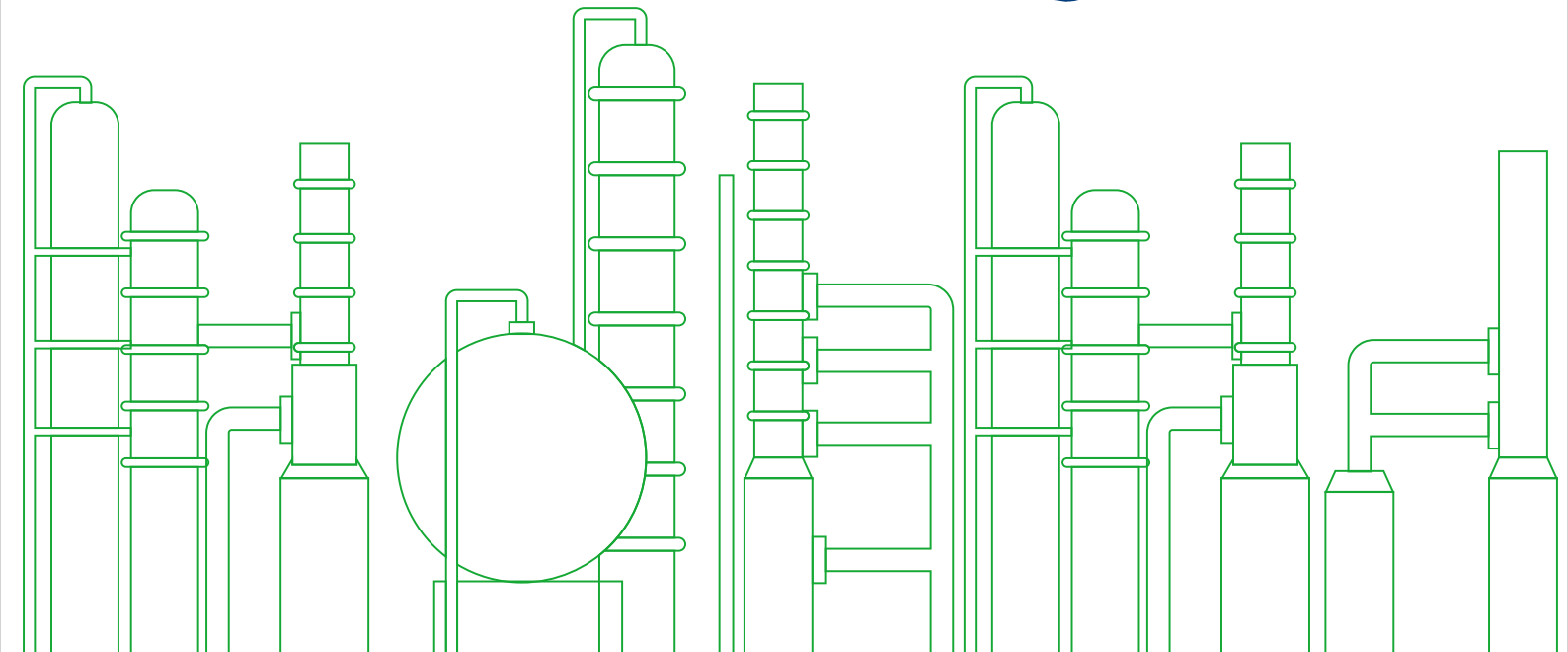
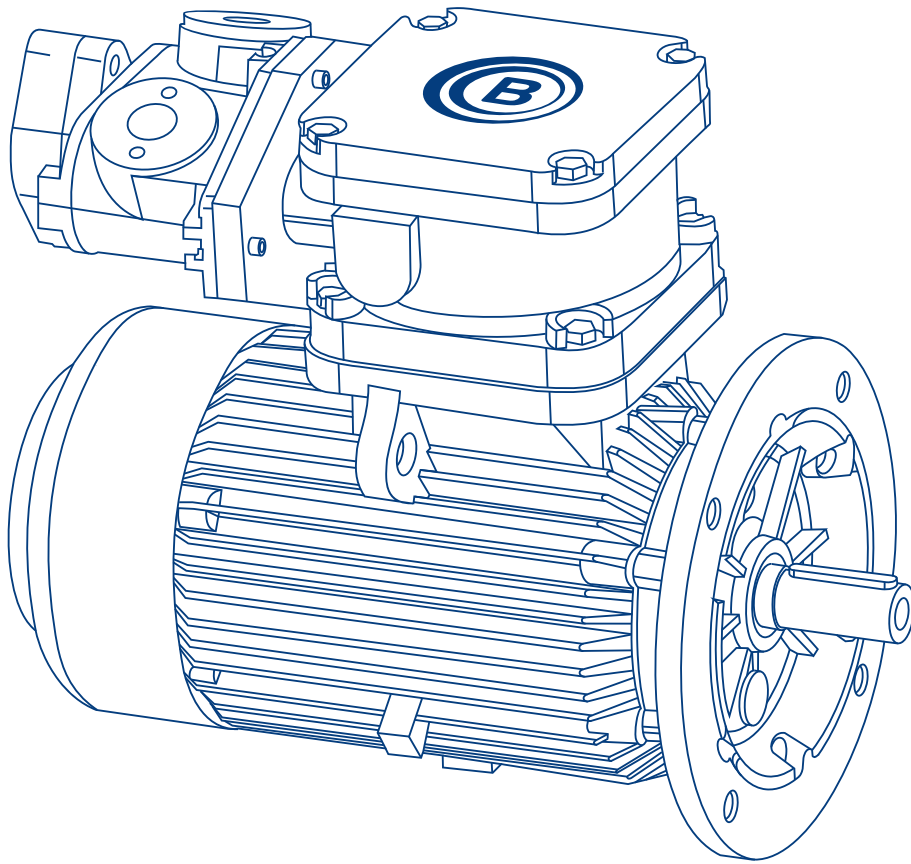
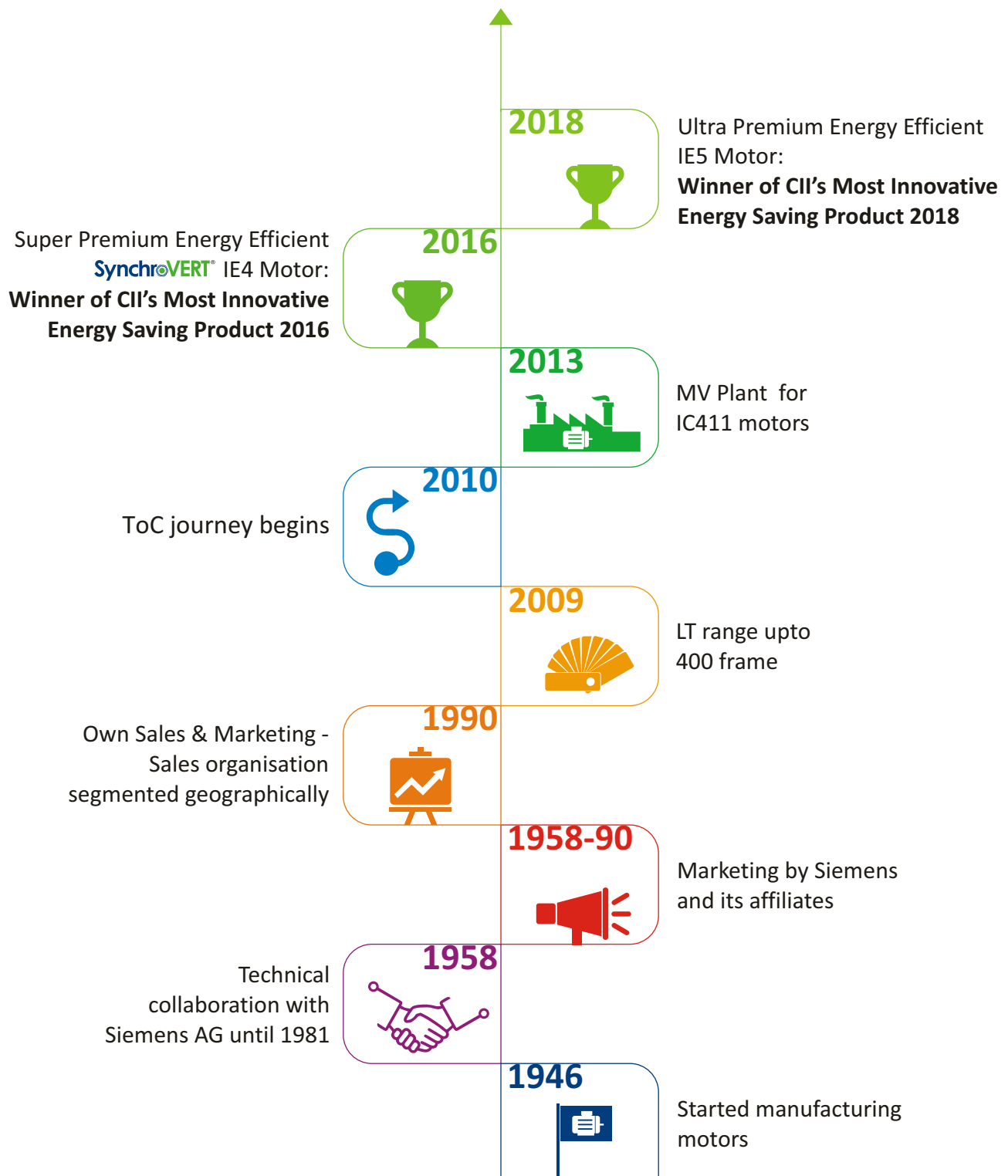


LV Motors: Hazardous Area Application

Safety first, always | Reliable | Long lasting



BHARAT BIJLEE MOTORS: MILESTONES



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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 5571
Zone '0'	An area in which Hazardous atmosphere is continuously present	Generally, use of electrical equipment is to be avoided. But when this is not practicable, Intrinsically safe or pressurized electrical equipment to be used.
Zone '1'	Hazardous atmosphere is likely to be present under normal operating conditions.	For this area, electrical equipment used, must be in flame proof enclosure type Ex (d) conforming to IS/IEC 60079-1.
Zone '2'	In this area hazardous atmosphere is likely to be present only under abnormal operating conditions and for a short period.	Apparatus with type of protection Ex (e) in accordance with IS/IEC 60079-7 may be used without any special enclosure. Apparatus having type of protection Ex (nA) in accordance with IS/IEC 60079-15 are also permitted for use.

Why Bharat Bijlee?

Bharat Bijlee offers to its customers a wide range of hazardous area motors



Non Sparking & Flame Proof Motors across different efficiency levels



ATEX / IECEx certification for Flame Proof Ex(d) motors



Zone '1', '21' & '22' for FLP Ex(d) motors & Zone '2' for Non-Sparking Ex(nA) motors



Licensed by BIS as per statutory requirement



Suited for temperature class T4, T5 & T6 for FLP motors & temperature class T3 for Non-Sparking motors



Motors with certified test reports from PESO approved test laboratory



With major certifications viz. PESO, DGMS

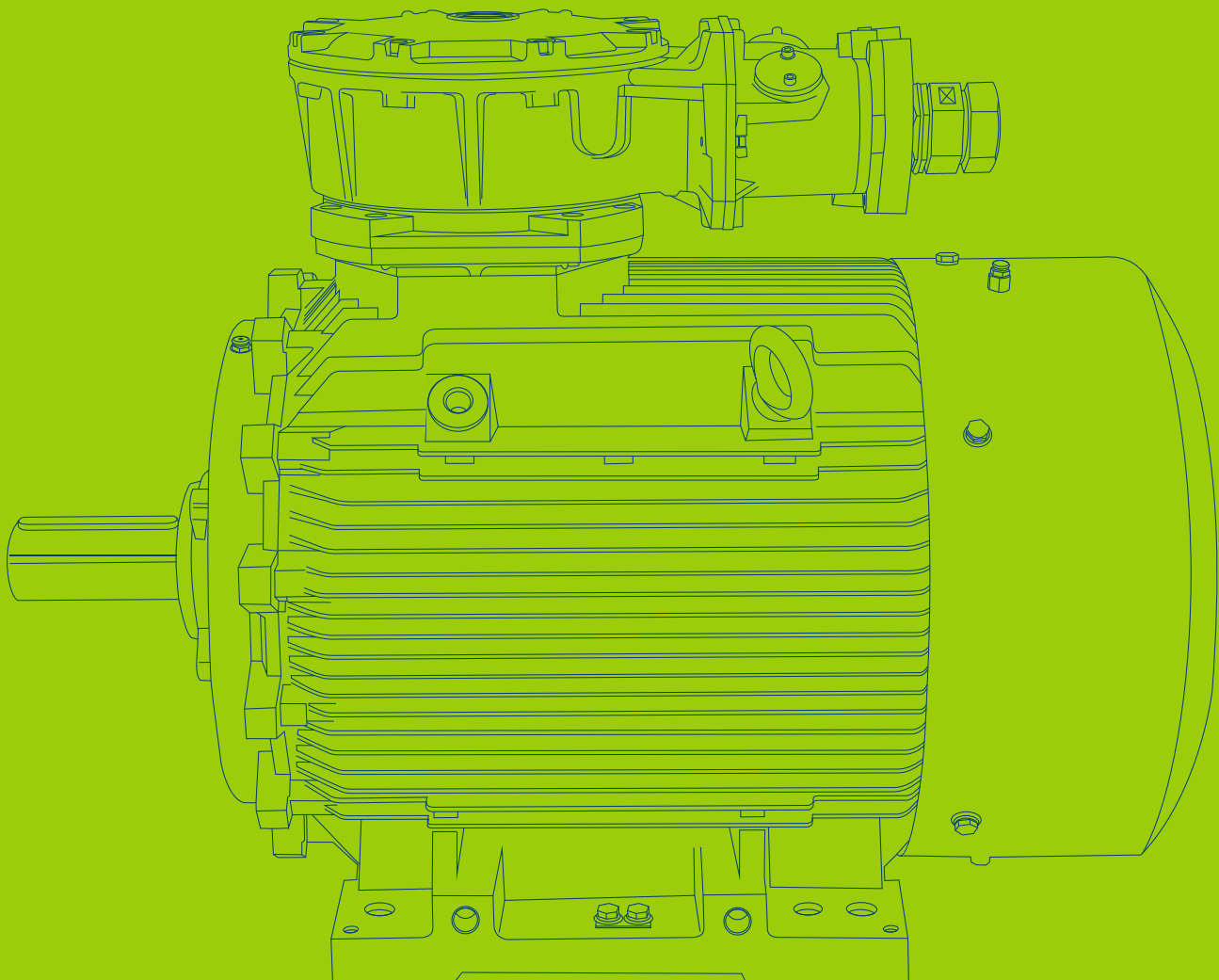


Accessories and customizations as per customer's requirements adhering to necessary statutory requirements

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 of 2,50,000 motors is backed by an indigenous state-of-the-art manufacturing facility. With rigorous quality checks at various stages in our factory, we deliver one of the finest and most reliable motors in the industry.

FLAME PROOF MOTORS: Type Ex(d)



FLAME PROOF MOTORS: Type Ex(d)

A. Technical Information

A.1 Industrial Applications:



Coal
Mines



Petro
Chemicals
& Chemicals



Oil Mines
& Rigs



Fertilizers



Solvent
Extraction
Plant



Paints &
Varnish
Industry



LPG
Bottling
Plants



Agro
Chemicals



Drugs &
Pharmaceuticals



General
Industry

A.2 Reference Standards:

IS/IEC 60079-0	Electrical apparatus for Explosive gas atmosphere-Part 0 General Requirements
IS/IEC 60079-1	Electrical apparatus for Explosive gas atmosphere-Equipment protection by flame proof enclosures "d"
IS 5572	Classification of Hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 5571	Guide for selection and installation of electrical equipment for hazardous areas (other than mines)
IS/IEC 60034-1	Rotating Electrical Machines: Part 1 Rating & 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/IEC 60034-9	Permissible limits of noise level for Rotating Electrical Machines
IS 12075	Mechanical Vibration of Rotating Electrical Machines
IEC 60072-1	Dimension & 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 & 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 & transported
Bureau of Indian Standards (BIS)	Licensing	

All Flame Proof Motors have License mark IS/IEC 60079-1:2007. 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:

Temp. 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 is coming in contact with the explosive gas. In case of Flame Proof Ex(d) Motors, this refers to external surface temperature whereas in case of Non sparking Ex (nA) motors, this refers to the internal temperature as well.

Temperature Class of Bharat Bijlee Motors

Frame Size		Temperature Class
IEC Frame Size	BBL 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:

Hazardous Gases have been classified in IS/IEC 60079-1 and are associated only with flame proof enclosures. Bharat Bijlee Flame proof motors are offered suitable for gas group. I, IIA and IIB only. Additionally, frame MJ132 is suitable for gas group IIB + H₂ (Hydrogen). 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 $\pm$ 10%
- Frequency: 50 Hz $\pm$ 5%
- Combined Variation: $\pm$ 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 Supply Voltage, Frequency, Ambient & Altitude

I. Variation in Supply Voltage & Frequency

Voltage Variation %	Frequency Variation %	Combined Voltage & Frequency %	Permissible Output as % of Rated Value
$\pm$ 10	$\pm$ 5	$\pm$ 10	100
$\pm$ 12.5	$\pm$ 5	$\pm$ 12.5	95
$\pm$ 15	$\pm$ 5	$\pm$ 15	90

II. Variation in Ambient

Ambient Temperature (°C)	Permissible Output as % of Rated Value
< 30	107
30 to 45	100
50	96
55	92
60	87

III. 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. If this measurement is done at higher voltage then the estimated starting current is more accurate.

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 %
355 kW to 560kW	25 %
560kW and above (with rated voltage 690V or higher)	25 %

Duty, Starting Time & 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 & 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.

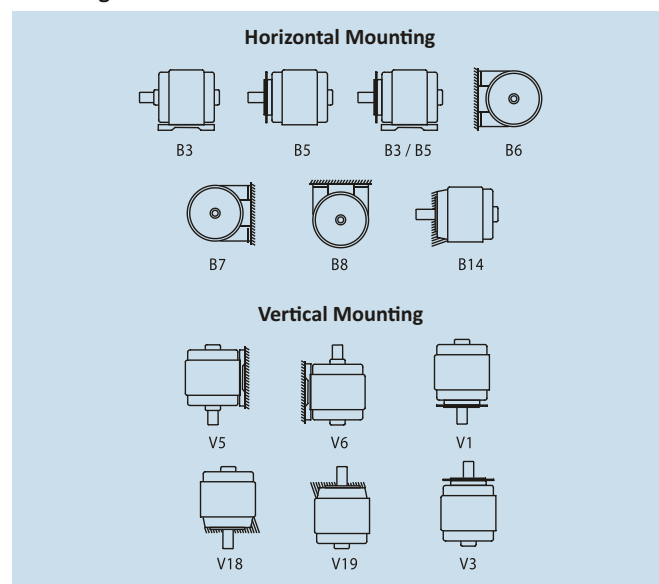
All motors are Totally Enclosed Fan Cooled (TEFC). The cooling is effected by self-driven, bi-directional cast iron or fabricated centrifugal fan protected by fan cover. The type of cooling is IC 411 as per IS 6362/IEC 60034-6. Minimum cooling distance as indicated in GA drawing has to be provided for 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 and V3 mounting without any change.

Direction of Rotation:

All motors are suitable for bi-directional rotation.

Balancing & Vibration:

Rotors are dynamically balanced with a half key in the shaft extension. The balancing grade is G2.5 as per ISO:1940. Vibration grade is 'Normal grade' conforming to IS 12075. Other grades as per IS 12075 or IEC 60034-14 can be provided on request.

Motors are designed for noise level well below the limits specified in IS 12065 and IEC 60034 -9.

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. Special data such as efficiency, starting current, starting torque, gas group, temperature class and statutory approval references are also provided with usual name plate details.

FLAME PROOF MOTORS: Type Ex(d)

Technical Information

Bearing & Terminal Box Details:

Frame Size	Bearing Nos. C3 Clearance		Terminal Box Type	Terminal		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	4
90	6205 2Z	6205 2Z	MJ132	3/6*	M6	1 x M25	6
100	6206 2Z	6206 2Z					16
112	6206 2Z	6206 2Z					
132	6208 2Z	6208 2Z					
160	6209 2Z	6209 2Z	MJ200	6	M8	2 x M32	50
180	6310 2Z	6310 2Z				2 x M40	70
200	6212 2Z	6212 2Z					
225	6213	6213	MJ280	6	M12	2 x M50	150
250	6215	6215					
280 (2Pole)	6316	6316					
280 (4, 6, 8 Pole)	6317	6316					
315S/M & L	6319	6319	MJ315	6	M16	2 x M63	240

* 3 Terminals up to & including 1.5 kW & 6 terminals for higher kW Outputs

** 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) are filled with grease Unirex N3- ESSO. Others are filled with SKF LGMT3 of SKF make.

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
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 with 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	Type Reference	Packing Box Dimensions			Motor Gross Weight (kg)
		Length	Width	Height	
80	2J080453G	440	440	310	34
90L	2J09L653G	510	470	340	51
100L	2J10L233G	510	310	510	66
112M	2J11M653G	510	310	510	73
132M	2J13M693G	610	330	550	118
160ML	2J16L293G	790	440	540	216
180L	2J18L633G	790	460	690	267
200L	2J20L253G	940	540	690	408
225SM	2J22M643G	920	540	790	534
250M	2J25M4A3G	1100	660	820	696
280SM	2J28M453G	1220	660	890	860
315SM	2J31M653G	1300	870	1000	1120
315L	2J31L6B3G	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 varnishing 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 at least the same tensile-strength as the original ones.
- Care should be taken to see that all screw, 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 & optional Features

Range	Type	Frame	kW
	Standard Range of FLP Motors	80 to 315	0.37 to 200
	FLP Motors: Efficiency Values Complying to IE2 Class of IEC 60034-30-1	80 to 315	0.37 to 200
	FLP Motors: Efficiency Values Complying to IE3 Class of IEC 60034-30-1	80 to 315	0.37 to 200

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

Performance Data & 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 Feature	Optional Feature
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: Upto frame 112 in 4Pole
TB Position: Top	TB Position: RHS: 112 frame & above LHS: 160 frame & 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 & 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	
Gel Coat on Winding: For all frames	
Space Heater: 315 frame	Space Heater: 80 Frame & Above
Framewise Inverter Duty Suitability: Standard Efficiency Motor: 315 Frame IE2 Efficiency Motor: 315 Frame IE3 Efficiency Motor: For all frames	Inverter Duty Suitability: Standard Efficiency: Upto 280 frame IE2 Efficiency: Upto 250 frame
Packing: Corrugated Boxes: Upto 90 Frame Wooden Packing Boxes: 100 Frame & Above	Sea Worthy/Export Packing Case
For standard bearings, kindly refer to the bearing chart	Insulated Bearing: 132 frame & above (hybrid bearing till 225 frame) Cylindrical Roller Bearing on DE Side: 160 frame & above

Our other optional features:

- Non standard shaft material, diameter & extension
- Double compression glands
- Auxilliary Terminal Box: 200 frame & above
- Thermister: 80 frame & above
- Canopy, water flinger, non standard paint & 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 auxilliary terminal box with our nearest sales office
- 2) For FLP motors to be operated on VFD supply, combined testing of motor & converter is mandatory. Refer page 10 for further details
- 3) For any other non standard feature, kindly contact our nearest sales office
- 4) 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. IS 5571 (Guide for selection and installation of electrical equipment for hazardous areas - other than mines) 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. The authorities give reference to IS 5571:2009 clause 10.6.1 (a) for this testing. This is also mentioned in the international standard IEC 60079-14:2007 (Explosive atmospheres - Part 14: Electrical installations design, selection and erection), clause 10.6.1 (a).

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 the windings and cable circuits and 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 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 voltage appearing at motor terminals is $\leq 1.56kV$. Warranty clause of motor is applicable only if sine wave filter is provided at converter output terminals by the motor user.

Use of Thermal Protective Devices

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



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 GD ²	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	6.0	2.7	3.0	kgm ²	kg
*0.37	0.5	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	10.0	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	3.7	0.89	0.87	0.83	89.0	88.0	86.0	5.8	2.0	3.0	0.1340	145
15	20	160M	MJ160	MD16M25300000	2920	26.2	5.0	0.89	0.88	0.82	89.5	89.0	87.0	6.0	2.0	3.0	0.1710	154
18.5	25	160L	MJ160	MD16L27300000	2920	31.6	6.2	0.90	0.88	0.86	90.5	90.0	88.0	6.5	2.0	3.0	0.23	168
*22	30	180L	MJ180	MD18L21300000	2930	37.6	7.3	0.89	0.87	0.80	91.5	90.5	88.0	6.5	2.2	2.7	0.30	220
30	40	200L	MJ200	MD20L23300000	2950	51.2	9.9	0.88	0.85	0.79	92.6	92.0	89.5	6.5	2.5	2.5	0.52	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	0.61	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/IEC 60034-1

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 GD ²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			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	kgm ²	kg
*0.37	0.5	80	MJ80	MD0804A300000	1415	0.97	0.26	0.76	0.70	0.58	70.0	68.0	64.0	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	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	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	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	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	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	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	0.1040	100
7.5	10.0	132M	MJ132	MD13M4K300000	1450	13.7	5.04	0.87	0.82	0.72	87.5	87.0	85.0	0.1260	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	0.1410	136
11	15	160M	MJ160	MD16M4C300000	1450	20.5	7.4	0.84	0.81	0.76	89.0	89.0	86.0	0.1770	143
15	20	160L	MJ160	MD16L4K300000	1450	27.5	10.1	0.84	0.83	0.79	90.2	90.5	90.0	0.2350	156
*18.5	25	180L	MJ180	MD18L43300000	1460	33.2	12.3	0.85	0.82	0.72	91.2	91.2	90.0	0.46	215
22	30	180L	MJ180	MD18L47300000	1460	39.2	14.7	0.85	0.82	0.72	91.8	91.5	90.0	0.54	230
30	40	200L	MJ200	MD20L43300000	1465	51.6	19.9	0.88	0.84	0.77	92.0	92.0	90.0	0.86	305
37	50	225S	MJ225	MD22S41300000	1470	63.6	24.5	0.87	0.83	0.75	93.0	93.0	91.0	1.32	380
45	60	225M	MJ225	MD22M43300000	1470	76.3	29.8	0.88	0.84	0.75	93.2	93.2	91.0	1.60	430
55	75	250M	MJ250	MD25M41300000	1478	93.8	36.2	0.87	0.84	0.77	93.8	93.5	92.0	2.78	595
75	100	280S	MJ280	MD28S41300000	1485	129	49.2	0.86	0.83	0.75	94.2	94.0	93.0	5.00	705
90	120	280M	MJ280	MD28M43300000	1485	154	59.0	0.86	0.83	0.75	94.7	94.5	93.5	6.00	725

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

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)
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 GD ²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency				
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	kgm ²	kg
0.37	0.5	80	MJ80	MD08061300000	910	1.08	0.40	0.70	0.60	0.48	68.0	66.0	61.0	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	0.0084	32
*0.75	1.0	90L	MJ90	MD09163300000	925	1.99	0.79	0.72	0.61	0.50	73.0	70.0	69.0	0.0122	48
1.1	1.5	90L	MJ90	MD09165300000	930	2.80	1.15	0.72	0.61	0.50	76.0	74.0	72.0	0.0160	50
1.5	2.0	100L	MJ100	MD10163300000	935	3.72	1.56	0.72	0.64	0.52	78.0	75.0	72.0	0.0250	60
2.2	3.0	112M	MJ112	MD111M63300000	935	4.97	2.29	0.77	0.68	0.55	80.0	80.0	74.0	0.0500	67
3.7	5.0	132S	MJ132	MD13S6B300000	950	8.1	3.79	0.77	0.72	0.60	83.0	83.0	82.0	0.1180	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	0.1720	120
7.5	10.0	160M	MJ160	MD16M63300000	960	14.8	7.61	0.80	0.74	0.64	88.0	88.0	86.0	0.2760	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	0.3400	169
11	15	160L	MJ160	MD16L67300000	965	21.6	11.1	0.80	0.77	0.70	88.5	88.0	87.0	0.4000	169
15	20	180L	MJ180	MD18L61300000	965	29.0	15.1	0.80	0.75	0.62	90.0	90.0	87.0	0.6800	210
18.5	25	200L	MJ200	MD20L61300000	975	34.0	18.5	0.83	0.78	0.70	91.1	91.0	88.0	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	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	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	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	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	6.16	725

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

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



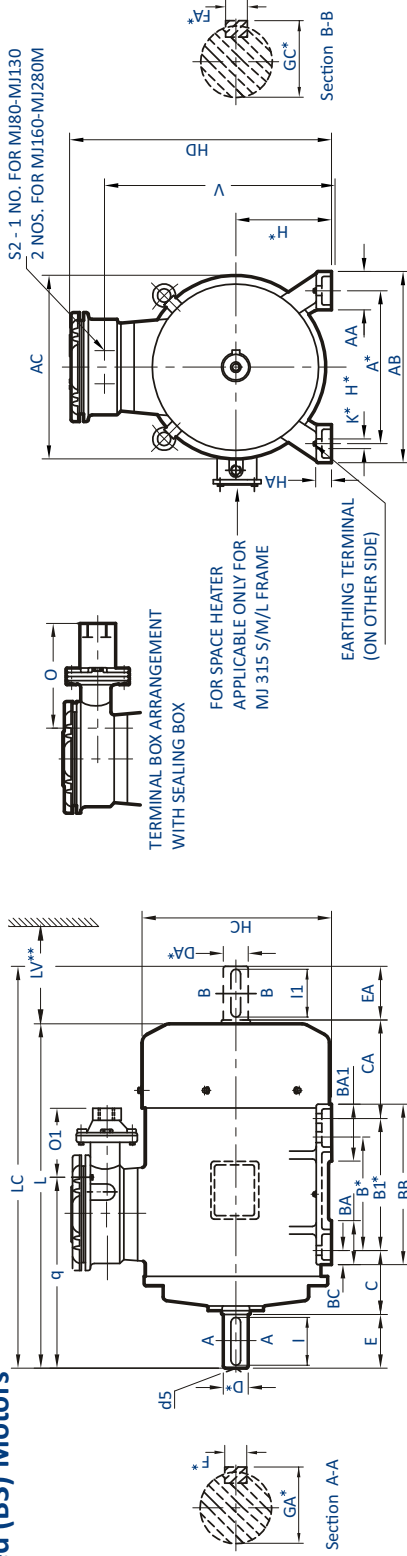
Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output					With DOL starting				Rotor GD ²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency				
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	kgm ²	kg
*0.37	0.5	90L	MJ90	MD09L83300000	700	1.32	0.52	0.63	0.52	0.41	62.0	55.0	48.0	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	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	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	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	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	0.0990	100
3.7	5.0	160M	MJ160	MD16M81300000	720	8.1	5.01	0.78	0.74	0.65	82.0	82.0	78.0	0.2170	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	0.2990	151
7.5	10.0	160L	MJ160	MD16L87300000	710	15.6	10.29	0.78	0.74	0.65	86.0	84.0	82.0	0.4000	165
*9.3	12.5	180L	MJ180	MD18L81300000	715	18.9	12.67	0.79	0.74	0.64	86.5	86.5	85.0	0.6200	205
11	15	180L	MJ180	MD18L83300000	720	22.1	14.9	0.79	0.74	0.64	87.5	87.5	86.0	0.7200	210
15	20	200L	MJ200	MD20L83300000	720	28.8	20.3	0.82	0.79	0.71	88.5	88.5	87.0	1.3200	305
18.5	25	225S	MJ225	MD22S81300000	725	36.6	24.9	0.79	0.77	0.69	89.0	88.0	87.0	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	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	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	5.83	725
45	60	280M	MJ280	MD28M85300000	730	86.1	60.0	0.79	0.75	0.65	92.0	92.0	91.0	6.86	725

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

FLAME PROOF MOTORS: Type Ex(d)

E. Dimensional Drawing: Standard Range of FLP Motors Foot Mounted (B3) 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 4, 6 & 8	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704 694	839 829	247	314	60	404	252	151	365	M32X1.5P	42	110	12	45	105	M16
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	M40X1.5P	48	110	14	51.5	100	M16
200L	2 4, 6 & 8	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805 771	927 893	235	394	80	488	237	133	395	M40X1.5P	55	110	16	59	100	M20
225S/M	2 4, 6 & 8	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	799 836	948 985	245	444	90	564	308	264 444	414	M50X1.5P	55	110	16	59	100	M20
250M	2 4, 6 & 8	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	915	1065	268	489	100	601	287	242	474	M50X1.5P	60	140	18	64	130	M20
280S/M	2 4, 6 & 8	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	1157	271	544	115	668	252	207	517	M50X1.5P	65	140	18	69	130	M20

Tolerances on Dimensions with*

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

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

- 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)

F. Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1

Applicable standard for testing & efficiency determination: IS15999

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 GD ²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Torque Ratio	Starting Torque to Torque Ratio		
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	kgm ²	kg		
*0.37	0.5	80	MJ80	2J0802A300000	2880	0.90	0.13	0.82	0.74	0.60	69.5	69.5	67.5	0.0037	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	0.0037	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	0.0037	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	0.0051	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	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	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	0.0142	62		
5.5	7.5	132S	MJ132	2J13S2G300000	2935	9.90	1.83	0.90	0.88	0.83	87.0	86.0	82.0	0.0820	114		
7.5	10.0	132S	MJ132	2J13S2N300000	2935	13.2	2.49	0.90	0.87	0.82	88.1	87.5	85.0	0.0980	120		
9.3	12.5	160M	MJ160	2J16M23300000	2940	16.5	3.08	0.88	0.86	0.81	88.9	88.6	86.0	0.1420	147		
11	15	160M	MJ160	2J16M25300000	2940	19.5	3.6	0.88	0.85	0.79	89.4	89.4	87.0	0.1600	153		
15	20	160M	MJ160	2J16M26300000	2940	26.3	5.0	0.88	0.87	0.82	90.3	90.0	88.0	0.1910	164		
18.5	25	160L	MJ160	2J16L29300000	2940	31.5	6.1	0.90	0.89	0.86	90.9	90.9	89.0	0.24	180		
*22	30	180L	MJ180	2J18L23300000	2940	38.5	7.3	0.87	0.84	0.78	91.3	91.3	90.0	0.33	221		
30	40	200L	MJ200	2J20L2A300000	2955	51.0	9.9	0.89	0.86	0.80	92.0	92.0	90.0	0.61	320		
37	50	200L	MJ200	2J20L25300000	2955	64.0	12.2	0.87	0.84	0.76	92.5	92.5	91.0	0.64	320		
45	60	225M	MJ225	2J22M25300000	2965	76.6	14.8	0.88	0.85	0.78	92.9	92.7	91.0	1.13	449		
55	75	250M	MJ250	2J25M23300000	2960	90.2	18.1	0.91	0.88	0.84	93.2	92.9	91.5	2.11	570		
75	100	280S	MJ280	2J28S23300000	2970	122	24.6	0.91	0.89	0.86	93.8	93.6	92.0	3.01	740		
90	120	280M	MJ280	2J28M25300000	2970	146	29.5	0.91	0.89	0.86	94.1	93.9	90.9	3.42	765		
110	150	315S	MJ315	2J31S23300000	2982	180	35.9	0.90	0.86	0.80	94.3	94.1	91.5	5.00	1050		
125	170	315M	MJ315	2J31M2A300000	2982	207	40.8	0.89	0.85	0.78	94.5	93.5	91.5	5.00	1050		
132	180	315M	MJ315	2J31M23300000	2982	216	43.1	0.90	0.86	0.80	94.6	93.6	91.3	5.00	1050		
150	200	315L	MJ315	2J31L2A300000	2982	248	49.0	0.89	0.84	0.78	94.7	93.7	92.2	6.20	1240		
160	215	315L	MJ315	2J31L25300000	2985	261	52.2	0.90	0.86	0.80	94.8	94.1	93.0	6.20	1240		
180	240	315L	MJ315	2J31L2B300000	2982	300	58.8	0.88	0.82	0.75	94.9	94.1	93.0	7.70	1500		

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

FLAME PROOF MOTORS: Type Ex(d)

Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1



Applicable standard for testing & efficiency determination: IS15999

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 GD ²	Net Weight B3 constr.
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current Ratio		
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	kgm ²	kg	
*0.37	0.5	80	MJ80	2J08041300000	1415	0.96	0.26	0.74	0.68	0.55	72.7	72.7	67.7	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	0.0072	32	
0.75	1.0	80	MJ80	2J08045300000	1410	1.70	0.52	0.77	0.67	0.55	79.6	79.6	76.0	0.0082	33	
*1.1	1.5	90L	MJ90	2J09L42300000	1425	2.40	0.75	0.78	0.69	0.55	81.4	81.4	79.0	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	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	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	0.0600	75	
5.5	7.5	132S	MJ132	2J13S4K300000	1450	10.40	3.69	0.84	0.81	0.67	87.7	87.7	86.0	0.0993	107	
7.5	10.0	132M	MJ132	2J13M4T300000	1450	14.0	5.04	0.84	0.76	0.65	88.7	88.7	87.0	0.1248	114	
9.3	12.5	160M	MJ160	2J16M4C300000	1465	17.6	6.18	0.82	0.76	0.68	89.4	89.4	87.0	0.1870	148	
11	15	160M	MJ160	2J16M4K300000	1465	20.5	7.3	0.83	0.78	0.68	89.8	89.8	88.5	0.2850	157	
15	20	160L	MJ160	2J16L4T300000	1465	27.8	10.0	0.83	0.78	0.68	90.6	90.6	89.5	0.2930	175	
*18.5	25	180L	MJ180	2J18L47300000	1465	33.2	12.3	0.85	0.82	0.76	91.2	91.2	89.5	0.19	230	
22	30	180L	MJ180	2J18L48300000	1460	39.3	14.6	0.85	0.82	0.72	91.6	91.6	91.0	0.51	226	
30	40	200L	MJ200	2J20L45300000	1470	52.6	19.9	0.86	0.82	0.72	92.3	92.0	90.0	0.29	319	
37	50	225M	MJ225	2J22M43300000	1470	63.8	24.5	0.87	0.85	0.77	92.7	92.5	90.5	1.60	430	
45	60	250M	MJ225	2J22M45300000	1470	78.2	29.8	0.86	0.83	0.75	93.1	93.1	92.0	1.60	430	
55	75	250M	MJ250	2J25M433000000	1480	95.2	36.2	0.86	0.82	0.76	93.5	93.5	93.0	2.78	590	
75	100	280S	MJ280	2J28S42300000	1485	131	49.2	0.85	0.82	0.74	94.0	94.0	93.0	5.53	710	
90	120	280M	MJ280	2J28M45300000	1482	156	59.1	0.85	0.82	0.74	94.2	94.0	93.0	6.36	730	
110	150	315S	MJ315	2J31S41300000	1485	188	72.1	0.86	0.83	0.76	94.5	94.3	92.3	9.97	980	
125	170	315M	MJ315	2J31M4A300000	1486	216	81.9	0.85	0.81	0.74	94.6	94.3	92.7	11.70	1045	
132	180	315M	MJ315	2J31M43300000	1487	225	86.5	0.86	0.83	0.76	94.7	94.5	93.0	11.70	1045	
150	200	315L	MJ315	2J31L4A300000	1488	262	98.2	0.84	0.80	0.72	94.7	94.4	92.8	14.00	1230	
160	215	315L	MJ315	2J31L45300000	1487	270	105	0.87	0.84	0.78	94.9	94.6	93.1	14.00	1230	
180	240	315L	MJ315	2J31L46300000	1487	307	118	0.86	0.83	0.76	95.0	94.7	93.2	15.60	1303	
200	270	315L	MJ315	2J31L47300000	1489	340	131	0.86	0.83	0.76	95.1	94.8	93.3	17.76	1385	

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

FLAME PROOF MOTORS: Type Ex(d)

Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1



Applicable standard for testing & efficiency determination: IS15999
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 GD ²	Net Weight B3 constr.		
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current Ratio	Starting Torque Ratio	Pullout Torque Ratio					
kW	HP			B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	FL	3/4L	1/2L	3.0	1.9	2.2	kgm ²	kg
0.37	0.5	80	MJ80	2J080613000000	910	1.06	0.40	0.72	0.62	0.50	67.6	67.6	65.0	67.6	67.6	65.0	3.0	1.9	2.2	0.0060	31
0.55	0.75	80	MJ80	2J080633000000	910	1.45	0.59	0.72	0.62	0.50	73.1	73.1	70.0	73.1	73.1	70.0	3.5	2.0	2.3	0.0084	32
*0.75	1.0	90L	MJ90	2J09L633000000	920	1.90	0.79	0.72	0.61	0.50	75.9	75.9	72.3	75.9	75.9	72.3	4.0	2.0	2.5	0.0105	40
1.1	1.5	90L	MJ90	2J09L653000000	930	2.72	1.15	0.72	0.61	0.50	78.1	78.1	74.0	78.1	78.1	74.0	4.0	2.0	2.6	0.0160	50
1.5	2.0	100L	MJ100	2J10L633000000	935	3.63	1.56	0.72	0.62	0.52	79.8	79.8	76.0	79.8	79.8	76.0	4.5	2.0	2.5	0.0253	60
2.2	3.0	112M	MJ112	2J11M653000000	955	5.00	2.24	0.75	0.65	0.56	81.8	81.8	79.8	81.8	81.8	79.8	5.0	2.1	2.5	0.0650	71
3.7	5.0	132S	MJ132	2J13S663000000	960	7.83	3.75	0.78	0.73	0.60	84.3	84.3	83.5	84.3	84.3	83.5	5.5	2.0	2.5	0.1093	104
5.5	7.5	132M	MJ132	2J13M673000000	960	11.6	5.58	0.77	0.71	0.60	86.0	86.0	85.0	86.0	86.0	85.0	5.5	2.0	2.5	0.1518	125
7.5	10.0	160M	MJ160	2J16M633000000	960	15.0	7.61	0.80	0.74	0.64	87.2	87.2	85.2	87.2	87.2	85.2	5.5	2.0	2.5	0.2760	149
9.3	12.5	160L	MJ160	2J16L663000000	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	86.7	88.0	88.0	86.7	5.5	2.1	2.5	0.3400	160
11	15	160L	MJ160	2J16L673000000	965	21.6	11.1	0.80	0.77	0.66	88.7	88.7	87.0	88.7	88.7	87.0	6.0	2.0	2.5	0.4000	169
15	20	180L	MJ180	2J18L633000000	965	29.1	15.1	0.80	0.75	0.62	89.7	89.7	87.2	89.7	89.7	87.2	5.5	2.6	2.3	0.8200	214
18.5	25	200L	MJ200	2J20L633000000	975	34.7	18.5	0.82	0.77	0.69	90.4	90.4	88.3	90.4	90.4	88.3	5.5	2.6	2.3	1.20	290
22	30	200L	MJ200	2J20L653000000	975	41.1	22.0	0.82	0.77	0.69	90.9	90.9	88.8	90.9	90.9	88.8	6.0	2.6	2.3	1.37	300
30	40	225M	MJ225	2J22M643000000	975	52.9	30.0	0.86	0.84	0.76	91.7	91.7	88.7	91.7	91.2	88.7	7.0	2.5	2.2	2.41	444
37	50	250M	MJ250	2J25M633000000	980	63.4	36.8	0.88	0.85	0.80	92.2	92.2	91.0	92.2	92.2	91.0	6.0	2.5	2.3	3.72	573
45	60	280S	MJ280	2J28S613000000	984	80.4	44.5	0.84	0.80	0.72	92.7	92.7	91.2	92.7	92.7	91.2	6.0	2.5	2.4	5.11	615
55	75	280M	MJ280	2J28M633000000	984	95.6	54.4	0.86	0.83	0.76	93.1	93.1	91.0	93.1	93.1	91.0	6.0	2.4	2.4	6.16	665
75	100	315S	MJ315	2J31S613000000	988	133	73.9	0.84	0.82	0.75	93.7	93.7	92.5	93.7	93.7	92.5	6.0	2.4	2.5	10.70	940
90	120	315M	MJ315	2J31M633000000	989	159	88.6	0.84	0.80	0.74	94.0	94.0	92.9	94.0	94.0	92.9	6.0	2.2	2.5	12.40	1005
110	150	315M	MJ315	2J31M653000000	989	193	108	0.84	0.81	0.74	94.3	94.3	93.3	94.3	94.3	93.3	6.0	2.3	2.5	15.50	1110
125	170	315L	MJ315	2J31L6A3000000	990	222	123	0.83	0.80	0.72	94.4	94.4	93.0	94.4	94.2	93.0	6.0	2.3	2.5	18.00	1295
132	180	315L	MJ315	2J31L673000000	990	231	130	0.84	0.81	0.74	94.6	94.6	93.8	94.6	94.6	93.8	6.0	2.3	2.5	18.00	1425
150	200	315L	MJ315	2J31L6B3000000	990	265	148	0.82	0.79	0.70	94.7	94.3	92.8	94.7	94.3	92.8	6.0	2.0	2.5	21.50	1425
160	215	315L	MJ315	2J31L693000000	990	280	157	0.84	0.81	0.71	94.8	94.5	93.0	94.8	94.5	93.0	6.0	2.0	2.5	21.50	1425

* These ratings are offered in higher frame size

Note: All performance values are subject to tolerance as per IS/IEC 60034-1

FLAME PROOF MOTORS: Type Ex(d)

Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1



Applicable standard for testing & efficiency determination: IS15999

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 GD ²	Net Weight B3 constr.			
					Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated 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				kgm ²	kg	
	*0.37	0.5	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	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	0.2023	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	0.2905	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	0.3755	161
	*9.3	12.5	180L	MJ180	2J18L83300000	720	19.5	12.6	0.77	0.74	0.64	86.3	86.3	85.0	5.0	1.7	2.1	0.71	210
	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	1.3600	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	2.10	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	3.72	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	5.83	725
	45	60	280M	MJ280	2J28M85300000	730	90.8	60.0	0.76	0.72	0.60	90.7	90.7	90.5	5.5	2.0	2.2	6.86	775

* These ratings are offered in higher frame size

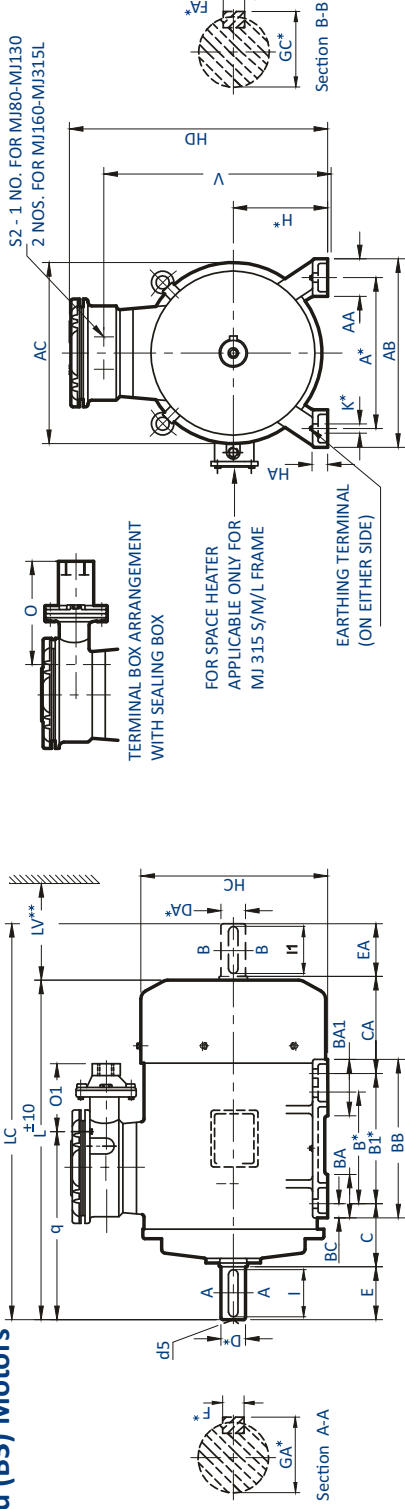
Note:

1) All performance values are subject to tolerance as per IS/IEC 60034-1

2) For higher ratings, kindly contact our nearest sales office

FLAME PROOF MOTORS: Type Ex(d)

G. Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 Foot Mounted (B3) 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 4, 6 & 8	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704 694	839 829	247	314	60	404	252	151	365	M32X1.5P	42	110	12	45	105	M16
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	M40X1.5P	48	110	14	51.5	100	M16
200L	2 4, 6 & 8	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805 771	927 893	235	394	80	488	237	133	395	M40X1.5P	55	110	16	59	100	M20
225S/M	2 4, 6 & 8	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	824 836	973 985	270 245	444	90	564	308	264	414 444	M50X1.5P	55 60	110 140	16 18	59 64	100 130	M20
250M	2 4, 6 & 8	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	915	1065	268	489	100	601	287	242	474	M50X1.5P	60 65	140 140	18 18	64 69	130 130	M20
280S/M	2 4, 6 & 8	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	1157	271	544	115	668	252	207	517	M50X1.5P	65 75	140 140	18 20	69 79.5	130 130	M20
315S/M	2 4, 6 & 8	508	406	457	216	315	28	625	540	120	115	155	46	49	617	850	1178 1163	1338 1353	381 336	606	130	758	256	225	584 614	M63X1.5P	65 80	140 170	18 22	69 85	130 160	M20
315L	2 4, 6 & 8	508	508	—	216	315	28	625	593	120	115	115	46	45	617	850	1343 1328	1503 1518	499 454	606	145	758	276	225	666 696	M63X1.5P	65 90	140 170	18 25	69 95	130 160	M20 M24

Tolerances on Dimensions with*

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

Dimension	Tolerance	Specification
D, DA	j6 k6 m6	19, 24, 28Ø 38, 42, 48Ø 55, 60, 65, 75, 80Ø
GA, GC, F, FA d5(centering)		IS 1231 IS 2048 IS 2540

□ 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.

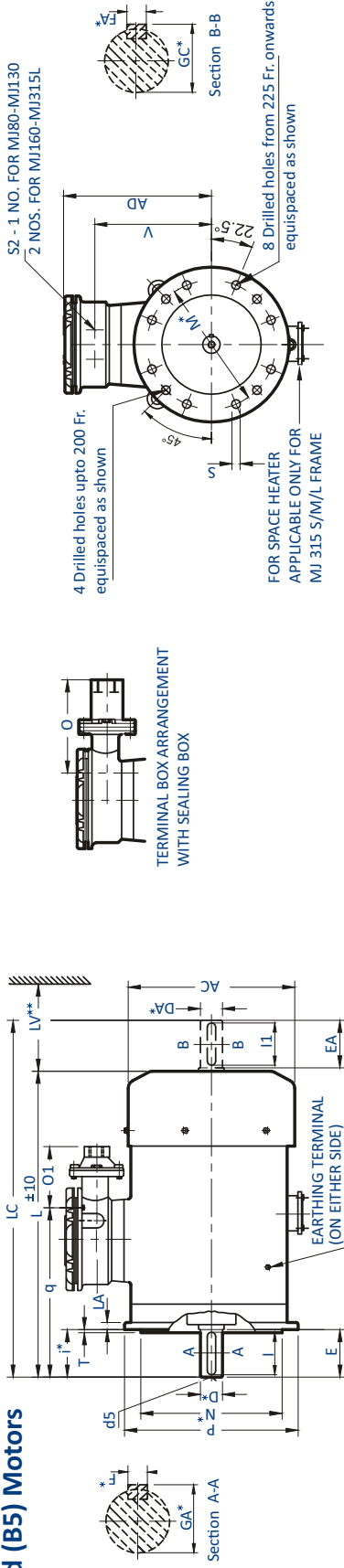
** Minimum distance for efficient cooling of motor to be maintained by user

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 Class of IEC 60034-30-1 Flange Mounted (B5) Motors



IEC Fr. Size		Pole		FIXING					GENERAL							TERMINAL BOX							SHAFT				
		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	M32X1.5P	42	110	12	45	105	M16			
	694								829																		
180L	2, 4, 6 & 8	350	250	300	110	19	5	16	354	745	867	335	70	267	270	166	395	M40X1.5P	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	M40X1.5P	55	110	16	59	100	M20			
	792								914																		
225S/M	2	450	350	400	110	19	5	16	444	824	973	426	90	339	308	264	414	M50X1.5P	60	140	18	64	130	M20			
	140				836				985	444																	
250M	2	550	450	500	140	19	5	18	489	915	1065	438	100	351	287	242	474	M50X1.5P	60	140	18	64	130	M20			
4, 6 & 8	65																								140	18	69
280S/M	2	550	450	500	140	19	5	18	544	1010	1157	475	115	388	252	207	517	M50X1.5P	65	140	20	69	130	M20			
	4, 6 & 8																								75	140	20
315S/M	2	660	550	600	140	24	6	22	610	1178	1338	535	130	443	276	225	584	M63X1.5P	65	140	18	69	130	M20			
	170				1163					1353	614						80								170	22	85
315L	2	660	550	600	140	24	6	22	610	1343	1503	535	145	443	276	225	666	M63X1.5P	65	140	18	69	130	M20			
	170				1328					1518	696						80								170	22	85

Tolerances on Dimensions with*

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

Dimension	Tolerance	Specification	
		j6	19, 24, 28Ø
D, DA	k6	38, 42, 48Ø	IS 1231
	m6	55, 60, 65, 75, 80Ø	
GA, GC, F, FA			IS 2048
d5(centering)			IS 2540

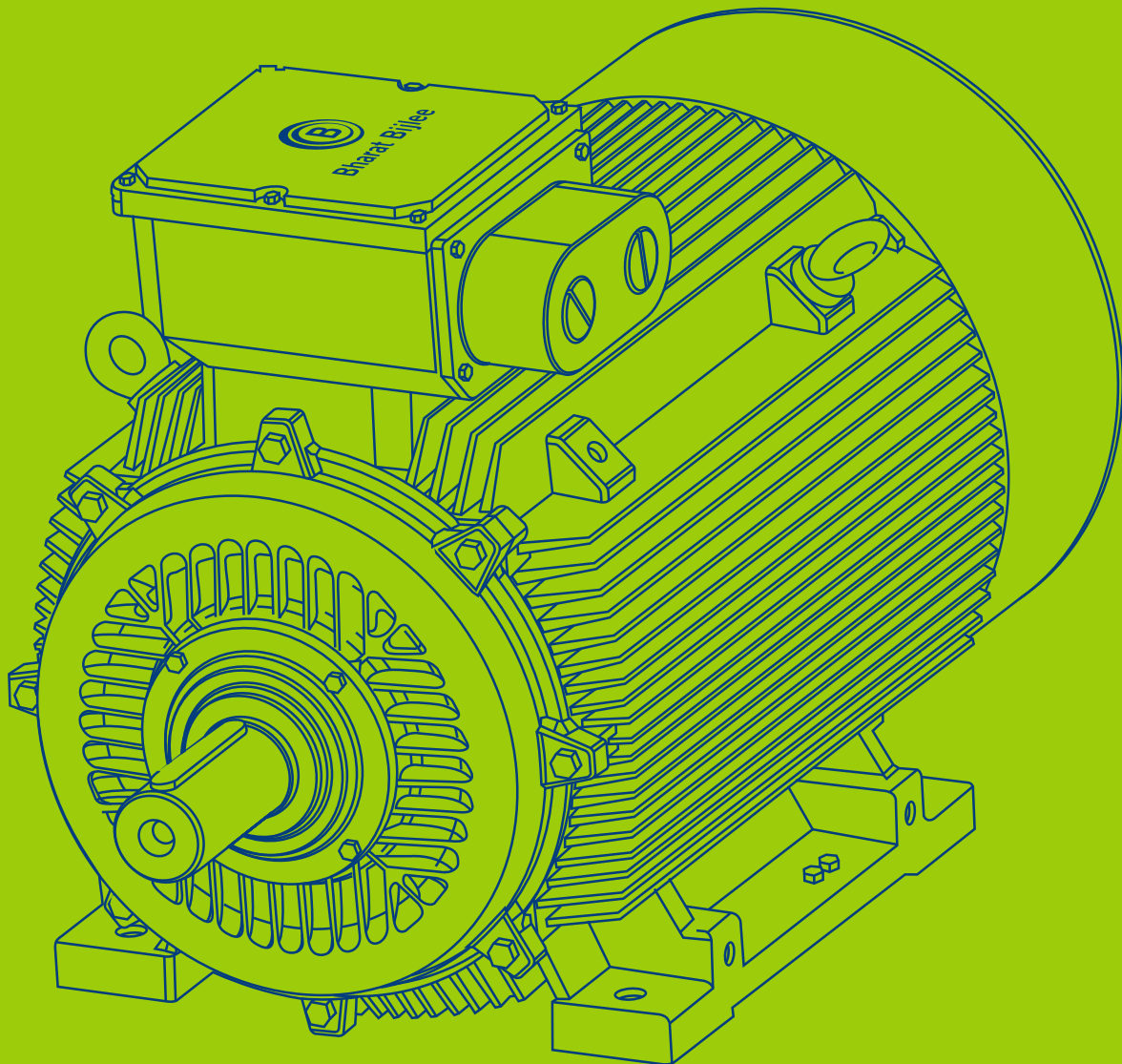
- Separate sp. heater T. Box will be provided as a std. feature in case of MJ 315 S/M/L frames.
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- 8 Nos. Fixing Holes from 225 S/M frame onwards
- Key / key way fit: h9 / N9.

** 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.

NON SPARKING MOTORS: Type Ex(nA)



NON SPARKING MOTORS: Type Ex(nA)

A. Technical Information

Non sparking motors provide protection against auto ignition of surrounding gases which may be released under abnormal operating condition.

A.1 Reference Standards:

IS/IEC 60079	Electrical apparatus for Explosive gas atmosphere - Part 0 General Requirements
IS/IEC 60079-15	Electrical apparatus for Explosive gas atmosphere - Part 15 Construction test and marking of type of protection 'n' electrical apparatus
IS 5572	Classification of Hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 5571	Guide for selection and installation of electrical equipment for hazardous areas (other than mines)
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 60079-15.

A.3 Electrical Features

Standard Operating Conditions:

- Voltage: 415V $\pm$ 10%
- Frequency: 50 Hz $\pm$ 5%
- Combined Variation: $\pm$ 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
$\pm$ 10	$\pm$ 5	$\pm$ 10	100
$\pm$ 12.5	$\pm$ 5	$\pm$ 12.5	95
$\pm$ 15	$\pm$ 5	$\pm$ 15	90

For Motors With Ambient 40°C		For Motors With Ambient 50°C	
Ambient Temperature (°C)	Permissible Output as % of Rated Value	Ambient Temperature (°C)	Permissible Output as % of Rated Value
20	107	30	107
21 to 35	103	30 to 45	103
40	100	50	100
45	95	55	96
50	91	60	92

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. If this measurement is done at higher voltage then the estimated starting current is more accurate.

In BB, starting current measurement is done as per the following table.

NON SPARKING MOTORS: Type Ex(nA)

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 %
355 kW to 560kW	25 %
560kW and above (with rated voltage 690V or higher)	25 %

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 & Cooling:

Upto 80 frame: Aluminium Construction; 90 frame & above: Cast Iron Construction.

All motors are Totally Enclosed Fan Cooled (TEFC). The cooling is effected 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 Non-sparking motors have degree of protection IP55 as per IS/IEC 60034-5 as a standards features. In addition, all flange mounted motors (B5 and B14) have oil tight Shaft (OTS) protection. Motor 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 polyimide base acid/alkali resistant paint of Dark Admiralty Grey, Shade No.632 (asper 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 & Terminal Box Details:

Fr. Size	Bearing Nos. C3 Clearance		Terminal		No. & Size of Cable Entries	Max cond cross sec area (mm ²)
	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*	M5	2 x M25 x 1.5P	10
100L	6206 2Z	6205 2Z	3*			
112M	6206 2Z	6205 2Z	3*			
132S/M	6208 2Z	6208 2Z	6	M6	2 x M32 x 1.5P	16
160M/L	6309 2Z	6209 2Z	6			
180M/L (4 Pole)	6310 2Z	6309 2Z	6			
180M/L (2, 6 Pole)	6310 2Z	6210 2Z	6	M8	2 x M40 x 1.5P	50
200L	6312 2Z	6212 2Z	6			
225S/M	6313	6213	6			
250M	6315	6215	6	M10	2 x M50 x 1.5P	70
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			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				

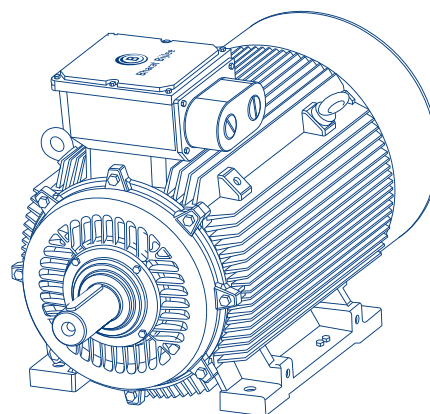
Note: 1) L10 bearing life is 50,000 hours for directly coupled loads through flexible couplings only.
2) IN 315L frame for star delta connection, higher size T box of 355 frame will be provided.

NON SPARKING MOTORS: Type Ex(nA)

B. General Specifications: Standard & Optional Features

Range

- **Series:** Non Sparking Motors, Type Ex(nA): Efficiency Values
Complying to IE2 Class of IEC 60034-30-1
- **kW:** 0.37 to 355
- **Frame:** 71 to 355
- **Polarity:** 2, 4, 6



Standard Feature	Optional Feature
Voltage: 415V	
Frequency: 50 Hz	
IP55	IP56, IP65, IP66
B3 Mounting	B5, B35, V1 & B14 (upto 132 frame)
Ambient: 50°C	
Duty: S1	
TB Position: Top: upto 80 frame, 250 frame & above RHS: 90 to 225 frame	TB Position: TOP / LHS: 90 to 225 frame RHS / LHS: 250 to 355 frame
Aluminium Construction: 71, 80 frame Cast Iron Construction: 90 frame & 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 & 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	
Gel Coat on Winding: For all frames	
Inverter Duty Application: 280 frame & above	Inverter Duty Application: upto 250 frame
Packing: Thermocol / Corrugated Boxes: Upto 132 Frame Wooden Packing Boxes: 160 Frame & Above	Sea Worthy/Export Packing Case
For standard bearings, kindly refer to the bearing chart	Insulated Bearing: 132 frame & above (hybrid bearing till 225 frame) Cylindrical Roller Bearing on DE Side: 160 frame & above

Our other optional features:

- Non standard shaft material, diameter & extension
- Double compression glands
- Higher size T Box, auxilliary T Box from 200 frame onwards as per requirement & feasibility
- Space Heater: 90 frame and above
- Thermister: 90 frame and above
- Canopy, water flinger, non standard paint & paint shade, cable gland
- 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 auxilliary terminal box with our nearest sales office
- 2) For Non Sparking motors to be operated on VFD supply, combined testing of motor & converter is mandatory. Refer page 27 for further details
- 3) For any other non standard feature, kindly contact our nearest sales office

NON SPARKING MOTORS: Type Ex(nA)

C. Statutory Requirement for Non Sparking Induction Motors Fed with VFD Supply

Combined Testing of non sparking 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. IS 5571 (Guide for selection and installation of electrical equipment for hazardous areas - other than mines) 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. The authorities give reference to IS 5571:2009 clause 14.4.2 (a) for this testing. This is also mentioned in the international standard IEC 60079-14:2007 (Explosive atmospheres - Part 14: Electrical installations design, selection and erection), clause 14.4.2 (a). IS/IEC 60079-15:2005 clause 17.8.2.2 also states that the motor shall be tested with the converter to prove that the temperature class limits are not exceeded.

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 the windings and cable circuits and 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 non sparking motor is fed through converter supply, normally converter is placed in safe area and motor is working in hazardous area. Hence the cable length between converter and 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 voltage appearing at motor terminals is $\leq 1.56\text{kV}$. Warranty clause of motor is applicable only if sine wave filter is provided at converter output terminals by the motor user in case of use of high cable length.

Use of thermal protective devices

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



NON SPARKING MOTORS: Type Ex(nA)

D. Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1

Applicable standard for testing & efficiency determination : IS15999

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 GD ²	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		
kW	HP		B3 construction	RPM	Amps.	kg-m	FL	3/4L	1/2L	FL	3/4L	1/2L	kgm ²	kg		
0.37	0.5	71	2S0712A3	2850	1.03	0.13	0.72	0.60	0.55	69.5	69.5	67.5	0.0019	7		
0.55	0.75	71	2S071233	2805	1.36	0.19	0.76	0.68	0.55	74.1	74.1	72.0	0.0019	7		
0.75	1.0	80	2S080213	2840	1.66	0.26	0.81	0.73	0.60	77.4	77.4	76.4	0.0037	10		
1.1	1.5	80	2S080233	2855	2.37	0.37	0.81	0.75	0.61	79.6	79.6	79.6	0.0051	11		
1.5	2.0	90S	2S09S243	2840	3.13	0.51	0.82	0.78	0.68	81.3	81.3	78.0	0.0091	17		
2.2	3.0	90L	2S09L273	2840	4.49	0.75	0.82	0.78	0.68	83.2	83.2	81.7	0.0113	20		
3.7	5.0	100L	2S10L233	2890	6.84	1.25	0.88	0.83	0.75	85.5	85.5	84.0	0.0212	26		
5.5	7.5	132S	2S13S2G3	2935	9.77	1.83	0.90	0.88	0.83	87.0	86.0	82.0	0.0820	55		
7.5	10.0	132S	2S13S2N3	2935	13.2	2.49	0.90	0.87	0.82	88.1	87.5	85.0	0.0980	67		
9.3	12.5	160M	2S16M233	2935	16.4	3.09	0.89	0.86	0.82	88.8	88.6	85.0	0.1500	105		
11	15	160M	2S16M253	2935	19.2	3.7	0.89	0.84	0.76	89.4	89.4	87.0	0.1710	112		
15	20	160M	2S16M263	2930	26.0	5.0	0.89	0.88	0.82	90.3	90.0	88.0	0.2030	120		
18.5	25	160L	2S16L293	2930	31.5	6.1	0.90	0.89	0.86	90.9	90.7	89.0	0.27	137		
22	30	180M	2S18M233	2935	37.7	7.3	0.89	0.87	0.82	91.3	91.0	88.8	0.34	177		
30	40	200L	2S20L2A3	2955	51.0	9.9	0.89	0.86	0.80	92.0	92.0	90.0	0.61	264		
37	50	200L	2S20L273	2955	64.0	12.2	0.87	0.84	0.76	92.5	92.5	91.0	0.64	280		
45	60	225M	2S22M253	2965	76.6	14.8	0.88	0.85	0.78	92.9	92.7	91.0	1.13	353		
55	75	250M	2S25M233	2965	90.2	18.1	0.91	0.89	0.86	93.2	92.7	90.0	2.60	550		
75	100	280S	2S28S233	2970	122.2	24.6	0.91	0.89	0.86	93.8	93.6	92.0	3.01	669		
90	120	280M	2S28M253	2970	146.2	29.5	0.91	0.89	0.86	94.1	93.9	90.9	3.42	750		
110	150	315S	2S31S233	2982	180.3	35.9	0.90	0.86	0.80	94.3	94.1	91.5	5.00	898		
125	170	315M	2S31M2A3	2982	206.8	40.8	0.89	0.85	0.78	94.5	93.5	91.5	5.00	940		
132	180	315M	2S31M233	2982	215.7	43.1	0.90	0.86	0.80	94.6	93.6	91.3	5.00	940		
150	200	315L	2S31L2A3	2982	247.6	49.0	0.89	0.84	0.78	94.7	93.7	92.2	6.20	1100		
160	215	315L	2S31L253	2985	260.9	52.2	0.90	0.86	0.80	94.8	94.1	93.0	6.20	1100		
180	240	315L	2S31L2B3	2982	299.9	58.8	0.88	0.82	0.75	94.9	94.1	93.0	7.70	1390		
200	270	355L	2S35L2A3	2985	325.4	65.3	0.90	0.87	0.82	95.0	94.2	92.2	12.00	1680		
*250	335	355L	2S35L213	2985	406.8	81.6	0.90	0.88	0.84	95.0	94.5	92.8	12.00	1680		
*315	425	355L	2S35L233	2985	513	103	0.90	0.88	0.84	95.0	94.5	93.0	14.70	1870		

* These ratings are suitable for class F temperature rise

Note: 1) All performance values are subject to tolerance as per IS/IEC 60034-1

NON SPARKING MOTORS: Type Ex(nA)

Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1

Applicable standard for testing & efficiency determination : IS15999

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 GD ²	Net Weight B3 constr.
				Rated Speed	Rated Current	Rated Torque	Power Factor			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	kgm ²	kg
0.37	0.5	71	2S071433	1370	1.00	0.26	0.71	0.62	0.50	72.7	72.7	66.0	0.0033	7
0.55	0.75	80	2S080433	1420	1.34	0.38	0.74	0.64	0.50	77.1	77.1	72.0	0.0072	11
0.75	1.0	80	2S080453	1410	1.70	0.52	0.77	0.67	0.55	79.6	79.6	76.0	0.0082	12
1.1	1.5	90S	2S09S423	1430	2.44	0.75	0.77	0.70	0.57	81.4	81.4	77.5	0.0150	15
1.5	2.0	90L	2S09L473	1435	3.23	1.02	0.78	0.70	0.57	82.8	82.8	80.0	0.0190	19
2.2	3.0	100L	2S10L473	1435	4.48	1.49	0.81	0.74	0.60	84.3	84.3	82.0	0.0280	26
3.7	5.0	112M	2S11M473	1450	7.46	2.49	0.80	0.76	0.62	86.3	86.3	84.0	0.0660	46
5.5	7.5	132S	2S13S4K3	1450	10.2	3.69	0.85	0.82	0.74	87.7	87.7	86.0	0.1260	64
7.5	10.0	132M	2S13M4T3	1450	13.8	5.04	0.85	0.82	0.74	88.7	88.7	87.0	0.1630	74
9.3	12.5	160M	2S16M4C3	1460	17.6	6.20	0.82	0.76	0.68	89.4	89.4	87.0	0.1770	105
11	15.0	160M	2S16M4K3	1465	20.3	7.31	0.84	0.80	0.70	89.8	89.8	88.0	0.2290	115
15	20	160L	2S16L4T3	1465	27.1	10.0	0.85	0.82	0.72	90.7	90.7	89.5	0.3000	128
18.5	25	180M	2S18M473	1465	33.2	12.3	0.85	0.82	0.76	91.2	91.2	89.5	0.5400	188
22	30	180L	2S18L483	1470	39.8	14.6	0.84	0.78	0.70	91.6	91.6	89.8	0.61	200
30	40	200L	2S20L453	1470	52.6	19.9	0.86	0.82	0.72	92.3	92.0	90.0	0.93	275
37	50	225S	2S22S433	1470	63.8	24.5	0.87	0.85	0.77	92.7	92.5	90.5	1.60	362
45	60	225M	2S22M453	1470	77.3	29.8	0.87	0.85	0.77	93.1	92.8	91.0	1.85	377
55	75	250M	2S25M433	1482	96.3	36.1	0.85	0.80	0.72	93.5	93.5	92.0	3.06	520
75	100	280S	2S28S423	1485	131	49.2	0.85	0.82	0.74	94.0	94.0	93.0	5.53	670
90	120	280M	2S28M453	1485	156	59.0	0.85	0.82	0.74	94.2	94.0	93.0	6.36	735
110	150	315S	2S31S413	1485	188	72.1	0.86	0.83	0.76	94.5	94.3	92.3	9.97	862
125	170	315M	2S31M4A3	1486	216	81.9	0.85	0.81	0.74	94.6	94.3	92.7	11.70	965
132	180	315M	2S31M433	1487	225	86.5	0.86	0.83	0.76	94.7	94.5	93.0	11.70	965
150	200	315L	2S31L4A3	1488	262	98.2	0.84	0.80	0.72	94.7	94.4	92.8	14.00	1145
160	215	315L	2S31L453	1487	270	104.8	0.87	0.84	0.78	94.9	94.6	93.1	14.00	1145
180	240	315L	2S31L463	1487	307	117.9	0.86	0.83	0.76	95.0	94.7	93.2	15.60	1225
200	270	315L	2S31L473	1489	340	130.8	0.86	0.83	0.76	95.1	94.8	93.3	17.76	1290
250	335	355L	2S35L413	1488	416	163.6	0.88	0.85	0.75	95.1	94.9	93.5	23.30	1680
315	422	355L	2S35L433	1488	524	206.2	0.88	0.85	0.75	95.1	94.8	93.5	32.70	1855
*355	475	355L	2S35L453	1488	590	232	0.88	0.85	0.75	95.1	94.9	93.5	37.90	2025

* These ratings are suitable for class F temperature rise

Note: 1) All performance values are subject to tolerance as per IS/IEC 60034-1

NON SPARKING MOTORS: Type Ex(nA)

Performance Data: Efficiency Values Complying to IE2 Class of IEC 60034-30-1

Applicable standard for testing & efficiency determination : IS15999

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

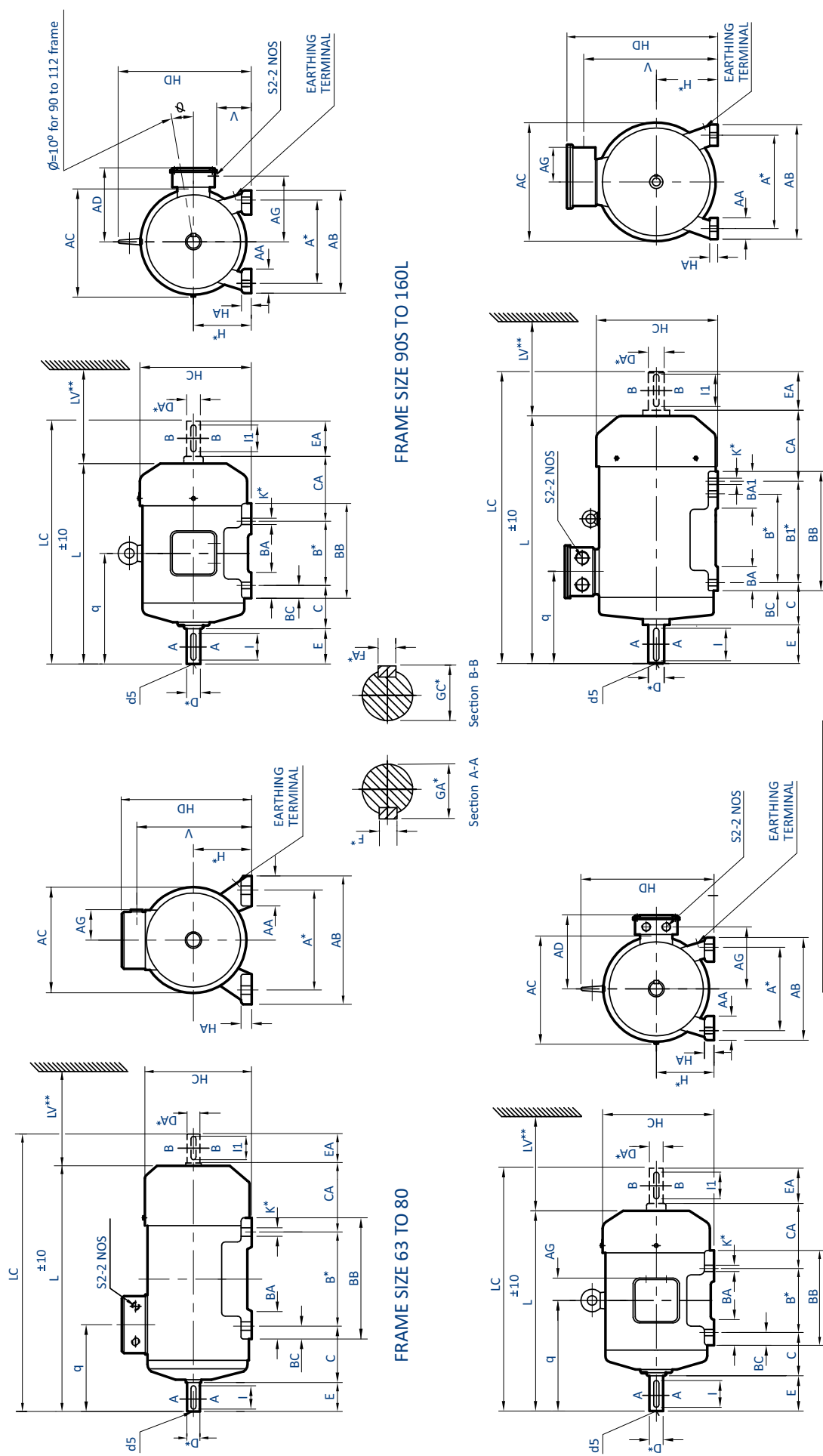
Rated Output		Frame size	Type Reference	Operating characteristics at rated output							With DOL starting			Rotor GD²	Net Weight B3 constr.		
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio			Starting Torque to Rated Torque Ratio	Pullout 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
0.37	0.5	80	2S080613	910	1.06	0.40	0.72	0.62	0.50	67.6	67.6	65.0	3.0	1.9	2.2	0.0060	10
0.55	0.75	80	2S080633	910	1.45	0.59	0.72	0.62	0.50	73.1	73.1	70.0	3.5	2.0	2.3	0.0084	11
0.75	1.0	90S	2S09S633	925	1.91	0.79	0.72	0.61	0.50	75.9	75.9	72.3	3.5	2.0	2.5	0.0122	14
1.1	1.5	90L	2S09L653	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	23
1.5	2.0	100L	2S10L633	935	3.63	1.56	0.72	0.60	0.52	79.8	79.6	75.0	4.5	2.0	2.5	0.0250	27
2.2	3.0	112M	2S11M653	940	4.99	2.28	0.75	0.65	0.58	81.8	81.8	79.8	5.0	2.1	2.5	0.0650	33
3.7	5.0	132S	2S13S6G3	960	8.00	3.75	0.74	0.70	0.60	84.3	83.5	82.0	5.5	2.0	2.5	0.1300	52
5.5	7.5	132M	2S13M6T3	960	11.4	5.58	0.74	0.70	0.60	86.0	84.5	82.0	6.0	2.0	2.5	0.1930	75
7.5	10.0	160M	2S16M633	960	15.0	7.61	0.80	0.74	0.64	87.2	87.2	85.2	5.5	2.0	2.5	0.2760	103
9.3	12.5	160L	2S16L663	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	86.7	5.5	2.1	2.5	0.3400	113
11	15.0	160L	2S16L673	965	21.6	11.10	0.80	0.77	0.66	88.7	88.7	87.0	6.0	2.0	2.5	0.4000	123
15	20	180L	2S18L633	965	29.1	15.1	0.80	0.75	0.62	89.7	89.7	87.2	5.5	2.6	2.3	0.8200	200
18.5	25	200L	2S20L633	975	34.7	18.5	0.82	0.77	0.69	90.4	90.4	88.3	5.5	2.6	2.3	1.2000	254
22	30	200L	2S20L653	975	41.1	22.0	0.82	0.77	0.69	90.9	90.9	88.8	6.0	2.6	2.3	1.37	270
30	40	225M	2S22M643	975	52.9	30.0	0.86	0.84	0.76	91.7	91.2	88.7	7.0	2.5	2.2	2.41	358
37	50	250M	2S25M633	980	63.4	36.8	0.88	0.85	0.82	92.2	92.2	91.0	6.0	2.5	2.3	3.72	528
45	60	280S	2S28S613	984	80.4	44.5	0.84	0.80	0.72	92.7	92.7	91.2	6.0	2.5	2.4	5.11	573
55	75	280M	2S28M633	984	95.6	54.4	0.86	0.83	0.76	93.1	93.1	91.0	6.0	2.4	2.4	6.16	620
75	100	315S	2S31S613	988	133	73.9	0.84	0.82	0.75	93.7	93.7	92.5	6.0	2.4	2.5	10.70	830
90	120	315M	2S31M633	989	159	88.6	0.84	0.80	0.74	94.0	94.0	92.9	6.0	2.2	2.5	12.40	912
110	150	315M	2S31M653	989	193	108.3	0.84	0.81	0.74	94.3	94.3	93.3	6.0	2.3	2.5	15.50	1010
125	170	315L	2S31L6A3	990	222	123.0	0.83	0.80	0.72	94.4	94.2	93.0	6.0	2.3	2.5	18.00	1175
132	180	315L	2S31L673	990	231	129.9	0.84	0.81	0.74	94.6	94.6	93.8	6.0	2.3	2.5	18.00	1175
150	200	315L	2S31L6B3	990	265	147.9	0.82	0.79	0.70	94.7	94.3	92.8	6.0	2.0	2.5	21.50	1231
160	215	315L	2S31L693	990	280	157.4	0.84	0.81	0.71	94.8	94.5	93.0	6.0	2.0	2.5	21.50	1231
180	240	355L	2S35L6A3	990	322	177.1	0.82	0.77	0.65	94.9	94.6	93.3	6.0	2.0	2.5	28.70	1670
200	270	355L	2S35L613	990	349	196.8	0.84	0.80	0.70	95.0	94.7	93.5	6.0	2.0	2.5	28.70	1670
250	335	355L	2S35L633	990	436	246.0	0.84	0.80	0.70	95.0	94.7	93.4	6.0	2.0	2.5	35.50	1780

Note:

1) All performance values are subject to tolerance as per IS/IEC 60034-1

NON SPARKING MOTORS: Type Ex(nA)

E. Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 Foot Mounted (B3) Motors



FRAME SIZE 180M TO 225M

FRAME SIZE 250M TO 355L

CAT-E-6335-3-1

NON SPARKING MOTORS: Type Ex(nA)

Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 | Foot Mounted (B3) Motors

IEC Fr. Size		Pole	FIXING						GENERAL												TERMINAL BOX						SHAFT					TABLE B				
			A*	B*	BI*	C	H*	K*	AB	BB	AA	BA	BA1	BC	HA	HC	HD	AD	L	LC	CA	AC	LV**	V	q	AG	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	241	75	124	30	159	104	52	M20X1.5P	11	23	4	12.5	18	M4	—	—	—	
71	2, 4 & 6	112	90	—	45	71	7	135	110	31	30	—	13	7	141	206	—	234	278	83	140	30	175	102	52	M20X1.5P	14	30	5	16	25	M5	—	—	—	
80	2, 4 & 6	125	100	—	50	80	10	150	124	31	35	—	15	9	159	225	—	267	324	94	157	30	194	112	52	M20X1.5P	19	40	6	21.5	35	M6	—	—	—	
90S	6 & 8	100	100	—	—	56	90	10	180	130	50	43	—	18	13	177	①	141	302	374	143	174	35	57	156	110	M20X1.5P	24	50	8	27	45	M8	2 & 4	336	408
90L	6 & 8	140	125	—	—	—	—	—	155	—	—	—	—	—	—	—	—	327	399	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
100L	6 & 8	160	140	—	—	63	100	12	200	176	54	50	—	21	14	198	235	179	366	448	125	195	40	66	193	138	M25X1.5P	28	60	8	31	55	M10	2 & 4	361	433
112M	6 & 8	190	140	—	—	70	112	12	230	176	62	51	—	21	15	222	260	191	388	471	141	220	45	80	200	151	M25X1.5P	28	60	8	31	55	M10	2 & 4	387	469
132S	6 & 8	—	140	—	—	—	—	—	180	—	50	—	—	—	—	—	—	459	552	172	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
132M	6	216	178	—	—	89	132	12	256	218	64	—	23	17	262	308	206	497	590	172	260	50	99	258	167	M25X1.5P	38	80	10	41	70	M12	2 & 4	518	617	
160M	2, 4	—	210	—	—	—	—	—	250	—	—	—	—	—	—	—	—	605	741	203	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
160L	6 & 8	254	—	—	—	108	160	15	310	—	58	70	—	23	20	318	366	226	585	721	183	316	60	98	186	M25X1.5P	42	110	12	45	105	M16	2 & 4	635	771	
180M	2, 6 & 8	279	241	—	—	121	180	15	344	281	65	70	—	23	26	357	412	265	679	799	217	354	70	83	352	216	M32X1.5P	48	110	14	51.5	100	M16	2 & 4	679	815
180L	6 & 8	279	279	—	—	—	—	—	319	—	—	—	—	—	—	—	—	717	838	218	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
200L	2	318	305	—	—	133	200	19	398	355	85	85	—	28	32	397	462	319	795	920	262	394	80	—	396	249	M40X1.5P	55	110	16	59	100	M20	4	698	802
200L	6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	772	897	239	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
225S	4	286	—	—	—	—	—	—	336	—	—	—	—	—	—	—	—	852	1001	281	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
225M	2	356	311	—	—	149	225	19	436	361	85	85	—	28	34	450	509	344	837	956	276	450	90	—	415	273	M40X1.5P	55	110	16	59	100	M20	—	—	—
225M	6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	852	1001	251	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
250M	2	406	349	—	—	168	250	24	506	425	100	115	—	49	42	495	665	—	993	1137	337	489	100	578	352	243	M50X1.5P	60	140	18	64	130	M20	4	877	1026
250M	4, 6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	914	1065	268	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
280S/M	2	457	368	419	190	280	24	540	490	100	110	149	40	42	552	725	—	1010	1160	271	544	115	638	360	243	M50X1.5P	65	140	18	69	130	M20	—	—	—	
280S/M	4, 6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
315S/M	2	406	—	457	—	—	—	—	540	120	120	155	—	—	—	—	—	1137	1297	340	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
315S/M	4, 6 & 8	508	—	—	216	315	28	625	—	—	—	—	46	45	600	830	—	1167	1358	—	600	130	728	416	278	M50X1.5P	65	140	18	69	130	M20	—	—	—	
315L	2	508	—	—	—	—	—	—	593	120	120	—	—	—	—	—	—	1302	1458	454	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
315L	4, 6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1332	1518	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
355L	2	610	630	—	—	254	355	28	710	770	110	170	—	73	45	693	939	—	1461	1622	458	685	145	850	434	403	M75X1.5P	75	140	20	79.5	130	M20	—	—	—
355L	4, 6 & 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1491	1682	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

TABLE A

Dimension	Tolerance	Specification	Dimension	Tolerance	Specification
A, B	± 0.75	IS 1231	D, DA	j6 k6 m6	IS 1231
H	-0.5 -1.0 +0.360	UPTO 280 OVER 280	GA, GC, FFA dS(centering)	IS 2048	IS 2540
K	+0.430 +0.520	12.15ø 19,24,28ø			

Special Remarks

15kW/2P & 11kW/4P in 160M will have dimensions "L", "LC" & "CA" as indicated in table "B"

* Refer TABLE 'A' for tolerances

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

☐ In 315L FR. For star delta connection Higher size T. Box will be provided

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

All Dimensions are in mm unless otherwise specified.

① Without Eye bolt

☐ Key / key way fit: h9 / N9.

☐ Double shaft extension can be provided with shaft dimension identical to DE shaft.

☐ Also suitable for B6, B7, B8, V5 & V6 mounting as per IS 2253.

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

Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 Flange Mounted (B5) Motors



FRAME SIZE 250M TO 355L

CAT-E-6335-5-1

Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 | Flange Mounted (B5) Motors

		FIXING					GENERAL							TERMINAL BOX					SHAFT					TABLE B			
IEC Fr. Size	Pole	P	N*	M*	i*	S	T	LA	AD	AC	L	LC	g	LV**	V	q	AG	S2	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5	Pole	L	LC
63	2&4	140	95	115	23	10	3	9	127	124	225	260	—	30	96	109	52	M20X1.5P	11	23	4	12.5	18	M4	—	—	—
71	2, 4 & 6	160	110	130	30	10	3.5	9	135	140	261	305	—	30	104	127	52	M20X1.5P	14	30	5	16	25	M5	—	—	—
80	2, 4 & 6	200	130	165	40	12	3.5	10	145	157	267	324	—	30	114	112	52	M20X1.5P	19	40	6	21.5	35	M6	—	—	—
90S	6 & 8	200	130	165	50	12	3.5	10	141	174	302	374	①	35	110	156	53	M20X1.5P	24	50	8	27	45	M8	2 & 4	336	408
90L	6 & 8										327	399			169									2 & 4	361	433	
100L	6 & 8	250	180	215	60	15	4	11	179	195	366	448	135	40	138	193	56	M25X1.5P	28	60	8	31	55	M10	2 & 4	387	469
112M	6 & 8	250	180	215	60	15	4	11	191	220	388	471	148	45	151	200	56	M25X1.5P	28	60	8	31	55	M10	4	419	502
132S	6 & 8										459	552				239								2 & 4	518	617	
132M	6	300	230	265	80	15	4	12	206	260	497	590	176	50	167	258	63	M25X1.5P	38	80	10	41	70	M12	—	—	—
160M	2, 4 6 & 8										605	741				323									4	556	659
160L	6 & 8	350	250	300	110	19	5	13	226	316	585	721	206	60	186	345	63	M25X1.5P	42	110	12	45	105	M16	2 & 4	635	771
180M	2, 6 & 8	350	250	300	110	19	5	13	265	354	679	799	232	70	216	352	97	M32X1.5P	48	110	14	51.5	100	M16	—	—	—
180L	6 & 8										717	838				371								2 & 4	679	815	
200L	2 6 & 8	400	300	350	110	19	5	15	319	394	795	920	262	80	249	396	172	M40X1.5P	55	110	16	59	100	M20	4	795	920
225S	4				140						852	1001				432.5			60	140	18	64	130		—	—	—
225M	2 6 & 8	450	350	400	110 140	19	5	16	344	450	837	956	284	90	273	415 445	172	M40X1.5P	55	110	16	59	100	M20	—	—	—
250M	2 4, 6 & 8	550	450	500	140	19	5	18	415	489	993	1134	—	100	328	352	243	M50X1.5P	60	140	18	64	130	M20	4	877	1026
280S/M	2 4, 6 & 8	550	450	500	140	19	5	18	445	544	1010	1160	—	115	358	360	243	M50X1.5P	65	140	18	69	130	M20	—	—	—
315S/M	2 4, 6 & 8				140						1137	1293				386		M50X1.5P	75	140	20	79.5	130		—	—	—
315L	2 4, 6 & 8	660	550	600	170 140 170	24	6	22	515	600	1167 1302 1332	1353 1458 1518	—	130	413	416 386 416	278	M63X1.5P	80 80	170 170	22 22	85 85	160 160	M20	—	—	—
355L	2 4, 6 & 8	800	680	740	140 170	24	6	25	584	690	1461 1491	1622 1682	—	145	495	434 464	403	M75X1.5P	75 95	140 170	20 25	79.5 100	130 160	M20 M24	—	—	—

Special Remarks
15kW/2P & 11kW/4P in 160M will have dimensions
"L" & "LC" as Indicated in table "B"

Special Remarks

- ① Without Eye bolt
 ***** Minimum distance for efficient cooling of motor to be maintained by user
☐ In 315L FR, For star delta connection Higher size T. Box will be provided
☐ Key / key way fit: H9 / N9,

All Dimensions are in mm unless otherwise specified.

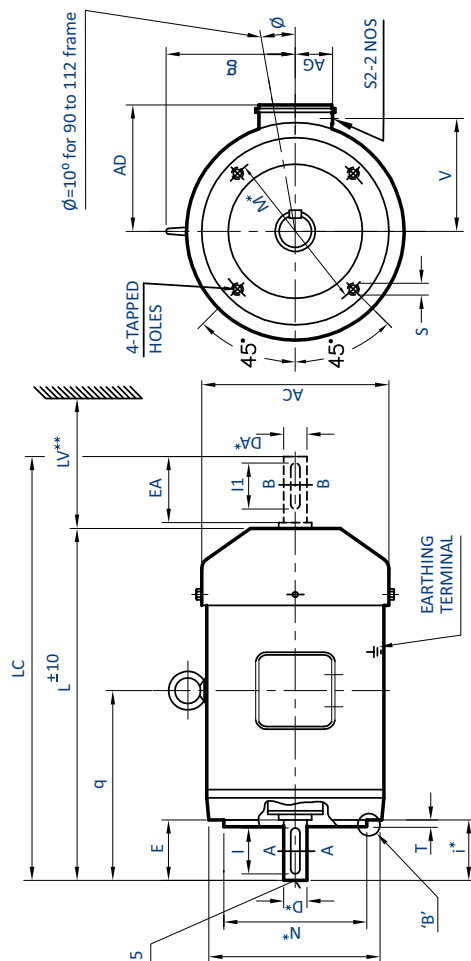
* Refer TABLE 'A' for tolerance

Note:

- 1) For B3 / B5 mounting motor in frame 63 & 71, kindly contact our nearest sales office
- 2) For non standard motors, dimensions may change. Please contact our nearest sales office for details.

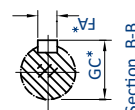
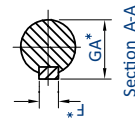
CAT-A-6235-5-2

Dimensional Drawing: Efficiency Values Complying to IE2 Class of IEC 60034-30-1 Face Mounted (B14) Motors



FRAME SIZE 90S TO 132M

TABLE B		
Pole	L	LC
—	—	—
—	—	—
—	—	—
2 & 4	336	408
2 & 4	361	433
2 & 4	387	469
4	419	502
2 & 4	518	617
—	—	—
4	556	659



Dimension	Tolerance	Specification
N	j6	IS 2223
M	± 0.3	
i	± 1.0	

Dimension	Tolerance	Specification
D, DA	j6	11, 14, 19, 24, 28 $\emptyset$
	k6	
GA, GC, F, FA	38 $\emptyset$	IS 1231
GA, GC, F, FA		IS 2048
GA, GC, F, FA		IS 2540

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

- ① Without Eye bolt
- ☐ Also suitable for V19, & V18 mounting as per IS 2253.
- ☐ Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- All Dimensions are in mm unless otherwise specified.
- Key / key way fit: h9 / n9

CERTIFICATIONS



Super Premium Energy Efficient
SynchroVERT™ IE4 Motor:
Winner of CII's Most Innovative Energy Saving Product 2016

New Product



Ultra Premium Energy Efficient
IE5 Motor:
Winner of CII's Most Innovative Energy Saving Product 2018

Upcoming Product



ISO 14001:2015



OHSAS 18001:2007



ISO 9001:2015

LV MOTORS PRODUCT RANGE

Motors Conform to relevant Indian Standards (IS) & IEC 60034 series

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

Motor Type	Frame	Power (kW)	Polarity		Standard Technical Specifications
IE2 Motors	71 to 355	0.37 to 355	2, 4, 6		• Ambient: 50° C • Ambient for DCCA: 40° C • Mounting: B3, B5, B35, V1 • Inverter Grade Winding: For IE3 and DCCA • Duty: S1 • RTD & BTD: For DCCA motors
IE3 Motors	80 to 355	0.55 to 355	2, 4, 6		
Large LT Motors (DCCA)	355 to 450	250 to 1250	2, 4, 6, 8		
IE4 MOTORS	112 to 225	1.5 to 45	4		• Ambient: 50° C • Mounting: B3, B5, B35, V1 • Inverter Duty Winding • Duty: S1 • VPI: With Class H solvent less Resin
Standard Flame Proof Motors	80 to 315	0.37 to 200	2, 4, 6, 8		• Ambient: 45° C • Mounting: B3, B5, B35, V1 • Inverter Grade Winding: For IE3 Motors • Duty: S1
IE2 Flame Proof Motors	80 to 315	0.37 to 200	2, 4, 6, 8		
IE3 Flame Proof Motors	80 to 315	0.75 to 180	2, 4, 6		
IE2 Non - Sparking Motors	71 to 355	0.37 to 355	2, 4, 6		• Ambient: 50° C • Mounting: B3, B5, B35, V1 (B14 upto 132 Frame) • Duty: S1
Crane & Hoist Duty Motors	71 to 355	0.37 to 400	4, 6, 8		• Ambient: 45° C • Mounting: B3, B5, B35, V1 (B14 upto 132 Frame) • Duty: S2, S3, S4, S5 • Offered in DOL & Converter Fed Supply
Brake Motors (With Integral DC Brake)	71 to 132	0.37 to 9.3	2, 4, 6, 8		• Ambient: 50° C • Duty: S1, S2, S3, S4, S5 • Mounting: B3, B5, B35 • Integral DC Brake
Brake Motors (With External Mounted Brake)	71 to 200	0.37 to 22	2, 4, 6		• Ambient: 50° C • Duty: S1, S2, S3, S4, S5 • Mounting: B3, B5, B35 • External Mounted DC Brake/Arrangement
Slip Ring Motors	100 to 160	1.1 to 10	4, 6		• Ambient: 45° C • Mounting: B3, B35 • Duty: S3, S4, S5
Textile Motors	100 to 160	1.1 to 15	4, 6, 8		• Ambient: 50° C • Mounting: B3, B5, B35 • Duty: S1
Cane Unloader Motors	160 to 225	11 to 30	6		• Ambient: 45° C • Start/Stop per Hour: upto 900 • Mounting: B3, B5, B35 • Forced Cooling • Thermostat • Duty: S5, 50% CDF • Shaft Material: EN24

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

Optional Features		Applications
- Non Standard Voltage: upto 690V - Shaft Material: EN24 - Enclosure: IP56 / 65 / 66 - Forced Cooling: 132 to 450 Frame - Space Heater: 90 Frame onwards - Roller Bearing: 160 Frame onwards - RTD & BTD: 250 Frame onwards - Insulation: Class H - Thermistor: 80 to 355L	- Insulated Bearing: 160 Frame onwards - High Temperature Grease: Suitable up to 200° C - Higher Polarity on request - SS Hardware - Non std shaft diameter / extension (subject to confirmation) - Non Standard Paint - Provision for Encoder Mounting - Low Vibration as per IS or IEC	Most common applications comprising of: 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
- Shaft Material: EN24 - Enclosure: IP56 / 65 / 66 - Roller Bearing: 160 Frame onwards - Insulation: Class H - Space Heater: 90 frame onwards - Thermistor: 80 to 225 Frame	- Non std shaft diameter / extension (subject to confirmation) - Non Standard Paint - Provision for Encoder Mounting - Low Vibration as per IS or IEC	Fans, HVAC, Pumps, Textiles, hydraulic press
- Non Standard Voltage: 550V - Shaft Material: EN24 - Enclosure: IP56 / 65 / 66 - Space Heater: 90 Frame onwards - Roller Bearing: 160 Frame onwards - Insulation: Class H 8 pole motor on request - Thermistor: 80 to 315 L	- Insulated Bearing: 160 Frame onwards - Intermittent Duty S3, S4: 80 to 132 Frame in 4 pole only - Non std shaft diameter / extension - Motors for Inverter Duty - Test facility for combined Testing with VFD - Non Standard Paint - Low Vibration as per IS or IEC	Most common applications comprising of: Pump, Fan, Compressor, Material Handling, Agitator, LPG Bottling Plant, Pharma Machinery, Chemical Plant Machinery, Machinery for mines
- Shaft Material: EN24 - Enclosure: IP56 / 65 / 66 - Roller Bearing: 160 Frame onwards - Insulation: Class H	- Insulated Bearing: 160 Frame onwards - Higher Polarity on request - Non std shaft diameter / extension - Motors for Inverter Duty - Test facility for combined testing with VFD - Non Standard Paint - Low Vibration as per IS or IEC	Pump, Fan, Compressor, Material Handling, Agitator, Pharma Machinery
- Non Standard Voltage: 380 to 460V - Shaft Material: EN24 - Enclosure: IP56 / 65 / 66 - Space Heater: 90 Frame onwards - Roller Bearing: 160 Frame onwards - BTD: 250 Frame & above - Insulation: Class H - Thermistor: 80 to 355 L	- Insulated Bearing: 160 Frame onwards - Non std shaft diameter & extension - Motors for Inverter Duty - Non Standard Paint - Low Vibration as per IS or IEC	Crane, Hoist, Lift, Material Handling, Car Stacker, Door Opening
- Non Standard Voltage: upto 460V - Manual Release Arrangement: For 90 to 132 Frame - Motors for Inverter Duty	- Non std shaft diameter & extension - Double Shaft Extension for brake arrangement - Non Standard Paint	Crane, Hoist, Material Handling, Textile, Pharma to name a few
- Non Standard Voltage: upto 460V - Manual Release Arrangement - Motors for Inverter Duty	- Double Shaft Extension for brake arrangement - Non Standard Paint - Higher Braking Torque	Crane, Hoist, Material Handling, Textile, Pharma to name a few
Non std shaft diameter & extension	Non Standard Paint	Crane, Hoist, Lift, Material Handling
- Non Standard Voltage: upto 500V - Insulation: Class H	- Motors for Inverter Duty - Non Standard Paint - Low Vibration as per IS	Ginning, Textile Machinery
- Insulation: Class H - Thermistor	- Insulated Bearing: 160 Frame onwards - Non Standard Paint	Cane Loading-Unloading Machine

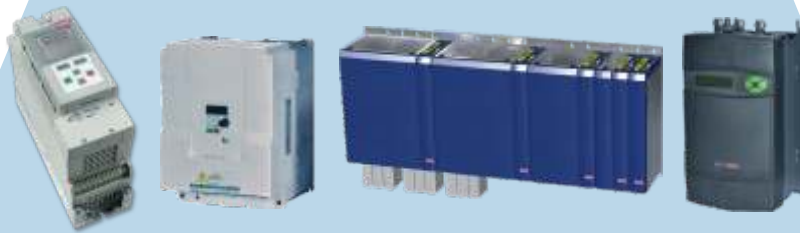
MOTOR, DRIVE AND AUTOMATION SOLUTIONS



Visualisation & HMI



Controls



Drives



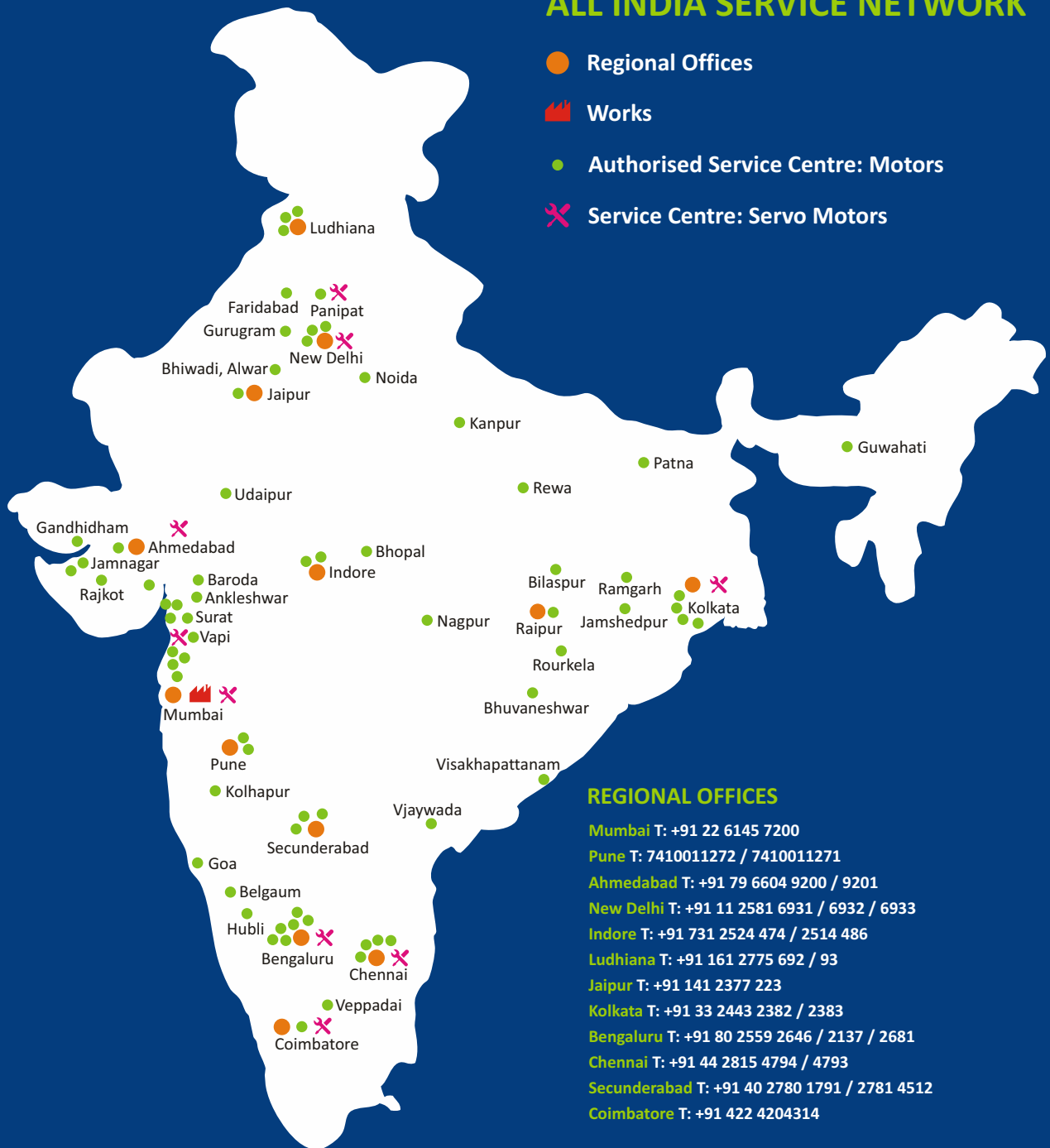
Motors

Bharat Bijlee's Industrial Systems product portfolio caters to a spectrum of applications and spans the machine automation pyramid.

Notes

ALL INDIA SERVICE NETWORK

- Regional Offices
- 🔥 Works
- Authorised Service Centre: Motors
- ✕ Service Centre: Servo Motors



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