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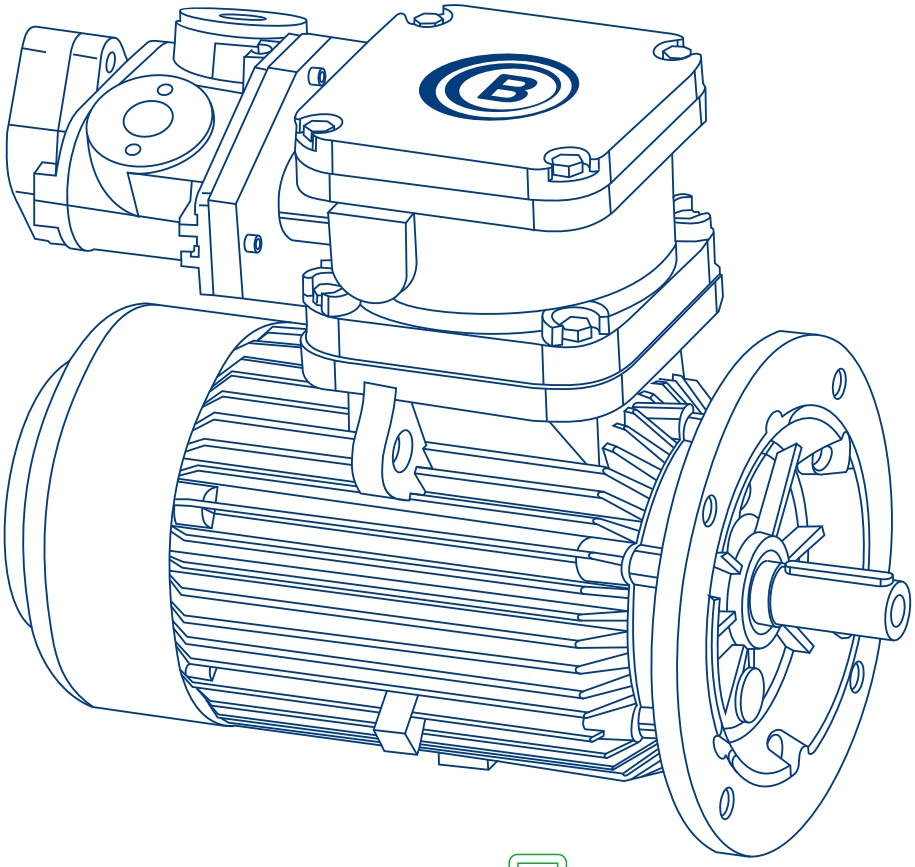
Bharat Bijlee

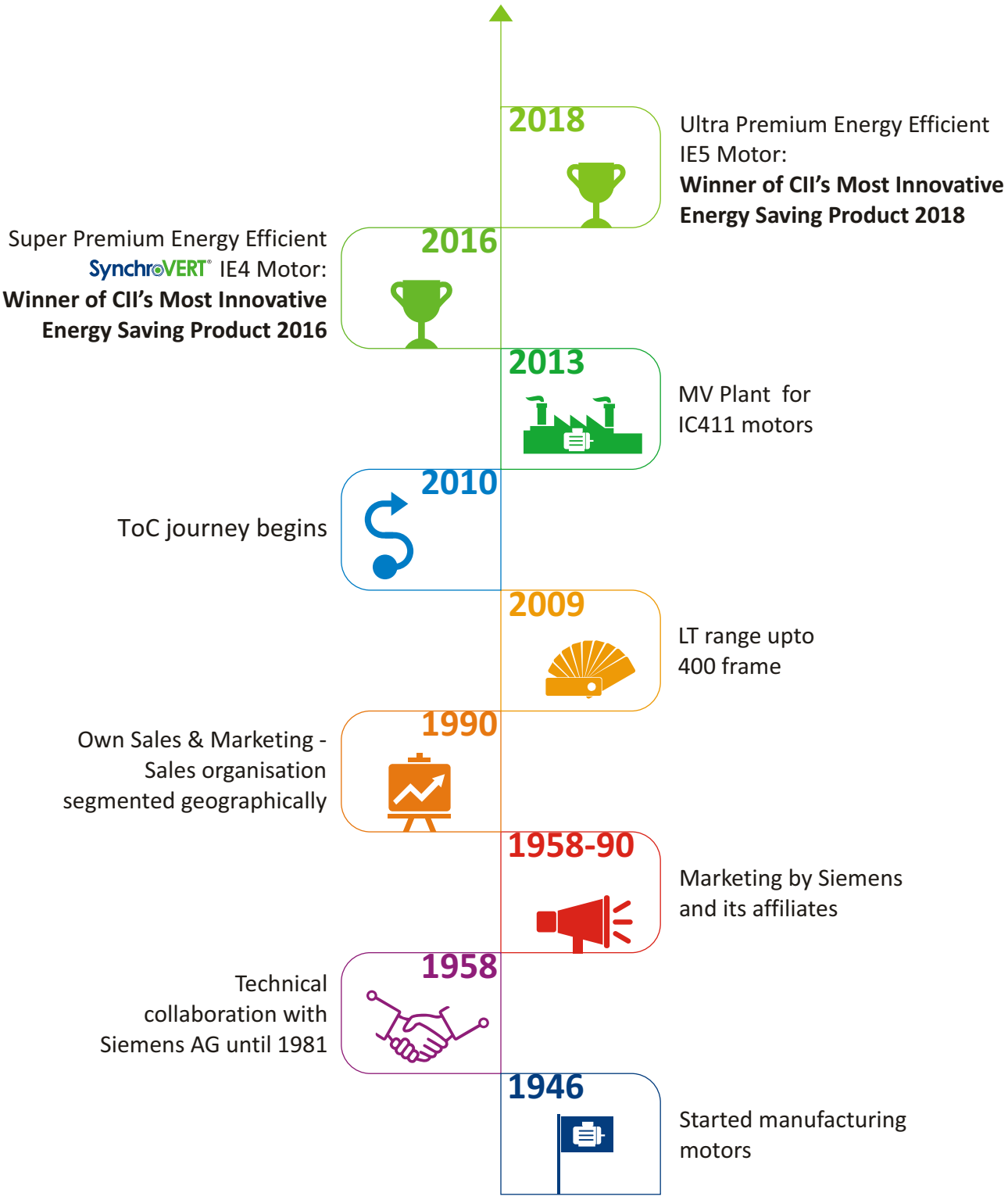
LV Motors: Hazardous Area Application

Safe | Reliable | Long lasting



May 2022

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?

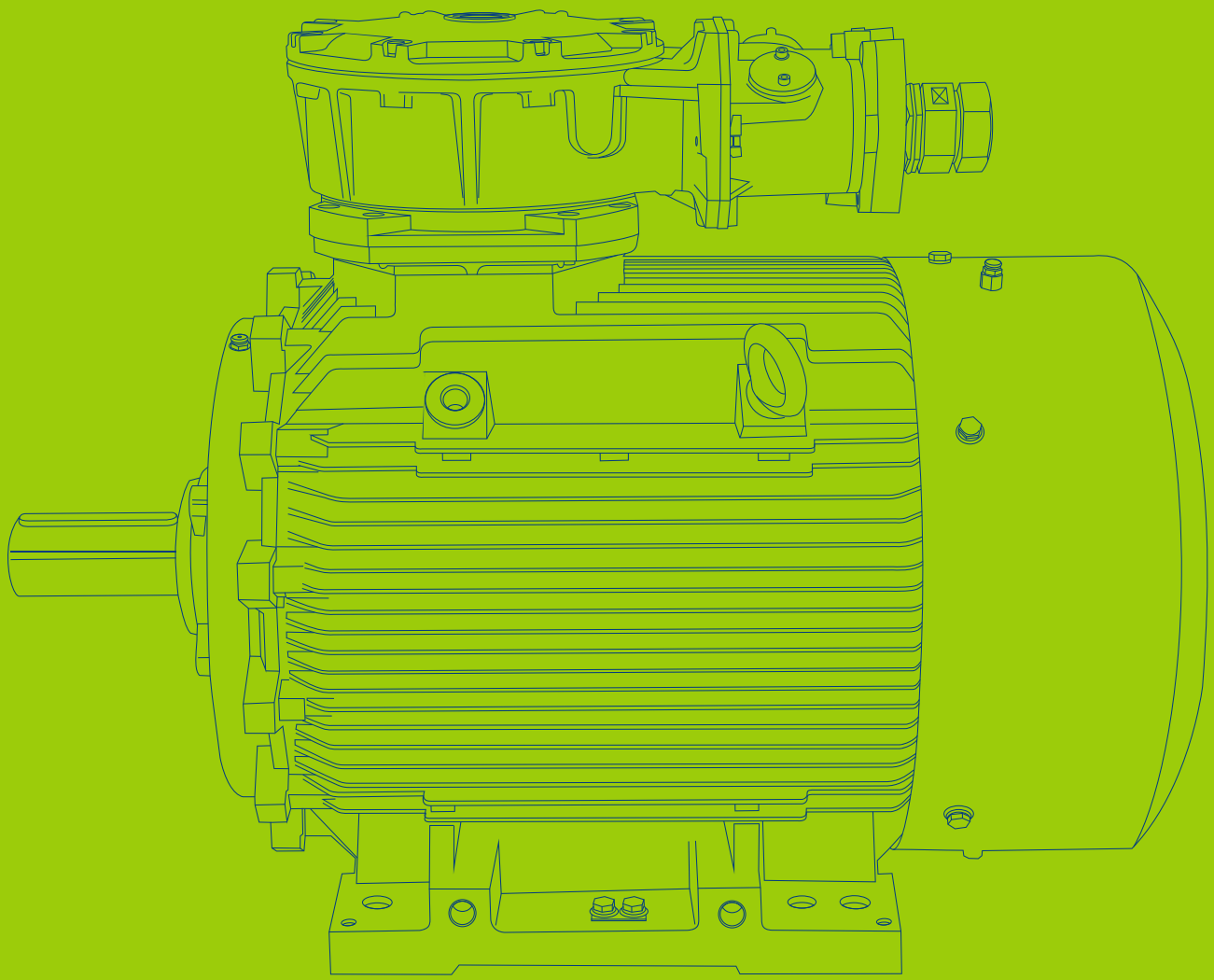
Bharat Bijlee offers a wide range of hazardous area motors.

- 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.

Bharat Bijlee

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	BB Frame Size	
80	MJ 80	T6
90	MJ 90	T5
100	MJ 100	T5
112	MJ 112	T5
132	MJ 132	T5
160	MJ 160	T5
180	MJ 180	T5
200	MJ 200	T5
225	MJ 225	T5
250	MJ 250	T4
280	MJ 280	T4
315	MJ 315	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

- Vacuum Pressure Impregnation (VPI) is provided to windings on request.
- 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

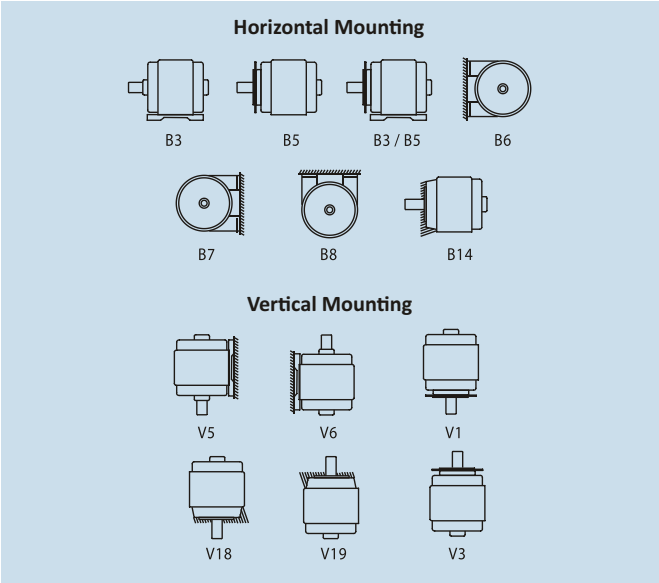
These motors are so designed that the frame temperature will remain below the ignition temperature of gas-air mixture involved. The frame, end shields, terminals boxes and bearing covers of all motors are made of grey cast iron. All cast iron parts forming flame proof enclosures are subjected to hydraulic 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)
	Length	Width	Height	
80	440	440	310	34
90L	510	470	340	51
100L	575	575	360	66
112M	640	420	560	73
132M	610	330	485	118
160M/L	790	440	540	216
180L	890	490	635	267
200L	940	540	690	408
225S/M	920	540	790	534
250M	1100	660	820	696
280S/M	1220	660	890	860
315S/M	1300	870	1000	1120
315L	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

Performance data and drawings of respective ratings are included ahead.
IE2 FLP: For 8 Pole ratings higher than 45kW, kindly refer to our nearest sales office.
IE3 FLP: For further details, kindly refer to our nearest sales office.

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: Standard Range of FLP Motors

Applicable standard for testing: IS 4029
Applicable standard for efficiency determination: IS 4889
Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

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

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

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	80	MJ80	MD0802A300000	2880	0.81	0.13	0.85	0.78	0.70	75.0	72.0	67.0	6.0	2.7	3.0	0.0037	31
*0.55	0.75	80	MJ80	MD0802B300000	2860	1.24	0.19	0.82	0.74	0.62	75.0	73.0	68.0	5.5	2.7	3.0	0.0037	31
0.75	1.0	80	MJ80	MD08021300000	2830	1.65	0.26	0.82	0.74	0.62	77.0	76.0	72.0	5.0	2.5	2.8	0.0037	31
1.1	1.5	80	MJ80	MD08023300000	2840	2.36	0.38	0.82	0.75	0.63	79.0	79.0	76.0	5.9	2.7	3.0	0.0051	32
*1.5	2.0	90L	MJ90	MD09L23300000	2825	3.01	0.52	0.86	0.83	0.76	80.6	78.0	74.0	5.5	2.7	3.0	0.0071	48
2.2	3.0	90L	MJ90	MD09L25300000	2830	4.36	0.76	0.85	0.82	0.74	82.5	80.0	76.0	6.0	3.0	3.0	0.0093	50
3.7	5.0	100L	MJ100	MD10L21300000	2900	7.12	1.24	0.85	0.80	0.70	85.0	83.0	78.0	6.5	2.8	3.0	0.0188	62
5.5	7.5	132S	MJ132	MD13S2B300000	2920	10.1	1.83	0.88	0.85	0.77	85.7	85.0	80.0	6.5	2.3	3.0	0.0630	82
7.5	10	132S	MJ132	MD13S2E300000	2920	13.6	2.50	0.88	0.84	0.76	87.0	86.0	82.0	6.5	2.3	3.0	0.0760	82
9.3	12.5	132M	MJ132	MD13M2N300000	2920	16.5	3.10	0.89	0.85	0.76	88.0	86.0	83.0	6.5	2.4	2.9	0.0980	120
11	15	160M	MJ160	MD16M21300000	2920	19.3	3.67	0.89	0.87	0.83	89.0	88.0	86.0	5.8	2.0	3.0	0.134	145
15	20	160M	MJ160	MD16M25300000	2920	26.2	5.00	0.89	0.88	0.82	89.5	89.0	87.0	6.0	2.0	3.0	0.171	154
18.5	25	160L	MJ160	MD16L27300000	2920	31.6	6.17	0.90	0.88	0.86	90.5	90.0	88.0	6.5	2.0	3.0	0.225	168
*22	30	180L	MJ180	MD18L21300000	2930	37.6	7.31	0.89	0.87	0.80	91.5	90.5	88.0	6.5	2.2	2.7	0.300	220
30	40	200L	MJ200	MD20L23300000	2950	51.2	9.91	0.88	0.85	0.79	92.6	92.0	89.5	6.5	2.5	2.5	0.520	260
37	50	200L	MJ200	MD20L25300000	2945	62.9	12.2	0.88	0.85	0.79	93.0	92.5	91.0	6.5	2.5	2.5	0.610	320
45	60	225M	MJ225	MD22M23300000	2960	74.4	14.8	0.90	0.87	0.83	93.5	93.0	91.0	6.0	2.5	2.5	1.04	420
55	75	250M	MJ250	MD25M21300000	2960	89.1	18.1	0.92	0.91	0.86	93.3	92.8	91.5	6.0	2.1	2.6	2.11	570
75	100	280S	MJ280	MD28S21300000	2970	122	24.6	0.91	0.89	0.84	93.7	92.5	90.0	6.0	1.8	2.7	2.63	690
90	120	280M	MJ280	MD28M23300000	2970	146	29.5	0.91	0.89	0.84	94.0	93.0	91.0	6.0	1.8	2.7	3.01	740

* 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'

Performance Data: Standard Range of FLP Motors

Applicable standard for testing: IS 4029
Applicable standard for efficiency determination: IS 4889
Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

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

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

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	80	MJ80	MD0804A300000	1415	0.97	0.25	0.76	0.70	0.58	70.0	68.0	64.0	4.5	2.4	2.6	0.0061	31
0.55	0.75	80	MJ80	MD08041300000	1405	1.28	0.38	0.81	0.70	0.56	74.0	71.0	67.0	4.0	2.4	2.6	0.0061	31
0.75	1.0	80	MJ80	MD08043300000	1405	1.74	0.52	0.78	0.70	0.58	77.0	76.0	72.0	4.5	2.8	3.0	0.0072	32
*1.1	1.5	90L	MJ90	MD09L43300000	1410	2.45	0.76	0.80	0.73	0.61	78.0	77.0	72.0	4.2	2.3	2.7	0.0120	48
1.5	2.0	90L	MJ90	MD09L45300000	1410	3.26	1.04	0.80	0.72	0.58	80.0	79.0	75.0	5.0	2.5	3.0	0.0160	50
2.2	3.0	100L	MJ100	MD10L43300000	1420	4.60	1.51	0.81	0.69	0.53	82.0	80.0	76.0	5.5	2.4	3.0	0.0210	60
3.7	5.0	112M	MJ112	MD11M43300000	1430	7.30	2.52	0.83	0.76	0.65	85.0	85.0	82.0	6.0	2.6	3.0	0.0530	70
5.5	7.5	132S	MJ132	MD13S4B300000	1450	10.3	3.69	0.86	0.81	0.70	86.5	86.0	84.0	6.0	2.4	3.0	0.104	100
7.5	10	132M	MJ132	MD13M4K300000	1450	13.7	5.04	0.87	0.82	0.72	87.5	87.0	85.0	6.0	2.3	3.0	0.126	113
9.3	12.5	160M	MJ160	MD16M4A300000	1450	17.4	6.25	0.84	0.80	0.72	88.5	88.0	87.0	6.0	2.0	2.5	0.141	136
11	15	160M	MJ160	MD16M4C300000	1450	20.5	7.39	0.84	0.81	0.76	89.0	89.0	86.0	6.0	2.1	2.5	0.177	143
15	20	160L	MJ160	MD16L4K300000	1450	27.5	10.1	0.84	0.83	0.79	90.2	90.5	90.0	6.0	2.1	2.5	0.235	156
*18.5	25	180L	MJ180	MD18L43300000	1460	33.2	12.3	0.85	0.82	0.72	91.2	91.2	90.0	6.0	2.4	2.5	0.460	215
22	30	180L	MJ180	MD18L47300000	1460	39.2	14.7	0.85	0.82	0.72	91.8	91.5	90.0	6.0	2.4	2.5	0.540	230
30	40	200L	MJ200	MD20L43300000	1465	51.6	19.9	0.88	0.84	0.77	92.0	92.0	90.0	6.0	2.6	2.5	0.860	305
37	50	225S	MJ225	MD22S41300000	1470	65.1	24.5	0.85	0.82	0.75	93.0	93.0	91.0	6.0	2.3	2.4	1.41	386
45	60	225M	MJ225	MD22M43300000	1470	79.0	29.8	0.85	0.82	0.74	93.2	93.2	91.0	6.5	2.4	2.5	1.67	414
55	75	250M	MJ250	MD25M41300000	1478	93.8	36.2	0.87	0.84	0.77	93.8	93.5	92.0	6.0	2.4	2.5	2.78	595
75	100	280S	MJ280	MD28S41300000	1485	129	49.2	0.86	0.83	0.75	94.2	94.0	93.0	6.0	2.1	2.8	5.00	705
90	120	280M	MJ280	MD28M43300000	1485	154	59.0	0.86	0.83	0.75	94.7	94.5	93.5	6.0	2.1	2.8	6.000	725

* 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'

Performance Data: Standard Range of FLP Motors

Applicable standard for testing: IS 4029
Applicable standard for efficiency determination: IS 4889
Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

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

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

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.37	0.50	80	MJ80	MD08061300000	910	1.08	0.40	0.70	0.60	0.48	68.0	66.0	61.0	3.0	2.1	2.3	0.0060	31
0.55	0.75	80	MJ80	MD08063300000	915	1.56	0.59	0.71	0.62	0.48	69.0	70.0	64.0	4.0	2.2	2.5	0.0084	32
*0.75	1.0	90L	MJ90	MD09L63300000	925	1.99	0.79	0.72	0.61	0.50	73.0	70.0	69.0	3.4	2.0	2.5	0.0122	48
1.1	1.5	90L	MJ90	MD09L65300000	930	2.80	1.15	0.72	0.61	0.50	76.0	74.0	72.0	4.0	2.1	2.6	0.0160	50
1.5	2.0	100L	MJ100	MD10L63300000	935	3.72	1.56	0.72	0.64	0.52	78.0	75.0	72.0	4.0	2.0	2.5	0.0250	60
2.2	3.0	112M	MJ112	MD11M63300000	935	4.97	2.29	0.77	0.68	0.55	80.0	80.0	74.0	5.0	2.0	2.5	0.0500	67
3.7	5.0	132S	MJ132	MD13S6B300000	950	8.10	3.79	0.77	0.72	0.60	83.0	83.0	82.0	5.0	2.2	2.8	0.118	100
5.5	7.5	132M	MJ132	MD13M6N300000	950	11.6	5.64	0.78	0.74	0.64	84.5	84.5	83.0	5.5	2.5	3.0	0.172	120
7.5	10	160M	MJ160	MD16M63300000	960	14.8	7.61	0.80	0.74	0.64	88.0	88.0	86.0	5.4	2.0	2.5	0.276	149
9.3	12.5	160L	MJ160	MD16L66300000	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	87.0	5.5	2.1	2.5	0.340	169
11	15	160L	MJ160	MD16L67300000	965	21.6	11.1	0.80	0.77	0.70	88.5	88.0	87.0	6.0	2.0	2.5	0.400	169
15	20	180L	MJ180	MD18L61300000	965	29.0	15.1	0.80	0.75	0.62	90.0	90.0	87.0	5.5	2.6	2.3	0.680	210
18.5	25	200L	MJ200	MD20L61300000	975	34.0	18.5	0.83	0.78	0.70	91.1	91.0	88.0	5.8	2.6	2.3	1.00	275
22	30	200L	MJ200	MD20L63300000	975	40.3	22.0	0.83	0.77	0.68	91.5	91.0	88.0	5.8	2.6	2.3	1.20	290
30	40	225M	MJ225	MD22M62300000	975	52.1	30.0	0.87	0.84	0.76	92.0	91.0	88.0	6.0	2.3	2.2	2.10	430
37	50	250M	MJ250	MD25M60300000	975	63.2	37.0	0.88	0.85	0.82	92.5	92.5	91.0	6.0	2.5	2.3	3.51	560
45	60	280S	MJ280	MD28S61300000	984	80.1	44.5	0.84	0.80	0.72	93.0	92.5	92.0	6.0	2.5	2.4	5.11	615
55	75	280M	MJ280	MD28M63300000	984	95.2	54.4	0.86	0.83	0.76	93.5	93.0	92.0	6.0	2.4	2.4	6.16	725

* 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'

Performance Data: Standard Range of FLP Motors

Applicable standard for testing: IS 4029
Applicable standard for efficiency determination: IS 4889
Voltage: 415V +/- 10%
Frequency: 50Hz +/- 5%
Combined Variation: +/- 10%

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

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

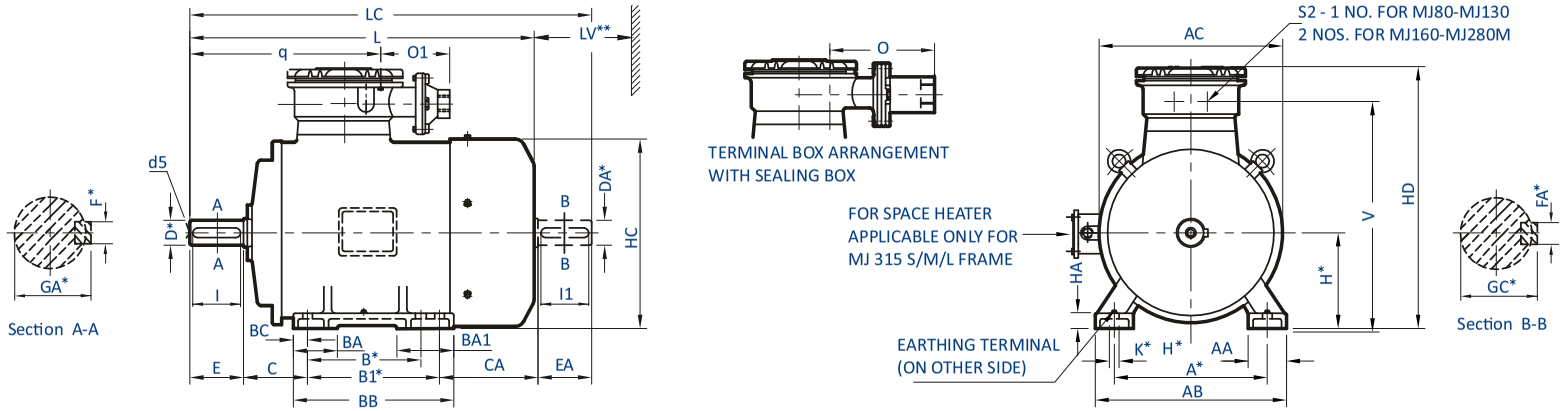
Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output									With DOL starting			Rotor GD²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	90L	MJ90	MD09L83300000	700	1.32	0.51	0.63	0.52	0.41	62.0	55.0	48.0	2.7	1.8	2.1	0.0110	46
0.55	0.75	90L	MJ90	MD09L85300000	690	1.81	0.78	0.63	0.55	0.43	67.0	62.0	58.0	2.9	2.0	2.4	0.0140	46
0.75	1.0	100L	MJ100	MD10L81300000	685	2.04	1.07	0.73	0.63	0.50	70.0	70.0	64.0	3.0	1.6	1.8	0.0230	55
1.1	1.5	100L	MJ100	MD10L83300000	690	2.91	1.55	0.71	0.62	0.48	74.0	73.0	71.0	3.3	1.9	2.3	0.0270	59
1.5	2.0	112M	MJ112	MD11M81300000	705	3.87	2.07	0.70	0.62	0.50	77.0	77.0	75.0	3.8	1.7	2.2	0.0510	70
2.2	3.0	132S	MJ132	MD13S8B300000	705	5.03	3.04	0.78	0.74	0.64	78.0	78.0	75.0	3.5	1.8	2.3	0.0990	100
3.7	5.0	160M	MJ160	MD16M81300000	720	8.10	5.01	0.78	0.74	0.65	82.0	82.0	78.0	4.4	1.8	2.0	0.217	137
5.5	7.5	160M	MJ160	MD16M83300000	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82.0	4.8	1.9	2.2	0.299	151
7.5	10	160L	MJ160	MD16L87300000	710	15.6	10.3	0.78	0.74	0.65	86.0	84.0	82.0	5.5	2.1	2.2	0.400	165
*9.3	12.5	180L	MJ180	MD18L81300000	715	18.9	12.7	0.79	0.74	0.64	86.5	86.5	85.0	4.5	2.1	2.2	0.620	205
11	15	180L	MJ180	MD18L83300000	720	22.1	14.9	0.79	0.74	0.64	87.5	87.5	86.0	4.5	2.1	2.2	0.720	210
15	20	200L	MJ200	MD20L83300000	720	28.8	20.3	0.82	0.79	0.71	88.5	88.5	87.0	5.5	2.5	2.3	1.32	305
18.5	25	225S	MJ225	MD22S81300000	725	36.6	24.9	0.79	0.77	0.69	89.0	88.0	87.0	5.3	2.1	2.2	1.95	380
22	30	225M	MJ225	MD22M83300000	725	43.0	29.6	0.79	0.77	0.69	90.0	89.0	87.0	5.3	2.1	2.2	2.41	430
30	40	250M	MJ250	MD25M81300000	730	55.9	40.0	0.82	0.78	0.68	91.0	90.5	89.0	5.5	2.5	2.2	3.72	570
37	50	280S	MJ280	MD28S82300000	730	70.8	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	725
45	60	280M	MJ280	MD28M85300000	730	86.1	60.0	0.79	0.75	0.65	92.0	92.0	91.0	5.5	2.2	2.2	6.86	725

* 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'

E. Dimensional Drawing: Standard Range of FLP Motors 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	LC	CA	AC	LV**	V	O	O1	q	S2	D DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4 & 6	125	100	—	50	80	10	153	126	32	36	—	16	10	162	296	330	386	156	164	30	236	214	135	168	M20X1.5P	19	40	6	21.5	35	M6
90L	2, 4, 6 & 8	140	125	—	56	90	10	180	160	50	40	—	19	13	177	336	382	463	182	174	35	269	217	141	195	M25X1.5P	24	50	8	27	45	M8
100L	2, 4, 6 & 8	160	140	—	63	100	12	200	176	54	45	—	21	14	198	358	435	520	197	195	40	291	207	131	225	M25X1.5P	28	60	8	31	55	M10
112M	2, 4, 6 & 8	190	140	—	70	112	12	230	176	50	55	—	21	15	222	374	456	539	209	220	45	316	200	124	233	M25X1.5P	28	60	8	31	55	M10
132S/M	2, 4, 6 & 8	216	140	178	89	132	12	256	218	50	53	77	23	17	262	408	551	660	225	260	50	352	175	100	282	M25X1.5P	38	80	10	41	70	M12
160M/L	2	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704	839	247	314	60	404	252	151	365	M25X1.5P	42	110	12	45	105	M16
	4, 6 & 8																694	829														
180L	2, 4, 6 & 8	279	279	—	121	180	15	339	339	80	75	—	33	26	357	515	720	842	200	354	70	447	270	166	370	M25X1.5P	48	110	14	51.5	100	M16
200L	2	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805	927	235	394	80	488	237	133	395	M25X1.5P	55	110	16	59	100	M20
	4, 6 & 8																771	893														
225S/M	2	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	799	948	245	444	90	564	308	264	414	M40X1.5P	55	110	16	59	100	M20
	4, 6 & 8																836	985							444		60	140	18	64	130	
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	915	1065	268	489	100	601	287	242	474	M40X1.5P	60	140	18	64	130	M20
	4, 6 & 8																										65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	1157	271	544	115	668	252	207	517	M40X1.5P	65	140	18	69	130	M20
	4, 6 & 8																										75	140	20	79.5	130	

Tolerances on Dimensions with*

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

Dimension	Tolerance		Specification
D, DA	j6	19, 24, 28Ø	IS 1231
	k6	38, 42, 48Ø	
	m6	55, 60, 65, 75Ø	
GA, GC, F, FA			IS 2048
d5(centering)			IS 2540

- Key / key way fit: h9 / N9.
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.

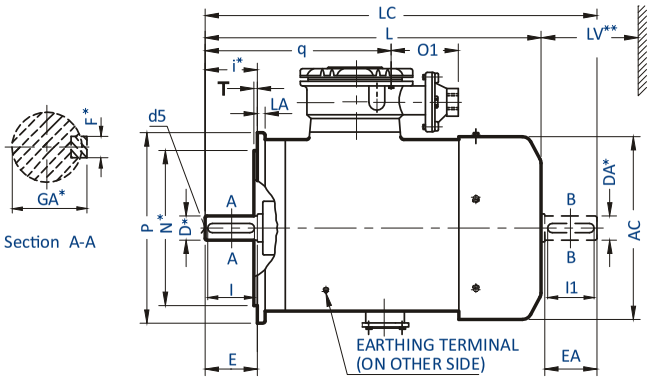
** Minimum distance for efficient cooling of motor to be maintained by user

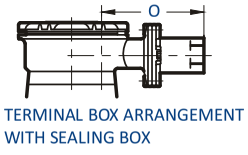
Note : For non standard motors, dimensions may change. Please contact our nearest sales office for details

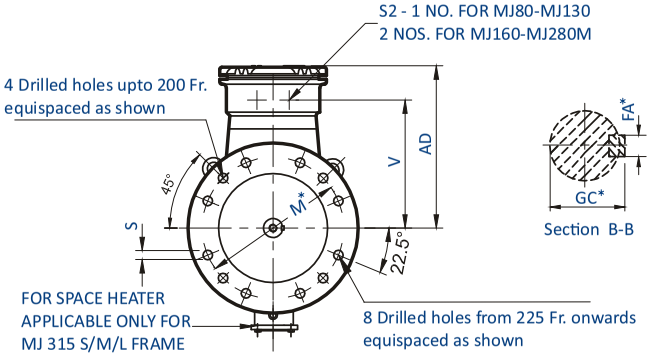
All Dimensions are in mm unless otherwise specified.

FLAME PROOF MOTORS: Type Ex 'd'

Dimensional Drawing: Standard Range of FLP Motors Flange Mounted IMB5/IM3001 Motors







		FIXING					GENERAL							TERMINAL BOX					SHAFT					
IEC Fr. Size	Pole	P	N*	M*	i*	S	T	LA	AC	L	LC	AD	LV**	V	O	O1	q	S2	D DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4 & 6	200	130	165	40	12	3.5	11	164	330	386	216	30	156	214	135	168	M20X1.5P	19	40	6	21.5	35	M6
90L	2, 4, 6 & 8	200	130	165	50	12	3.5	11	174	382	463	246	35	179	217	141	195	M25X1.5P	24	50	8	27	45	M8
100L	2, 4, 6 & 8	250	180	215	60	15	4	12	195	435	520	258	40	191	207	131	225	M25X1.5P	28	60	8	31	55	M10
112M	2, 4, 6 & 8	250	180	215	60	15	4	12	220	456	539	262	45	204	200	124	233	M25X1.5P	28	60	8	31	55	M10
132S/M	2, 4, 6 & 8	300	230	265	80	15	4	13	260	551	660	290	50	223	175	100	282	M25X1.5P	38	80	10	41	70	M12
160M/L	2	350	250	300	110	19	5	13	314	704	839	312	60	244	252	151	365	M25X1.5P	42	110	12	45	105	M16
	4, 6 & 8									694	829													
180L	2, 4, 6 & 8	350	250	300	110	19	5	16	354	745	867	335	70	267	270	166	395	M25X1.5P	48	110	14	51.5	100	M16
200L	2	400	300	350	110	19	5	15	394	826	948	356	80	288	237	133	416	M25X1.5P	55	110	16	59	100	M20
	4, 6 & 8									792	914													
225S/M	2	450	350	400	110	19	5	16	444	799	948	426	90	339	308	264	414	M40X1.5P	55	110	16	59	100	M20
	4, 6 & 8				140					836	985						444		60	140	18	64	130	
250M	2	550	450	500	140	19	5	18	489	915	1065	438	100	351	287	242	474	M40X1.5P	60	140	18	64	130	M20
	4, 6 & 8																		65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	544	1010	1157	475	115	388	252	207	517	M40X1.5P	65	140	18	69	130	M20
	4, 6 & 8																		75	140	20	79.5	130	

Tolerances on Dimensions with*

Dimension	Tolerance		Specification
N	j6		IS 2223
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, 75Ø	
GA, GC, F, FA			IS 2048
d5(centering)			IS 2540

- ☐ 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.

Note :
1) For non standard motors, dimensions may change. Please contact our nearest sales office for details
2) For B3/B5 mounting motor in frame 180L & 200L, please refer to our nearest sales office

All Dimensions are in mm unless otherwise specified.

CAT-D-8028-3-1

Bharat Bijlee

FLAME PROOF MOTORS: Type Ex 'd'

F. Performance Data: Efficiency Values Complying to IE2 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 F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	80	MJ80	2J0802A300000	2880	0.90	0.13	0.82	0.74	0.60	69.5	69.5	67.5	6.0	2.7	3.0	0.0026	31
*0.55	0.75	80	MJ80	2J0802B300000	2860	1.26	0.19	0.82	0.74	0.60	74.1	74.1	72.0	6.0	2.7	3.0	0.0026	31
0.75	1.0	80	MJ80	2J08021300000	2840	1.66	0.26	0.81	0.73	0.60	77.4	77.4	76.4	5.0	2.2	2.5	0.0026	31
1.1	1.5	80	MJ80	2J08023300000	2855	2.37	0.35	0.81	0.75	0.61	79.6	79.6	79.6	5.5	2.7	3.0	0.0034	32
*1.5	2.0	90L	MJ90	2J09L24300000	2835	3.09	0.52	0.83	0.77	0.66	81.3	81.3	80.0	6.0	2.6	2.8	0.0053	48
2.2	3.0	90L	MJ90	2J09L27300000	2835	4.33	0.76	0.85	0.80	0.70	83.2	83.2	82.5	6.0	2.8	3.0	0.0066	45
3.7	5.0	100L	MJ100	2J10L23300000	2890	6.84	1.25	0.88	0.83	0.73	85.5	85.5	83.0	6.5	2.8	3.1	0.0142	62
5.5	7.5	132S	MJ132	2J13S2G300000	2930	9.88	1.83	0.89	0.86	0.79	87.0	87.0	84.5	6.5	2.5	3.0	0.0820	89
7.5	10	132S	MJ132	2J13S2N300000	2935	13.2	2.49	0.90	0.87	0.82	88.1	87.5	85.0	6.5	2.6	3.0	0.0980	97
9.3	12.5	160M	MJ160	2J16M23300000	2940	16.5	3.08	0.88	0.86	0.81	88.9	88.6	86.0	6.0	2.0	2.5	0.142	147
11	15	160M	MJ160	2J16M25300000	2940	19.5	3.64	0.88	0.85	0.79	89.4	89.4	87.0	6.5	2.1	2.6	0.160	153
15	20	160M	MJ160	2J16M26300000	2940	26.3	4.97	0.88	0.87	0.82	90.3	90.0	88.0	6.5	2.0	2.5	0.191	164
18.5	25	160L	MJ160	2J16L29300000	2940	31.5	6.13	0.90	0.89	0.86	90.9	90.9	89.0	6.5	2.0	2.5	0.244	180
*22	30	180L	MJ180	2J18L23300000	2940	38.5	7.29	0.87	0.84	0.78	91.3	91.3	90.0	6.5	2.4	2.7	0.325	221
30	40	200L	MJ200	2J20L2A300000	2950	51.6	9.91	0.88	0.86	0.80	92.0	92.0	90.5	6.5	2.6	3.0	0.524	300
37	50	200L	MJ200	2J20L25300000	2955	64.0	12.2	0.87	0.84	0.76	92.5	92.5	91.0	7.0	2.2	2.5	0.640	320
45	60	225M	MJ225	2J22M25300000	2965	77.5	14.8	0.87	0.85	0.80	92.9	92.9	91.5	6.5	2.3	2.4	1.04	449
55	75	250M	MJ250	2J25M23300000	2970	92.2	18.0	0.89	0.87	0.81	93.2	92.9	91.0	6.5	2.3	2.7	1.45	560
75	100	280S	MJ280	2J28S23300000	2970	122	24.6	0.91	0.89	0.80	93.8	93.6	92.0	6.5	2.0	2.8	3.01	740
90	120	280M	MJ280	2J28M25300000	2970	146	29.5	0.91	0.89	0.86	94.1	93.9	90.9	6.5	2.0	2.8	3.42	765
110	150	315S	MJ315	2J31S23300000	2982	180	35.9	0.90	0.86	0.80	94.3	94.1	91.5	7.0	2.2	2.5	5.00	1050
125	170	315M	MJ315	2J31M2A300000	2982	207	40.8	0.89	0.85	0.78	94.5	93.5	91.5	7.0	2.2	2.6	5.00	1050
132	180	315M	MJ315	2J31M23300000	2982	216	43.1	0.90	0.86	0.80	94.6	93.6	91.3	7.0	2.0	2.5	5.00	1050
150	200	315L	MJ315	2J31L2A300000	2982	248	49.0	0.89	0.84	0.78	94.7	93.7	92.2	7.0	2.0	2.5	6.20	1240
160	215	315L	MJ315	2J31L25300000	2985	261	52.2	0.90	0.86	0.80	94.8	94.1	93.0	7.0	2.4	2.5	6.20	1240
180	240	315L	MJ315	2J31L2B300000	2982	300	58.8	0.88	0.82	0.75	94.9	94.1	93.0	7.0	2.0	2.5	7.70	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'

Performance Data: Efficiency Values Complying to IE2 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 F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.37	0.50	80	MJ80	2J08041300000	1415	0.96	0.25	0.74	0.68	0.55	72.7	72.7	67.7	5.0	2.4	2.6	0.0061	31
0.55	0.75	80	MJ80	2J08043300000	1420	1.34	0.38	0.74	0.64	0.50	77.1	77.1	72.0	5.0	2.8	3.0	0.0066	31
0.75	1.0	80	MJ80	2J08045300000	1410	1.70	0.52	0.77	0.67	0.55	79.6	79.6	76.0	5.0	2.8	3.0	0.0073	32
*1.1	1.5	90L	MJ90	2J09L42300000	1425	2.40	0.75	0.78	0.69	0.55	81.4	81.4	79.0	5.5	2.3	2.7	0.0106	40
1.5	2.0	90L	MJ90	2J09L47300000	1425	3.23	1.03	0.78	0.68	0.56	82.8	82.8	80.5	5.5	2.5	2.8	0.0130	43
2.2	3.0	100L	MJ100	2J10L47300000	1425	4.37	1.50	0.83	0.74	0.60	84.3	84.3	82.5	6.0	2.6	3.0	0.0211	62
3.7	5.0	112M	MJ112	2J11M47300000	1445	7.36	2.49	0.81	0.76	0.64	86.3	86.3	85.0	6.0	2.6	3.0	0.0600	75
5.5	7.5	132S	MJ132	2J13S4K300000	1450	10.4	3.69	0.84	0.81	0.67	87.7	87.7	86.0	6.5	2.2	2.8	0.0993	90
7.5	10	132M	MJ132	2J13M4T300000	1450	14.0	5.04	0.84	0.76	0.65	88.7	88.7	87.0	6.5	2.3	2.8	0.125	100
9.3	12.5	160M	MJ160	2J16M4C300000	1465	17.6	6.18	0.82	0.76	0.68	89.4	89.4	87.0	6.5	2.4	2.7	0.187	148
11	15	160M	MJ160	2J16M4K300000	1465	20.5	7.31	0.83	0.78	0.68	89.8	89.8	88.5	6.5	2.4	2.7	0.224	157
15	20	160L	MJ160	2J16L4T300000	1465	27.8	9.97	0.83	0.78	0.68	90.6	90.6	89.5	6.5	2.4	2.7	0.293	175
*18.5	25	180L	MJ180	2J18L47300000	1465	33.6	12.3	0.84	0.80	0.70	91.2	91.2	90.5	6.0	2.6	2.9	0.467	218
22	30	180L	MJ180	2J18L48300000	1460	39.3	14.7	0.85	0.82	0.72	91.6	91.6	91.0	6.5	2.6	2.9	0.512	226
30	40	200L	MJ200	2J20L45300000	1470	54.5	19.9	0.83	0.79	0.68	92.3	92.3	90.5	6.5	2.4	2.6	1.070	311
37	50	225S	MJ225	2J22S43300000	1470	65.3	24.5	0.85	0.82	0.75	92.7	92.7	91.0	6.0	2.3	2.4	1.410	386
45	60	250M	MJ225	2J22M45300000	1470	79.1	29.8	0.85	0.82	0.74	93.1	92.8	91.0	6.5	2.4	2.5	1.670	414
55	75	250M	MJ250	2J25M433000000	1480	96.3	36.2	0.85	0.82	0.74	93.5	93.5	92.5	6.5	2.5	2.7	2.950	590
75	100	280S	MJ280	2J28S42300000	1485	129	49.2	0.86	0.83	0.76	94.0	94.0	93.0	6.5	2.4	2.6	6.00	720
90	120	280M	MJ280	2J28M45300000	1485	155	59.0	0.86	0.82	0.76	94.2	94.2	93.5	6.5	2.3	2.8	6.87	775
110	150	315S	MJ315	2J31S41300000	1488	191	72.0	0.85	0.82	0.72	94.5	94.5	93.2	6.5	2.5	3.0	9.04	1018
125	170	315M	MJ315	2J31M4A300000	1488	216	81.8	0.85	0.80	0.73	94.7	94.4	93.5	6.8	2.3	2.8	10.7	1050
132	180	315M	MJ315	2J31M43300000	1488	225	86.4	0.86	0.83	0.76	94.7	94.7	94.0	6.5	2.3	2.8	10.7	1050
150	200	315L	MJ315	2J31L4A300000	1487	259	98.3	0.85	0.83	0.76	94.9	94.7	94.0	6.8	2.5	3.0	13.3	1250
160	215	315L	MJ315	2J31L45300000	1487	273	105	0.86	0.84	0.78	94.9	94.9	94.0	6.5	2.4	3.0	13.3	1250
180	240	315L	MJ315	2J31L46300000	1488	307	118	0.86	0.84	0.78	95.0	95.0	94.5	6.5	2.4	3.0	14.9	1315
200	270	315L	MJ315	2J31L47300000	1489	336	131	0.87	0.84	0.78	95.1	95.1	94.0	6.5	2.4	3.0	17.0	1405

* 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'

Performance Data: Efficiency Values Complying to IE2 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 F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.37	0.50	80	MJ80	2J08061300000	910	1.06	0.40	0.72	0.62	0.50	67.6	67.6	63.0	3.0	2.0	2.2	0.0054	29
0.55	0.75	80	MJ80	2J08063300000	910	1.45	0.59	0.72	0.63	0.50	73.1	73.1	70.0	3.5	2.1	2.3	0.0078	31
*0.75	1.0	90L	MJ90	2J09L63300000	920	1.90	0.79	0.72	0.61	0.50	75.9	75.9	72.3	4.0	2.0	2.5	0.0105	40
1.1	1.5	90L	MJ90	2J09L65300000	930	2.72	1.15	0.72	0.61	0.50	78.1	78.1	74.0	4.0	2.0	2.6	0.0160	50
1.5	2.0	100L	MJ100	2J10L63300000	935	3.63	1.56	0.72	0.62	0.52	79.8	79.8	76.0	4.5	2.0	2.5	0.0253	60
2.2	3.0	112M	MJ112	2J11M65300000	955	5.00	2.24	0.75	0.65	0.56	81.8	81.8	79.8	5.0	2.1	2.5	0.0650	71
3.7	5.0	132S	MJ132	2J13S6G300000	960	7.83	3.75	0.78	0.73	0.60	84.3	84.3	83.5	5.5	2.0	2.5	0.109	104
5.5	7.5	132M	MJ132	2J13M6T300000	960	11.6	5.58	0.77	0.71	0.60	86.0	86.0	85.0	5.5	2.0	2.5	0.152	125
7.5	10	160M	MJ160	2J16M63300000	960	15.0	7.61	0.80	0.74	0.64	87.2	87.2	85.2	5.5	2.0	2.5	0.276	149
9.3	12.5	160L	MJ160	2J16L66300000	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	86.7	5.5	2.1	2.5	0.340	160
11	15	160L	MJ160	2J16L67300000	965	21.6	11.1	0.80	0.77	0.66	88.7	88.7	87.0	6.0	2.0	2.5	0.400	169
15	20	180L	MJ180	2J18L63300000	975	28.4	15.0	0.82	0.78	0.68	89.7	89.7	89.0	5.5	2.3	2.5	0.707	229
18.5	25	200L	MJ200	2J20L63300000	975	34.7	18.5	0.82	0.77	0.69	90.4	90.4	89.5	6.0	2.6	2.7	1.10	282
22	30	200L	MJ200	2J20L65300000	975	41.1	22.0	0.82	0.77	0.69	90.9	90.9	89.5	6.0	2.6	2.7	1.30	300
30	40	225M	MJ225	2J22M64300000	980	52.3	29.8	0.87	0.84	0.76	91.7	91.7	90.0	6.5	2.5	2.6	2.41	430
37	50	250M	MJ250	2J25M63300000	980	63.4	36.8	0.88	0.85	0.78	92.2	92.2	91.8	6.5	2.5	2.7	3.25	573
45	60	280S	MJ280	2J28S61300000	983	80.4	44.6	0.84	0.81	0.73	92.7	92.7	92.6	6.0	2.2	2.5	4.68	630
55	75	280M	MJ280	2J28M63300000	983	96.7	54.5	0.85	0.82	0.75	93.1	93.1	92.8	6.0	2.2	2.5	6.18	686
75	100	315S	MJ315	2J31S61300000	988	133	73.9	0.84	0.80	0.72	93.7	93.7	93.2	6.0	2.2	2.5	9.64	936
90	120	315M	MJ315	2J31M63300000	990	159	88.6	0.84	0.80	0.72	94.0	94.0	93.5	6.0	2.2	2.5	11.4	1000
110	150	315M	MJ315	2J31M65300000	990	193	108	0.84	0.79	0.70	94.3	94.3	93.5	6.0	2.3	2.5	14.8	1121
125	170	315L	MJ315	2J31L6A300000	990	222	123	0.83	0.79	0.70	94.5	94.5	93.5	6.5	2.2	2.5	17.3	1348
132	180	315L	MJ315	2J31L67300000	990	231	130	0.84	0.80	0.72	94.6	94.6	94.0	6.0	2.1	2.4	17.3	1348
150	200	315L	MJ315	2J31L6B300000	993	265	147	0.83	0.79	0.70	94.7	94.7	94.4	6.0	2.2	2.5	20.4	1460
160	215	315L	MJ315	2J31L69300000	993	280	157	0.84	0.80	0.72	94.8	94.8	94.5	6.0	2.2	2.5	20.4	1460

* 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'

Performance Data: Efficiency Values Complying to IE2 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 F
Temperature Rise: Class B
Protection: IP55

Rated Output		Frame Size IEC	Frame Size BBL	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			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
*0.18	0.25	80	MJ80	2J08081300000	675	0.91	0.26	0.60	0.52	0.42	45.9	45.9	40.0	3.0	1.8	2.2	0.005	31
*0.25	0.35	80	MJ80	2J08083300000	675	1.11	0.36	0.62	0.55	0.45	50.6	50.6	45.0	3.0	1.8	2.2	0.008	32
*0.37	0.50	90L	MJ90	2J09L83300000	695	1.30	0.52	0.70	0.60	0.50	56.1	56.1	53.0	2.8	1.7	2.1	0.0110	38
0.55	0.75	90L	MJ90	2J09L85300000	680	1.82	0.79	0.68	0.60	0.46	61.7	61.7	56.0	2.8	1.7	2.1	0.0129	39
0.75	1.0	100L	MJ100	2J10L81300000	685	2.25	1.07	0.70	0.61	0.50	66.2	66.2	66.2	3.0	1.9	2.3	0.0216	50
1.1	1.5	100L	MJ100	2J10L83300000	680	3.10	1.58	0.70	0.61	0.50	70.8	70.8	67.0	3.0	1.9	2.3	0.0271	52
1.5	2.0	112M	MJ112	2J11M81300000	695	4.00	2.10	0.70	0.61	0.49	74.1	74.1	71.0	3.8	1.7	2.2	0.0500	58
2.2	3.0	132S	MJ132	2J13S8B300000	705	5.33	3.04	0.74	0.66	0.55	77.6	77.6	76.0	3.8	1.7	2.2	0.0911	82
3.7	5.0	160M	MJ160	2J16M81300000	715	8.55	5.04	0.74	0.68	0.55	81.4	81.4	80.0	4.4	1.7	2.2	0.202	133
5.5	7.5	160M	MJ160	2J16M83300000	715	12.2	7.49	0.75	0.68	0.55	83.8	83.8	82.5	4.4	1.7	2.2	0.291	148
7.5	10	160L	MJ160	2J16L86300000	715	16.3	10.2	0.75	0.70	0.58	85.3	85.3	84.0	4.4	1.8	2.3	0.376	161
*9.3	12.5	180L	MJ180	2J18L83300000	725	19.5	12.5	0.77	0.74	0.64	86.3	86.3	85.0	5.0	1.7	2.1	0.705	210
11	15	180L	MJ180	2J18L86300000	725	23.8	14.8	0.74	0.68	0.60	86.9	86.9	86.0	5.0	1.8	2.2	0.716	213
15	20	200L	MJ200	2J20L84300000	725	28.9	20.2	0.82	0.77	0.65	88.0	88.0	87.0	5.5	2.3	2.5	1.36	310
18.5	25	225S	MJ225	2J22S82300000	725	35.4	24.9	0.82	0.80	0.72	88.6	88.6	87.6	5.5	2.0	2.2	2.11	419
22	30	225M	MJ225	2J22M83300000	725	41.9	29.6	0.82	0.80	0.72	89.1	89.1	88.1	5.5	2.0	2.2	2.41	430
30	40	250M	MJ250	2J25M81300000	730	56.7	40.0	0.82	0.80	0.72	89.8	89.8	89.0	5.5	2.0	2.2	3.25	570
37	50	280S	MJ280	2J28S82300000	730	73.1	49.4	0.78	0.74	0.65	90.3	90.3	90.0	5.5	2.0	2.2	6.18	725
45	60	280M	MJ280	2J28M85300000	738	90.8	59.4	0.76	0.72	0.60	90.7	90.7	90.5	5.5	2.0	2.2	7.25	775
55	75	315S	MJ315	2J31S81300000	739	112	72.5	0.75	0.72	0.62	91.0	91.0	90.5	5.5	1.8	2.0	9.64	836
75	100	315M	MJ315	2J31M83300000	739	154	98.8	0.74	0.70	0.62	91.6	91.6	91.0	5.5	1.8	2.0	11.4	900
90	120	315M	MJ315	2J31M85300000	741	179	118	0.76	0.72	0.64	91.9	91.9	91.5	5.5	1.8	2.0	14.8	1021
110	150	315L	MJ315	2J31L87300000	742	224	144	0.74	0.69	0.58	92.3	92.3	92.0	5.5	2.0	2.2	17.3	1228
125	170	315L	MJ315	2J31L8A300000	742	247	164	0.76	0.70	0.60	92.5	92.5	92.0	5.5	2.0	2.2	21.5	1375
132	180	315L	MJ315	2J31L89300000	742	261	173	0.76	0.72	0.62	92.6	92.6	92.0	5.5	2.0	2.2	21.5	1375

* These ratings are offered in higher frame size

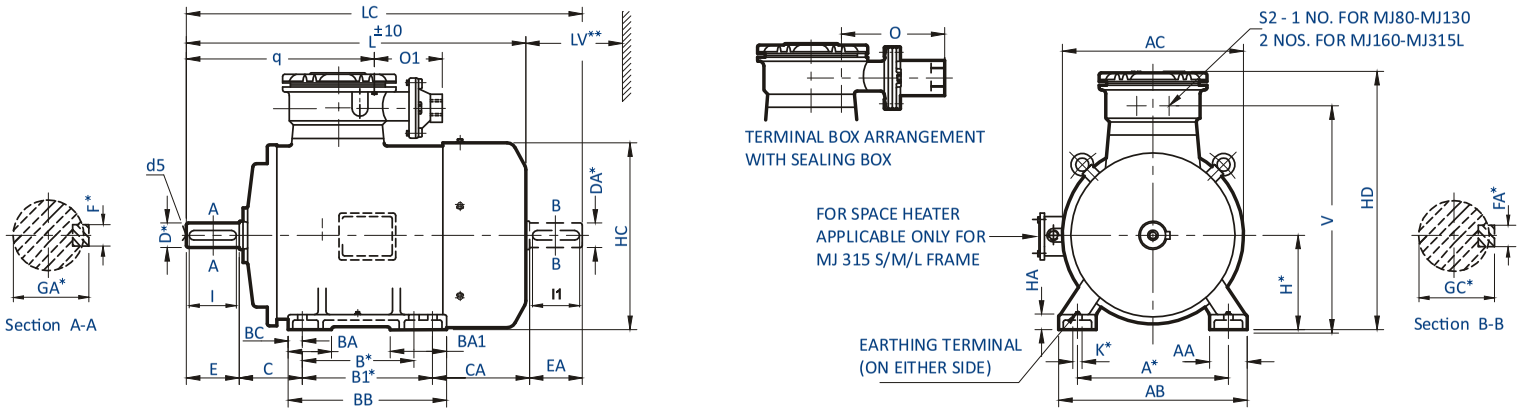
Note

1) All performance values are subject to tolerance as per IS 15999: Part 1
2) For higher ratings, kindly contact our nearest sales office

Bharat Bijlee

FLAME PROOF MOTORS: Type Ex 'd'

G. Dimensional Drawing: Efficiency Values Complying to IE2 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	LC	CA	AC	LV**	V	O	O1	q	S2	D DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4 & 6	125	100	—	50	80	10	153	126	32	36	—	16	10	162	296	330	386	156	164	30	236	214	135	168	M20X1.5P	19	40	6	21.5	35	M6
90L	2, 4, 6 & 8	140	125	—	56	90	10	180	160	50	40	—	19	13	177	336	382	463	182	174	35	269	217	141	195	M25X1.5P	24	50	8	27	45	M8
100L	2, 4, 6 & 8	160	140	—	63	100	12	200	176	54	45	—	21	14	198	358	435	520	197	195	40	291	207	131	225	M25X1.5P	28	60	8	31	55	M10
112M	2, 4, 6 & 8	190	140	—	70	112	12	230	176	50	55	—	21	15	222	374	456	539	209	220	45	316	200	124	233	M25X1.5P	28	60	8	31	55	M10
132S/M	2, 4, 6 & 8	216	140	178	89	132	12	256	218	50	53	77	23	17	262	408	551	660	233	260	50	352	175	100	282	M25X1.5P	38	80	10	41	70	M12
160M/L	2	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704	839	247	314	60	404	252	151	365	M25X1.5P	42	110	12	45	105	M16
	4, 6 & 8																694	829														
180L	2, 4, 6 & 8	279	279	—	121	180	15	339	339	80	75	—	33	26	357	515	720	842	200	354	70	447	270	166	370	M25X1.5P	48	110	14	51.5	100	M16
200L	2	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805	927	235	394	80	488	237	133	395	M25X1.5P	55	110	16	59	100	M20
	4, 6 & 8																771	893														
225S/M	2	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	824	973	270	444	90	564	308	264	414	M40X1.5P	55	110	16	59	100	M20
	4, 6 & 8																836	985	245						444		60	140	18	64	130	
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	915	1065	268	489	100	601	287	242	474	M40X1.5P	60	140	18	64	130	M20
	4, 6 & 8																										65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	1157	271	544	115	668	252	207	517	M40X1.5P	65	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	1338	381	606	130	758	256	225	584	M50X1.5P	65	140	18	69	130	M20
	4, 6 & 8																1163	1353	336						614		80	170	22	85	160	
315L	2	508	508	—	216	315	28	625	593	120	115	115	46	45	617	850	1343	1503	499	606	145	758	276	225	666	M50X1.5P	65	140	18	69	130	M20
	4, 6 & 8																1328	1518	454						696		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

- Separate sp. heater T. Box will be provided as a std. feature in case of MJ 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.

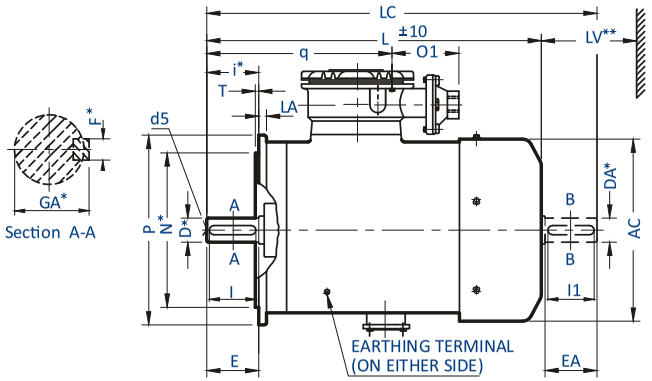
** Minimum distance for efficient cooling of motor to be maintained by user.

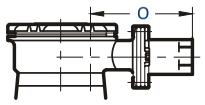
Note For non standard motors, dimensions may change. Please contact our nearest sales office for details.

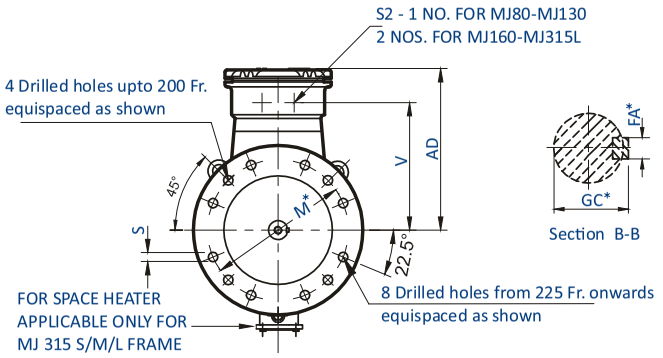
All Dimensions are in mm unless otherwise specified.

FLAME PROOF MOTORS: Type Ex 'd'

Dimensional Drawing: Efficiency Values Complying to IE2 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	LC	AD	LV**	V	O	O1	q	S2	D DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	2, 4 & 6	200	130	165	40	12	3.5	11	164	330	386	216	30	156	214	135	168	M20X1.5P	19	40	6	21.5	35	M6
90L	2, 4, 6 & 8	200	130	165	50	12	3.5	11	174	382	463	246	35	179	217	141	195	M25X1.5P	24	50	8	27	45	M8
100L	2, 4, 6 & 8	250	180	215	60	15	4	12	195	435	520	258	40	191	207	131	225	M25X1.5P	28	60	8	31	55	M10
112M	2, 4, 6 & 8	250	180	215	60	15	4	12	220	456	539	262	45	204	200	124	233	M25X1.5P	28	60	8	31	55	M10
132S/M	2, 4, 6 & 8	300	230	265	80	15	4	13	260	551	660	290	50	223	175	100	282	M25X1.5P	38	80	10	41	70	M12
160M/L	2	350	250	300	110	19	5	13	314	704	839	312	60	244	252	151	365	M25X1.5P	42	110	12	45	105	M16
	4, 6 & 8									694	829													
180L	2, 4, 6 & 8	350	250	300	110	19	5	16	354	745	867	335	70	267	270	166	395	M25X1.5P	48	110	14	51.5	100	M16
200L	2	400	300	350	110	19	5	15	394	826	948	356	80	288	237	133	416	M25X1.5P	55	110	16	59	100	M20
	4, 6 & 8									792	914													
225S/M	2	450	350	400	110	19	5	16	444	824	973	426	90	339	308	264	414	M40X1.5P	55	110	16	59	100	M20
	4, 6 & 8				140					836	985						444		60	140	18	64	130	
250M	2	550	450	500	140	19	5	18	489	915	1065	438	100	351	287	242	474	M40X1.5P	60	140	18	64	130	M20
	4, 6 & 8																		65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	544	1010	1157	475	115	388	252	207	517	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	1338	535	130	443	276	225	584	M50X1.5P	65	140	18	69	130	M20
	4, 6 & 8				170					1163	1353						614		80	170	22	85	160	
315L	2	660	550	600	140	24	6	22	610	1343	1503	535	145	443	276	225	666	M50X1.5P	65	140	18	69	130	M20
	4, 6 & 8				170					1328	1518						696		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

- Separate sp. heater T. Box will be provided as a std. feature in case of MJ 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.

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

Note:

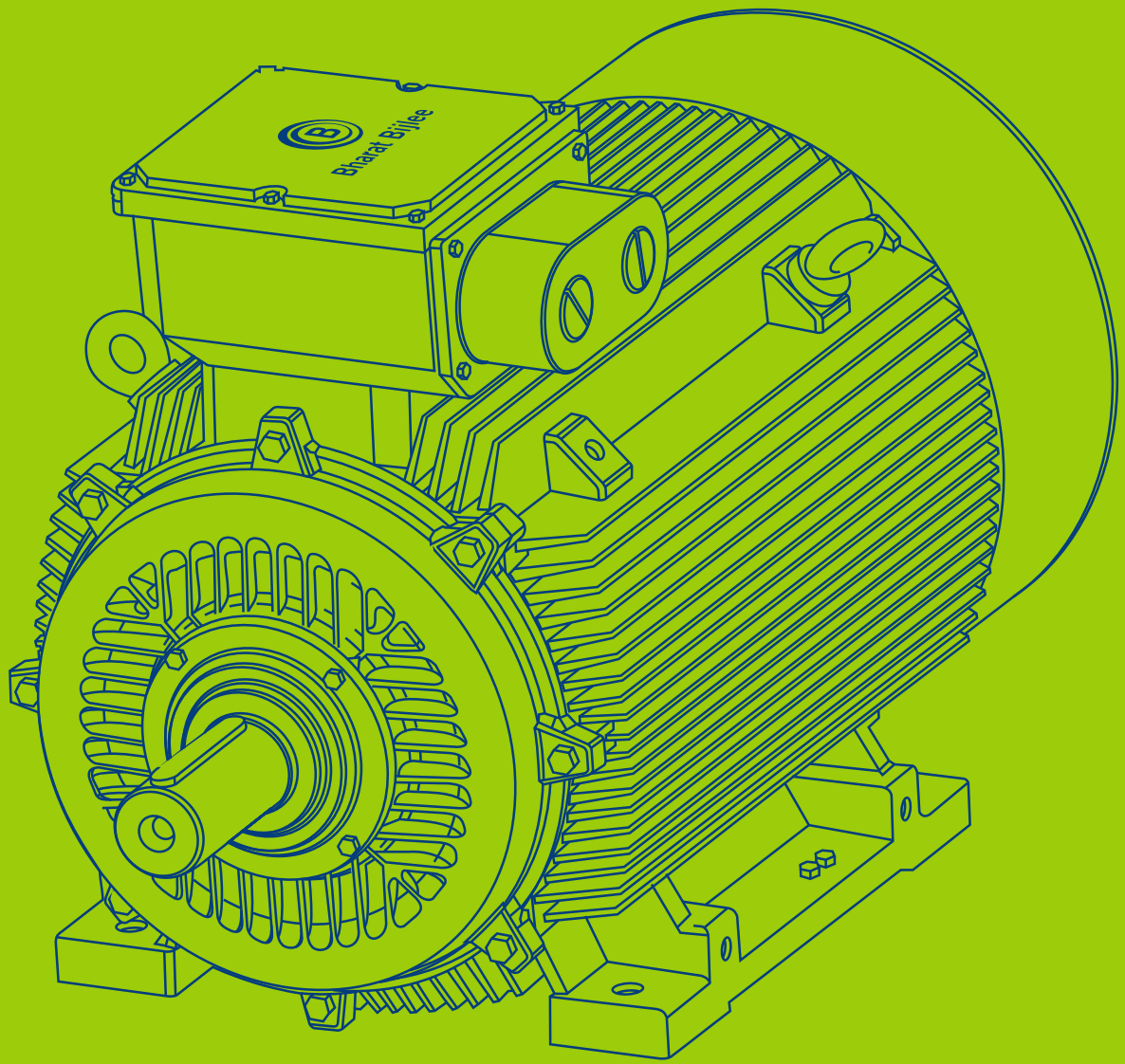
For motor in frame 180L & 200L with B3/B5 mounting , kindly refer to our nearest sales office.

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

All Dimensions are in mm unless otherwise specified.

Bharat Bijlee

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

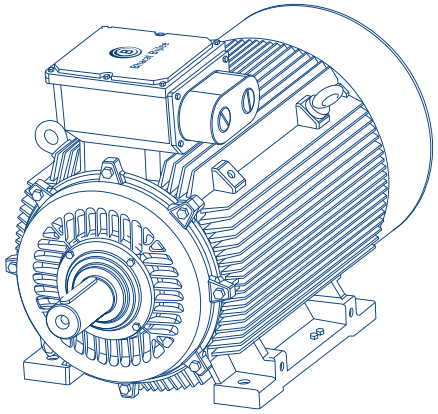
Fr. Size	Bearing Nos. C3 Clearance		Terminals		No. & Size of Cable Entries	Max cond cross sec area (mm²)
	D.E.	N.D.E.	Nos	Size		
63	6201 2Z	6201 2Z	3	M4	2 x M20 x 1.5P	4
71	6202 2Z	6202 2Z				
80	6004 2Z	6004 2Z				
90S, 90L	6205 2Z	6205 2Z	3*			
100L	6206 2Z	6205 2Z	3*		2 x M25 x 1.5P	10
112M	6206 2Z	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 IE2 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 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		B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.18	0.25	63	2E063213AT000	2700	0.58	0.06	0.72	0.65	0.50	60.4	60.4	54.0	3.5	2.3	2.5	0.0005	4.5
0.25	0.35	63	2E063233AT000	2700	0.75	0.09	0.72	0.65	0.50	64.8	64.8	60.0	3.5	2.4	2.6	0.0006	5
0.37	0.50	71	2E0712A3AT000	2800	0.95	0.13	0.78	0.70	0.53	69.5	69.5	64.0	4.0	2.0	3.0	0.0012	6.8
0.55	0.75	71	2E071233AT000	2820	1.36	0.19	0.76	0.64	0.50	74.1	74.1	65.0	5.0	2.5	2.8	0.0016	7.7
0.75	1.0	80	2E080213CT000	2840	1.66	0.26	0.81	0.73	0.60	77.4	77.4	76.4	5.0	2.2	2.5	0.0026	15
1.1	1.5	80	2E080233CT000	2855	2.37	0.38	0.81	0.75	0.61	79.6	79.6	79.6	5.5	2.7	3.0	0.0034	16
1.5	2.0	90S	2E09S243CT000	2835	3.09	0.52	0.83	0.77	0.66	81.3	81.3	80.0	6.0	2.6	2.8	0.0053	22
2.2	3.0	90L	2E09L273CT000	2835	4.33	0.76	0.85	0.80	0.70	83.2	83.2	82.5	6.0	2.8	3.0	0.0066	24
3.7	5.0	100L	2E10L233CT000	2890	6.84	1.25	0.88	0.83	0.73	85.5	85.5	83.0	6.5	2.8	3.1	0.0142	34
5.5	7.5	132S	2E13S2G3CT000	2930	9.88	1.83	0.89	0.86	0.79	87.0	87.0	84.5	6.5	2.5	3.0	0.0515	68
7.5	10	132S	2E13S2N3CT000	2935	13.3	2.49	0.89	0.86	0.80	88.1	87.7	86.0	6.5	2.5	3.0	0.0800	80
9.3	12.5	160M	2E16M233CT000	2940	16.5	3.08	0.88	0.86	0.81	88.9	88.6	86.0	6.0	2.0	2.5	0.142	98
11	15	160M	2E16M253CT000	2940	19.5	3.64	0.88	0.85	0.79	89.4	89.4	87.0	6.5	2.1	2.6	0.160	104
15	20	160M	2E16M263CT000	2940	26.3	4.97	0.88	0.87	0.82	90.3	90.0	88.0	6.5	2.0	2.5	0.191	115
18.5	25	160L	2E16L293CT000	2940	31.5	6.13	0.90	0.89	0.86	90.9	90.9	89.0	6.5	2.0	2.5	0.244	137
22	30	180M	2E18M233CT000	2940	38.5	7.29	0.87	0.84	0.78	91.3	91.3	90.0	6.5	2.4	2.7	0.325	171
30	40	200L	2E20L2A3CT000	2950	51.6	9.91	0.88	0.86	0.80	92.0	92.0	90.5	6.5	2.6	3.0	0.524	259
37	50	200L	2E20L273CT000	2955	64.7	12.2	0.86	0.83	0.75	92.5	92.5	91.0	6.5	2.6	3.0	0.573	272
45	60	225M	2E22M253CT000	2965	77.5	14.8	0.87	0.85	0.80	92.9	92.9	91.5	6.5	2.3	2.4	1.04	365
55	75	250M	2E25M233CT000	2970	92.2	18.0	0.89	0.87	0.81	93.2	92.9	91.0	6.5	2.3	2.7	1.45	487
75	100	280S	2E28S233CT000	2970	122	24.6	0.91	0.89	0.86	93.8	93.6	92.0	6.5	2.0	2.8	3.01	669
90	120	280M	2E28M253CT000	2970	146	29.5	0.91	0.89	0.86	94.1	93.9	90.9	6.5	2.0	2.8	3.42	750
110	150	315S	2E31S233CT000	2982	180	35.9	0.90	0.86	0.80	94.3	94.1	91.5	7.0	2.2	2.5	5.00	940
125	170	315M	2E31M2A3CT000	2982	207	40.8	0.89	0.85	0.78	94.5	93.5	91.5	7.0	2.2	2.6	5.00	940
132	180	315M	2E31M233CT000	2982	216	43.1	0.90	0.86	0.80	94.6	93.6	91.3	7.0	2.0	2.5	5.00	940
150	200	315L	2E31L2A3CT000	2982	248	49.0	0.89	0.84	0.78	94.7	93.7	92.2	7.0	2.0	2.5	6.20	1100
160	215	315L	2E31L253CT000	2985	261	52.2	0.90	0.86	0.80	94.8	94.1	93.0	7.0	2.4	2.5	6.20	1100
180	240	315L	2E31L2B3CT000	2982	300	58.8	0.88	0.82	0.75	94.9	94.1	93.0	7.0	2.0	2.5	7.70	1390

For higher ratings upto 355kW, kindly refer to our nearest sales office.

Note: 1) All performance values are subject to tolerance as per IS 15999: Part 1

Bharat Bijlee

INCREASED SAFETY MOTORS: Type Ex e

Performance Data: Efficiency Values Complying to IE2 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 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		B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.12	0.16	63	2E063413AT000	1320	0.39	0.09	0.73	0.62	0.48	59.1	59.1	53.0	2.5	1.7	2.0	0.0010	4.5
0.18	0.25	63	2E063433AT000	1340	0.54	0.13	0.72	0.62	0.50	64.7	64.7	59.0	3.0	1.7	2.0	0.0013	5.5
0.25	0.35	71	2E0714A3AT000	1375	0.72	0.18	0.71	0.61	0.45	68.5	68.5	60.0	3.5	1.7	1.9	0.0022	6.8
0.37	0.50	71	2E071433AT000	1400	1.00	0.26	0.68	0.58	0.47	72.7	72.7	70.0	3.5	2.0	2.2	0.0031	8
0.55	0.75	80	2E080433CT000	1420	1.34	0.38	0.74	0.64	0.50	77.1	77.1	72.0	5.0	2.8	3.0	0.0066	15
0.75	1.0	80	2E080453CT000	1410	1.70	0.52	0.77	0.67	0.55	79.6	79.6	76.0	5.0	2.8	3.0	0.0073	16
1.1	1.5	90S	2E09S423CT000	1425	2.41	0.75	0.78	0.69	0.55	81.4	81.4	79.0	5.5	2.3	2.7	0.0097	21
1.5	2.0	90L	2E09L473CT000	1425	3.23	1.03	0.78	0.68	0.56	82.8	82.8	80.5	5.5	2.5	2.8	0.013	24
2.2	3.0	100L	2E10L473CT000	1425	4.37	1.50	0.83	0.74	0.60	84.3	84.3	82.5	6.0	2.6	3.0	0.021	34
3.7	5.0	112M	2E11M473CT000	1445	7.36	2.49	0.81	0.76	0.64	86.3	86.3	85.0	6.0	2.6	3.0	0.049	45
5.5	7.5	132S	2E13S4K3CT000	1450	10.4	3.69	0.84	0.81	0.67	87.7	87.7	86.0	6.5	2.2	2.8	0.103	69
7.5	10	132M	2E13M4T3CT000	1450	14.0	5.04	0.84	0.76	0.65	88.7	88.7	87.0	6.5	2.3	2.8	0.125	78
9.3	12.5	160M	2E16M4C3CT000	1465	17.6	6.18	0.82	0.76	0.68	89.4	89.4	87.0	6.5	2.4	2.7	0.187	99
11	15	160M	2E16M4K3CT000	1465	20.5	7.31	0.83	0.78	0.68	89.8	89.8	88.5	6.5	2.4	2.7	0.224	109
15	20	160L	2E16L4T3CT000	1465	27.8	10.0	0.83	0.78	0.68	90.6	90.6	89.5	6.5	2.4	2.7	0.293	132
18.5	25	180M	2E18M473CT000	1465	33.6	12.3	0.84	0.80	0.70	91.2	91.2	90.5	6.0	2.6	2.9	0.467	168
22	30	180L	2E18L483CT000	1465	39.3	14.6	0.85	0.82	0.72	91.6	91.6	91.0	6.5	2.6	2.9	0.532	187
30	40	200L	2E20L453CT000	1470	54.5	19.9	0.83	0.79	0.68	92.3	92.3	90.5	6.5	2.4	2.6	1.07	267
37	50	225S	2E22S433CT000	1470	65.3	24.5	0.85	0.82	0.75	92.7	92.7	91.0	6.0	2.3	2.4	1.41	330
45	60	225M	2E22M453CT000	1470	79.1	29.8	0.85	0.82	0.74	93.1	92.8	91.0	6.5	2.4	2.5	1.67	362
55	75	250M	2E25M433CT000	1480	96.3	36.2	0.85	0.82	0.74	93.5	93.5	92.5	6.5	2.5	2.7	2.95	500
75	100	280S	2E28S423CT000	1485	129	49.2	0.86	0.83	0.76	94.0	94.0	93.0	6.5	2.4	2.6	6.00	670
90	120	280M	2E28M453CT000	1485	155	59.0	0.86	0.82	0.76	94.2	94.2	93.5	6.5	2.3	2.8	6.87	725
110	150	315S	2E31S413CT000	1488	191	72.0	0.85	0.82	0.72	94.5	94.5	93.2	6.5	2.5	3.0	9.04	900
125	170	315M	2E31M4A3CT000	1488	216	81.8	0.85	0.80	0.73	94.7	94.4	93.5	6.8	2.25	2.75	10.7	970
132	180	315M	2E31M433CT000	1488	225	86.4	0.86	0.83	0.76	94.7	94.7	94.0	6.5	2.25	2.75	10.7	970
150	200	315L	2E31L4A3CT000	1487	259	98.3	0.85	0.83	0.76	94.9	94.7	94.0	6.8	2.5	3.0	13.3	1165
160	215	315L	2E31L453CT000	1487	273	105	0.86	0.84	0.78	94.9	94.9	94.0	6.5	2.4	3.0	13.3	1165
180	240	315L	2E31L463CT000	1488	307	118	0.86	0.84	0.78	95.0	95.0	94.5	6.5	2.4	3.0	14.9	1230
200	270	315L	2E31L473CT000	1489	336	131	0.87	0.84	0.78	95.1	95.1	94.0	6.5	2.4	3.0	17.0	1320

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

INCREASED SAFETY MOTORS: Type Ex ec

Performance Data: Efficiency Values Complying to IE2 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 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		B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.18	0.25	71	2E0716A300000	880	0.63	0.20	0.70	0.60	0.50	56.6	56.6	56.6	2.4	1.7	1.8	0.0033	7.2
0.25	0.35	71	2E07163300000	860	0.78	0.28	0.72	0.62	0.50	61.6	61.6	61.6	2.6	1.8	1.9	0.0033	7.2
0.37	0.50	80	2E080613CT000	910	1.06	0.40	0.72	0.62	0.50	67.6	67.6	63.0	3.0	2.0	2.2	0.0054	13
0.55	0.75	80	2E080633CT000	910	1.45	0.59	0.72	0.63	0.50	73.1	73.1	70.0	3.5	2.1	2.3	0.0078	15
0.75	1.0	90S	2E09S633CT000	920	1.90	0.79	0.72	0.61	0.50	75.9	75.9	72.3	4.0	2.0	2.5	0.0105	21
1.1	1.5	90L	2E09L653CT000	920	2.72	1.16	0.72	0.61	0.50	78.1	78.1	74.0	4.0	2.0	2.5	0.0155	24
1.5	2.0	100L	2E10L633CT000	935	3.63	1.56	0.72	0.62	0.52	79.8	79.8	76.0	4.5	2.0	2.5	0.0241	32
2.2	3.0	112M	2E11M653CT000	955	5.00	2.24	0.75	0.65	0.56	81.8	81.8	79.8	5.5	2.1	2.5	0.0609	45
3.7	5.0	132S	2E13S6G3CT000	960	7.83	3.75	0.78	0.73	0.60	84.3	84.3	83.5	5.5	2.0	2.5	0.109	67
5.5	7.5	132M	2E13M6T3CT000	960	11.6	5.58	0.77	0.71	0.60	86.0	86.0	85.0	5.5	2.0	2.5	0.152	80
7.5	10	160M	2E16M633CT000	965	15.3	7.57	0.78	0.73	0.62	87.2	87.2	86.0	5.5	1.9	2.3	0.217	97
9.3	12.5	160L	2E16L663CT000	965	18.6	9.39	0.79	0.74	0.64	88.0	88.0	86.7	5.5	1.9	2.3	0.289	115
11	15	160L	2E16L673CT000	965	22.1	11.1	0.78	0.73	0.62	88.7	88.7	87.0	6.0	2.0	2.5	0.319	120
15	20	180L	2E18L633CT000	975	28.4	15.0	0.82	0.78	0.68	89.7	89.7	89.0	5.5	2.3	2.5	0.740	183
18.5	25	200L	2E20L633CT000	975	34.7	18.5	0.82	0.77	0.69	90.4	90.4	89.5	6.0	2.6	2.7	1.10	242
22	30	200L	2E20L653CT000	975	41.1	22.0	0.82	0.77	0.69	90.9	90.9	89.5	6.0	2.6	2.7	1.30	260
30	40	225M	2E22M643CT000	980	52.3	29.8	0.87	0.84	0.76	91.7	91.7	90.0	6.5	2.5	2.6	2.41	355
37	50	250M	2E25M633CT000	980	63.4	36.8	0.88	0.85	0.78	92.2	92.2	91.8	6.5	2.5	2.7	3.25	500
45	60	280S	2E28S613CT000	983	80.4	44.6	0.84	0.81	0.73	92.7	92.7	92.6	6.0	2.2	2.5	4.68	580
55	75	280M	2E28M633CT000	983	96.7	54.5	0.85	0.82	0.75	93.1	93.1	92.8	6.0	2.2	2.5	6.18	640
75	100	315S	2E31S613CT000	988	133	73.9	0.84	0.80	0.72	93.7	93.7	93.2	6.0	2.2	2.5	9.64	836
90	120	315M	2E31M633CT000	990	159	88.5	0.84	0.80	0.72	94.0	94.0	93.5	6.0	2.2	2.5	11.4	900
110	150	315M	2E31M653CT000	990	193	108	0.84	0.79	0.70	94.3	94.3	93.5	6.0	2.3	2.5	14.8	1021
125	170	315L	2E31L6A3CT000	990	222	123	0.83	0.79	0.70	94.5	94.5	93.5	6.5	2.2	2.5	17.3	1228
132	180	315L	2E31L673CT000	990	231	130	0.84	0.80	0.72	94.6	94.6	94.0	6.0	2.1	2.4	17.3	1228
150	200	315L	2E31L6B3CT000	993	265	147	0.83	0.79	0.70	94.7	94.7	94.4	6.0	2.2	2.5	20.4	1340
160	215	315L	2E31L693CT000	993	280	157	0.84	0.80	0.72	94.8	94.8	94.5	6.0	2.2	2.5	20.4	1340

For higher ratings upto 315kW, kindly refer to our nearest sales office.

Note: 1) All performance values are subject to tolerance as per IS 15999: Part 1

Bharat Bijlee

INCREASED SAFETY MOTORS: Type Ex ec

Performance Data: Efficiency Values Complying to IE2 Efficiency Class of IS 12615

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

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

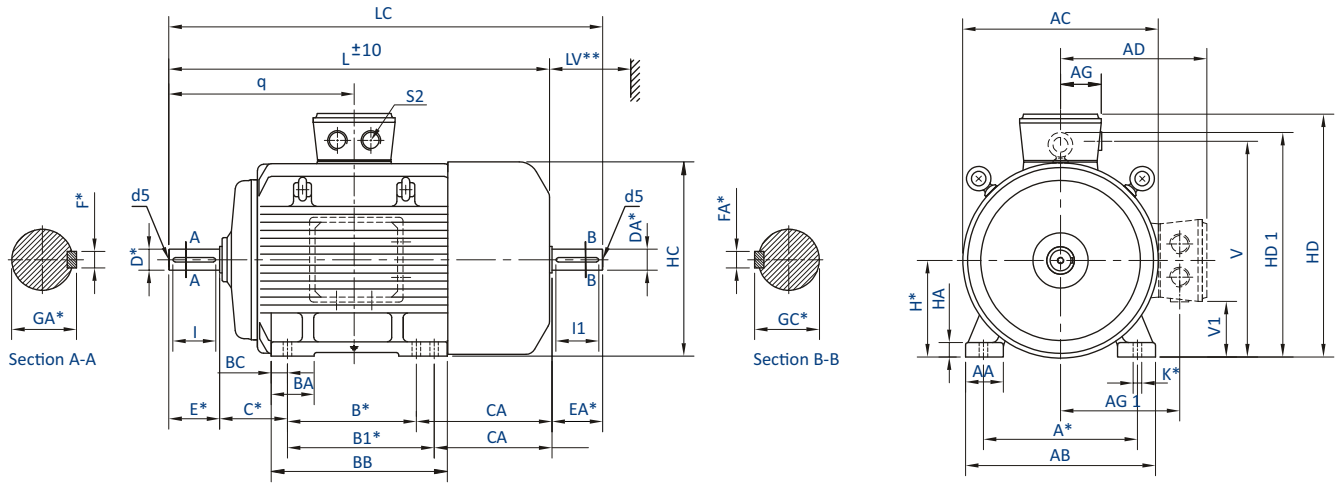
Insulation: Class F
Temperature Rise: Class B
Protection: IP55

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		B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm²	kg
0.12	0.16	71	2E071833AT000	640	0.76	0.18	0.55	0.50	0.40	39.8	39.8	39.8	2.2	1.7	2.1	0.0033	7
0.18	0.25	80	2E080813CT000	675	0.91	0.26	0.60	0.52	0.42	45.9	45.9	40.0	3.0	1.8	2.2	0.0054	13
0.25	0.35	80	2E080833CT000	675	1.11	0.36	0.62	0.55	0.45	50.6	50.6	45.0	3.0	1.8	2.2	0.0078	15
0.37	0.50	90S	2E09S813CT000	680	1.30	0.53	0.71	0.58	0.46	56.1	56.1	53.0	2.8	1.7	2.1	0.0097	19
0.55	0.75	90L	2E09L853CT000	680	1.82	0.79	0.68	0.60	0.46	61.7	61.7	56.0	2.8	1.7	2.1	0.0129	21
0.75	1.0	100L	2E10L813CT000	685	2.25	1.07	0.70	0.61	0.50	66.2	66.2	66.2	3.0	1.9	2.3	0.0216	28
1.1	1.5	100L	2E10L833CT000	680	3.09	1.58	0.70	0.61	0.50	70.8	70.8	67.0	3.0	1.9	2.3	0.0271	30
1.5	2.0	112M	2E11M813CT000	695	4.00	2.10	0.70	0.61	0.49	74.1	74.1	71.0	3.8	1.7	2.2	0.0500	38
2.2	3.0	132S	2E13S8B3CT000	705	5.33	3.04	0.74	0.66	0.55	77.6	77.6	76.0	3.8	1.7	2.2	0.0911	62
3.7	5.0	160M	2E16M813CT000	715	8.55	5.04	0.74	0.68	0.55	81.4	81.4	80.0	4.4	1.7	2.2	0.202	87
5.5	7.5	160M	2E16M833CT000	715	12.2	7.49	0.75	0.68	0.55	83.8	83.8	82.5	4.4	1.7	2.2	0.291	101
7.5	10	160L	2E16L863CT000	715	16.3	10.2	0.75	0.70	0.58	85.3	85.3	84.0	4.4	1.8	2.3	0.376	119
9.3	12.5	180M	2E18M833CT000	725	19.5	12.5	0.77	0.74	0.64	86.3	86.3	85.0	5.0	1.7	2.1	0.705	170
11	15	180L	2E18L873CT000	725	22.9	14.8	0.77	0.74	0.64	86.9	86.9	86.0	5.0	1.8	2.2	0.813	187
15	20	200L	2E20L843CT000	725	28.9	20.2	0.82	0.77	0.65	88.0	88.0	87.0	5.5	2.3	2.5	1.37	264
18.5	25	225S	2E22S823CT000	725	35.4	24.9	0.82	0.80	0.72	88.6	88.6	87.6	5.5	2.0	2.2	2.11	324
22	30	225M	2E22M833CT000	725	41.9	29.6	0.82	0.80	0.72	89.1	89.1	88.1	5.5	2.0	2.2	2.41	351
30	40	250M	2E25M813CT000	730	56.7	40.0	0.82	0.80	0.72	89.8	89.8	89.0	5.5	2.0	2.2	3.25	498
37	50	280S	2E28S823CT000	730	73.1	49.4	0.78	0.74	0.65	90.3	90.3	90.0	5.5	2.0	2.2	6.18	641
45	60	280M	2E28M853CT000	738	90.8	59.4	0.76	0.72	0.60	90.7	90.7	90.5	5.5	2.0	2.2	7.25	690
55	75	315S	2E31S81300000	739	112.1	72.5	0.75	0.72	0.62	91.0	91.0	90.5	5.5	1.8	2.0	9.64	836
75	100	315M	2E31M83300000	739	153.9	98.8	0.74	0.70	0.62	91.6	91.6	91.0	5.5	1.8	2.0	11.4	900
90	120	315M	2E31M85300000	741	179.3	118.3	0.76	0.72	0.64	91.9	91.9	91.5	5.5	1.8	2.0	14.8	1021
110	150	315L	2E31L87300000	742	224.1	144.4	0.74	0.69	0.58	92.3	92.3	92.0	5.5	2.0	2.2	17.3	1228
125	170	315L	2E31L8A300000	742	247.4	164.1	0.76	0.70	0.60	92.5	92.5	92.0	5.5	2.0	2.2	21.5	1375
132	180	315L	2E31L89300000	742	260.9	173.3	0.76	0.72	0.62	92.6	92.6	92.0	5.5	2.0	2.2	21.5	1375

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

E. Dimensional Drawing: Efficiency Values Complying to IE2 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	2,4,6,8	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
80	2,4,6,8	125	100	—	50	80	10	150	124	31	35	—	15	9	159	225	145	267	30	157	195	52	—	—	114	M20x1.5P	19	40	6	21.5	35	M6
90S	2,4,6,8	140	100	—	56	90	10	180	130	50	43	—	18	13	177	230	140	302	35	174	200	52	—	57	110	M20x1.5P	24	50	8	27	45	M8
90L	2,4,6,8		125						155									327													
100L	2,4,6,8	160	140	—	63	100	12	200	176	54	50	—	21	14	198	279	179	366	40	195	238	56	—	66	138	M25x1.5P	28	60	8	31	55	M10
112M	2,4,6,8	190	140	—	70	112	12	230	176	62	51	—	21	15	222	303	191	388	45	220	246	56	260	80	151	M25x1.5P	28	60	8	31	55	M10
132S	2(7.5kW)	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
	2,4																	475													
	6,8																	459													
132M	4		178						218		54							513													
	6																	497													
160M	2(15kW)	254	210	—	108	160	15	310	250	58	70	—	23	20	318	386	226	635	60	316	346	63	366	98	186	M25x1.5P	42	110	12	45	105	M16
	2																	605													
	4,6,8																	585													
160L	2,4		254						294									679													
	6,8																	629													
180M	2,4,6,8	279	241	—	121	180	15	344	281	65	70	—	23	26	357	451	271	679	70	354	396	97	412	83	216	M32x1.5P	48	110	14	51.5	100	M16
180L	2,4,6,8		279						319									717													
200L	2	318	305	—	133	200	19	398	355	85	85	—	28	32	397	519	319	795	80	394	449	155	461	—	249	M40x1.5P	55	110	16	59	100	M20
	4,6,8																	772													
225S	4,6,8	356	286	—	149	225	19	436	336	85	85	—	28	34	450	569	344	827	90	445	498	155	509	—	275	M40x1.5P	60	140	18	64	130	M20
225M	2		311						361									837									55	110	16	59	100	
	4,6,8																	855									60	140	18	64	130	
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	665	415	914	100	489	578	243	572	—	328	M50x1.5P	60	140	18	64	130	M20
	4,6,8																										65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	100	110	149	40	42	552	725	445	1010	115	544	638	243	630	—	358	M50x1.5P	65	140	18	69	130	M20
	4,6,8																										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	
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
	4(315KW)																	1575													
	4,6,8																	1531									100	210	28	106	200	M24

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.
3. TB Position: To be read as: when viewed from DE side / when viewed parallel to the shaft / cable entry.

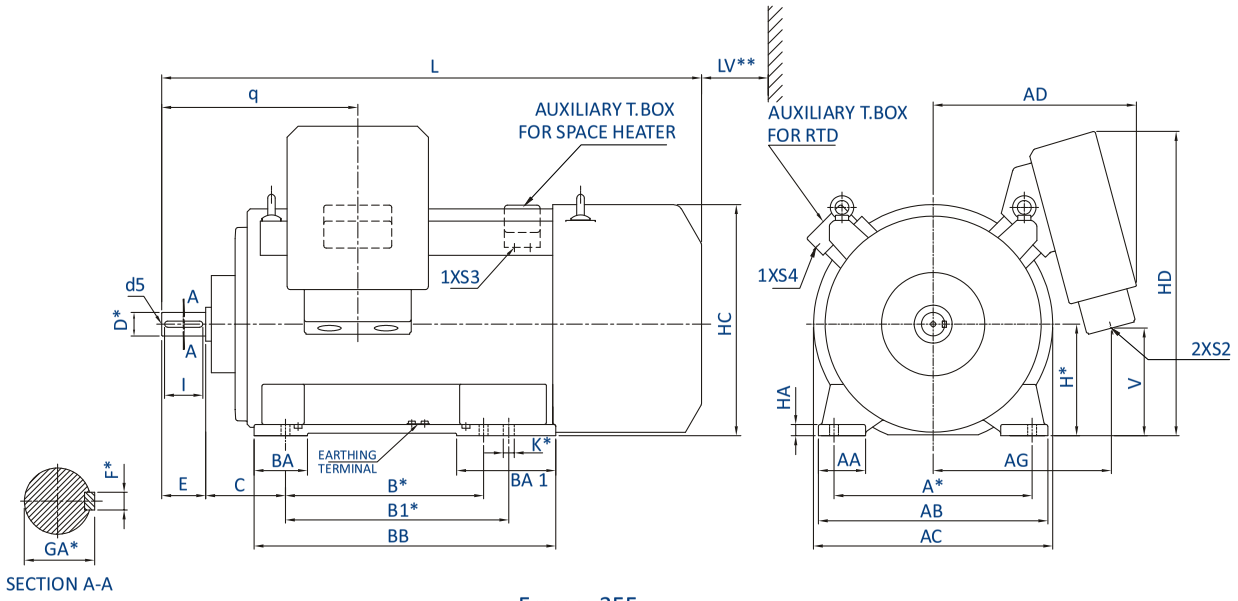
(a) 63, 80, 160 to 225 Frame: Top / Center of body / RHS when viewed from DE side
(b) 160 Frame & 180 Frame: RHS / Center of Body / Downwards side
(c) 200 to 225 Frame: RHS / Center of Body / NDE side
(d) 70, 250 to 355 Frame: Top / Towards Drive End / RHS when viewed from DE side

Bharat Bijlee

INCREASED SAFETY MOTORS: Type Ex ec

E. Dimensional Drawing: Efficiency Values Complying to IE2 Efficiency Class of IS 12615 | Foot Mounted (B3) Motors

Frame Size : 355



Frame: 355

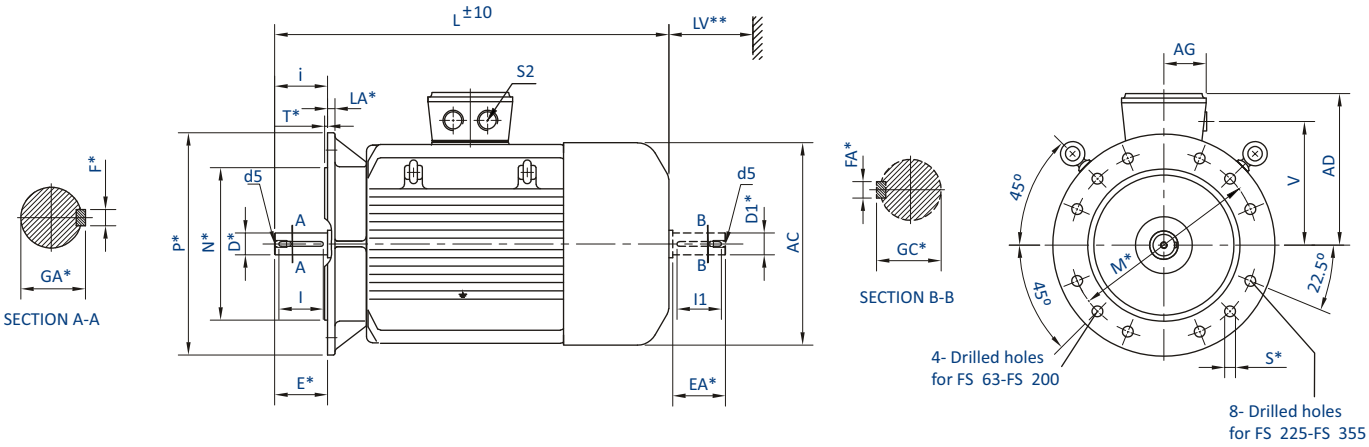
		FIXING						GENERAL											
IEC Fr. Size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	AC	LV
355L/K	2	610	630	710	254	355	28	730	960	150	170	315	36	736	985	685	1735	765	200
355L/K	4/6/8	610	630	710	254	355	28	730	960	150	170	315	36	736	985	685	1765	765	130

		TERMINAL BOX						SHAFT					
IEC Fr. Size	Pole	V	q	AG	S2	S3	S4	D*	E	F*	GA*	I	d5
355L/K	2	345	625	595	M75X1.5P	M20X1.5P	M25X1.5P	75	140	20	79.5	130	M20
355L/K	4/6/8	345	655	595	M75X1.5P	M20X1.5P	M25X1.5P	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	-

E. Dimensional Drawing: Efficiency Values Complying to IE2 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*	l l1	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	2,4,6,8	160	110	130	30	10	3.5	9	135	262	30	140	95	52	M20x1.5P	14	30	5	16	25	M5
80	2,4,6,8	200	130	165	40	12	3.5	10	145	267	30	157	105	52	M20x1.5P	19	40	6	21.5	35	M6
90S	2,4,6,8	200	130	165	50	12	3.5	10	140	302	35	174	110	52	M20x1.5P	24	50	8	27	45	M8
90L	2,4,6,8									327											
100L	2,4,6,8	250	180	215	60	15	4	11	179	366	40	195	138	56	M25x1.5P	28	60	8	31	55	M10
112M	2,4,6,8	250	180	215	60	15	4	11	191	388	45	220	151	56	M25x1.5P	28	60	8	31	55	M10
132S	2(7.5kW)	300	230	265	80	15	4	12	206	518	50	260	167	63	M25x1.5P	38	80	10	41	70	M12
	2,4									475											
	6,8									459											
132M	4									513											
	6									497											
160M	2(15kW)	350	250	300	110	19	5	13	226	635	60	316	186	63	M25x1.5P	42	110	12	45	105	M16
	2									605											
	4,6,8									585											
160L	2,4									679											
	6,8									629											
180M	2,4,6,8	350	250	300	110	19	5	13	271	679	70	354	216	97	M32x1.5P	48	110	14	51.5	100	M16
180L	2,4,6,8									717											
200L	2	400	300	350	110	19	5	15	319	795	80	394	249	155	M40x1.5P	55	110	16	59	100	M20
	4,6,8									772											
225S	4,6,8	450	350	400	140	19	5	16	394	827	90	445	275	155	M40x1.5P	60	140	18	64	130	M20
225M	2				110					837						55	110	16	59	100	
	4,6,8				140					855						60	140	18	64	130	
250M	2	550	450	500	140	19	5	18	415	914	100	489	328	243	M50x1.5P	60	140	18	64	130	M20
	4,6,8															65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	445	1010	115	544	358	243	M50x1.5P	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	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
	4(355kW)				210					1575						100	210	28	106	200	M24
	4,6,8									1531											

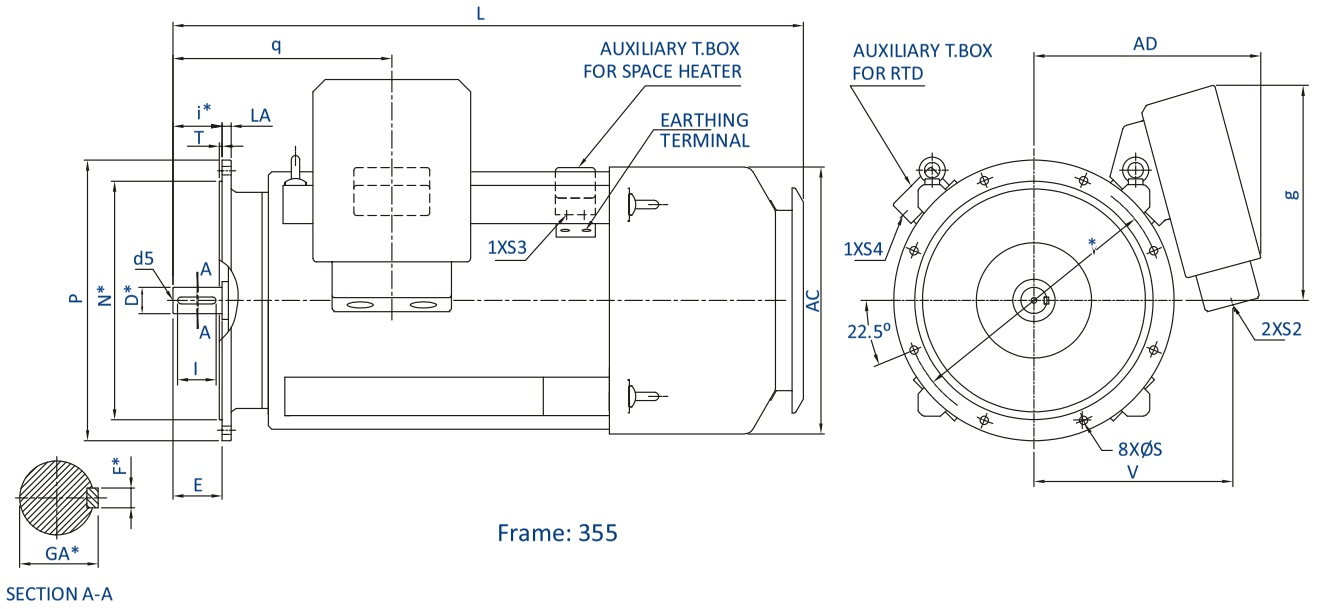
Notes: * This is a mandatory dimension for all standard motors
**Minimum distance for efficient cooling of motor to be maintained by user
1. All dimensions are in mm unless otherwise specified.
2. Tolerances on mandatory dimensions are as per IS: 2223.
3. For non standard motors, dimensions may change. 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.
3. TB Position: To be read as: when viewed parallel to the shaft / cable entry.

(a) 63, 80, 160 to 225 Frame: Center of body / RHS when viewed from DE side
(b) 71 Frame & 250 to 355 Frame: Towards Drive End / RHS when viewed from DE side
(c) 200 to 225 Frame: Center of Body / NDE side

INCREASED SAFETY MOTORS: Type Ex ec

E. Dimensional Drawing: Efficiency Values Complying to IE2 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	S3	S4
355L/K	2	800	680	740	140	24	6	25	685	765	1835	630	570	625	-	M75X1.5P	M20X1.5P	M25X1.5P
355L/K	4/6/8	800	680	740	170	24	6	25	685	765	1865	630	570	655	-	M75X1.5P	M20X1.5P	M25X1.5P

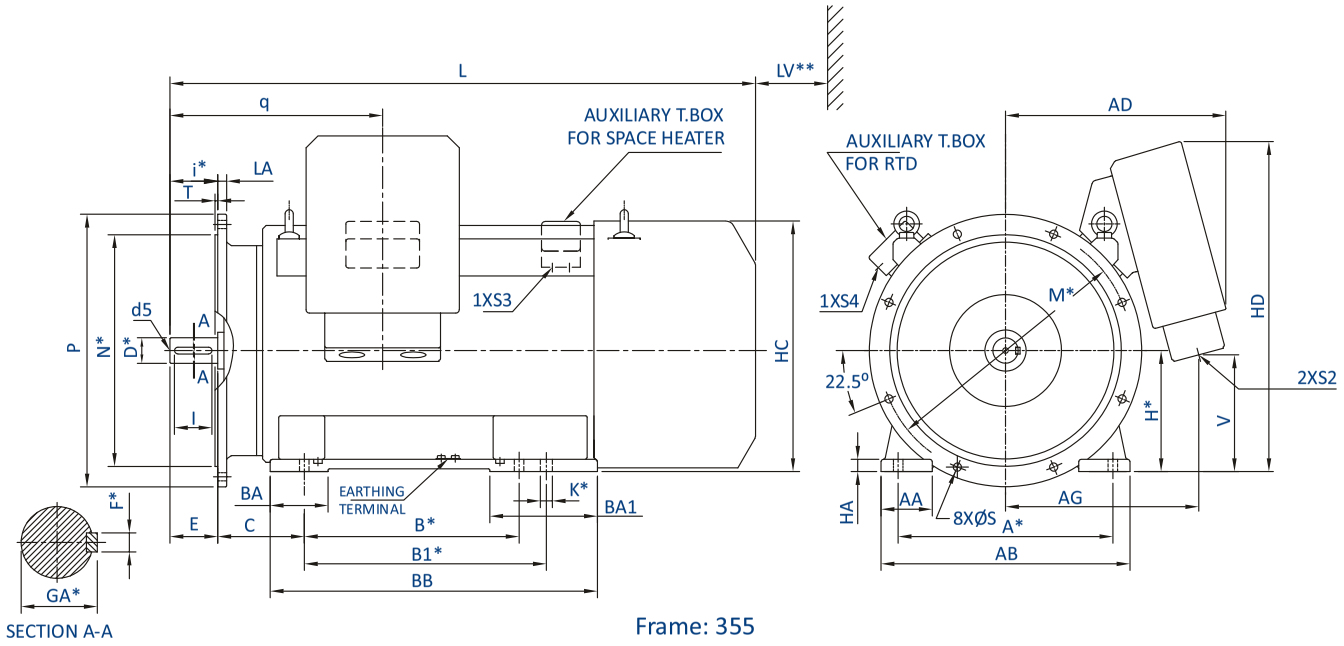
		SHAFT					
IEC Fr. Size	Pole	D*	E	F*	GA*	I	d5
355L/K	2	75	140	20	79.5	130	M20
355L/K	4/6/8	95	170	25	100	160	M24

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 IE2 Efficiency Class of IS 12615 | Foot & Flange (B35) Motors

Frame Size: 355



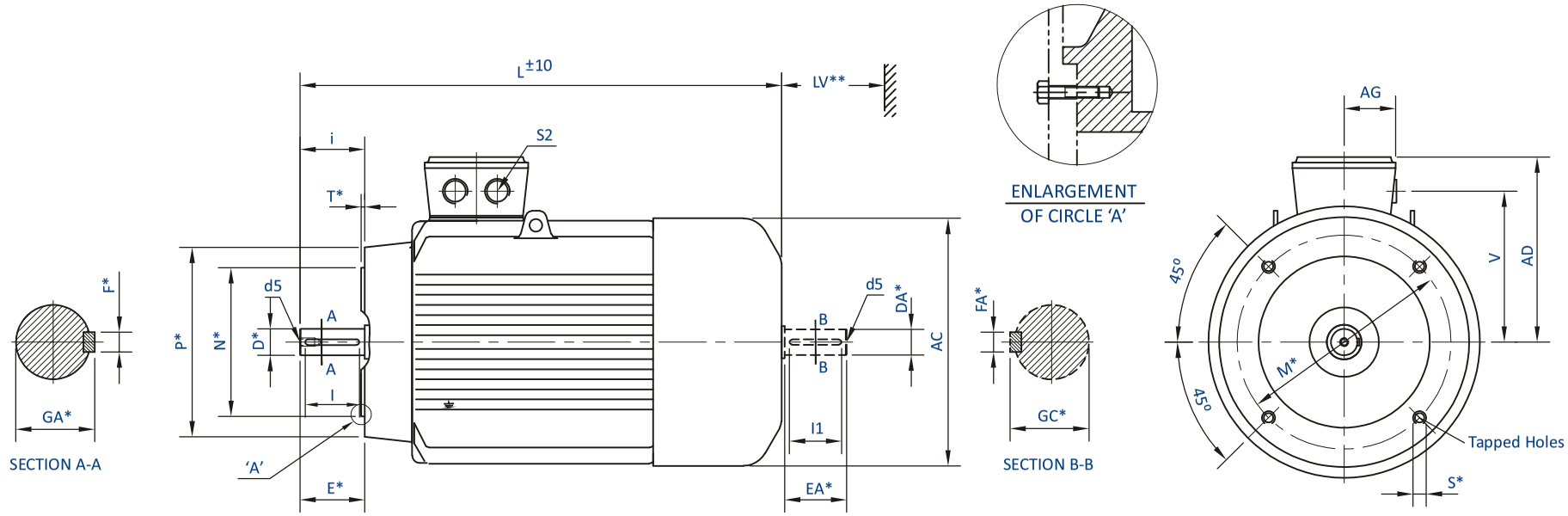
		FIXING											SHAFT					
IEC Fr. Size	Pole	A*	B*	B1*	C	H*	K*	P	N*	M*	i*	S	D*	E	F*	GA*	l	ds
355L/K	2	610	630	710	254	355	28	800	680	740	140	24	75	140	20	79.5	130	M20
355L/K	4/6/8	610	630	710	254	355	28	800	680	740	170	24	95	170	25	100	160	M24

		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	S3	S4
355L/K	2	6	25	730	960	150	170	315	36	736	985	685	1735	765	200	345	625	595	M75X1.5P	M20X1.5P	M25X1.5P
355L/K	4/6/8	6	25	730	960	150	170	315	36	736	985	685	1765	765	130	345	655	595	M75X1.5P	M20X1.5P	M25X1.5P

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 IE2 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	2,4,6,8	105	70	85	30	M6X10	2.5	135	235	30	140	104	52	M20x1.5P	14	30	5	16	25	M5
80	2,4,6,8	120	80	100	40	M6X13	3	145	267	30	157	104	52	M20x1.5P	19	40	6	21.5	35	M6
90S	2,4,6,8	140	95	115	50	M8X12	3	140	302	35	174	110	53	M20x1.5P	24	50	8	27	45	M8
90L	2,4,6,8								327											
100L	2,4,6,8	160	110	130	60	M8X12	3.5	179	366	40	195	138	56	M25x1.5P	28	60	8	31	55	M10
112M	2,4,6,8	160	110	130	60	M8X12	3.5	191	388	45	220	151	56	M25x1.5P	28	60	8	31	55	M10

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.
3. TB Position: To be read as: when viewed parallel to the shaft / cable entry.
(a) 63, 80 to 112 Frame: Center of body / RHS when viewed from DE side
(b) 71 Frame: Towards Drive End / RHS when viewed from DE side

CERTIFICATIONS

ISO 9001 : 2015

ISO 45001:2018

ISO 14001 : 2015

ATEX Certificate

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%

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

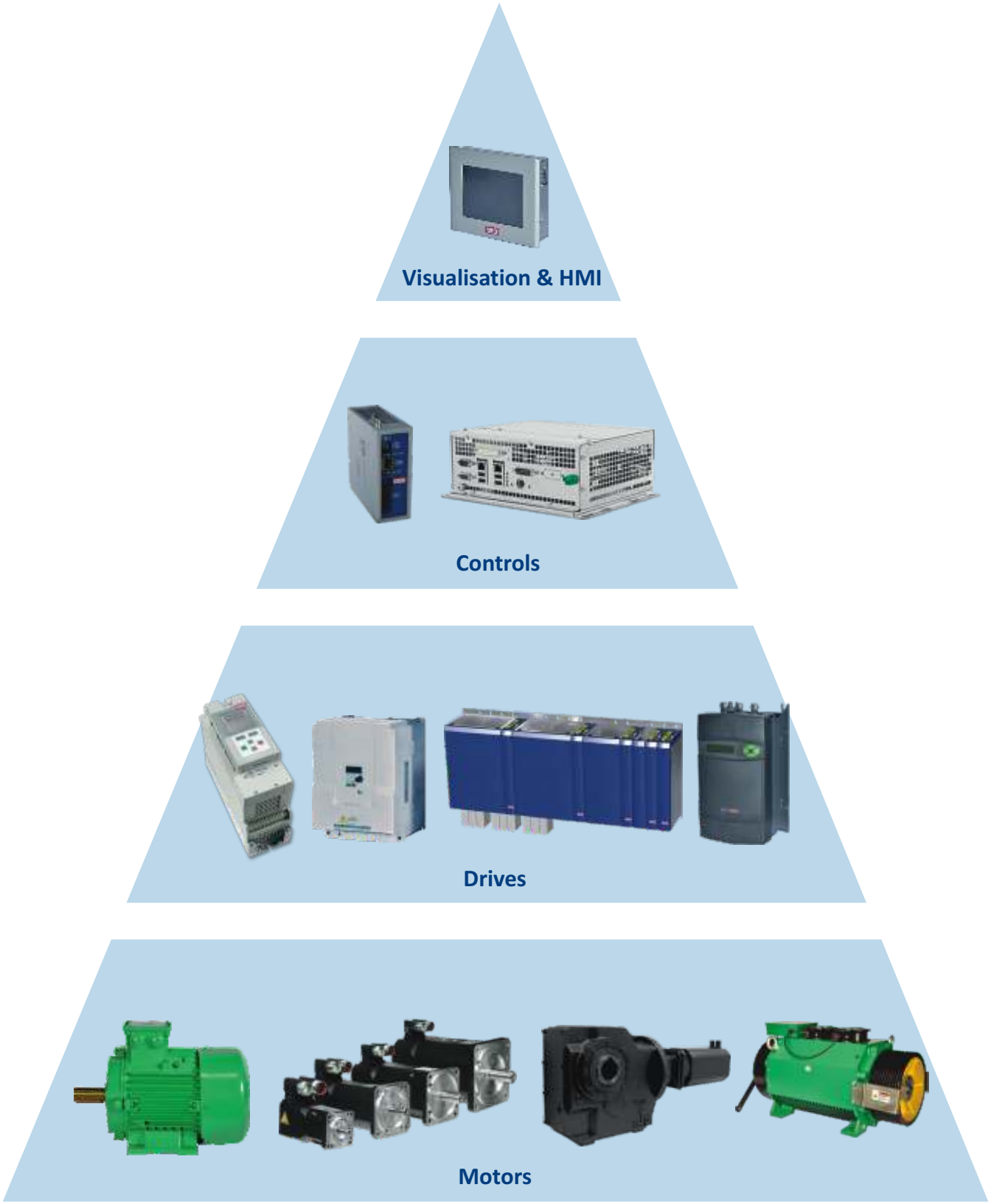
Motor Type	Frame	Power (kW)	Polarity		Standard Technical Specifications	Optional Features		Applications
IE2 Motors IE3 Motors Large LT Motors (DCCA)	56 to 355 56 to 355 355 to 450	0.12 to 355 0.12 to 355 250 to 1250	2, 4, 6, 8 2, 4, 6, 8 2, 4, 6, 8		• Ambient: 50° C • Ambient for DCCA: 40° C • Inverter Grade Winding: For IE3 and DCCA • Duty: S1 • RTD & BTD: For DCCA motors • Mounting: B3, B5, B35, V1, B14 upto 132 Frame	• 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
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	• 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

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
						• 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

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)	• 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
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)	• 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
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	• 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
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	• 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
Slip Ring Motors	100 to 160	1.1 to 10	4, 6		• Ambient: 45° C • Duty: S3, S4, S5 • Mounting: B3	• Mounting: B35 • Non standard shaft diameter and extension*	• Non Standard Paint	Crane, Hoist, Lift, Material Handling
Textile Motors	100 to 160	1.1 to 15	4, 6, 8		• Ambient: 50° C • Duty: S1 • Mounting: B3, B5, B35	• Non Standard Voltage: upto 500V • Insulation: Class H	• Motors for Inverter Duty • Non Standard Paint • Low Vibration as per IS	Ginning, Textile Machinery
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	• Insulation: Class H • PTC Thermistor	• Insulated Bearing: 132 Frame onwards • Non Standard Paint	Cane Loading-Unloading Machine

* Subject to confirmation from Bharat Bijlee

MOTOR, DRIVE AND AUTOMATION SOLUTIONS



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Secunderabad T: +91 40 2780 1791 / 2781 4512
Coimbatore T: +91 422 4204314

For any enquiries please write to **motorlvsales@bharatbijlee.com**

BB ServiceLINE®
Customer Service Helpdesk for Industrial Systems

+91 22 - 2763 7290 | serviceline@bharatbijlee.com

Bharat Bijlee

REGISTERED OFFICE
Electric Mansion, 6th Floor,
Appasaheb Marathe Marg,
Prabhadevi, Mumbai 400 025
T: +91 22 2430 6237 / 6375
E: info@bharatbijlee.com
CIN: L31300MH1946PLC005017

WORKS
No. 2, MIDC Thane-Belapur Road, Airoli,
Navi Mumbai 400 708
T: +91 22 2763 7200 / +91 22 2760 0401

www.bharatbijlee.com

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