centrifuges and conveyor motors, etc.

The enquiry should be accompanied with following information:

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

FLAME PROOF MOTORS: Type Ex 'd'

Technical Information

Insulation for Converter Fed Motors

- Converted fed motors are provided with special insulation scheme to take care of voltage surges in the supply voltage.
- Depending on the voltage wave rise time (dV/dt) and the maximum peak to peak voltage at the motor terminals, suitable insulation schemes are provided on request.
- On customer's demand, insulated bearings are offered from frame size 160 onwards on the non driving end side of the motor.

Earthing Terminals

Two earthing terminals are provided, one on each motor foot. Also, two earthing terminals are provided in the terminal box.

A.6 Mechanical Features

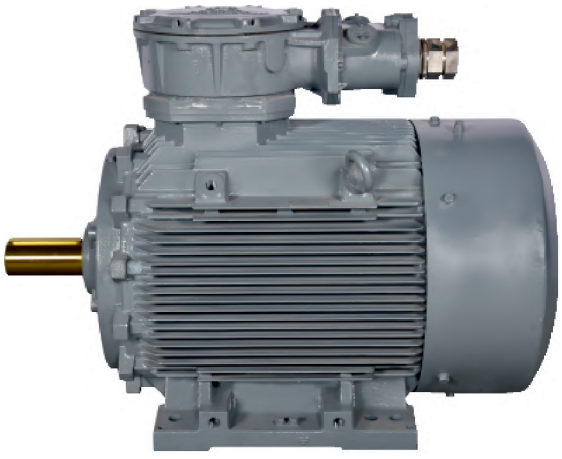
Enclosure and Cooling

These motors are so designed that the frame temperature will remain below the ignition temperature of gas-air mixture involved. The frame, end shields, terminals boxes and bearing covers of all motors are made of grey cast iron. All cast iron parts forming flame proof enclosures are subjected to hydraulic pressure test, after final machining as per IS/IEC 60079-1.

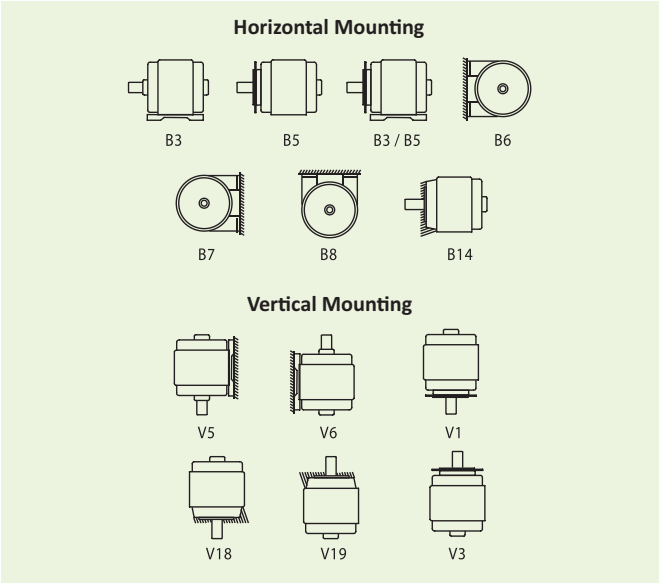
All motors are Totally Enclosed Fan Cooled (TEFC). The cooling is affected by self-driven, bi-directional cast iron or fabricated centrifugal fan protected by fan cover. The type of cooling is IC 411 as per IS 6362/IEC 60034-6. Minimum cooling distance as indicated in GA drawing has to be provided for effective cooling of the motor.

Degree of Protection

All motors have IP55 Degree of protection as per IS/IEC 60034-5. Higher degree of protection can be provided on request. All flanged motors are additionally provided with oil tight shaft protection on driving end side. A drain plug is not permissible in FLP motors.



Mounting



Standard motors are designed for foot mounting (B3). All foot mounted motors are with integral feet construction . These are also suitable for B6, B7, B8, V5 and V6 mounting without any change. Motors can be supplied in Flange mounting (B5). These are also suitable for V1 mounting.

Direction of Rotation

All motors are suitable for bi-directional rotation.

Balancing and Vibration

Rotors are dynamically balanced with a half key in the shaft extension. The balancing grade is G2.5 as per ISO:21940. Vibration grade is 'Normal grade' conforming to IS 12075. Other grades as per IS 12075 can be provided on request.

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

Lifting Arrangement

All motors are provided with lifting hooks. When two or more hooks are provided, all hooks to be used simultaneously for lifting the motor.

Paint

All motors are given a special treatment of primer and paint to internal as well as external surface. All external surfaces are coated with epoxy polyamide base acid/alkali resistant paint of dark Admiralty Grey Shade (No. 632 as per IS: 5).

Name Plate

Stainless steel name plate is provided on each motor. Data such as gas group, temperature class and statutory approval references are provided with usual nameplate details.

FLAME PROOF MOTORS: Type Ex 'd'

Technical Information

Bearing and Terminal Box Details

Frame Size	Bearing Nos. C3 Clearance		Terminal Box Type	Terminals		Cable Entries No & Size **	Maximum Conductor Cross Sectional Area (mm^2)
	D.E.	N.D.E.		Nos	Size		
80	6204 2Z	6204 2Z	MJ80	3	M5	1 x M20	1R X 3CX4
90	6205 2Z	6205 2Z	MJ132	3/6*	M6	1 x M25	1RX3CX16
100	6206 2Z	6206 2Z					
112	6206 2Z	6206 2Z					
132	6208 2Z	6208 2Z					
160	6209 2Z	6209 2Z	MJ200	6	M8	2 x M25	2RX3CX35
180	6310 2Z	6310 2Z					
200	6212 2Z	6212 2Z					
225	6213	6213	MJ280	6	M12	2 x M40	2RX3CX95
250	6215	6215					
280 (2 Pole)	6316	6316					
280 (4, 6, 8 Pole)	6317	6316					
315S/M & L	6319	6319	MJ315	6	M16	2 x M50	2RX3CX185

* 3 terminals up to and including 1.5 kW and 6 terminals for higher kW output.
** Cable entries other than those mentioned in the table can be offered subject to availability of statutory approval.

Note

1) L10 bearing life is 50,000 hours for directly coupled loads through flexible couplings only.
2) Standard terminal box location is TOP.
3) Sealed bearing (2Z) is filled with Lithium Soap based grease. Open bearings are filled with SKF LGMT3/ Unirex N3- ESSO grease.

Re-lubrication Interval

Bearing	Pole	Re-lubrication	
		Quantity (g)	Interval (Hrs)
6213	2	120	3200
	4		9000
	6		15000
	8		21000
6215	2	150	2800
	4		8200
	6		10000
	8		18000
6316	2	180	2000
	4		7500
	6		12500
	8		16500
6317	4		7500
	6		13000
	8		17500
6319	2	220	2000
	4		5000
	6		7500
	8		10000

Cable Entries

Motor for mining application (i.e. coal mines and oil mines) is provided with compound filling sealing box. Cable entries suitable for flame proof glands (for application in hazardous area Gas Group IIA and IIB only) can be provided with flame proof glands. A cable sealing box is mandatory for all motors for use in coal mines and oil mines.

FLAME PROOF MOTORS: Type Ex 'd'

Technical Information

Shipping Dimension

Frame	Packing Box Dimensions (mm)				Motor Gross Weight (kg)
	Pole	Length	Width	Height	
80	2, 4, 6, 8	440	440	310	33
80	2(1.1kW) 4(0.55kW) 6(0.55kW)	510	445	345	34
90L	2, 4, 6, 8	510	470	340	48
90L	2(2.2kW) 4(1.5kW) 6(1.1kW)	505	565	350	52
100L	2, 4	640	420	560	66
100L	6, 8	575	575	360	64
112M	2, 4, 6, 8	640	620	560	73
132S/M	2, 4, 6, 8	610	330	485	89
132S/M	2(7.5kW) 4(7.5kW) 6(5.5kW)	765	330	485	118
160M/L	2, 4, 6, 8	790	440	540	216
160M/L	2(18.5kW) 6(11kW)	840	440	540	220
180M/L	2, 4, 6, 8	940	440	635	320
200L	2, 4, 6, 8	940	540	690	408
225S/M	2, 4, 6, 8	920	540	790	534
250M	2, 4, 6, 8	1100	660	820	696
280S/M	2, 4, 6, 8	1220	660	890	860
315S/M	2, 4, 6, 8	1300	870	1000	1120
315L	2, 4, 6, 8	1500	870	1003	1625

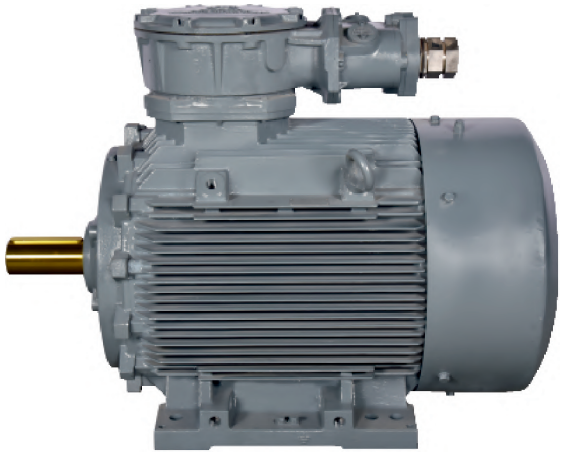
Special Features

- Sturdy housing that prevents an internal explosion from spreading to the external environment and also resists the explosion pressure.
- Robust bearing shields and caps bolted to the frame in a manner where the gaps remain unaffected in the event of an internal explosion.
- Screen on air intake with a mesh size not exceeding 8mm.
- External two earth terminals on motor feet.
- Protective earth conductor terminal in the terminal box.
- Ex 'd' mark on the motors.
- Special insulation treatment and painting treatment to resist highly corrosive atmosphere.
- All vertical mounted motors will be provided with 3 lifting lugs.

Special Maintenance Care During Operation

Each motor must be provided with protective circuit breaker or an equally effective device. In order to maintain safety protection, the following care must be taken on site during operation:

- The joint faces must not be re-machined nor finished or coated with varnish or paint. The surfaces must be kept metallically clean. A thin film of grease must be applied as protection against rust. The use of gaskets at point where there were originally none, is not permitted.
- Defective mounting screws and bolts must be replaced promptly by new ones of a material with same tensile-strength as the original ones.
- Care should be taken to see that all screws, bolts, nuts etc, used for fixing the parts of flame proof enclosure are provided with spring washer wherever originally supplied, to prevent them from getting loose due to shocks and vibration during operation.
- Enough ventilating space must be provided for efficient cooling of the motor. Refer GA drawing given in the catalogue.



FLAME PROOF MOTORS: Type Ex 'd'

B. General Specifications: Standard and Optional Features

Range

- **Series:** 3 Phase Squirrel Cage Induction, Flame Proof Motors
- **Polarity:** 2, 4, 6, 8

Type	Frame	kW
Standard Range of FLP Motors	80 to 315	0.37 to 200
FLP Motors: Efficiency Values Complying to IE2 Class of IS 12615	80 to 315	0.37 to 200
FLP Motors: Efficiency Values Complying to IE3 Class of IS 12615	80 to 315	0.37 to 200

Standard & IE2 efficiency series of FLP Motors: please refer catalogue, 'LV Motors: Hazardous Area Application'. IE3 FLP: Performance data and drawings of respective ratings are included ahead.

Standard Features	Optional Features
Voltage: 415V	220 to 690V
Frequency: 50 Hz	60 Hz
IP55	IP56, IP65, IP66
B3 Mounting	B5, B35, V1
Ambient: 45°C	Any other on request
Duty: S1	S3 / S4 Duty: on request
TB Position: Top	TB Position: RHS: 112 Frame and above LHS: 160 Frame and above
Cast Iron Construction: For all frames	
Shaft Material: EN8	EN24, EN57
Insulation: Class F	Insulation: Class H
IC411: Totally Enclosed Fan Cooled	
Sealed Bearing: upto 200 Frame Online Greasing Arrangement: 225 Frame and above	Online Greasing Arrangement: 180 to 200 Frame
Paint Shade: AAP 632	AAP Epoxy based RAL grade or Epoxy based IS:5 grade
Fan Cover: Mild Steel	
Gelcoat on Winding: For all frames	
Space Heater: 315 Frame	Space Heater: 90 Frame and above
Motor suitable for grid supply	**Motors with Inverter Duty Suitability, offered with:** 1. Combined testing for temperature class certification; test facility available 2. Motor fitted with PTC thermistor
Packing: Corrugated Boxes: Upto 100 Frame Wooden Packing Boxes: 112 Frame and above	Seaworthy/Export Packing Case
For standard bearings, kindly refer to the bearing chart	Insulated Bearing: 132 Frame and above (hybrid bearing till 225 Frame) Cylindrical Roller Bearing on DE Side: 160 Frame and above

Our other optional features

- Non standard shaft material, diameter and extension
- Double compression glands
- Auxiliary Terminal Box: 200 Frame and above
- Thermistor: 90 Frame and above
- Canopy, water flinger, non standard paint and paint shade
- High temperature grease
- Reduced and special grades of vibration as per IS 12075 can be provided on request

Note

1) Kindly confirm application wise requirement of cable sealing box and auxiliary terminal box with our nearest sales office.
2) For any other non standard feature, kindly contact our nearest sales office.
3) For enquiries of ATEX / IECEx certified motors, kindly contact our nearest sales office.

FLAME PROOF MOTORS: Type Ex 'd'

C. Statutory Requirement for Flame Proof Induction Motors Fed with VFD Supply

Combined Testing of Flame Proof Motor and Converter

Bharat Bijlee motors have been tested and approved by statutory authorities for given temperature class with sinusoidal supply. Since VFD supply contains more harmonics, temperature rise of motor increases on VFD supply. This leads to increase in surface temperature. Also, with the VFD, motor speed is varied. When motor speed is reduced, it leads to poor cooling and higher temperature rise. So the new temperature class needs to be verified by statutory authority. 16724 (Explosive Atmospheres - electrical installations design, selection and erection) or IEC 60079-14 (Explosive Atmospheres - Part 14: electrical installations design, selection and erection) is the selection guide for the user. The statutory testing authorities insist that the motors intended for use in hazardous area, which are to be supplied with varying voltage and frequency by converter, shall be tested, certified, and approved in association with the converter to determine the temperature class / maximum surface temperature.

Note

1) Additional factors may also need to be taken into account, which include provision by the user of additional output filters or reactors and the length of cable between converter and motor. Both these affect motor input voltage and cause additional motor heating.

2) High frequency switching in converters can lead to rapid rise time voltage stress in windings and cable circuits and therefore is a further potential source of ignition. It is necessary to consider the effects of this stress according to the type of protection. It will be necessary to add an additional output filter after the converter.

3) Insulation scheme of flame proof IE3 motor is enhanced to suit high rate of rise of voltage (dV/dt). However, based on speed range, torque-speed profile and other application requirements, the accessories and other features need to be carefully selected for safe and reliable operation of motors. These accessories and features can be offered on specific request.

4) Bearing currents require special consideration. Possible solutions include the use of insulated bearings, either alone, or in accordance with a filter that reduces common mode voltages and / or dV/dt.

Cable Length between Motor and Converter

Whenever flame proof motor is fed through converter supply, converter is placed in safe area and motor is working in hazardous area. Hence the cable length is generally high, i.e. 500 to 800 meters long. For effective and trouble free operation of motor, use of filters (preferably sine wave filter) at converter output terminals is a must, when using such high cable length. The customer and / or his system integrator has to ensure that the peak phase to phase voltage appearing at motor terminals is <= 1.56kV and rise time should be > 0.5 micro second. Electrically balanced shielded cable (with 3 earth conductors) should always be used when motors are fed with VFD supply.

Use of Thermal Protective Devices

Use of thermistors is recommended to protect the motor from abnormal temperature rise of stator winding.

Bharat Bijlee

FLAME PROOF MOTORS: Type Ex 'd'

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 45°C
Duty: S1 (Continuous)
3000 rpm (2 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Operating characteristics at rated output									With DOL starting			Rotor GD²	Net Weight B3 constr.
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP	IEC	B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.5	80	3J0802A300000	2830	0.85	0.13	0.82	0.74	0.62	73.8	73.8	70.0	6.0	2.5	2.8	0.0026	28
*0.55	0.75	80	3J08021300000	2830	1.23	0.19	0.80	0.73	0.60	78.1	77.1	74.0	5.0	2.5	2.8	0.0026	29
0.75	1.0	80	3J0802B300000	2870	1.54	0.25	0.84	0.79	0.70	80.7	80.7	79.7	6.0	2.7	3.0	0.0034	31
1.1	1.5	80	3J0802E300000	2850	2.28	0.38	0.81	0.76	0.65	82.7	82.7	80.0	6.0	2.8	3.1	0.0037	33
1.5	2.0	90L	3J09L2B300000	2850	2.88	0.51	0.86	0.81	0.72	84.2	84.2	84.2	6.5	2.75	3.0	0.0066	45
2.2	3.0	90L	3J09L2E300000	2850	4.14	0.75	0.86	0.80	0.71	85.9	85.9	85.5	6.5	3.0	3.3	0.0084	49
3.7	5.0	100L	3J10L2B300000	2890	6.74	1.25	0.87	0.82	0.73	87.8	87.8	87.3	7.0	3.0	3.1	0.0158	61
5.5	7.5	132S	3J13S2C300000	2935	9.53	1.83	0.90	0.87	0.81	89.2	89.2	87.5	7.0	2.3	3.0	0.0878	99
7.5	10.0	132S	3J13S2H300000	2935	12.9	2.49	0.90	0.87	0.81	90.1	90.1	88.7	7.0	2.3	3.0	0.0936	109
9.3	12.5	160M	3J16M2B300000	2950	16.6	3.07	0.86	0.83	0.76	90.7	90.3	88.7	6.5	2.3	2.8	0.151	147
11	15.0	160M	3J16M2E300000	2950	19.3	3.63	0.87	0.83	0.76	91.2	91.2	89.2	7.0	2.5	3.0	0.173	156
15	20.0	160M	3J16M2H300000	2945	26.1	4.96	0.87	0.84	0.77	91.9	91.9	90.0	6.5	2.3	2.8	0.217	164
18.5	25.0	160L	3J16L2M300000	2945	31.3	6.12	0.89	0.86	0.79	92.4	92.4	90.8	6.5	2.3	2.8	0.258	181
22	30.0	180M	3J18M2B300000	2950	37.5	7.26	0.88	0.84	0.78	92.7	92.7	91.0	7.0	2.7	3.0	0.34	277
30	40.0	200L	3J20L2B300000	2955	50.8	9.89	0.88	0.86	0.80	93.3	93.3	91.8	6.5	2.6	3.0	0.59	323
37	50	200L	3J20L2E300000	2955	62.4	12.20	0.88	0.86	0.80	93.7	93.7	92.0	6.8	2.7	3.1	0.65	351
45	60	225M	3J22M2B300000	2965	75.7	14.8	0.88	0.86	0.82	94.0	94.0	93.0	6.6	2.1	2.7	1.19	458
55	75.0	250M	3J25M2E300000	2970	91.2	18.0	0.89	0.86	0.80	94.3	94.3	93.0	6.8	2.5	3.0	1.68	570
75	100	280S	3J28S2E300000	2970	121	24.6	0.91	0.89	0.86	94.7	94.7	92.7	7.0	2.0	2.7	2.9	740
90	120	280M	3J28M2H300000	2970	145	29.5	0.91	0.89	0.86	95.0	95.0	93.0	7.0	2.0	2.7	3.42	765
110	150	315S	3J31S2E300000	2982	179	35.9	0.90	0.86	0.80	95.2	94.6	93.0	7.0	2.2	2.5	5.0	1050
132	180	315L	3J31L2H300000	2985	214	43.1	0.90	0.86	0.80	95.4	95.4	93.5	7.0	2.2	2.5	6.2	1240
150	200	315L	3J31L2K300000	2985	248	48.9	0.88	0.86	0.80	95.6	95.6	93.6	7.0	2.4	2.7	7.7	1500
160	215	315L	3J31L2M300000	2985	265	52.2	0.88	0.86	0.80	95.6	95.6	93.6	7.0	2.4	2.7	7.7	1500

* These ratings are offered in higher frame size
Note: All performance values are subject to tolerance as per IS: 15999: Part 1

FLAME PROOF MOTORS: Type Ex 'd'

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 45°C
Duty: S1 (Continuous)
1500 rpm (4 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Operating characteristics at rated output									With DOL starting			Rotor GD²	Net Weight B3 constr.
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP	IEC	B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	80	3J08043300000	1405	0.90	0.26	0.74	0.69	0.58	77.3	77.3	70.0	5.0	2.4	2.6	0.0072	32
0.55	0.75	80	3J0804B300000	1415	1.18	0.38	0.80	0.70	0.56	80.8	80.8	79.8	5.3	2.8	3.0	0.0081	34
0.75	1.0	80	3J0804E300000	1420	1.71	0.51	0.74	0.63	0.50	82.5	82.5	80.0	5.5	3.0	3.3	0.0094	36
*1.1	1.5	90L	3J09L4B300000	1425	2.33	0.75	0.78	0.70	0.55	84.1	84.1	82.5	5.5	2.5	2.7	0.0121	44
1.5	2	90L	3J09L4E300000	1425	3.14	1.03	0.78	0.70	0.55	85.3	85.3	84.5	6.0	2.5	2.7	0.0149	43
2.2	3	100L	3J10L4B300000	1435	4.53	1.49	0.78	0.72	0.60	86.7	86.7	85.8	6.0	2.5	3.0	0.0245	62
3.7	5	112M	3J11M4B300000	1455	7.37	2.48	0.79	0.74	0.60	88.4	88.4	86.5	6.5	3.0	3.5	0.0588	73
5.5	7.5	132S	3J13S4C300000	1455	10.3	3.68	0.83	0.78	0.66	89.6	89.6	88.4	6.5	2.5	3.0	0.117	93
7.5	10	132M	3J13M4H300000	1455	13.9	5.02	0.83	0.78	0.66	90.4	90.4	89.4	6.5	2.5	3.3	0.157	111
9.3	12.5	160M	3J16M4E300000	1465	17.3	6.18	0.82	0.77	0.66	91.0	91.0	90.4	6.5	2.1	2.5	0.212	156
11	15	160M	3J16M4H300000	1465	20.4	7.31	0.82	0.77	0.66	91.4	91.4	90.8	6.5	2.1	2.5	0.235	163
15	20	160L	3J16L4M300000	1465	27.3	9.97	0.83	0.78	0.68	92.1	92.1	91.6	6.5	2.2	2.7	0.306	178
18.5	25.0	180M	3J18M4B300000	1470	33.1	12.3	0.84	0.80	0.70	92.6	92.6	91.5	6.5	2.6	2.9	0.55	268
22	30	180L	3J18L4E300000	1470	39.2	14.6	0.84	0.80	0.70	93.0	93.0	92.0	6.5	2.6	2.9	0.64	283
30	40	200L	3J20L4B300000	1470	51.8	19.9	0.86	0.82	0.75	93.6	93.6	92.6	6.5	2.6	3.0	1.31	358
37	50	225S	3J22S4B300000	1480	65.3	24.4	0.84	0.80	0.71	93.9	93.9	93.4	6.5	2.5	2.6	1.79	445
45	60	225M	3J22M4E300000	1480	78.2	29.6	0.85	0.81	0.72	94.2	94.2	93.5	6.5	2.6	2.8	2.03	459
55	75	250M	3J25M4B300000	1480	96.3	36.2	0.84	0.80	0.72	94.6	94.6	93.8	6.0	2.0	2.6	3.06	600
75	100	280S	3J28S4B300000	1485	131	49.2	0.84	0.80	0.72	95.0	95.0	94.2	6.5	2.5	3.0	6.11	725
90	120	280M	3J28M4H300000	1487	155	59.0	0.85	0.82	0.74	95.2	95.2	94.5	6.5	2.5	3.0	7.14	778
110	150	315S	3J31S4G300000	1488	189	72.0	0.85	0.82	0.74	95.4	95.4	93.9	6.8	2.5	3.0	11.7	1053
132	180	315L	3J31L4K300000	1488	226	86.4	0.85	0.82	0.74	95.6	95.6	94.1	6.8	2.5	3.0	14.0	1230
160	215	315L	3J31L4P300000	1490	277	104.6	0.84	0.80	0.72	95.8	95.8	94.5	6.6	2.5	3.0	15.6	1303
180	240	315L	3J31L4T300000	1491	311	117.6	0.84	0.80	0.72	95.9	95.9	94.6	6.6	2.7	3.0	17.8	1385

* These ratings are offered in higher frame size
Note: All performance values are subject to tolerance as per IS: 15999: Part 1

Bharat Bijlee

FLAME PROOF MOTORS: Type Ex 'd'

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 45°C
Duty: S1 (Continuous)
1000 rpm (6 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Operating characteristics at rated output									With DOL starting			Rotor GD²	Net Weight B3 constr.
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP	IEC	B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.37	0.5	80	3J0806B300000	910	0.96	0.40	0.73	0.62	0.53	73.5	73.5	72.5	4.0	2.2	2.5	0.0073	29
0.55	0.75	80	3J0806E300000	920	1.38	0.58	0.72	0.64	0.52	77.2	77.2	76.0	4.0	2.3	2.6	0.0101	32
*0.75	1.0	90L	3J09L6B300000	925	1.84	0.79	0.72	0.62	0.52	78.9	78.9	78.6	4.0	2.1	2.5	0.0143	39
1.1	1.5	90L	3J09L6E300000	920	2.62	1.16	0.72	0.62	0.52	81.0	81.0	80.0	4.0	2.0	2.5	0.0181	43
1.5	2.0	100L	3J10L6B300000	935	3.51	1.56	0.72	0.62	0.54	82.5	82.5	81.0	4.5	2.3	2.5	0.0275	56
2.2	3.0	112M	3J11M6B300000	960	4.84	2.23	0.75	0.68	0.55	84.3	84.3	81.0	6.0	2.3	2.5	0.0691	68
3.7	5.0	132S	3J13S6C300000	960	7.83	3.75	0.76	0.70	0.58	86.5	86.5	86.0	5.5	2.2	2.6	0.121	90
5.5	7.5	132M	3J13M6H300000	965	11.3	5.55	0.77	0.70	0.60	88.0	88.0	87.5	5.5	2.2	2.6	0.180	107
7.5	10	160M	3J16M6B300000	970	15.2	7.53	0.77	0.72	0.61	89.1	89.1	88.5	6.0	2.0	2.6	0.275	156
9.3	12.5	160L	3J16L6E300000	970	18.7	9.34	0.77	0.72	0.61	89.8	89.8	89.0	6.0	2.0	2.6	0.332	167
11	15	160L	3J16L6H300000	970	22.0	11.0	0.77	0.72	0.61	90.3	90.3	89.2	6.0	2.0	2.6	0.390	178
15	20	180L	3J18L6B300000	977	27.6	15.0	0.83	0.78	0.72	91.2	91.2	91.2	5.5	2.5	3.0	0.888	284
18.5	25	200L	3J20L6B300000	980	34.2	18.4	0.82	0.79	0.70	91.7	91.7	91.0	6.0	2.7	3.2	1.23	295
22	30	200L	3J20L6E300000	980	40.5	21.9	0.82	0.80	0.70	92.2	92.2	91.2	6.0	2.7	3.2	1.47	324
30	40	225M	3J22M6B300000	984	51.1	29.7	0.88	0.84	0.77	92.9	92.9	92.6	6.5	3.0	3.5	2.85	450
37	50	250M	3J25M6B300000	985	63.4	36.6	0.87	0.85	0.77	93.3	93.3	92.7	7.0	2.8	3.0	3.41	573
45	60	280S	3J28S6B300000	984	79.5	44.5	0.84	0.80	0.72	93.7	93.7	93.0	6.0	2.4	2.9	5.11	650
55	75	280M	3J28M6E300000	985	95.7	54.4	0.85	0.81	0.72	94.1	94.1	93.4	6.0	2.5	3.0	6.82	736
75	100	315S	3J31S6B300000	992	130	73.6	0.85	0.82	0.72	94.6	94.6	93.6	6.0	2.5	3.0	10.7	940
90	120	315M	3J31M6E300000	992	155	88.4	0.85	0.82	0.72	94.9	94.9	93.9	6.0	2.5	3.0	12.1	1005
110	150	315M	3J31M6H300000	992	189	108.0	0.85	0.82	0.72	95.1	95.1	94.2	6.0	2.5	3.0	15.5	1005
132	180	315L	3J31L6M300000	992	229	129.6	0.84	0.80	0.72	95.4	95.4	94.4	6.0	2.5	3.0	18.0	1425
160	215	315L	3J31L6P300000	992	284	157.1	0.82	0.76	0.68	95.6	95.6	94	6.5	2.3	2.5	21.5	1425

* These ratings are offered in higher frame size
Note: All performance values are subject to tolerance as per IS: 15999: Part 1

FLAME PROOF MOTORS: Type Ex 'd'

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 45°C
Duty: S1 (Continuous)
750 rpm (8 Pole)

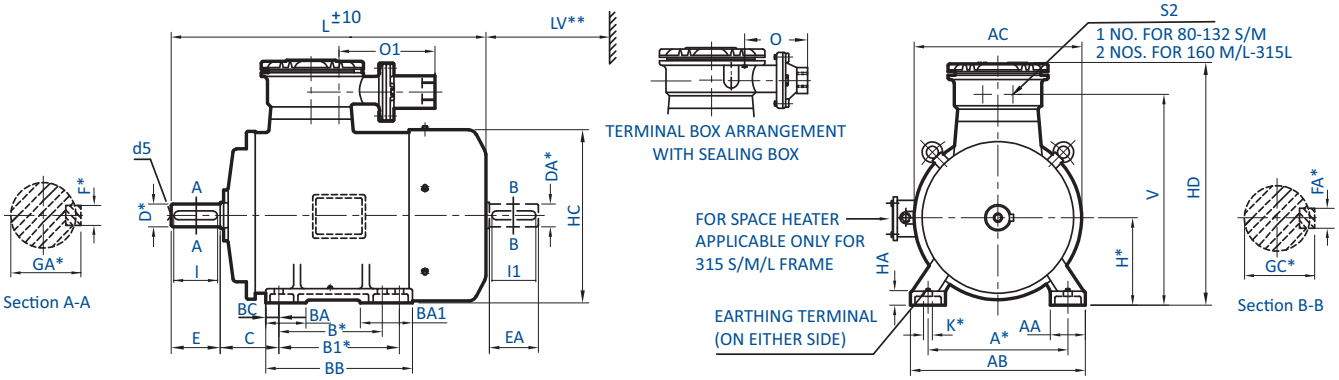
Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Operating characteristics at rated output									With DOL starting			Rotor GD²	Net Weight B3 constr.
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP	IEC	B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.18	0.25	80	3J08081300000	675	0.78	0.26	0.55	0.48	0.40	58.7	58.7	52.0	3.0	1.8	2.2	0.0054	27
*0.25	0.35	80	3J08083300000	675	0.94	0.36	0.58	0.48	0.40	64.1	64.1	58.0	3.0	1.8	2.2	0.0078	29
*0.37	0.5	90L	3J09L85300000	700	1.09	0.51	0.68	0.58	0.45	69.3	69.3	65	3.5	1.8	2	0.013	37
0.55	0.75	90L	3J09L86300000	690	1.54	0.78	0.68	0.58	0.45	73	73	68	3.5	1.8	2	0.017	39
0.75	1	100L	3J10L83300000	695	1.99	1.05	0.7	0.6	0.5	75	75	73	3.8	1.9	2.3	0.027	53
1.1	1.5	100L	3J10L85300000	695	2.81	1.54	0.7	0.6	0.5	77.7	77.7	75	3.8	1.9	2.3	0.034	56
1.5	2	112M	3J11M83300000	700	3.64	2.09	0.72	0.64	0.52	79.7	79.7	78	3.8	1.7	2.2	0.059	62
2.2	3	132S	3J13S8B300000	710	5.05	3.02	0.74	0.66	0.55	81.9	81.9	80	3.8	1.7	2.2	0.091	81
3.7	5	160M	3J16M82300000	715	8.12	5.04	0.75	0.7	0.58	84.5	84.5	83	4.8	1.7	2.2	0.219	139
5.5	7.5	160M	3J16M84300000	715	11.8	7.49	0.75	0.7	0.58	86.2	86.2	85	4.8	1.8	2.3	0.350	160
7.5	10	160L	3J16L88300000	715	15.9	10.2	0.75	0.7	0.58	87.3	87.3	86	4.8	1.8	2.3	0.418	170
9.3	12.5	180M	3J18M87300000	725	19.3	12.5	0.76	0.70	0.60	88.1	88.1	87.0	5.5	2.0	2.2	0.811	274
11	15	180L	3J18L89300000	725	22.7	14.8	0.76	0.70	0.60	88.6	88.6	87.5	5.5	2.0	2.2	0.906	284
15	20	200L	3J20L85300000	725	28.4	20.2	0.82	0.77	0.65	89.6	89.6	88.6	6.0	2.3	2.5	1.45	318
18.5	25	225S	3J22S82300000	725	34.8	24.9	0.82	0.80	0.72	90.1	90.1	89.1	5.5	2.0	2.2	2.11	383
22	30	225M	3J22M83300000	725	41.2	29.6	0.82	0.80	0.72	90.6	90.6	89.6	5.5	2.0	2.2	2.41	405
30	40	250M	3J25M81300000	730	55.7	40.0	0.82	0.80	0.72	91.3	91.3	91.0	5.5	2.0	2.2	3.28	570
37	50	280S	3J28S82300000	730	71.9	49.4	0.78	0.74	0.65	91.8	91.8	91.0	5.5	2.0	2.2	6.18	725
45	60	280M	3J28M85300000	738	89.3	59.4	0.76	0.72	0.60	92.2	92.2	91.5	5.5	2.0	2.2	7.25	725
55	75	315S	3J31S81300000	739	110	72.5	0.75	0.72	0.62	92.5	92.5	92	5.5	1.8	2	9.6	936
75	100	315M	3J31M83300000	739	151	98.8	0.74	0.7	0.62	93.1	93.1	92.5	5.5	1.8	2	11.4	1010
90	120	315M	3J31M85300000	741	176	118.3	0.76	0.72	0.64	93.4	93.4	93	5.5	1.8	2	14.8	1120
110	150	315L	3J31L87300000	742	221	144.4	0.74	0.69	0.58	93.7	93.7	93	5.5	2	2.2	17.3	1348
125	170	315L	3J31L8A300000	742	244	164.1	0.76	0.70	0.6	93.9	93.9	93	5.5	2	2.2	21.5	1475
132	180	315L	3J31L89300000	742	257	173.3	0.76	0.72	0.62	94	94	93	5.5	2	2.2	21.5	1475

* These ratings are offered in higher frame size
Note: All performance values are subject to tolerance as per IS: 15999: Part 1

FLAME PROOF MOTORS: Type Ex 'd'

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615
Foot Mounted IMB3/IM1001 Motors



		FIXING						GENERAL											TERMINAL BOX				SHAFT					
IEC Fr. Size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	BC	HA	HC	HD	L	AC	LV**	V	O	O1	S2	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4, 6 & 8	125	100	—	50	80	10	153	126	32	36	—	16	10	162	296	330	164	30	236	214	135	M20x1.5P	19	40	6	21.5	35	M6
	2(1.1kW) 4(0.55kW) 6(0.55kW)																352												
90L	2, 4, 6 & 8	140	125	—	56	90	10	180	160	50	40	—	16	13	177	336	382	174	35	269	217	141	M25x1.5P	24	50	8	27	45	M8
	2(2.2kW) 4(1.5kW) 6(1.1kW)																418												
100L	2, 4	160	140	—	63	100	12	200	176	54	45	—	21	14	198	358	465	195	40	291	207	131	M25x1.5P	28	60	8	31	55	M10
	6, 8																435												
112M	2, 8	190	140	—	70	112	12	230	176	50	55	—	21	15	222	374	456	220	45	316	200	124	M25x1.5P	28	60	8	31	55	M10
	4, 6																481												
132S/M	2, 4, 6 & 8	216	140	178	89	132	12	256	218	50	53	77	23	17	262	408	551	260	50	352	175	100	M25x1.5P	38	80	10	41	70	M12
	2(7.5kW) 4(7.5kW) 6(5.5kW)																602												
160M/L	2	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704	314	60	404	252	151	M25x1.5P	42	110	12	45	105	M16
	4, 6 & 8																694												
	2(18.5kW) 6(11kW)																734												
180M/L	2, 4, 6 & 8	279	241	279	121	180	15	339	426	80	112	212	55	26	357	515	850	354	70	447	270	166	M25x1.5P	48	110	14	51.5	100	M16
200L	2, 4	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805	394	80	488	237	113	M25x1.5P	55	110	16	59	100	M20
	6, 8																771												
	2(37kW) 4(30kW)																870												
	6(22kW) 8(15kW)																840												
225S/M	2	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	882	444	90	564	308	264	M40x1.5P	55	110	16	59	100	M20
	4, 6																912							60	140	18	64	130	
	8																836												
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	994	489	100	601	287	242	M40x1.5P	60	140	18	64	130	M20
	4, 6																							65	140	18	69	130	
	8																915												
280S/M	2	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	544	115	668	252	207	M40x1.5P	60	140	18	69	130	M20
	4, 6 & 8																							75	140	20	79.5	130	
315S/M	2	508	406	457	216	315	28	625	540	120	115	155	46	49	617	850	1178	606	130	758	256	225	M50x1.5P	65	140	18	69	130	M20
	4, 6 & 8																1163							80	170	22	85	160	
315L	2	508	508	—	216	315	28	625	593	120	115	115	46	45	617	850	1343	606	145	758	276	225	M50x1.5P	65	140	18	69	130	M20
	4, 6 & 8																1328							90	170	25	95	160	M24

Tolerances on Dimensions with*

Dimension	Tolerance		Specification
A, B	±0.75		
H	-0.5	UPTO 280	IS : 1231
	-1.0	OVER 280	
K	+0.360	10Ø	
	+0.430	12, 15Ø	
	+0.520	19, 24, 28Ø	

Dimension	Tolerance		Specification
D, DA	j6	19, 24, 28Ø	IS : 1231
	k6	38, 42, 48Ø	
	m6	55, 60, 65, 75, 80, 90Ø	
GA, GC, F, FA			IS : 2048

** Minimum distance for efficient cooling of motor to be maintained by user.

Note: For non standard motors, dimensions may change. Please contact our nearest sales office for details

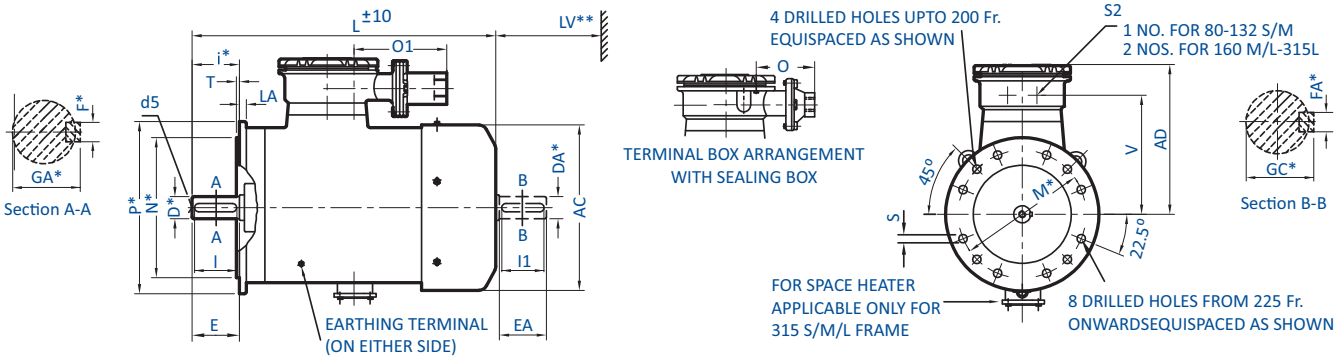
- ☐ Separate space heater T. Box will be provided as a std. feature in case of 315 S/M/L frames.
- ☐ Key / key way fit: h9 / N9.
- ☐ Double shaft extension can be provided with shaft dimension identical to D.E. shaft.

All Dimensions are in mm unless otherwise specified.

CAT-D-80315-3-1

FLAME PROOF MOTORS: Type Ex 'd'

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 Flange Mounted IMB5/IM3001 Motors



		FIXING				GENERAL							TERMINAL BOX				SHAFT					
IEC Fr. Size	Pole	P*	N*	M*	i*	S	T	LA	AC	L	AD	LV**	V	O	O1	S2	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4, 6 & 8	200	130	165	40	12	3.5	11	164	330	216	30	156	214	135	M20x1.5P	19	40	6	21.5	35	M6
	2(1.1kW) 4(0.55kW) 6(0.55kW)									352												
90L	2, 4, 6 & 8	200	130	165	50	12	3.5	11	174	382	246	35	179	217	141	M25x1.5P	24	50	8	27	45	M8
	2(2.2kW) 4(1.5kW) 6(1.1kW)									418												
100L	2, 4	250	180	215	60	15	4	12	195	465	258	40	191	207	131	M25x1.5P	28	60	8	31	55	M10
	6, 8									435												
112M	2, 8	250	180	215	60	15	4	12	220	456	262	45	204	200	124	M25x1.5P	28	60	8	31	55	M10
	4, 6									481												
132S/M	2, 4, 6 & 8	300	230	265	80	15	4	13	260	551	290	50	223	175	100	M25x1.5P	38	80	10	41	70	M12
	2(7.5kW) 4(7.5kW) 6(5.5kW)									602												
160M/L	2	350	250	300	110	19	5	13	314	704	312	60	244	252	151	M25x1.5P	42	110	12	45	105	M16
	4, 6 & 8									694												
	2(18.5kW) 6(11kW)									734												
180M/L	2, 4, 6 & 8	350	250	300	110	19	5	16	354	875	335	70	267	270	166	M25x1.5P	48	110	14	51.5	100	M16
200L	2, 4	400	300	350	110	19	5	15	394	826	356	80	288	237	133	M25x1.5P	55	110	16	59	100	M20
	6, 8									792												
	2(37kW) 4(30kW)									891												
	6(22kW) 8(15kW)									861												
225S/M	2	450	350	400	110	19	5	16	444	882	426	90	339	308	264	M40x1.5P	55	110	16	59	100	M20
	4, 6				140					912							60	140	18	64	130	
	8									836												
250M	2	550	450	500	140	19	5	18	489	994	438	100	351	287	242	M40x1.5P	60	140	18	64	130	M20
	4, 6																65	140	18	69	130	
	8									915												
280S/M	2	550	450	500	140	19	5	18	544	1010	475	115	388	252	207	M40x1.5P	65	140	18	69	130	M20
	4, 6 & 8																75	140	20	79.5	130	
315S/M	2	660	550	600	140	24	6	22	610	1178	535	130	443	276	225	M50x1.5P	65	140	18	69	130	M20
	4, 6 & 8				170					1163							80	170	22	85	160	
315L	2	660	550	600	140	24	6	22	610	1343	535	145	443	276	225	M50x1.5P	65	140	18	69	130	M20
	4, 6 & 8				170					1328							90	170	25	95	160	M24

Tolerances on Dimensions with*

Dimension	Tolerance		Specification
N	j6	UPTO 450	IS : 2223
	js6	OVER 450	
M	±0.3	UPTO 265	
	±0.5	OVER 265	
i	±1	UPTO 85	
	±1.5	OVER 85	

Dimension	Tolerance		Specification
D, DA	j6	19, 24, 28Ø	IS : 1231
	k6	38, 42, 48Ø	
	m6	55, 60, 65, 75, 80, 90Ø	
GA, GC, F, FA			IS : 2048

All Dimensions are in mm unless otherwise specified.

** Minimum distance for efficient cooling of motor to be maintained by user.

Note: For motor in frame 180M/L & 200L with B3/B5 Mounting, kindly refer to our nearest sales office.
For non standard motors, dimensions may change. Please contact our nearest sales office for details.

- ☐ Separate space. heater T. Box will be provided as a std. feature in case of 315 S/M/L frames.
- ☐ Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- ☐ 8 Nos. Fixing Holes from 225 S/M frame onwards
- ☐ Key / key way fit: h9 / N9.

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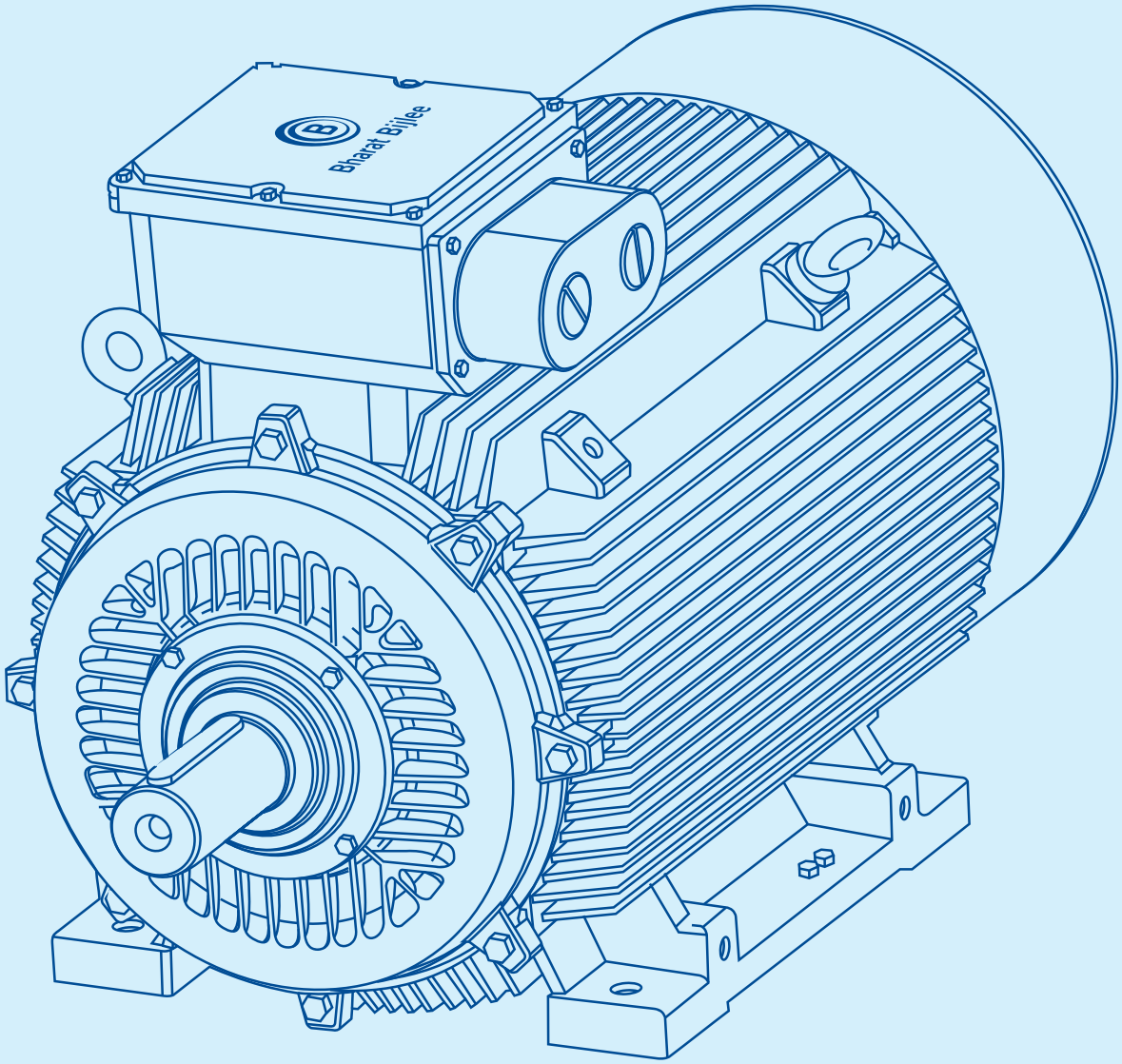
INCREASED SAFETY Ex ec MOTORS



INCREASED SAFETY: Type Ex ec-IS/IEC 60079-7 (Former Ex nA)

A. Technical Information

Increased Safety Ex ec motors provide protection against auto ignition of surrounding gases, which may be released under abnormal operating conditions.

A.1 Reference Standards

IS/IEC 60079	Electrical apparatus for explosive gas atmosphere - Part 0 General Requirements
IS/IEC 60079-7	Electrical apparatus for explosive gas atmosphere - Part 7 Equipment Protection by increased safety ''e"
IS 5572	Classification of hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 16724	Explosive Atmospheres - Electrical installations design, selection and Erection
IEC 60079-14	Explosive Atmospheres - Part 14: Electrical installations design, selection and erection

A.2 Limiting Temperature

These motors are designed such that the limiting temperatures of all parts in continuous operation does not exceed 200°C i.e. Temperature Class T3, as per IS/IEC 60079-7.

A.3 Electrical Features

Standard Operating Conditions

- Voltage: 415V ± 10%
- Frequency: 50 Hz ± 5%
- Combined Variation: ± 10% (absolute sum with maximum frequency variation 5%)
- Ambient: 50°C
- Altitude: upto 1000m above mean sea level

Re-Rating factors applicable under different conditions of Supply Voltage, Frequency, Ambient and Altitude

Voltage Variation %	Frequency Variation %	Combined Voltage & Frequency %	Permissible Output as % of Rated Value
± 10	± 5	± 10	100

For Motors with Ambient 50°C	
Ambient Temperature (°C)	Permissible Output as % of Rated Value
50	100
55	93
60	85

Altitude above Mean Sea Level (m)	Permissible Output as % of Rated Value
1000	100
1500	97
2000	94
2500	90
3000	86
3500	82
4000	77

Method of Starting

kW Rating	Method of Starting	No. of Leads
Upto & including 1.5 kW	DOL	3 (Internal Star Connection)
Above 1.5 kW	DOL or Star / Delta	6

Starting Current Measurement of Bharat Bijlee Motors

Induction motor starting current is generally 6 to 7 times the full load current of the motor. This is a characteristic feature of the motor and though undesirable, it is inevitable in the design of the motor.

Measurement of this starting current at rated voltage becomes difficult since it demands higher capacity of the supply system as well as use of appropriate CTs in the circuit of meters. Generally, a fraction of rated starting current is passed in the motor due to capacity constraints. This current is extrapolated to rated voltage.

INCREASED SAFETY MOTORS: Type Ex ec

Following guidelines are followed to conduct Locked Rotor Test

kW Range	Measurement at % of Voltage to Rated Voltage
0.12 kW to 90 kW	70 %
90 kW to 200 kW	60 %
200 kW to 355 kW	35 %

Earthing Terminals

Two earthing terminals are provided on the body and one earthing terminal is provided in the terminal box.

A.4 Mechanical Features

Enclosure and Cooling

Upto 71 Frame: Aluminium Construction; 80 Frame and above: Cast Iron Construction.

All motors are Totally Enclosed Fan Cooled (TEFC). The cooling is affected by self-driven, bi-directional cast iron or fabricated centrifugal fan protected by fan cover. The type of cooling is IC 411 as per IS 6362/IEC 60034-6. Minimum cooling distance as indicated in GA drawing has to be provided for effective cooling of the motor.

Degree of Protection

All Increased Safety motors have degree of protection IP55 as per IS/IEC 60034-5 as a standard feature. In addition, all flange mounted motors (B5 and B14) have oil tight shaft (OTS) protection. Motors with V1, V5 and V18 mounting are provided with a canopy fitted on the top of the fan cover.

Paint

All internal and external surfaces are coated with epoxy polymide base acid/alkali resistant paint of Dark Admiralty Grey, Shade No. 632 (as per IS: 5).

Name Plate

Stainless steel name plate is provided in each motor. Special data such as efficiency, temperature class and statutory approval reference are also provided on the nameplate along with the usual name plate details.

Bearing and Terminal Box Details

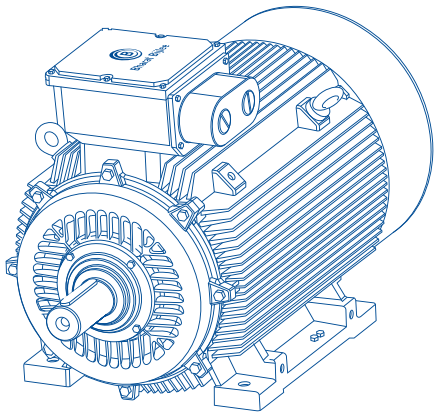
Fr. Size	Bearing Nos. C3 Clearance		Terminals		No. & Size of Cable Entries	Max cond cross sec area (mm²)
	D.E.	N.D.E.	Nos	Size		
63	6201 2Z	6201 2Z	3	M4	2 x M20 x 1.5P	4
71	6202 2Z	6202 2Z				
80	6004 2Z	6004 2Z				
90S, 90L	6205 2Z	6205 2Z	3*			
100L	6206 2Z	6205 2Z	3*		2 x M25 x 1.5P	10
112M	6206 2Z	6205 2Z				
132S/M	6208 2Z	6208 2Z	6	M5		
160M/L	6309 2Z	6209 2Z				16
180M/L	6310 2Z	6210 2Z	6	M6	2 x M32 x 1.5P	50
200L	6312 2Z	6212 2Z	6	M8	2 x M40 x 1.5P	70
225S/M	6313	6213				
250M	6315	6215	6	M10	2 x M50 x 1.5P	150
280S/M (2 Pole)	6316	6316				
280S/M (4, 6 Pole)	6317	6316				
315S/M	6319	6319	6	M12	2 x M50 x 1.5P	185
315L	6319	6319			2 x M63 x 1.5P	240
355L	6322	6322	6	M16	2 x M75 x 1.5P	300
355L/K (2 Pole)	6319	6319	6	M20	2 x M75 x 1.5P	400
355L/K (4, 6 Pole)	6322	6322				

* 3 terminals up to and including 1.5 kW and 6 terminals for higher kW output.

Note: 1) L10 bearing life is 50,000 hours for directly coupled loads through flexible couplings only.
2) In 315L frame for star delta connection, higher size T box of 355 frame will be provided.

INCREASED SAFETY MOTORS: Type Ex ec

B. General Specifications: Standard and Optional Features



Range

- **Series:** Increased Safety Motors, Type Ex ec: Efficiency Values Complying to IE2 & IE3 class of IS 12615/IEC 60034-30-1
- **kW:** 0.12 to 355
- **Frame:** 63 to 355
- **Polarity:** 2, 4, 6, 8

Standard Features	Optional Features
Voltage: 415V	Upto 690V
Frequency: 50 Hz	
IP55	IP56, IP65, IP66
B3 Mounting	B5, B35, V1 & B14 (upto 132 Frame)
Ambient: 50°C	Upto 60°C
Duty: S1	S3/S4 on request
TB Position: Top	RHS / LHS
Aluminium Construction: 63, 71 Frame Cast Iron Construction: 80 Frame and above	
Shaft Material: EN8	EN24, EN57
Insulation: Class F	Insulation: Class H
IC411: Totally Enclosed Fan Cooled	
Sealed Bearing: upto 200 Frame Online Greasing Arrangement: 225 Frame and above	Online Greasing Arrangement: 180 to 200 Frame
Paint Shade: AAP 632	AAP Epoxy based RAL grade or Epoxy based IS:5 grade
Fan Cover: Mild Steel	
Gelcoat on Winding: For all frames	
Motor suitable for grid supply	**Inverter Duty Suitability:** Combined testing facility available for temperature class certification
Packing: Thermocol / Corrugated Boxes: Upto 132 Frame Wooden Packing Boxes: 160 Frame and above	Seaworthy/Export Packing Case
For standard bearings, kindly refer to the bearing chart	Insulated Bearing: 132 Frame and above (hybrid bearing till 225 Frame) Cylindrical Roller Bearing on DE Side: 160 Frame and above

Our other optional features

- Non standard shaft material, diameter and extension
- Double compression flame proof glands
- Higher size T Box, auxiliary T Box from 200 Frame onwards as per requirement and feasibility
- Space Heater: 90 Frame and above
- Thermistor: 90 Frame and above
- Canopy, water flinger, non standard paint and paint shade
- High temperature grease
- Reduced and special grades of vibration as per IS 12075 can be provided on request

Note

1) Kindly confirm application wise requirement of auxiliary terminal box with our nearest sales office.
2) For Increased Safety Ex ec motors to be operated on VFD supply, combined testing of motor and converter is mandatory. Refer page 27 for further details.
3) For any other non standard feature, kindly contact our nearest sales office.

INCREASED SAFETY MOTORS: Type Ex ec

C. Statutory Requirement for Increased Safety Induction Motors Fed with VFD Supply

Combined testing of Increased Safety motor and converter

Bharat Bijlee motors have been tested and approved by statutory authorities for given temperature class with sinusoidal supply. Since VFD supply contains more harmonics, temperature of motor increases on VFD supply. This leads to increase in surface temperature. Also, with the VFD, motor speed is varied. When motor speed is reduced, it leads to poor cooling and higher temperature rise. So the new temperature class needs to be verified by statutory authority. IS 16724 (Explosive Atmospheres - Electrical installations design, selection and erection) or IEC 60079-14 (Explosive Atmospheres - Part 14: Electrical installations design, selection and erection) is the selection and installation guide for the user. The statutory testing authorities insist that the motors intended for use in hazardous area, which are to be supplied with varying voltage and frequency by converter, shall be tested, certified and approved in association with the converter to determine the temperature class / maximum surface temperature.

Note

1. Additional factors may also need to be taken into account, which include provision by the user of additional output filters or reactors and the length of cable between converter and motor. Both these affect motor input voltage and cause additional motor heating.
2. High frequency switching in converters can lead to rapid rise time voltage stress in windings and cable circuits, and is therefore a further potential source of ignition. It is necessary to consider the effects of this stress according to the type of protection. It will be necessary to add an additional output filter after the converter.
3. Bearing currents require special consideration. Possible solutions include the use of insulated bearings, either alone, or in accordance with a filter that reduces common mode voltages and / or dV/dt.

Cable length between motor and converter

Whenever Increased Safety Ex ec motor is fed through converter supply, normally the converter is placed in a safe area and the motor works in hazardous area. Hence, the cable length between the converter and the motor is generally high, i.e. 500 to 800 meters long. For effective and trouble free operation of motor, use of filters (preferably sine wave filter) at converter output terminals is a must, when using such high cable length. The customer and / or his system integrator has to ensure that the Peak Phase to Phase voltage appearing at motor terminals is <= 1.56kV for rated supply 415V and rise time is > 0.5 micro second. Electrically balanced shielded cable (with 3 earth conductors) should always be used when motors are fed with VFD supply.

Use of thermal protective devices

Use of thermistors is recommended to monitor the temperature rise of stator winding of motor.

INCREASED SAFETY MOTORS: Type Ex ec

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 50°C
Duty: S1 (Continuous)
3000 rpm (2 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Speed	Current	Rated Torque	Power Factor			% Efficiency			With DOL starting		Pullout Torque to Rated Torque Ratio	Rotor GD²	Net Weight
													Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP			RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.18	0.25	63	3E063213AT000	2700	0.53	0.06	0.72	0.65	0.50	65.9	65.9	60.0	3.5	2.3	2.5	0.0005	4.5
0.25	0.35	63	3E063233AT000	2700	0.69	0.09	0.72	0.65	0.50	69.7	69.7	64.0	3.5	2.4	2.6	0.0006	5
0.37	0.50	71	3E071233AT000	2860	0.91	0.13	0.77	0.65	0.55	73.8	73.8	67.0	5.5	2.9	3.2	0.0016	7.7
0.55	0.75	71	3E071253AT000	2840	1.28	0.19	0.77	0.70	0.56	77.8	77.8	74.5	5.0	2.7	3.0	0.0018	9
0.75	1.0	80	3E0802B3CT000	2870	1.54	0.25	0.84	0.79	0.70	80.7	80.7	79.7	6.0	2.7	3.0	0.0033	11
1.1	1.5	80	3E0802E3CT000	2850	2.28	0.38	0.81	0.76	0.65	82.7	82.7	80.0	6.0	2.8	3.1	0.0037	18
1.5	2.0	90S	3E09S2B3CT000	2850	2.88	0.51	0.86	0.81	0.72	84.2	84.2	84.2	6.5	2.75	3.0	0.0066	23
2.2	3.0	90L	3E09L2E3CT000	2850	4.14	0.75	0.86	0.80	0.71	85.9	85.9	85.5	6.5	3.0	3.3	0.0084	26
3.7	5.0	100L	3E10L2B3CT000	2890	6.74	1.25	0.87	0.82	0.73	87.8	87.8	87.3	7.0	3.0	3.1	0.0158	35
5.5	7.5	132S	3E13S2C3CT000	2935	9.53	1.83	0.90	0.87	0.81	89.2	89.2	87.5	7.0	2.3	3.0	0.0878	77
7.5	10	132S	3E13S2H3CT000	2935	12.9	2.49	0.90	0.87	0.81	90.1	90.1	88.7	7.0	2.3	3.0	0.0936	80
9.3	12.5	160M	3E16M2B3CT000	2950	16.6	3.07	0.86	0.83	0.76	90.7	90.3	88.7	6.5	2.3	2.8	0.151	101
11	15	160M	3E16M2E3CT000	2950	19.3	3.63	0.87	0.83	0.76	91.2	91.2	89.2	7.0	2.5	3.0	0.173	109
15	20	160M	3E16M2H3CT000	2945	26.1	4.96	0.87	0.84	0.77	91.9	91.9	90.0	6.5	2.3	2.8	0.217	126
18.5	25	160L	3E16L2M3CT000	2945	31.3	6.12	0.89	0.86	0.79	92.4	92.4	90.8	6.5	2.3	2.8	0.258	144
22	30	180M	3E18M2B3CT000	2950	37.5	7.26	0.88	0.84	0.78	92.7	92.7	91.0	7.0	2.7	3.0	0.336	188
30	40.0	200L	3E20L2B3CT000	2955	50.8	9.89	0.88	0.86	0.80	93.3	93.3	91.8	6.5	2.6	3.0	0.593	280
37	50.0	200L	3E20L2E3CT000	2955	62.4	12.20	0.88	0.86	0.80	93.7	93.7	92.0	6.8	2.7	3.1	0.651	296
45	60	225M	3E22M2B3CT000	2965	75.7	14.8	0.88	0.86	0.82	94.0	94.0	93.0	6.6	2.1	2.7	1.19	395
55	75	250M	3E25M2E3CT000	2970	91.2	18.0	0.89	0.86	0.80	94.3	94.3	93.0	6.8	2.5	3.0	1.68	550
75	100	280S	3E28S2E3CT000	2970	121	24.6	0.91	0.89	0.86	94.7	94.7	92.7	7.0	2.0	2.7	3.08	675
90	120	280M	3E28M2H3CT000	2970	145	29.5	0.91	0.89	0.86	95.0	95.0	93.0	7.0	2.0	2.7	3.69	760
110	150	315S	3E31S2E3CT000	2982	179	35.9	0.90	0.86	0.80	95.2	94.6	93.0	7.0	2.2	2.5	5.00	940
132	180	315L	3E31L2H3CT000	2982	214	43.1	0.90	0.86	0.80	95.4	94.8	93.2	7.0	2.2	2.5	6.20	1100
150	200	315L	3E31L2A3CT000	2985	248	49.0	0.88	0.86	0.80	95.5	95.5	93.0	7.0	2.4	2.7	7.70	1390
160	215	315L	3E31L2M3CT000	2985	265	52.2	0.88	0.86	0.80	95.6	95.6	93.6	7.0	2.4	2.7	7.70	1390
180	240	355L	3E35L2A3CT000	2987	284	58.7	0.92	0.89	0.86	95.7	95.7	93.7	7.0	1.8	2.4	12.0	1680
200	270	355L	3E35L2B3CT000	2988	316	65.2	0.92	0.89	0.84	95.8	95.8	93.8	7.0	2.0	2.5	12.0	1680
225	300	355L	3E35L2C3CT000	2987	355	73.4	0.92	0.89	0.84	95.8	95.8	93.8	6.5	1.8	2.4	12.0	1680
250	335	355L	3E35L2E3CT000	2988	395	81.5	0.92	0.90	0.86	95.8	95.8	93.8	7.0	2.0	2.5	14.7	1870
280	375	355L	3E35L2G3CT000	2987	442	91.0	0.92	0.90	0.86	95.8	95.8	93.8	6.5	1.8	2.4	18.9	2140

For higher ratings upto 355kW, kindly refer to our nearest sales office
Note: All performance values are subject to tolerance as per IS: 15999 Part 1

Bharat Bijlee

INCREASED SAFETY MOTORS: Type Ex ec

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 50°C
Duty: S1 (Continuous)
1500 rpm (4 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Speed	Current	Rated Torque	Power Factor			% Efficiency			With DOL starting		Pullout Torque to Rated Torque Ratio	Rotor GD²	Net Weight
													Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP			RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.12	0.16	63	3E063433AT000	1365	0.37	0.09	0.69	0.60	0.48	64.8	64.0	61.0	3.7	1.8	2.1	0.0013	5.4
0.18	0.25	63	3E063453AT000	1350	0.51	0.13	0.70	0.61	0.49	69.9	69.0	65.0	3.7	1.7	2.0	0.0016	6
0.25	0.35	71	3E071453AT000	1400	0.67	0.17	0.71	0.63	0.52	73.5	73.5	72.0	4.0	2.0	2.5	0.0031	8
0.37	0.50	71	3E071463AT000	1405	0.97	0.26	0.69	0.61	0.50	77.3	77.3	74.0	4.5	2.5	2.8	0.0038	10
0.55	0.75	80	3E0804B3CT000	1415	1.18	0.38	0.80	0.70	0.56	80.8	80.8	79.8	5.3	2.8	3.0	0.0081	18
0.75	1.0	80	3E0804E3CT000	1420	1.71	0.51	0.74	0.63	0.50	82.5	82.5	80.0	5.5	3.0	3.3	0.0094	19
1.1	1.5	90S	3E09S4B3CT000	1425	2.33	0.75	0.78	0.70	0.55	84.1	84.1	82.5	5.5	2.5	2.7	0.0121	23
1.5	2.0	90L	3E09L4E3CT000	1425	3.14	1.03	0.78	0.70	0.55	85.3	85.3	84.5	6.0	2.5	2.7	0.0149	26
2.2	3.0	100L	3E10L4B3CT000	1435	4.53	1.49	0.78	0.72	0.60	86.7	86.7	85.8	6.0	2.5	3.0	0.0245	35
3.7	5.0	112M	3E11M4B3CT000	1455	7.37	2.48	0.79	0.74	0.60	88.4	88.4	86.5	6.5	3.0	3.5	0.0588	47
5.5	7.5	132S	3E13S4C3CT000	1455	10.3	3.68	0.83	0.78	0.66	89.6	89.6	88.4	6.5	2.5	3.0	0.117	67
7.5	10	132M	3E13M4H3CT000	1455	13.9	5.02	0.83	0.78	0.66	90.4	90.4	89.4	6.5	2.5	3.3	0.157	92
9.3	12.5	160M	3E16M4E3CT000	1465	17.3	6.18	0.82	0.77	0.66	91.0	91.0	90.4	6.5	2.1	2.5	0.212	105
11	15	160M	3E16M4H3CT000	1465	20.4	7.31	0.82	0.77	0.66	91.4	91.4	90.8	6.5	2.1	2.5	0.235	118
15	20	160L	3E16L4M3CT000	1465	27.3	9.97	0.83	0.78	0.68	92.1	92.1	91.6	6.5	2.2	2.7	0.306	136
18.5	25	180M	3E18M4B3CT000	1470	33.1	12.3	0.84	0.80	0.70	92.6	92.6	91.5	6.5	2.6	2.9	0.550	188
22	30	180L	3E18L4E3CT000	1470	39.2	14.6	0.84	0.80	0.70	93.0	93.0	92.0	6.5	2.6	2.9	0.635	209
30	40	200L	3E20L4B3CT000	1470	51.8	19.9	0.86	0.82	0.75	93.6	93.6	92.6	6.5	2.6	3.0	1.31	303
37	50	225S	3E22S4B3CT000	1480	65.3	24.4	0.84	0.80	0.71	93.9	93.9	93.4	6.5	2.5	2.6	1.79	368
45	60	225M	3E22M4E3CT000	1480	78.2	29.6	0.85	0.81	0.72	94.2	94.2	93.5	6.5	2.6	2.8	2.03	396
55	75	250M	3E25M4B3CT000	1480	96.3	36.2	0.84	0.80	0.72	94.6	94.6	93.8	6.0	2.0	2.6	3.06	500
75	100	280S	3E28S4B3CT000	1485	131	49.2	0.84	0.80	0.72	95.0	95.0	94.2	6.5	2.5	3.0	6.11	680
90	120	280M	3E28M4H3CT000	1487	155	59.0	0.85	0.82	0.74	95.2	95.2	94.5	6.5	2.5	3.0	7.14	735
110	150	315S	3E31S4G3CT000	1488	189	72.0	0.85	0.82	0.74	95.4	95.4	93.9	6.8	2.5	3.0	11.7	965
132	180	315M	3E31M4K3CT000	1488	226	86.4	0.85	0.82	0.74	95.6	95.6	94.1	6.8	2.5	3.0	14.0	1115
160	215	315L	3E31L4P3CT000	1490	277	105	0.84	0.80	0.72	95.8	95.8	94.5	6.6	2.5	3.0	15.6	1225
180	240	315L	3E31L4T3CT000	1491	311	118	0.84	0.80	0.72	95.9	95.9	94.6	6.6	2.7	3.0	17.8	1290
200	270	315L	3E31L4W3CT000	1491	345	131	0.84	0.80	0.72	96.0	96.0	95.0	6.6	2.7	3.0	17.8	1290
225	300	355L	3E35L4B3CT000	1490	375	147	0.87	0.83	0.72	96.0	96.0	95.0	6.0	1.7	2.4	23.3	1680
250	335	355L	3E35L4E3CT000	1492	416	163	0.87	0.83	0.72	96.0	96.0	95.0	6.5	1.8	2.4	32.7	1855
315	422	355L	3E35L4H3CT000	1492	525	206	0.87	0.83	0.72	96.0	96.0	95.0	6.5	1.8	2.4	31.9	2159

For higher ratings upto 355kW, kindly refer to our nearest sales office
Note: All performance values are subject to tolerance as per IS: 15999 Part 1

INCREASED SAFETY MOTORS: Type Ex ec

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 50°C
Duty: S1 (Continuous)
1000 rpm (6 Pole)

Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Speed	Current	Rated Torque	Power Factor			% Efficiency			With DOL starting		Pullout Torque to Rated Torque Ratio	Rotor GD²	Net Weight
													Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP			RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.18	0.25	71	3E071633AT000	890	0.56	0.20	0.70	0.60	0.48	63.9	63.9	62.0	3.0	2.0	2.2	0.0033	7.5
0.25	0.35	71	3E071653AT000	870	0.72	0.28	0.70	0.61	0.48	68.6	68.6	67.6	3.6	2.0	2.2	0.0038	8.7
0.37	0.50	80	3E0806B3CT000	910	0.96	0.40	0.73	0.62	0.53	73.5	73.5	72.5	4.0	2.2	2.5	0.0073	15
0.55	0.75	80	3E0806E3CT000	920	1.38	0.58	0.72	0.64	0.52	77.2	77.2	76.0	4.0	2.3	2.6	0.0101	18
0.75	1.0	90S	3E09S6B3CT000	925	1.84	0.79	0.72	0.62	0.52	78.9	78.9	78.6	4.0	2.1	2.5	0.0143	24
1.1	1.5	90L	3E09L6E3CT000	920	2.62	1.16	0.72	0.62	0.52	81.0	81.0	80.0	4.0	2.0	2.5	0.0181	27
1.5	2.0	100L	3E10L6B3CT000	935	3.51	1.56	0.72	0.62	0.54	82.5	82.5	81.0	4.5	2.3	2.5	0.0275	36
2.2	3.0	112M	3E11M6B3CT000	960	4.84	2.23	0.75	0.68	0.55	84.3	84.3	81.0	6.0	2.3	2.5	0.0691	49
3.7	5.0	132S	3E13S6C3CT000	960	7.83	3.75	0.76	0.70	0.58	86.5	86.5	86.0	5.5	2.2	2.6	0.121	66
5.5	7.5	132M	3E13M6H3CT000	965	11.3	5.55	0.77	0.70	0.60	88.0	88.0	87.5	5.5	2.2	2.6	0.180	89
7.5	10	160M	3E16M6B3CT000	970	15.2	7.53	0.77	0.72	0.61	89.1	89.1	88.5	6.0	2.0	2.6	0.275	106
9.3	12.5	160L	3E16L6E3CT000	970	18.7	9.34	0.77	0.72	0.61	89.8	89.8	89.0	6.0	2.0	2.6	0.332	122
11	15	160L	3E16L6H3CT000	970	22.0	11.0	0.77	0.72	0.61	90.3	90.3	89.2	6.0	2.0	2.6	0.390	134
15	20	180L	3E18L6B3CT000	977	27.6	15.0	0.83	0.78	0.72	91.2	91.2	91.2	5.5	2.5	3.0	0.886	205
18.5	25	200L	3E20L6B3CT000	980	34.2	18.4	0.82	0.79	0.70	91.7	91.7	91.0	6.0	2.7	3.2	1.23	253
22	30	200L	3E20L6E3CT000	980	40.5	21.9	0.82	0.80	0.70	92.2	92.2	91.2	6.0	2.7	3.2	1.47	276
30	40	225M	3E22M6B3CT000	984	51.1	29.7	0.88	0.84	0.77	92.9	92.9	92.6	6.5	3.0	3.5	2.85	387
37	50	250M	3E25M6B3CT000	985	63.4	36.6	0.87	0.85	0.77	93.3	93.3	92.7	7.0	2.8	3.0	3.40	510
45	60	280S	3E28S6B3CT000	984	79.5	44.5	0.84	0.80	0.72	93.7	93.7	93.0	6.0	2.4	2.9	5.11	600
55	75	280M	3E28M6E3CT000	985	95.7	54.4	0.85	0.81	0.72	94.1	94.1	93.4	6.0	2.5	3.0	6.82	690
75	100	315S	3E31S6B3CT000	992	130	73.6	0.85	0.82	0.72	94.6	94.6	93.6	6.0	2.5	3.0	10.7	830
90	120	315M	3E31M6E3CT000	992	155	88.4	0.85	0.82	0.72	94.9	94.9	93.9	6.0	2.5	3.0	12.4	912
110	150	315M	3E31M6H3CT000	992	189	108	0.85	0.82	0.72	95.1	95.1	94.2	6.0	2.5	3.0	15.5	1010
132	180	315L	3E31L6M3CT000	992	229	130	0.84	0.80	0.72	95.4	95.4	94.4	6.0	2.5	3.0	18.0	1175
160	215	355L	3E35L6B3CT000	990	277	157	0.84	0.81	0.71	95.6	95.6	93.0	6.0	2.0	2.5	28.7	1670
180	240	355L	3E35L6C3CT000	990	319	177	0.82	0.78	0.66	95.7	95.7	94.0	6.0	2.0	2.5	28.7	1670
200	270	355L	3E35L6E3CT000	991	346	197	0.84	0.80	0.70	95.8	95.8	94.1	6.0	2.0	2.5	35.5	1780
250	335	355L	3E35L643CT000	991	432	246	0.84	0.80	0.70	95.8	95.8	94.1	6.0	2.0	2.5	40.1	2154

For higher ratings upto 315kW, kindly refer to our nearest sales office
Note: All performance values are subject to tolerance as per IS: 15999 Part 1

Bharat Bijlee

INCREASED SAFETY MOTORS: Type Ex ec

D: Performance Data: Efficiency values complying to IE3 Efficiency Class of IS:12615

Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

Ambient: 50°C
Duty: S1 (Continuous)
750 rpm (8 Pole)

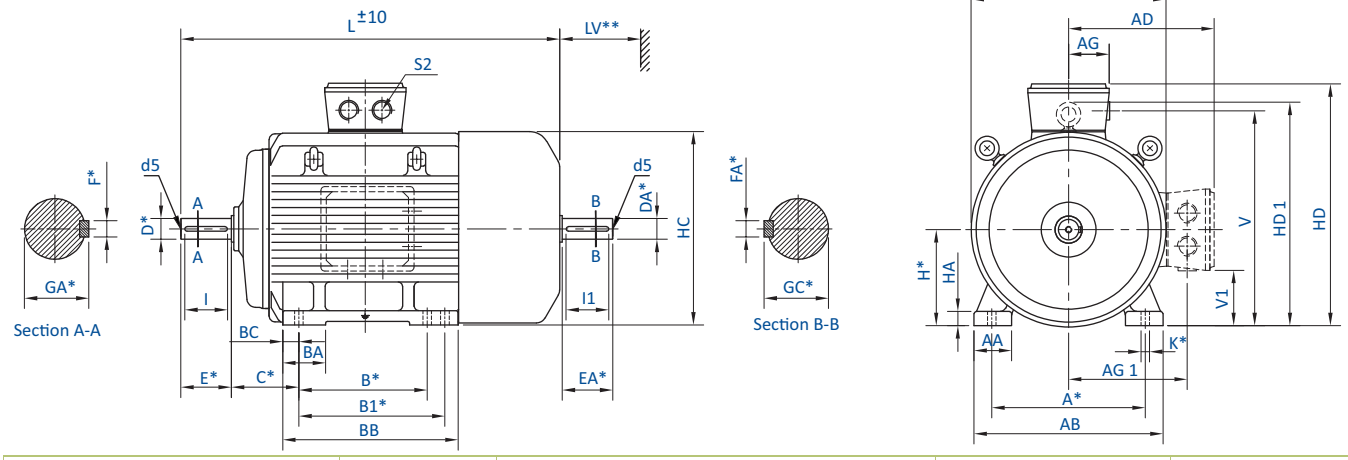
Insulation Class: Class F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size	Type Reference	Speed	Current	Rated Torque	Power Factor			% Efficiency			With DOL starting		Pullout Torque to Rated Torque Ratio	Rotor GD²	Net Weight
													Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP			RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.12	0.16	71	3E071833AT000	640	0.60	0.18	0.55	0.50	0.40	50.7	50.7	45.0	2.2	1.7	2.1	0.0033	7
0.18	0.25	80	3E080813CT000	675	0.78	0.26	0.55	0.48	0.40	58.7	58.7	52.0	3.0	1.8	2.2	0.0054	13
0.25	0.35	80	3E080833CT000	675	0.94	0.36	0.58	0.48	0.40	64.1	64.1	58.0	3.0	1.8	2.2	0.0078	15
0.37	0.50	90S	3E09S853CT000	700	1.10	0.51	0.68	0.58	0.45	69.3	69.3	65.0	3.5	1.8	2.0	0.0130	21
0.55	0.75	90L	3E09L863CT000	690	1.54	0.78	0.68	0.58	0.45	73.0	73.0	68.0	3.5	1.8	2.0	0.0170	22
0.75	1.0	100L	3E10L833CT000	695	2.00	1.05	0.70	0.60	0.50	75.0	75.0	73.0	3.8	1.9	2.3	0.0270	30
1.1	1.5	100L	3E10L853CT000	695	2.80	1.54	0.70	0.60	0.50	77.7	77.7	75.0	3.8	1.9	2.3	0.0340	34
1.5	2.0	112M	3E11M833CT000	700	3.64	2.09	0.72	0.64	0.52	79.7	79.7	78.0	3.8	1.7	2.2	0.0590	41
2.2	3.0	132S	3E13S8B3CT000	710	5.10	3.02	0.74	0.66	0.55	81.9	81.9	80.0	3.8	1.7	2.2	0.0910	62
3.7	5.0	160M	3E16M823CT000	715	8.12	5.04	0.75	0.70	0.58	84.5	84.5	83.0	4.8	1.7	2.2	0.219	91
5.5	7.5	160M	3E16M843CT000	715	11.8	7.49	0.75	0.70	0.58	86.2	86.2	85.0	4.8	1.8	2.3	0.350	111
7.5	10	160L	3E16L883CT000	715	15.9	10.2	0.75	0.70	0.58	87.3	87.3	86.0	4.8	1.8	2.3	0.418	126
9.3	12.5	180M	3E18M873CT000	725	19.3	12.5	0.76	0.70	0.60	88.1	88.1	87.0	5.5	2.0	2.2	0.811	188
11	15	180L	3E18L893CT000	725	22.7	14.8	0.76	0.70	0.60	88.6	88.6	87.5	5.5	2.0	2.2	0.906	203
15	20	200L	3E20L853CT000	725	28.4	20.2	0.82	0.77	0.65	89.6	89.6	88.6	6.0	2.3	2.5	1.44	271
18.5	25	225S	3E22S823CT000	725	34.8	24.9	0.82	0.80	0.72	90.1	90.1	89.1	5.5	2.0	2.2	2.11	324
22	30	225M	3E22M833CT000	725	41.2	29.6	0.82	0.80	0.72	90.6	90.6	89.6	5.5	2.0	2.2	2.41	351
30	40	250M	3E25M813CT000	730	55.7	40.0	0.82	0.80	0.72	91.3	91.3	91.0	5.5	2.0	2.2	3.25	498
37	50	280S	3E28S823CT000	730	71.9	49.4	0.78	0.74	0.65	91.8	91.8	91.0	5.5	2.0	2.2	6.18	641
45	60	280M	3E28M853CT000	738	89.3	59.4	0.76	0.72	0.60	92.2	92.2	91.5	5.5	2.0	2.2	7.25	690
55	75	315S	3E31S813CT000	739	110	72.5	0.75	0.72	0.62	92.5	92.5	92.0	5.5	1.8	2.0	9.6	836
75	100	315M	3E31M833CT000	739	151	98.8	0.74	0.70	0.62	93.1	93.1	92.5	5.5	1.8	2.0	11.4	900
90	120	315M	3E31M853CT000	741	176	118	0.76	0.72	0.64	93.4	93.4	93.0	5.5	1.8	2.0	14.8	1021
110	150	315L	3E31L873CT000	742	221	144	0.74	0.69	0.58	93.7	93.7	93.0	5.5	2.0	2.2	17.3	1228
125	170	315L	3E31L8A3CT000	742	244	164	0.76	0.70	0.60	93.9	93.9	93.0	5.5	2.0	2.2	21.5	1375
132	180	315L	3E31L893CT000	742	257	173	0.76	0.72	0.62	94.0	94.0	93.0	5.5	2.0	2.2	21.5	1375

For higher ratings upto 250kW, kindly refer to our nearest sales office
Note: All performance values are subject to tolerance as per IS: 15999 Part 1

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 Foot Mounted IMB3/IM1001 Motors



		FIXING					GENERAL													TERMINAL BOX						SHAFT					
IEC Fr. Size	Pole	A*	B*	B1*	C*	H*	K*	AB	BB	AA	BA	BA1	BC	HA	HC	HD	AD	L	LV**	AC	V	AG	HD1	V1	AG1	S2	D* DA*	E* EA*	F* FA*	GA* GC*	I I1	d5
63	2,4	100	80	—	40	63	7	126	100	28	30	—	13	7	125	190	—	206	30	124	159	52	—	—	—	M20x1.5P	11	23	4	12.5	18	M4
71	2(0.37kW), 4(0.25kW), 6(0.18kW) & 8	112	90	—	45	71	7	135	110	31	30	—	13	7	141	206	—	235	30	140	175	52	—	—	—	M20x1.5P	14	30	5	16	25	M5
	2(0.55kW), 4(0.37kW), 6(0.25kW)																	269													
80	2(1.1kW), 4&6(0.55kW)	125	100	—	50	80	10	150	124	31	35	—	15	9	159	206	145	310	30	157	195	52	—	—	114	M20x1.5P	19	40	6	21.5	35	M6
	2, 6, 8																	267													
90S	2, 4 ,6	140	100	—	56	90	10	180	130	50	43	—	18	13	177	230	140	336	35	174	200	52	—	57	110	M20x1.5P	24	50	8	27	45	M8
	8																	302													
90L	2, 4, 6		125	—					155			—						361					—								
	8																	327													
100L	2, 4	160	140	—	63	100	12	200	176	54	50	—	21	14	198	279	179	387	40	195	238	56	—	66	138	M25x1.5P	28	60	8	31	55	M10
	6, 8																	366													
112M	4, 6	190	140	—	70	112	12	230	176	62	51	—	21	15	222	303	191	419	45	220	246	56	260	80	151	M25x1.5P	28	60	8	31	55	M10
	8																	388													
132S	2	216	140	—	89	132	12	256	180	64	50	—	23	17	262	338	206	518	50	260	299	63	308	99	167	M25x1.5P	38	80	10	41	70	M12
	4																	475													
	6, 8																	459													
132M	4, 6		178						218		54							556													
160M	2(9.3kW), 4(9.3kW) & 6	254	210	—	108	160	15	310	250	58	70	—	23	20	318	386	226	605	60	316	346	63	366	98	186	M25x1.5P	42	110	12	45	105	M16
	2(11kW), 4(11kW) & 8																	635													
	2(15kW)																	655													
160L	2																	700													
	4, 6(11kW), & 8		254						294									679													
	6																	649													
180M	2, 4, 8	279	241	—	121	180	15	344	281	65	70	—	23	26	357	451	271	727	70	354	396	97	412	83	216	M32x1.5P	48	110	14	51.5	100	M16
180L	4, 6, 8		279						319									765													
200L	2, 4	318	305	—	133	200	19	398	355	85	85	—	28	32	397	519	319	850	80	394	449	155	461	—	249	M40x1.5P	55	110	16	59	100	M20
	6, 8																	772													
225S	4	356	286	—	149	225	19	436	336	85	85	—	28	34	450	569	344	872	90	445	498	155	509	—	275	M40x1.5P	60	140	18	64	130	M20
	8																	827													
225M	2																	867									55	110	16	59	100	
	4, 6		311						361									897									60	140	18	64	130	
	8																	855													
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	665	415	993	100	489	578	243	572	—	328	M50x1.5P	60	140	18	64	130	M20
	4, 6, 8																	914									65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	100	110	149	40	42	552	725	445	1027	115	544	638	243	630	—	358	M50x1.5P	65	140	18	69	130	M20
	4, 6, 8																	1010									75	140	20	79.5	130	
315S/M	2	508	406	457	216	315	28	605	540	120	120	155	46	45	617	834	519	1175	130	604	728	278	693	—	413	M50x1.5P	65	140	18	69	130	M20
	4, 6, 8																	1167									80	170	22	85	160	
315L	2		508	—				625	593			—						1340								M63x1.5P	65	140	18	69	130	
	4, 6, 8																	1332									90	170	25	95	160	M24
355L	2	610	630	—	254	355	28	710	770	110	170	—	73	45	693	939	584	1461	145	695	850	403	788	—	495	M75x1.5P	75	140	20	79.5	130	M20
	2(280kW)																	1505													
	4, 6																	1531									100	210	28	106	200	M24
	4(315kW), 6(250kW)																	1575													

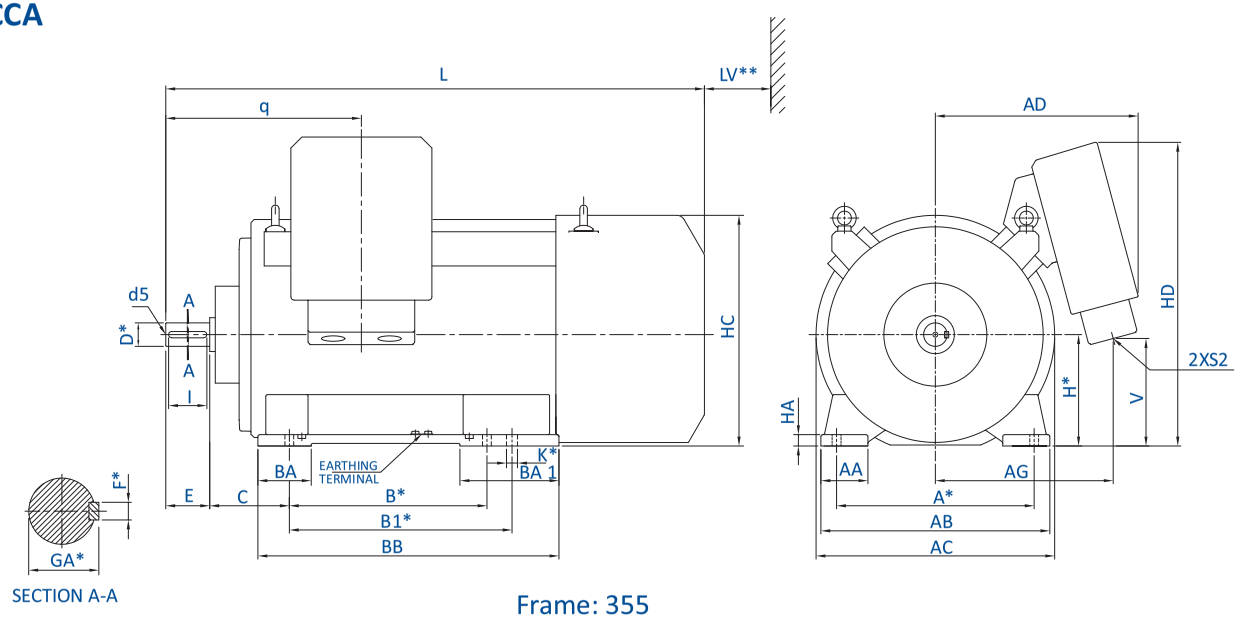
Notes: * This is a mandatory dimension for all standard motors
** Minimum distance for efficient cooling of motor to be maintained by user
1. All dimensions are in mm unless otherwise specified.
2. Tolerances on mandatory dimensions are as per IS: 1231.
3. For non standard motors, dimensions may change. Please contact our nearest sales office for details.

Notes: 1. Eyebolt is not provided in motors of 63 to 90 Frame.
2. Shaft extension at NDE identical to standard shaft extension at DE is not possible in 4, 6 & 8 pole in frames 315L & 355L.

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 | Foot Mounted (B3) Motors

Frame Size : 355 DCCA



Frame: 355

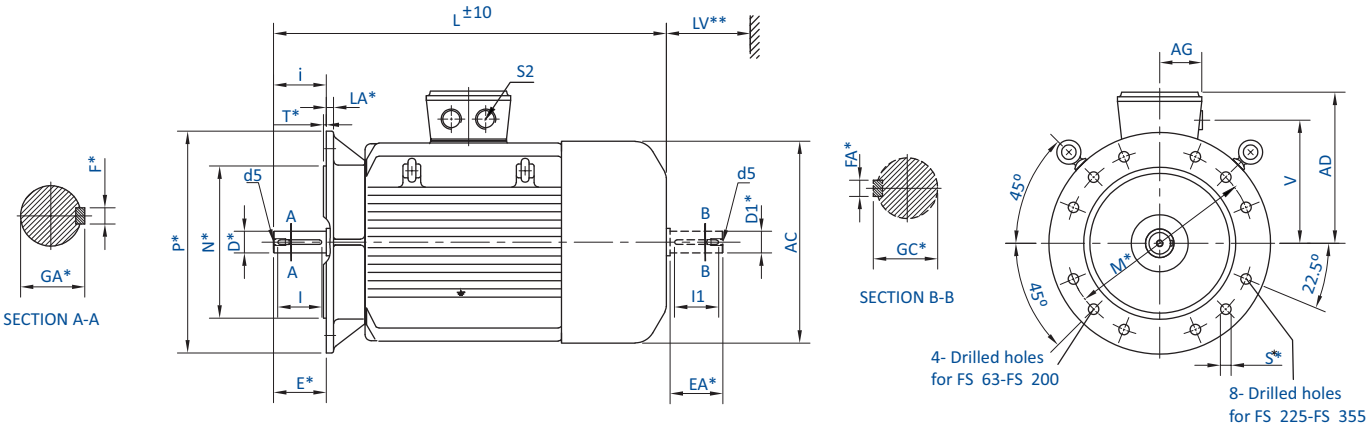
		FIXING						GENERAL											
IEC Fr. Size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	AC	Lv
355L/K	2	610	630	710	254	355	28	730	960	150	170	315	36	736	985	685	1735	765	200
355L/K	4/6/8	610	630	710	254	355	28	730	960	150	170	315	36	736	985	685	1765	765	130

		TERMINAL BOX					SHAFT					
IEC Fr. Size	Pole	V	q	AG	S2		D*	E	F*	GA*	I	d5
355L/K	2	345	625	595	M75X1.5P		75	140	20	79.5	130	M20
355L/K	4/6/8	345	655	595	M75X1.5P		95	170	25	100	160	M24

TABLE A									
Dimension	A	B	H	K	D	GA	F	d5 (Centering)	L
Tolerance	±0.75	±0.75	-1	-	m6	-	h9	-	±50
Specification	IS:1231	IS:1231	IS:1231	IS:1231	IS:1231	IS:2048	IS:2048	IS:2540	-

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 Flange Mounted IMB5/IM3001 Motors



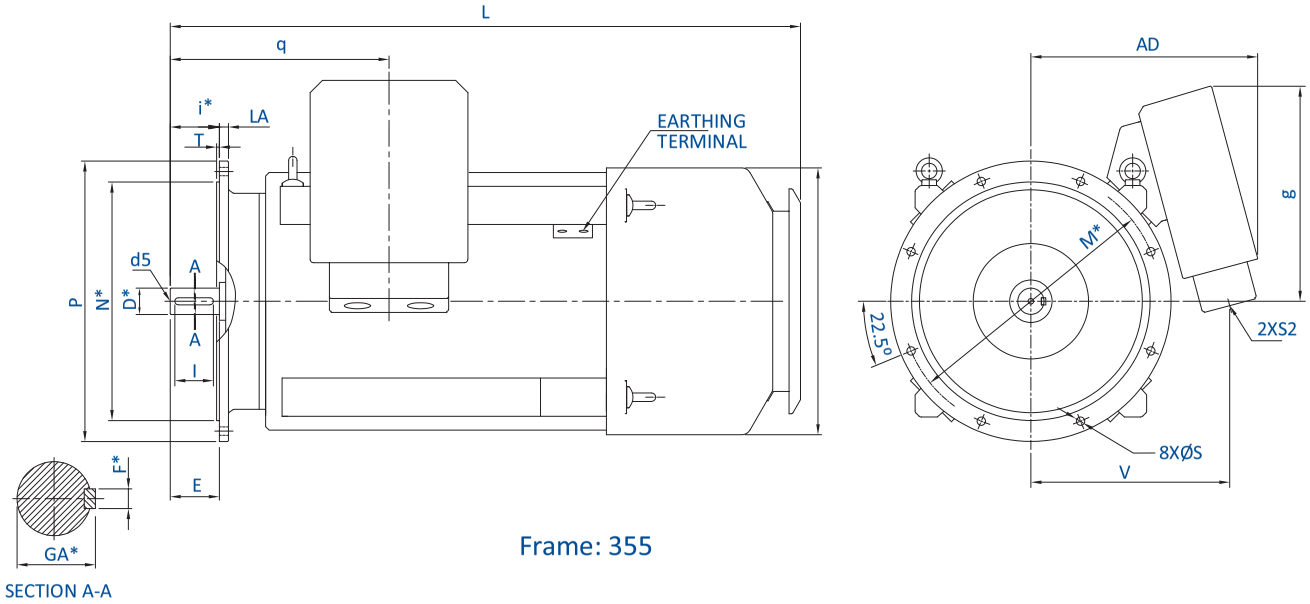
		FIXING					GENERAL						TERMINAL BOX			SHAFT					
IEC Fr. Size	Pole	P*	N*	M*	i	S*	T*	LA*	AD	L	LV**	AC	V	AG	S2	D* DA*	E* EA*	F* FA*	GA* GC*	I I1	d5
63	2,4	140	95	115	23	10	3	9	127	225	30	124	86	52	M20x1.5P	11	23	4	12.5	18	M4
71	2(0.37kW), 4(0.25kW), 6(0.18kW) & 8	160	110	130	30	10	3.5	9	135	262	30	140	95	52	M20x1.5P	14	30	5	16	25	M5
	2(0.55kW), 4(0.37kW), 6(0.25kW)									296											
80	2(1.1kW), 4, 6(0.55kW)	200	130	165	40	12	3.5	10	145	310	30	157	105	52	M20x1.5P	19	40	6	21.5	35	M6
	2, 6, 8									267											
90S	2, 4, 6	200	130	165	50	12	3.5	10	140	336	35	174	110	52	M20x1.5P	24	50	8	27	45	M8
	8									302											
90L	2, 4, 6									361											
	8									327											
100L	2, 4	250	180	215	60	15	4	11	179	387	40	195	138	56	M25x1.5P	28	60	8	31	55	M10
	6, 8									366											
112M	4, 6	250	180	215	60	15	4	11	191	419	45	220	151	56	M25x1.5P	28	60	8	31	55	M10
	8									388											
132S	2	300	230	265	80	15	4	12	206	518	50	260	167	63	M25x1.5P	38	80	10	41	70	M12
	4									475											
	6, 8									459											
132M	4, 6									556											
160M	2(9.3kW), 4(9.3kW), 6	350	250	300	110	19	5	13	226	605	60	316	186	63	M25x1.5P	42	110	12	45	105	M16
	2(11kW), 4(11kW), 8									635											
	2(15kW)									655											
160L	2									700											
	4, 6(11kW), 8									679											
	6									649											
180M	2, 4, 8	350	250	300	110	19	5	13	271	727	70	354	216	97	M32x1.5P	48	110	14	51.5	100	M16
180L	4, 6, 8									765											
200L	2, 4	400	300	350	110	19	5	15	319	850	80	394	249	155	M40x1.5P	55	110	16	59	100	M20
	6, 8									772											
225S	4	450	350	400	140	19	5	16	394	872	90	445	275	155	M40x1.5P	60	140	18	64	130	M20
	8									827											
225M	2				110					867						55	110	16	59	100	
	4, 6				140					897						60	140	18	64	130	
	8									855											
250M	2	550	450	500	140	19	5	18	415	993	100	489	328	243	M50x1.5P	60	140	18	64	130	M20
	4, 6, 8									914						65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	445	1027	115	544	358	243	M50x1.5P	65	140	18	69	130	M20
	4, 6, 8									1010						75	140	20	79.5	130	
315S/M	2	660	550	600	140	24	6	22	519	1175	130	604	413	278	M50x1.5P	65	140	18	69	130	M20
	4, 6, 8				170					1167						80	170	22	85	160	
315L	2				140					1340					M63x1.5P	65	140	18	69	130	
	4, 6, 8				170					1332						90	170	25	95	160	M24
355L	2	800	680	740	140	24	6	25	584	1461	145	695	495	403	M75x1.5P	75	140	20	79.5	130	M20
	2(280kW)									1505											
	4, 6				210					1531						100	210	28	106	200	M24
	4(315kW), 6(250kW)									1575											

Notes: * This is a mandatory dimension for all standard motors
** Minimum distance for efficient cooling of motor to be maintained by user
1. All dimensions are in mm unless otherwise specified.
2. Tolerances on mandatory dimensions are as per IS: 2223.
3. For non standard motors, dimensions may change. Please contact our nearest sales office for details.

Notes: 1. Eyebolt is not provided in motors of 63 to 90 Frame.
2. Shaft extension at NDE identical to standard shaft extension at DE is not possible in 4, 6 & 8 pole in frames 315L & 355L.

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 | Flange Mounted (V1) Motors
Frame Size: 355 DCCA



Frame: 355

		FIXING					GENERAL							TERMINAL BOX		
IEC Fr. Size	Pole	P	N*	M*	i*	S	T	LA	AD	AC	L	g	V	q	AG	S2
355L/K	2	800	680	740	140	24	6	25	685	765	1835	630	570	625	-	M75X1.5P
355L/K	4/6/8	800	680	740	170	24	6	25	685	765	1865	630	570	655	-	M75X1.5P

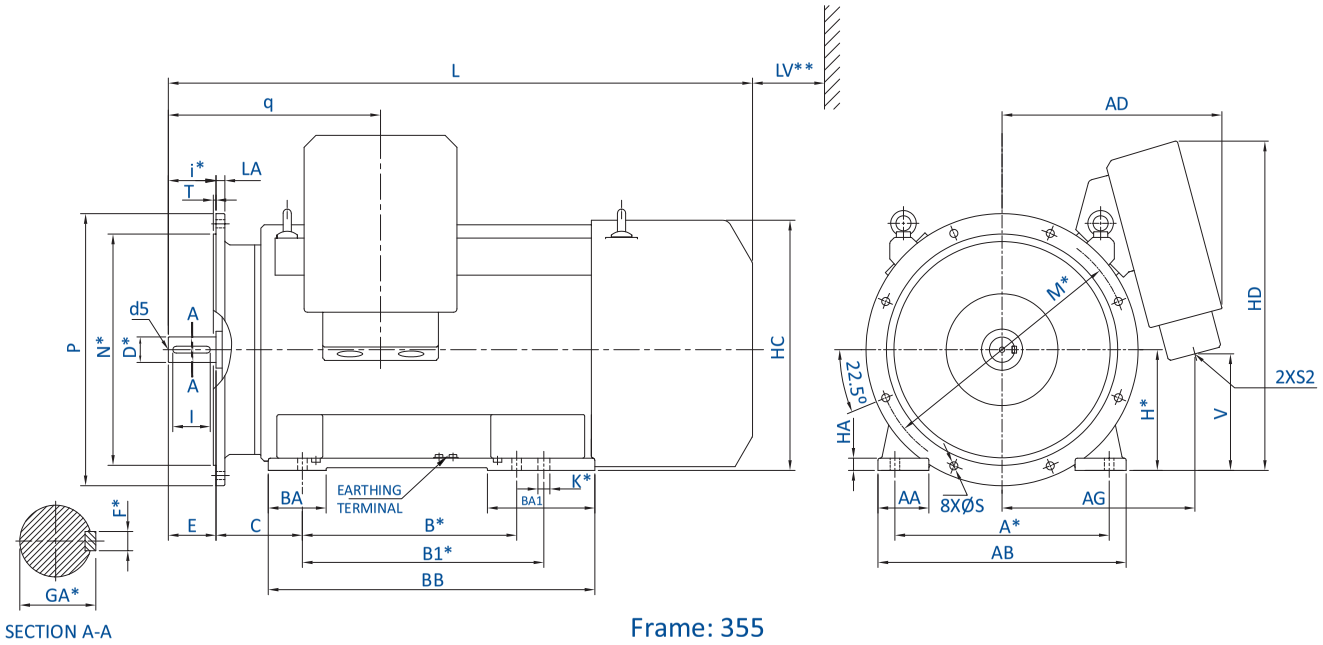
		SHAFT					
IEC Fr. Size	Pole	D*	E	F*	GA*	I	d5
355L/K	2	75	140	20	79.5	130	M20
355L/K	4/6/8	95	170	25	100	160	M24

TABLE A								
Dimension	N	M	i	D	GA	F	d5 (Centering)	L
Tolerance	js6	±0.5	±1.5	m6	-	h9	-	±50
Specification	IS:2223	IS:2223	-	IS:1231	IS:2048	IS:2048	IS:2540	-

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 | Foot & Flange Mounted (B35) Motors

Frame Size: 355 DCCA



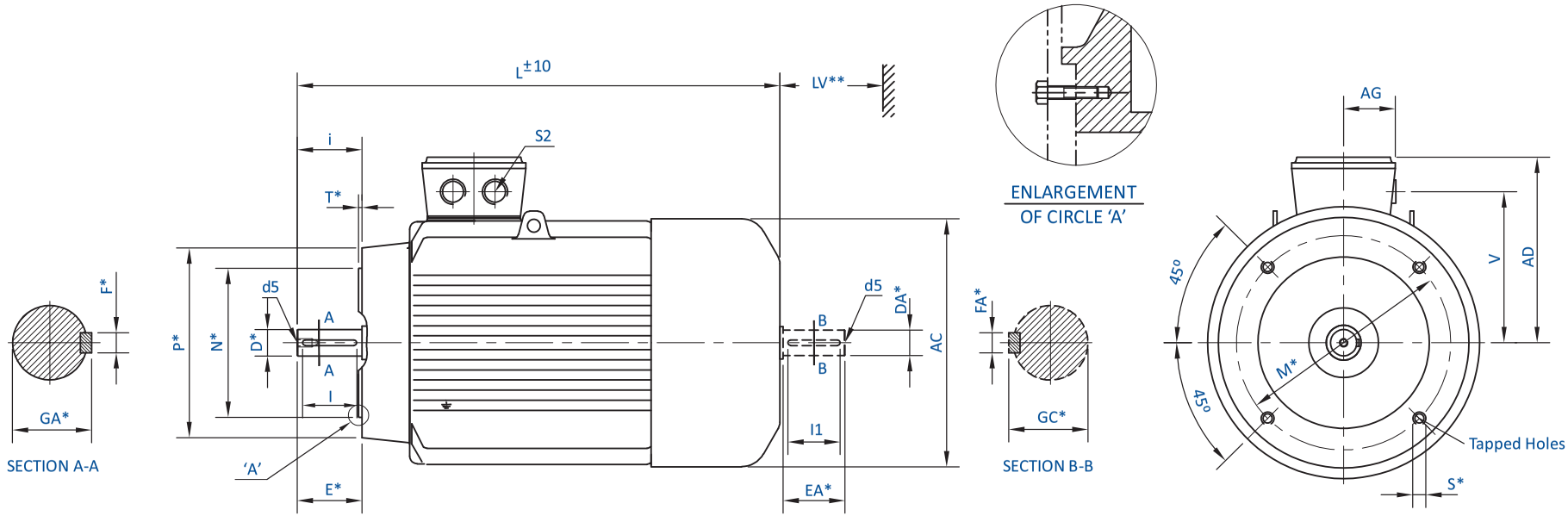
		FIXING											SHAFT					
IEC Fr. Size	Pole	A*	B*	B1*	C	H*	K*	P	N*	M*	i*	S	D*	E	F*	GA*	l	ds
355L/K	2	610	630	710	254	355	28	800	680	740	140	24	75	140	20	79.5	130	M20
355L/K	4/6/8	610	630	710	254	355	28	800	680	740	170	24	95	170	25	100	160	M24

		GENERAL														TERMINAL BOX			
IEC Fr. Size	Pole	T	LA	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	AC	Lv	V	q	AG	S2
355L/K	2	6	25	730	960	150	170	315	36	736	985	685	1735	765	200	345	625	595	M75X1.5P
355L/K	4/6/8	6	25	730	960	150	170	315	36	736	985	685	1765	765	130	345	655	595	M75X1.5P

TABLE A												
Dimension	A	B	H	K	N	M	i	D	GA	F	d5 (Centering)	L
Tolerance	±0.75	±0.75	-1	-	js6	±0.5	±1.5	m6	-	h9	-	±50
Specification	IS:1231	IS:1231	IS:1231	IS:1231	IS:2223	IS:2223	-	IS:1231	IS:2048	IS:2048	IS:2540	-

INCREASED SAFETY MOTORS: Type Ex ec

E: Dimensional Drawing: Efficiency Values Complying to IE3 Efficiency Class of IS 12615 | Face Mounted (B14) Motors



		FIXING					GENERAL					TERMINAL BOX			SHAFT					
IEC Fr. Size	Pole	P*	N*	M*	i	S*	T*	AD	L	LV**	AC	V	AG	S2	D* DA*	E* EA*	F* FA*	GA* GC*	I I1	d5
63	2,4	90	60	75	23	M5X10	2.5	127	206	30	124	96	52	M20x1.5P	11	23	4	12.5	18	M4
71	2(0.37kW), 4(0.25kW) 6(0.18kW), 8	105	70	85	30	M6X10	2.5	135	235	30	140	104	52	M20x1.5P	14	30	5	16	25	M5
	2(0.55kW), 4(0.37kW), 6(0.25kW)								269											
80	2(1.1kW), 4(0.55kW)	120	80	100	40	M6X13	3	145	310	30	157	104	52	M20x1.5P	19	40	6	21.5	35	M6
	2,6,8								267											
90S	2, 4, 6	140	95	115	50	M8X12	3	140	336	35	174	110	53	M20x1.5P	24	50	8	27	45	M8
	8								302											
90L	2, 4, 6								361											
	8								327											
100L	2, 4	160	110	130	60	M8X12	3.5	179	387	40	195	138	56	M25x1.5P	28	60	8	31	55	M10
	6, 8								366											
112M	4, 6	160	110	130	60	M8X12	3.5	191	419	45	220	151	56	M25x1.5P	28	60	8	31	55	M10
	8								388											

Notes: * This is a mandatory dimension for all standard motors
**Minimum distance for efficient cooling of motor to be maintained by user
1. All dimensions are in mm unless otherwise specified.
2. Tolerances on mandatory dimensions are as per IS: 2223.
3. For non standard motors, dimensions may change. Please contact our nearest sales office for details.

Notes: 1. Eyebolt is not provided in motors of 63 to 90 Frame.
2. For the dimensional drawing of 132 Frame, B14 mounting kindly contact our nearest sales office.

CERTIFICATIONS

TÜV NORD

CERTIFICATE

Management system as per

ISO 9001 : 2015

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

BHARAT BIJLEE LIMITED
(Motor Division)
No-2, MIDC, Opp. Airoli Station, Thane - Belapur Road,
Airoli, Navi Mumbai - 400 708, Maharashtra,
India

operates a management system in accordance with the requirements of ISO 9001 : 2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope -

Design, Development, Manufacture and Supply of A.C. Motors.

Certificate Registration No.**04 100 950130** Valid from **20.12.2022**
Audit Report No.**2.5-2714/2001** Valid until **19.12.2025**
Initial certification **14.07.1995**

Certification Body
at TÜV NORD CERT GmbH Mumbai, **19.11.2022**

TÜV NORD CERT GmbH Am TÜV 1 45307 Essen www.tuev-nord-cert.com

TUV India Pvt. Ltd., 801, Raheja Plaza - 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

ISO 9001 : 2015

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 10000425133-MSC-RvA-IND Initial certification date: 15 January 2015 Valid: 15 January 2021 – 15 January 2024

This is to certify that the management system of

Bharat Bijlee Limited
No.2, MIDC, Thane-Belapur Road, Airoli,NAVI MUMBAI - 400 708, Maharashtra, India

has been found to conform to the Occupational Health and Safety Management System standard:

ISO 45001:2018

This certificate is valid for the following scope:

Design, development & manufacture of motors, blowers, transformers, drives & automation, magnet technology machines
Design & development and planning of transformer projects at Airoli works

Place and date: **Barendrecht, 11 January 2021**

For the issuing office: **DNV GL - Business Assurance Zwolseweg 1, 2994 LB Barendrecht, Netherlands**

IAF MGMT. SYS. RvA C 011

The RvA is a signatory to the IAF MLA

Erie Keek
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

ISO 45001:2018

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 170201-2011-AE-IND-RvA Initial certification date: 26 January 2015 Valid: 26 January 2021 – 25 January 2024

This is to certify that the management system of

Bharat Bijlee Limited
No.2, MIDC, Thane-Belapur Road, Airoli, Navi Mumbai - 400 708, Maharashtra, India

has been found to conform to the Environmental Management System standard:

ISO 14001:2015

This certificate is valid for the following scope:

- **Design, development &manufacture of motors, blowers, transformers, drives & automation, magnet technology machines**
- **Design & development and planning of transformer projects at Airoli works**

Place and date: **Chennai, 09 January 2021**

For the issuing office: **DNV GL - Business Assurance ROMA, No. 10, GST Road, Alandur, Chennai - PIN - 600 016, India**

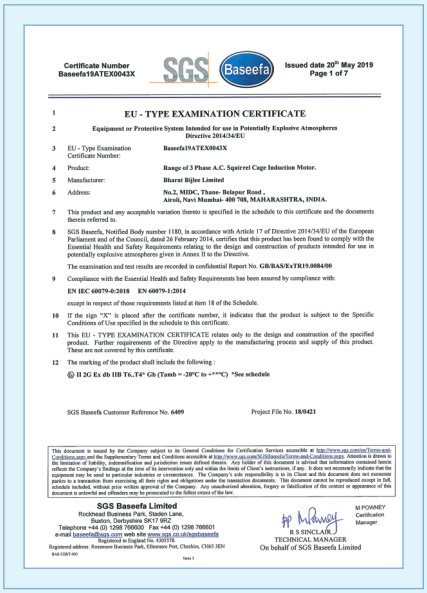
IAF MGMT. SYS. RvA C 011

The RvA is a signatory to the IAF MLA

Sivadasan Madiyath
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

ISO 14001 : 2015



Certificate Number
Baseefa19ATEX0043X

SGS Baseefa

Issued date 20th May 2019
Page 1 of 7

1 **EU - TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**

3 EU - Type Examination Certificate Number: **Baseefa19ATEX0043X**

4 Product: **Range of 3 Phase A.C. Squirrel Cage Induction Motor.**

5 Manufacturer: **Bharat Bijlee Limited**

6 Address: **No.2, MIDC, Thane- Belapur Road , Airoli, Navi Mumbai- 400 708, MAHARASHTRA, INDIA.**

7 This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 SGS Baseefa, Notified Body number 1180, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. **GB/BAS/ExTR19.0084/00**

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 EN 60079-1:2014

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

11 This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12 The marking of the product shall include the following :

Ⓔ II 2G Ex db IIB T6,T4* Gb (Tamb = -20°C to +*°C) *See schedule**

SGS Baseefa Customer Reference No. **6409** Project File No. **18/0421**

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SGS Baseefa Limited
Rockhead Business Park, Staden Lane,
Buxton, Derbyshire SK17 9RZ
Telephone +44 (0) 1298 768000 Fax +44 (0) 1298 768601
e-mail baseefa@sgs.com web site www.sgs.co.uk/baseefa
Registered in England No. 4305767
Registered address Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN

M POWNEY
Certification Manager

R S SINCLAIR
TECHNICAL MANAGER
On behalf of SGS Baseefa Limited

ATEX Certificate

IEC IECEx

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

Certificate No.: IECEx BAS 19.0036X Issue No: 0 Certificate history: Issue No. 0 (2019-05-20)

Status: **Current** Page 1 of 3

Date of Issue: **2019-05-20**

Applicant: **Bharat Bijlee Limited**
No.2, MIDC, Thane-Belapur Road,
Airoli, Navi Mumbai,
400-708,
India

Equipment: **Range of 3 Phase A.C. Squirrel Cage Induction Motor**
Optional accessory:

Type of Protection: **Flameproof**

Marking: **Ex db IIB T6..T4* Gb (Tamb = -20°C to +***°C) *See schedule**

Approved for issue on behalf of the IECEx Certification Body: R S Sinclair

Position: Technical Manager

Signature: (for printed version) M POWNEY Certification Manager

Date: 21/5/19

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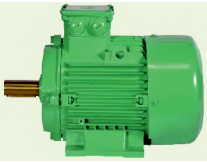
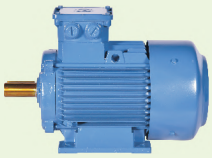
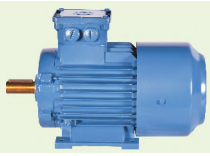
Certificate issued by:
SGS Baseefa Limited
Rockhead Business Park
Staden Lane
Buxton, Derbyshire, SK17 9RZ
United Kingdom

SGS Baseefa

IECEx Certificate of Conformity

LV MOTORS PRODUCT RANGE

Motors conform to relevant Indian Standards IS/IEC 60034 series
Voltage: 415V +/- 10%, Frequency: 50 Hz +/- 5%, Combined Variation: +/- 10%

Motor Type	Frame	Power (kW)	Polarity		Standard Technical Specifications
IE2 Motors IE3 Motors Large LT Motors (DCCA)	56 to 355 56 to 355 355 to 450	0.12 to 355 0.12 to 355 250 to 1250	2, 4, 6, 8 2, 4, 6, 8 2, 4, 6, 8		• Ambient: 50° C • Ambient for DCCA: 40° C • Inverter Grade Winding: For IE3 and DCCA • Duty: S1 • RTD & BTD: For DCCA motors • Mounting: B3, B5, B35, V1, B14 upto 132 Frame
IE4 Motors	112 to 225	1.5 to 45	4		• Ambient: 50° C • Inverter Duty Winding • Duty: S1 • VPI: With Class H solvent less Resin • Mounting: B3, B5, B35, V1
Standard Flame Proof Ex'd' Motors IE2 Flame Proof Ex'd' Motors IE3 Flame Proof Ex'd' Motors	80 to 315 80 to 315 80 to 315	0.37 to 200 0.37 to 200 0.37 to 180	2, 4, 6, 8 2, 4, 6, 8 2, 4, 6, 8		• Ambient: 45° C • Inverter Grade Winding: For IE3 Motors • Duty: S1 • Mounting: B3, B5, B35, V1
IE2 Increased Safety Ex ec Motors IE3 Increased Safety Ex ec Motors	63 to 355 63 to 355	0.12 to 355 0.12 to 355	2, 4, 6, 8 2, 4, 6, 8		• Ambient: 50° C • Duty: S1 • Mounting: B3, B5, B35, V1 (B14 upto 132 Frame)
Crane & Hoist Duty Motors	71 to 355	0.37 to 400	4, 6, 8		• Ambient: 45° C • Duty: S4 • Offered in DOL & Converter Fed Supply • Mounting: B3, B5, B35, V1 (B14 upto 132 Frame)
Brake Motors (With Integral DC Brake)	71 to 132	0.25 to 9.3	2, 4, 6, 8		• Ambient: 50° C • Duty: S1 • Mounting: B3, B5, B35 • Integral DC Brake
Brake Motors (With External Mounted Brake)	71 to 200	0.37 to 22	2, 4, 6, 8		• Ambient: 50° C • Duty: S1 • Mounting: B3, B5, B35 • External Mounted DC Brake/Arrangement
Slip Ring Motors	100 to 160	1.1 to 10	4, 6		• Ambient: 45° C • Duty: S3, S4, S5 • Mounting: B3
Textile Motors	100 to 160	1.1 to 15	4, 6, 8		• Ambient: 50° C • Duty: S1 • Mounting: B3, B5, B35
Cane Unloader Motors	160 to 225	11 to 30	6		• Ambient: 45° C • Start/Stop per Hour: upto 900 • Duty: S5, 50% CDF • Thermostat • Mounting: B3, B5, B35 • Forced Cooling • Shaft Material: En24

* Subject to confirmation from Bharat Bijlee

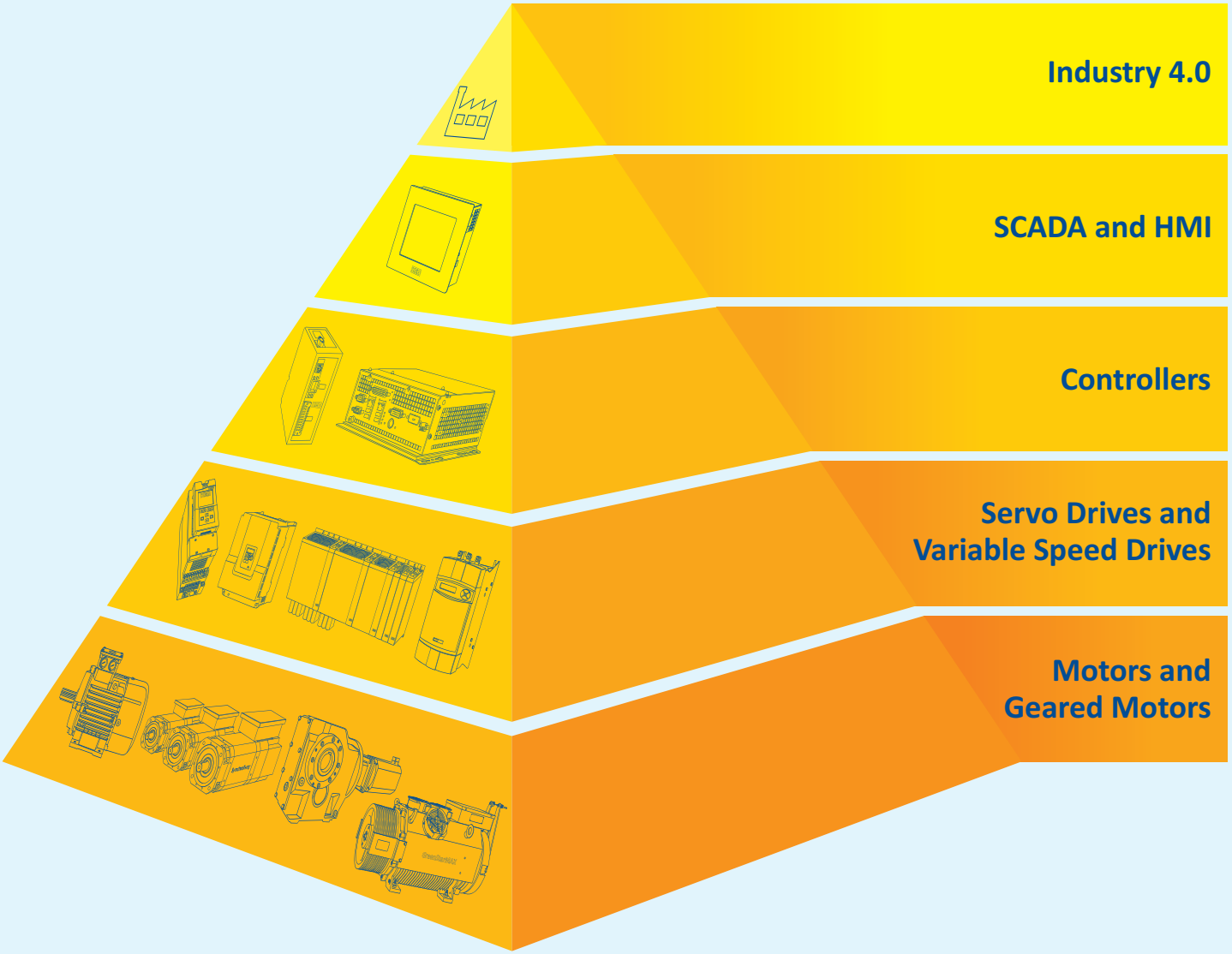
Insulation: Class 'F' with temperature rise limited to Class 'B', Rotation: Bi-directional Cooling: IC411, Degree of Protection: IP55, Altitude: Upto 1000m above MSL

Optional Features		Applications
• Non Standard Voltage: upto 690V • Higher Polarity on request • Insulation: Class H • Space Heater: 90 Frame onwards • RTD & BTD: 250 Frame onwards • PTC Thermistor: 80 to 355L • Shaft Material: EN24* • Enclosure: IP56 / 65 / 66 • Forced Cooling: 132 to 450 Frame • Roller Bearing: 160 Frame onwards	• High Temperature Grease: Suitable up to 200° C • SS Hardware • Non standard shaft diameter/extension* • Non Standard Paint • Provision for Encoder Mounting • Low Vibration as per IS or IEC • Insulated Bearing: 132 Frame onwards • SPM Nipples Provision: Frame 250 onwards	Pump, Fan, Compressor, Packing Machinery, Coiler/De-coiler, Agro Equipment, Food Processing Equipment, Paper Machinery, Agitator, Dairy Equipment, Machine Tool, Air Conditioning, Material Handling, Plastic Machinery, Textile Machinery, Cooling Tower, Crusher, Material Handling
• Insulation: Class H • Space Heater: 90 Frame onwards • PTC Thermistor: 80 to 225 Frame • Shaft Material: EN24* • Enclosure: IP56 / 65 / 66 • Roller Bearing: 160 Frame onwards	• Non standard shaft diameter/extension* • Non Standard Paint • Provision for Encoder Mounting • Low Vibration as per IS or IEC	Fans, HVAC, Pumps, Textiles, Hydraulic Press

• Non Standard Voltage: 220 to 690V
• Intermittent Duty S3, S4: In 4, 6, 8 Pole*
• Insulation: Class H
• PTC Thermistor: 80 to 315 L
• Space Heater: 90 Frame onwards
• Roller Bearing: 160 Frame onwards
• Shaft Material: EN24*
• Enclosure: IP56 / 65 / 66
	• Insulated Bearing: 132 Frame onwards
	• Non standard shaft diameter/extension*
	• Motors for inverter duty application ; offered with
	  • Combined testing of motor and VFD or
	  • Motors fitted with PTC Thermistor
	• Test facility available for combined Testing with VFD
	• Non Standard Paint
	• Low Vibration as per IS or IEC
		Pump, Fan, Compressor, Material Handling, Agitator, LPG Bottling Plant, Pharma Machinery, Chemical Plant Machinery, Machinery for Mines

• Insulation: Class H • Shaft Material: EN24* • Enclosure: IP56 / 65 / 66 • Roller Bearing: 160 Frame onwards	• Insulated Bearing: 132 Frame onwards • Non standard shaft diameter/extension* • Motors for inverter duty application with combined testing of motor and VFD for temperature class certification • Test facility available for combined testing with VFD • Non Standard Paint • Low Vibration as per IS or IEC	Pump, Fan, Compressor, Material Handling, Agitator, Pharma Machinery
• Duty: S2, S3 and S5 • Non Standard Voltage: 380 to 460V • Insulation: Class H • Space Heater: 90 Frame onwards • BTD: 250 Frame and above • PTC Thermistor: 80 to 355 L • Roller Bearing: 160 Frame onwards • Shaft Material: EN24* • Enclosure: IP56 / 65 / 66	• Motors for Inverter Duty • Insulated Bearing: 132 Frame onwards • Non standard shaft diameter/extension* • Non Standard Paint • Low Vibration as per IS or IEC	Crane, Hoist, Lift, Material Handling, Car Stacker, Door Opening
• Duty: S2 and above • Non Standard Voltage: upto 460V • Motors for Inverter Duty • Manual Release Arrangement: For 90 to 132 Frame	• Non standard shaft diameter/extension* • Non Standard Paint	Crane, Hoist, Material Handling, Textile, Pharma to name a few
• Duty: S2 and above • Non Standard Voltage: upto 460V • Motors for Inverter Duty • Manual Release Arrangement	• Double Shaft Extension for Brake Arrangement • Non Standard Paint	Crane, Hoist, Material Handling, Textile, Pharma to name a few
• Mounting: B35 • Non standard shaft diameter and extension*	• Non Standard Paint	Crane, Hoist, Lift, Material Handling
• Non Standard Voltage: upto 500V • Insulation: Class H	• Motors for Inverter Duty • Non Standard Paint • Low Vibration as per IS	Ginning, Textile Machinery
• Insulation: Class H • PTC Thermistor	• Insulated Bearing: 132 Frame onwards • Non Standard Paint	Cane Loading-Unloading Machine

INDUSTRIAL AUTOMATION PYRAMID



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