

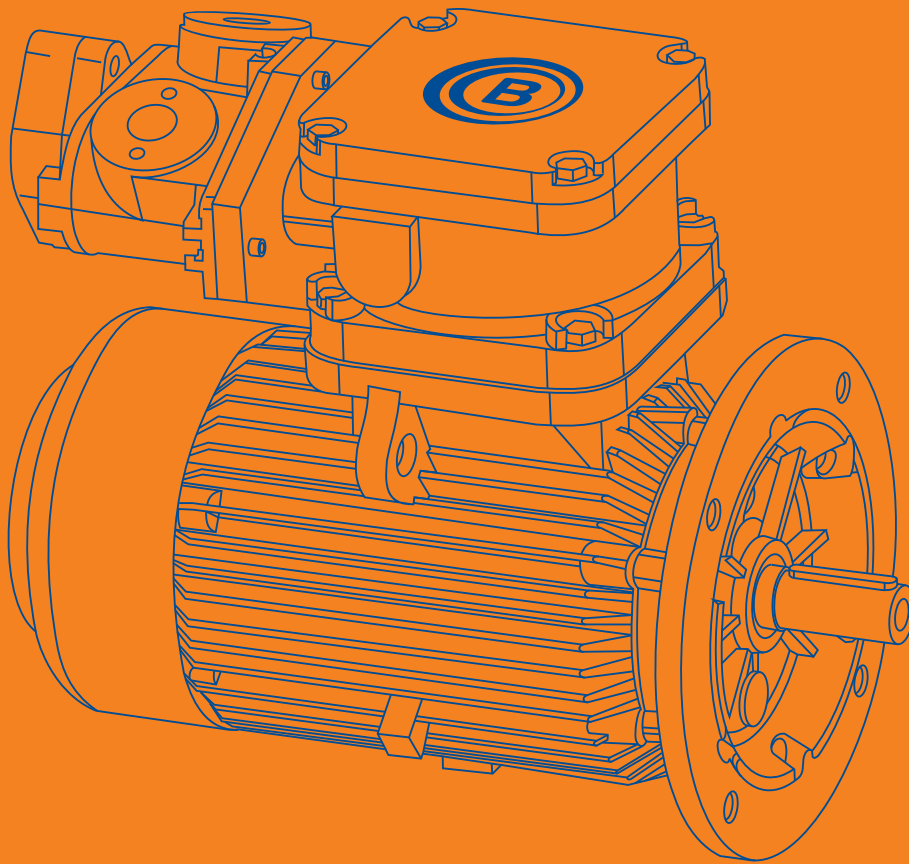
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# LV Motors: Hazardous Area Application IE2 Energy Efficiency Series

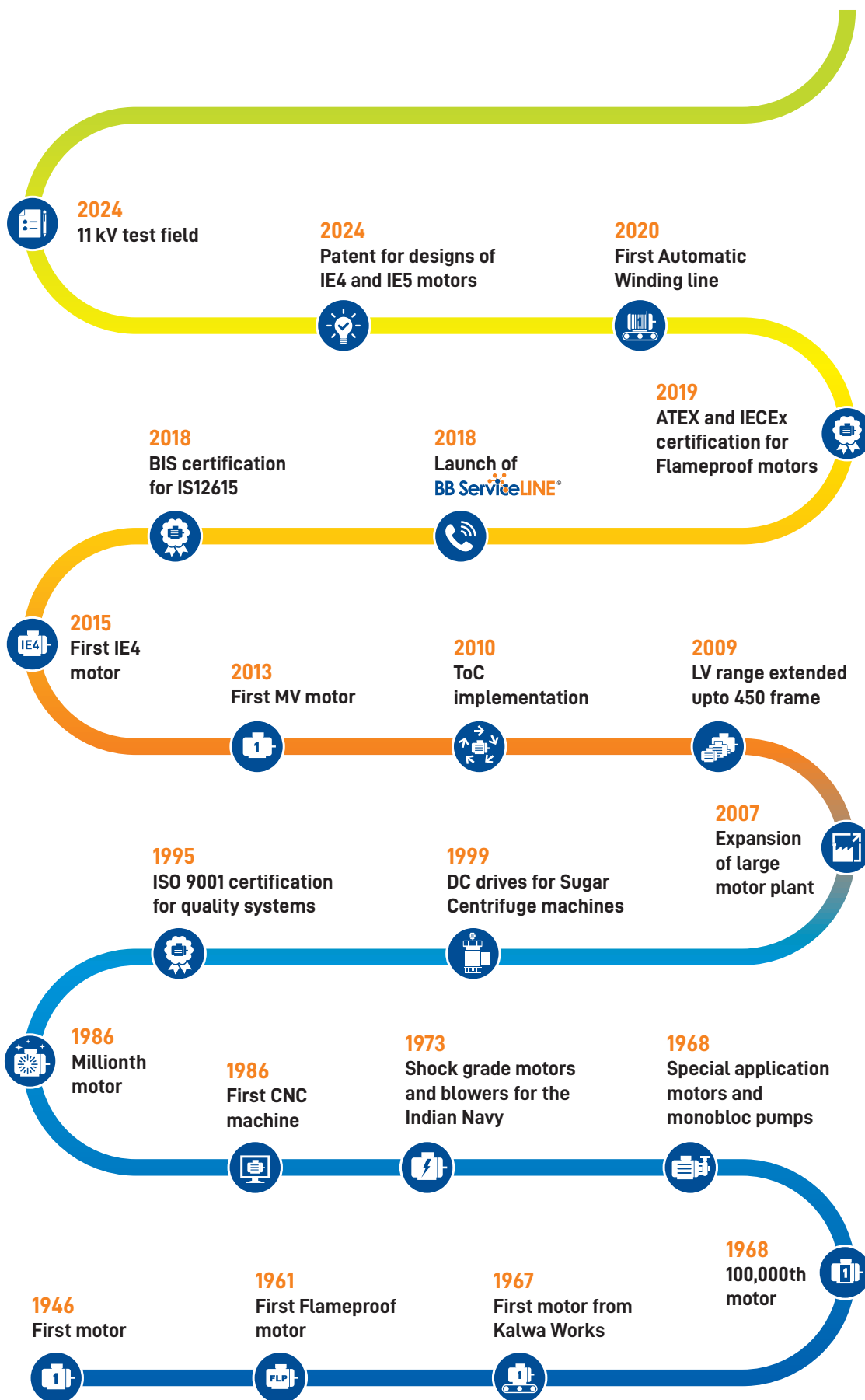
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Safe | Reliable | Long-lasting



JANUARY 2025

## BHARAT BIJLEE MOTORS: MILESTONES



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## LV HAZARDOUS AREA MOTORS: An Introduction

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

Motors are also used in applications in hazardous areas, thus creating a need for a very specific design suitable to such conditions. Hazardous areas are defined as those where explosive atmosphere is present, or is expected to be present, in quantities which merit the requirement of special precautions. The

construction, installation and use of equipment is designed specifically to suit the hazardous environment. The decision as to whether an area is hazardous as per the relevant regulations and specifications, rests entirely with the user, or in case of doubt, with the competent and authorized inspecting authority. IS 5572 classifies hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present.

Zone	Classification of area as per IS 5572	Selection of electrical equipment as per IS 16724
Zone '0'	An area in which hazardous atmosphere is continuously present.	Generally, use of electrical equipment is to be avoided. But when this is not practicable, intrinsically safe or pressurized electrical equipment to be used.
Zone '1'	Hazardous atmosphere is likely to be present under normal operating conditions.	For this area, electrical equipment used, must be in flame proof enclosure type Ex 'd' conforming to IS/IEC 60079-1.
Zone '2'	In this area, hazardous atmosphere is likely to be present only under abnormal operating conditions and for a short period.	Apparatus with type of protection Ex eb in accordance with IS/IEC 60079-7 may be used without any special enclosure. Apparatus having type of protection Ex ec in accordance with IS/IEC 60079-7 are also permitted for use.

### Why Bharat Bijlee?

Bharat Bijlee offers a wide range of hazardous area motors.



Increased Safety Ex ec and Flame Proof Ex 'd' motors across different efficiency levels



ATEX / IECEx certification for Flame Proof Ex 'd' motors



Flame Proof Ex 'd' motors for Zone '1', '21' & '22' & Increased Safety Ex ec motors for Zone '2' & '22'



Licensed by BIS as per statutory requirement



Flame Proof Ex 'd' motors suited for temperature class T4, T5 & T6 and increased Safety Ex ec motors for temperature class T3



Motors with certified test reports from PESO approved test laboratory



PESO certification

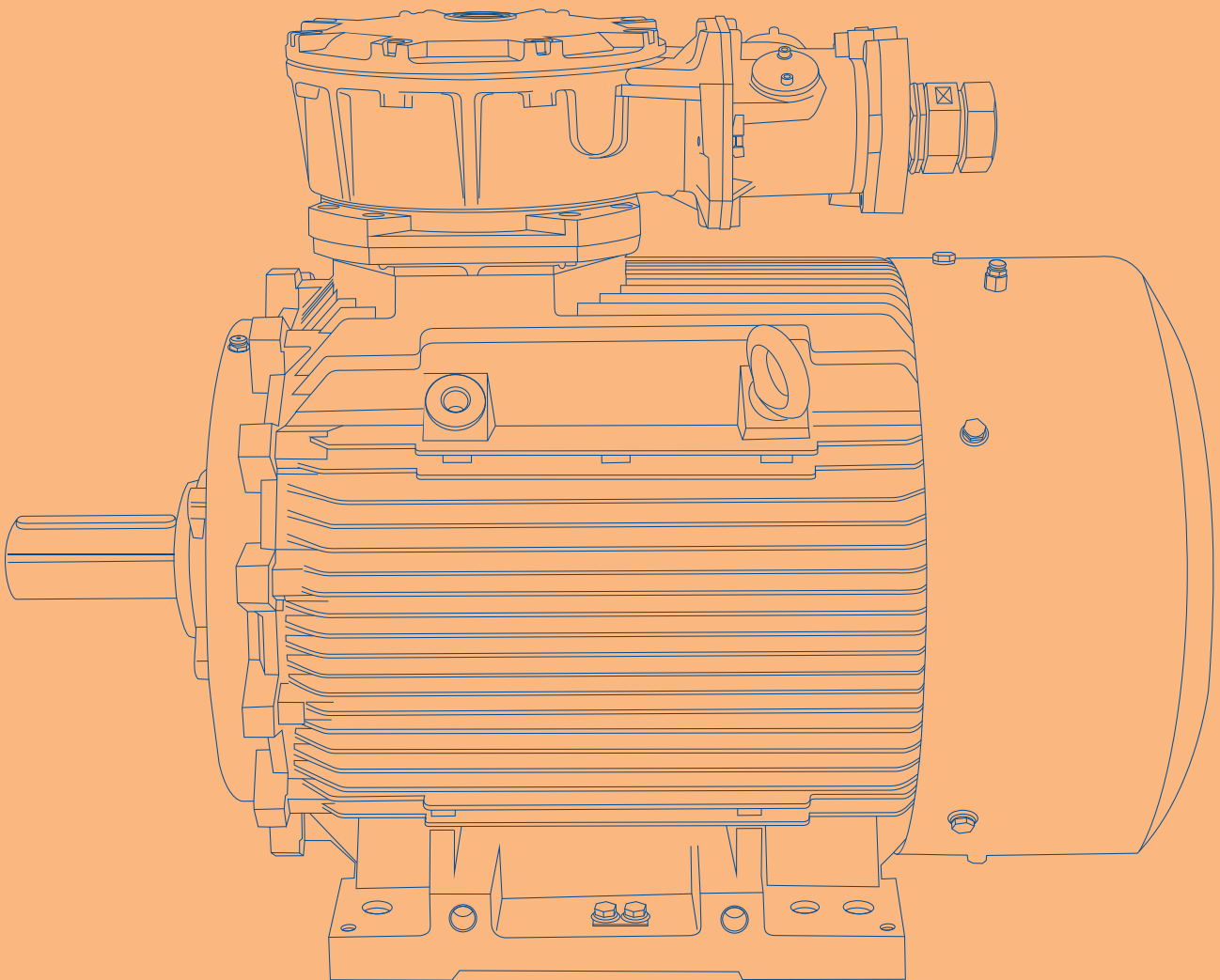


Accessories and customizations as per customers' requirements adhering to necessary statutory requirements

Bharat Bijlee's motors for hazardous area have been widely used across various sectors such as Oil & Gas, Pharmaceutical, Mining, Chemical & Power and have been successfully working on all possible applications over the years. These motors have been trusted for critical applications that require adherence to

extremely stringent norms. Our annual production capacity is backed by an indigenous state-of-the-art manufacturing facility. With rigorous quality checks at various stages in our factory, we deliver some of the finest and most reliable motors in the industry.

## IE2 FLAME PROOF MOTORS: Type Ex 'd'



## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### A. Technical Information

#### A.1 Industrial Applications



Coal  
Mines



Petro  
Chemicals  
& Chemicals



Oil Mines  
& Rigs



Fertilizers



Solvent  
Extraction  
Plant



Paints &  
Varnish  
Industry



LPG  
Bottling  
Plants



Agro  
Chemicals



Drugs &  
Pharmaceuticals



General  
Industry

#### A.2 Reference Standards

IS/IEC 60079-0	Electrical apparatus for explosive gas atmosphere-Part 0 General Requirements
IS/IEC 60079-1	Electrical apparatus for explosive gas atmosphere-equipment protection by Flame Proof Enclosures "d"
IS 5572	Classification of hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 16724	Explosive atmospheres - Electrical Installations Design, Selection and Erection
IS 15999 : Part 1	Rotating Electrical Machines - Part 1 : Rating and Performance
IS 12615	Line Operated Three Phase A.C. Motors (IE CODE) "Efficiency Classes and Performance Specification"
IS 4029	Guide for testing Three Phase Induction Motors (For Standard TEFC SCR Motors)
IS 4889	Methods of determination of efficiency of Rotating Electric Machines (For Standard TEFC SCR Motors)
IS 15999 - (Part 2/Sec 1)	Standard methods for determining losses and efficiency from tests (For IE Series Motors)
IS/IEC 60034-5	Degree of protection provided by the integral design of Rotating Electrical Machines (IP code Classification)
IS 6362/IEC 60034-6	Designation of method of cooling for Rotating Electrical Machines/method of cooling (IC code)
IS 12065	Permissible limits of noise level for Rotating Electrical Machines
IS 12075	Mechanical Vibration of Rotating Electrical Machines
IS 8223	Dimension and Output rating of Rotating Electrical Machines
IS 900	Code of practice for installation and maintenance of Induction Motors
IS 1231	Dimensions of Foot Mounted AC Induction Motors
IS 2223	Dimensions of Flange Mounted AC Induction Motors

#### A.3 Statutory Approvals and Licenses

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

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

## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### A.4 Temperature Class

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

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

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

#### Temperature Class of Bharat Bijlee Motors

Frame Size		Temperature Class
IEC Frame Size	BB Frame Size	
80	MJ 80	T6
90	MJ 90	T5
100	MJ 100	T5
112	MJ 112	T5
132	MJ 132	T5
160	MJ 160	T5
180	MJ 180	T5
200	MJ 200	T5
225	MJ 225	T5
250	MJ 250	T4
280	MJ 280	T4
315	MJ 315	T4
355	MJ 355	T4

#### Classification of Hazardous Gases

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

Gas Group	Gas or Vapour	Temperature Class
I	Methane (firedamp)	T1
	Industrial Methane*	T1
IIA	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
Ethylene		T2
Diethyl ether		T4
Ethylene oxide		T2
IIC	Coke-oven Gas	T1
	Hydrogen	T1
	Acetylene	T1

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

## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### A.5 Electrical Features

#### Standard Operating Conditions

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

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

##### I. Variation in Ambient

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

##### II. Variation in Altitude

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

#### Method of Starting

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

#### Starting Current Measurement

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

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

kW Range	Measurement at % of Voltage to Rated Voltage
0.12 kW to 90 kW	70 %
90 kW to 200 kW	60 %
200 kW to 315 kW	35 %

#### Duty, Starting Time and Number of Consecutive Starts

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

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

The enquiry should be accompanied with following information:

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

#### 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.

## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### A.6 Mechanical Features

#### Enclosure and Cooling

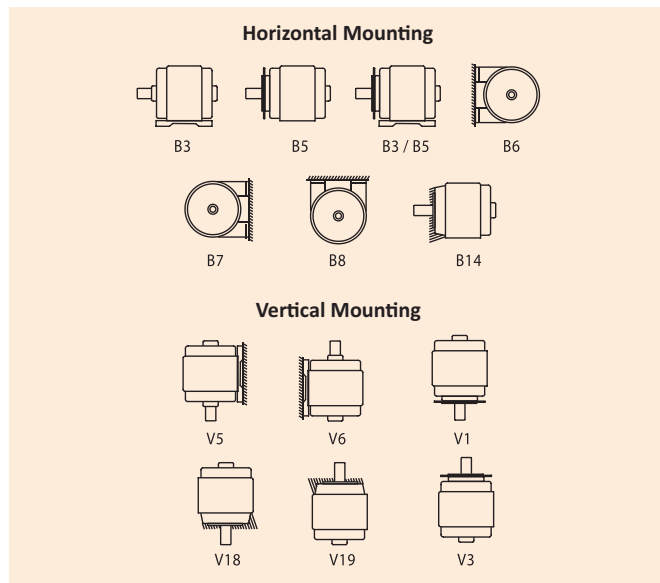
These motors are so designed that the frame temperature will remain below the ignition temperature of gas-air mixture involved. The frame, end shields, terminals boxes and bearing covers of all motors are made of grey cast iron. All cast iron parts forming flame proof enclosures are subjected to hydraulic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

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

#### Degree of Protection

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

#### Mounting



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

#### Direction of Rotation

All motors are suitable for bi-directional rotation.

#### Balancing and Vibration

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

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

#### Lifting Arrangement

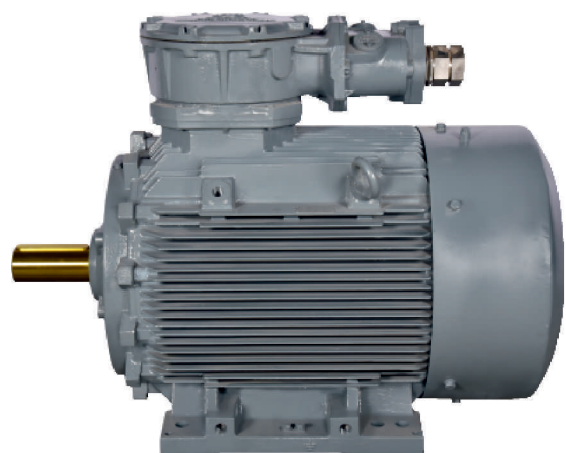
All motors are provided with lifting hooks. When two or more hooks are provided, all hooks to be used simultaneously for lifting the motor.

#### Paint

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

#### Name Plate

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



## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### Bearing and Terminal Box Details

Frame Size	Bearing Nos. C3 Clearance		Terminal Box Type	Terminals		Cable Entries No & Size **	Maximum Conductor Cross Sectional Area (mm <sup>2</sup> )
	D.E.	N.D.E.		Nos	Size		
80	6204 Z2	6204 Z2	MJ80	3	M5	1 x M20	1R X 3CX4
90	6205 Z2	6205 Z2	MJ132	3/6*	M6	1 x M25	1RX3CX16
100	6206 Z2	6206 Z2					
112	6206 Z2	6206 Z2					
132	6208 Z2	6208 Z2					
160	6209 Z2	6209 Z2	MJ200	6	M8	2 x M25	2RX3CX35
180	6310 Z2	6310 Z2					
200	6212 Z2	6212 Z2					
225	6213	6213	MJ280	6	M12	2 x M40	2RX3CX95
250	6215	6215					
280 (2 Pole)	6316	6316					
280 (4, 6, 8 Pole)	6317	6316					
315S/M & L	6319	6319	MJ315	6	M16	2 x M50	2RX3CX185
355L (2 Pole)	6319	6319	Mj355	6	M16	2 x M50	2RX3CX185
355L (4, 6, 8 Pole)	6322	6322					

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

\*\* Cable entries other than those mentioned in the table can be offered subject to availability of statutory approval.

#### Note

- 1) L10 bearing life is 50,000 hours for directly coupled loads through flexible couplings only.
- 2) Standard terminal box location is TOP.
- 3) Sealed bearing (Z2) is filled with Lithium Soap based grease. Open bearings are filled with SKF LGMT3/ Unirex N3- ESSO grease.

### Re-lubrication Interval

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

### Cable Entries

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



## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### Shipping Dimension

Frame	Packing Box Dimensions (mm)			Motor Gross Weight (kg)
	Length	Width	Height	
80	440	440	310	34
90L	510	470	340	51
100L	575	575	360	66
112M	640	420	560	73
132M	610	330	485	118
160M/L	790	440	540	216
180L	890	490	635	267
200L	940	540	690	408
225S/M	920	540	790	534
250M	1100	660	820	696
280S/M	1220	660	890	860
315S/M	1300	870	1000	1120
315L	1500	870	1003	1625
355L	1950	1150	1600	3175

### Special Features

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

### Special Maintenance Care During Operation

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

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

## IE2 FLAME PROOF MOTORS: Type Ex 'd'

### B. General Specifications: Standard and Optional Features

<b>Range</b> <ul style="list-style-type: none"> <li>• <b>Series:</b> 3 Phase Squirrel Cage Induction, Flame Proof Motors</li> <li>• <b>Polarity:</b> 2, 4, 6, 8</li> </ul>	Type	Frame	kW
	FLP Motors: Efficiency Values Complying to IE2 Class of IS 12615	80 to 355	0.37 to 315
	FLP Motors: Efficiency Values Complying to IE3 Class of IS 12615	80 to 355	0.37 to 315

Performance data and drawings of respective ratings are included ahead.  
IE3 FLP: For further details, kindly refer to our nearest sales office.

Voltage: 415V	220 to 690V
Frequency: 50 Hz	60 Hz
IP55	IP56, IP65, IP66
B3 Mounting	B5, B35, V1
Ambient: 45°C	Any other on request
Duty: S1	S3 / S4 Duty: on request
TB Position: Top	TB Position: RHS from 112 to 315frame LHS from 160 to 315frame 355 Frame : Top only
Cast Iron Construction: For all frames	
Shaft Material: EN8	EN24, EN57
Insulation: Class F	Insulation: Class H
IC411: Totally Enclosed Fan Cooled	
Sealed Bearing: upto 200 Frame Online Greasing Arrangement: 225 Frame and above	Online Greasing Arrangement: 180 to 200 Frame
Paint Shade: AAP 632	AAP Epoxy based RAL grade or Epoxy based IS:5 grade
Fan Cover: Mild Steel	
Gelcoat on Winding: For all frames	
	Space Heater: 90 Frame and above
Motor suitable for grid supply	<b>Motors with Inverter Duty Suitability, offered with:</b> 1. Combined testing for temperature class certification; test facility available 2. Motor fitted with PTC thermistor
Packing: Corrugated Boxes: Upto 100 Frame Wooden Packing Boxes: 112 Frame and above	Seaworthy/Export Packing Case
For standard bearings, kindly refer to the bearing chart	Insulated Bearing: 132 Frame and above (hybrid bearing till 225 Frame) Cylindrical Roller Bearing on DE Side: 160 Frame and above

#### Our other optional features

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

#### Note

- 1) Kindly confirm application wise requirement of cable sealing box and auxiliary terminal box with our nearest sales office.
- 2) For any other non standard feature, kindly contact our nearest sales office.
- 3) For enquiries of ATEX / IECEx certified motors, motors suitable for Zone 21/22 kindly contact our nearest sales office.

## FLAME PROOF MOTORS: Type Ex 'd'

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

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

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

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

Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output				With DOL starting				Net Weight B3 constr.				
kW	HP			B3 construction	Rated Speed RPM	Rated Current Amps.	Rated Torque kg-m	Power Factor	% Efficiency			Starting Current Ratio	Starting Torque Ratio	Pullout Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>		
							FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.5	80	MJ80	2J0802A300000	2880	0.90	0.13	0.82	0.74	0.6	69.5	67.5	6	2.7	3	0.0026	31
*0.55	0.75	80	MJ80	2J0802B300000	2860	1.26	0.19	0.82	0.74	0.6	74.1	72	6	2.7	3	0.0026	31
0.75	1	80	MJ80	2J08021300000	2840	1.66	0.26	0.81	0.73	0.6	77.4	76.4	5	2.2	2.5	0.0026	31
1.1	1.5	80	MJ80	2J08023300000	2855	2.37	0.38	0.81	0.75	0.61	79.6	79.6	5.5	2.7	3	0.0034	32
*1.5	2	90L	MJ90	2J09L24300000	2835	3.09	0.52	0.83	0.77	0.66	81.3	80	6	2.6	2.8	0.0053	48
2.2	3	90L	MJ90	2J09L27300000	2835	4.33	0.76	0.85	0.8	0.7	83.2	82.5	6	2.8	3	0.0066	45
3.7	5	100L	MJ100	2J10L23300000	2890	6.84	1.25	0.88	0.83	0.73	85.5	83	6.5	2.8	3.1	0.0142	62
5.5	7.5	132S	MJ132	2J13S2G300000	2930	9.88	1.83	0.89	0.86	0.79	87	84.5	6.5	2.5	3	0.082	89
7.5	10	132M	MJ132	2J13S2N300000	2935	13.2	2.49	0.9	0.87	0.82	88.1	85	6.5	2.6	3	0.098	97
9.3	12.5	160M	MJ160	2J16M23300000	2940	16.5	3.08	0.88	0.86	0.81	88.9	86	6	2	2.5	0.142	147
11	15	160M	MJ160	2J16M25300000	2940	19.5	3.64	0.88	0.85	0.79	89.4	87	6.5	2.1	2.6	0.160	153
15	20	160M	MJ160	2J16M26300000	2940	26.3	4.97	0.88	0.87	0.82	90.3	88	6.5	2	2.5	0.191	164
18.5	25	160L	MJ160	2J16L29300000	2940	31.5	6.13	0.9	0.89	0.86	90.9	89	6.5	2	2.5	0.244	180
*22	30	180L	MJ180	2J18L23300000	2940	38.5	7.29	0.87	0.84	0.78	91.3	90	6.5	2.4	2.7	0.325	221
30	40	200L	MJ200	2J20L2A300000	2950	51.6	9.91	0.88	0.86	0.80	92	90.5	6.5	2.6	3	0.524	300
37	50	200L	MJ200	2J20L25300000	2955	64.0	12.2	0.87	0.84	0.76	92.5	91	7	2.2	2.5	0.64	320
45	60	225M	MJ225	2J22M25300000	2965	77.5	14.8	0.87	0.85	0.8	92.9	91.5	6.5	2.3	2.4	1.04	449
55	75	250M	MJ250	2J25M23300000	2970	92.2	18.0	0.89	0.87	0.81	93.2	91	6.5	2.3	2.7	1.45	560
75	100	280M	MJ280	2J28M23300000	2975	122	24.6	0.91	0.89	0.86	93.8	92	6.5	2	2.5	3.54	740
90	120	280M	MJ280	2J28M25300000	2975	146	29.5	0.91	0.89	0.86	94.1	92.5	6.5	2	2.5	4.01	765
110	150	315S	MJ315S/M	2J31S23300000	2982	180	35.9	0.9	0.86	0.8	94.3	91.5	7	2.2	2.5	5.3	1037
125	170	315M	MJ315S/M	2J31M2A300000	2982	207	40.8	0.89	0.85	0.78	94.5	91.5	7	2.2	2.6	5.3	1037
132	180	315M	MJ315S/M	2J31M23300000	2982	216	43.1	0.9	0.86	0.8	94.6	91.3	7	2	2.5	5.3	1037
150	200	315L	MJ315L	2J31L2A300000	2982	248	49.0	0.89	0.84	0.78	94.7	92.2	7	2	2.5	6.6	1240
160	215	315L	MJ315L	2J31L25300000	2985	261	52.2	0.9	0.86	0.8	94.8	93	7	2.4	2.5	6.6	1240
180	240	315L	MJ315L	2J31L2B300000	2982	300	58.8	0.88	0.82	0.75	94.9	93	7	2	2.5	7.6	1363
200	270	315L	MJ315LX	2J31L29300000	2982	329	65.3	0.89	0.87	0.82	95.0	94.5	7.0	2.2	2.5	8.1	1441
225	300	355L	MJ355	2J35L2M300000	2985	366	73.4	0.90	0.88	0.84	95.0	93.2	7.0	1.8	2.5	14.5	2502
250	335	355L	MJ355	2J35L22300000	2987	407	81.5	0.90	0.88	0.84	95.0	93.4	7.0	2.0	2.6	14.5	2502
280	375	355L	MJ355	2J35L23300000	2988	456	91.3	0.90	0.88	0.84	95.0	93.5	7.0	1.8	2.6	16.2	2587

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

**FLAME PROOF MOTORS: Type Ex 'd'**



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

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

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

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

Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output				With DOL starting				Net Weight B3 constr.						
kW	HP			B3 construction	Rated Speed RPM	Rated Current Amps.	Rated Torque kg-m	Power Factor	% Efficiency	Starting Current Ratio	Starting Torque Ratio	Pullout Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>	kg					
*0.37	0.5	80	MJ80	2J08041300000	1415	0.96	0.25	FL	72.7	0.55	0.68	0.74	72.7	67.7	5	2.4	2.6	0.0061	31
0.55	0.75	80	MJ80	2J08043300000	1420	1.34	0.38	FL	77.1	0.5	0.64	0.74	77.1	72	5	2.8	3	0.0066	32
0.75	1	80	MJ80	2J08045300000	1410	1.70	0.52	FL	79.6	0.55	0.67	0.77	79.6	76	5	2.8	3	0.0073	32
*1.1	1.5	90L	MJ90	2J09L423000000	1425	2.41	0.75	FL	81.4	0.55	0.69	0.78	81.4	79	5.5	2.3	2.7	0.0106	40
1.5	2	90L	MJ90	2J09L473000000	1425	3.23	1.03	FL	82.8	0.68	0.78	0.83	82.8	80.5	5.5	2.5	2.8	0.013	43
2.2	3	100L	MJ100	2J10L473000000	1425	4.37	1.50	FL	84.3	0.6	0.74	0.83	84.3	82.5	6	2.6	3	0.0211	62
3.7	5	112M	MJ112	2J11M473000000	1445	7.36	2.49	FL	86.3	0.64	0.76	0.81	86.3	85	6	2.6	3	0.06	75
5.5	7.5	132S	MJ132	2J13S4K3000000	1450	10.40	3.69	FL	87.7	0.67	0.81	0.84	87.7	86	6.5	2.2	2.8	0.0993	90
7.5	10	132M	MJ132	2J13M4T3000000	1450	14.00	5.04	FL	88.7	0.65	0.76	0.84	88.7	87	6.5	2.3	2.8	0.1248	100
9.3	12.5	160M	MJ160	2J16M4C3000000	1465	17.60	6.18	FL	89.4	0.68	0.76	0.82	89.4	87	6.5	2.4	2.7	0.187	148
11	15	160M	MJ160	2J16M4K3000000	1465	20.50	7.31	FL	89.8	0.68	0.78	0.83	89.8	88.5	6.5	2.4	2.7	0.224	157
15	20	160L	MJ160	2J16L4T3000000	1465	27.80	9.97	FL	90.6	0.68	0.78	0.83	90.6	89.5	6.5	2.4	2.7	0.293	175
*18.5	25	180L	MJ180	2J18L473000000	1465	33.60	12.3	FL	91.2	0.7	0.8	0.84	91.2	90.5	6	2.6	2.9	0.467	218
22	30	180L	MJ180	2J18L483000000	1460	39.30	14.6	FL	91.6	0.72	0.82	0.85	91.6	91	6.5	2.6	2.9	0.512	226
30	40	200L	MJ200	2J20L453000000	1470	54.50	19.9	FL	92.3	0.68	0.79	0.83	92.3	90.5	6.5	2.4	2.6	1.07	311
37	50	225S	MJ225	2J22S433000000	1470	65.30	24.5	FL	92.7	0.75	0.82	0.85	92.7	91	6	2.3	2.4	1.41	386
45	60	225M	MJ225	2J22M453000000	1470	79.10	29.8	FL	93.1	0.74	0.82	0.85	93.1	91	6.5	2.4	2.5	1.67	414
55	75	250M	MJ250	2J25M433000000	1480	96.30	36.2	FL	93.5	0.74	0.82	0.85	93.5	92.5	6.5	2.5	2.7	2.95	590
75	100	280S	MJ280	2J28S423000000	1485	129	49.2	FL	94	0.76	0.83	0.86	94	93	6.5	2.4	2.6	6	720
90	120	280M	MJ280	2J28M453000000	1485	155	59.0	FL	94.2	0.76	0.82	0.86	94.2	93.5	6.5	2.3	2.8	6.87	775
110	150	315S	MJ315S/M	2J31S413000000	1488	191	72.0	FL	94.5	0.72	0.82	0.85	94.5	93.2	6.5	2.5	3.0	10.1	957
125	170	315M	MJ315S/M	2J31M4A3000000	1488	216	81.8	FL	94.7	0.73	0.8	0.85	94.7	93.5	6.8	2.25	2.75	11.6	1028
132	180	315M	MJ315S/M	2J31M433000000	1488	225	86.4	FL	94.7	0.76	0.83	0.86	94.7	94.0	6.5	2.3	2.8	11.6	1028
150	200	315L	MJ315L	2J31L4A3000000	1487	259	98.3	FL	94.9	0.76	0.83	0.85	94.9	94	6.8	2.5	3.0	14.6	1210
160	215	315L	MJ315L	2J31L453000000	1487	273	105	FL	94.9	0.78	0.84	0.86	94.9	94.0	6.5	2.4	3.0	14.6	1210
180	240	315L	MJ315L	2J31L463000000	1488	307	118	FL	95	0.78	0.84	0.86	95	94.5	6.5	2.4	3.0	16.1	1281
200	270	315L	MJ315LX	2J31L473000000	1489	336	131	FL	95.1	0.78	0.84	0.87	95.1	94.0	6.5	2.4	3.0	18.3	1403
225	300	355L	MJ355	2J35L4B3000000	1492	374	147	FL	95.1	0.85	0.85	0.88	95.1	94	6.5	2.2	2.5	22.6	2437
250	335	355L	MJ355	2J35L413000000	1488	416	164	FL	95.1	0.75	0.85	0.88	95.1	94.0	6.5	2.2	2.5	22.6	2437
280	375	355L	MJ355	2J35L433000000	1488	465	183	FL	95.1	0.75	0.85	0.88	95.1	94	6.5	2.2	2.5	27.9	2627

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

## FLAME PROOF MOTORS: Type Ex 'd'

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

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

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

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

Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output				With DOL starting				Net Weight B3 constr.				
kW	HP			B3 construction	Rated Speed RPM	Rated Current Amps.	Rated Torque kg-m	Power Factor	% Efficiency	Starting Current Ratio	Starting Torque Ratio	Pullout Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>				
							FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.5	80	MJ80	2J080613000000	910	1.06	0.40	0.72	0.62	0.5	67.6	63	3	2	2.2	0.0054	29
0.55	0.75	80	MJ80	2J080633000000	910	1.45	0.59	0.72	0.63	0.5	73.1	70	3.5	2.1	2.3	0.0078	31
*0.75	1	90L	MJ90	2J09L6330000000	920	1.90	0.79	0.72	0.61	0.5	75.9	72.3	4	2	2.5	0.0105	40
1.1	1.5	90L	MJ90	2J09L6530000000	930	2.72	1.15	0.72	0.61	0.5	78.1	74	4	2	2.6	0.016	50
1.5	2	100L	MJ100	2J10L6330000000	935	3.63	1.56	0.72	0.62	0.52	79.8	76	4.5	2	2.5	0.0253	60
2.2	3	112M	MJ112	2J11M6530000000	955	5.00	2.24	0.75	0.65	0.56	81.8	79.8	5	2.1	2.5	0.065	71
3.7	5	132S	MJ132	2J13S6G30000000	960	7.83	3.75	0.78	0.73	0.6	84.3	83.5	5.5	2	2.5	0.1093	104
5.5	7.5	132M	MJ132	2J13M6T30000000	960	11.60	5.58	0.77	0.71	0.6	86	85	5.5	2	2.5	0.1518	125
7.5	10	160M	MJ160	2J16M6330000000	960	14.96	7.61	0.8	0.74	0.64	87.2	85.2	5.5	2	2.5	0.276	149
9.3	12.5	160L	MJ160	2J16L6630000000	960	18.38	9.44	0.8	0.74	0.64	88	86.7	5.5	2.1	2.5	0.34	160
11	15	160L	MJ160	2J16L6730000000	965	21.57	11.10	0.8	0.77	0.66	88.7	87	6	2	2.5	0.4	169
15	20	180L	MJ180	2J18L6330000000	975	28.40	15.00	0.82	0.78	0.68	89.7	89	5.5	2.3	2.5	0.707	229
18.5	25	200L	MJ200	2J20L6330000000	975	34.70	18.50	0.82	0.77	0.69	90.4	89.5	6	2.6	2.7	1.1	282
22	30	200L	MJ200	2J20L6530000000	975	41.10	22.00	0.82	0.77	0.69	90.9	89.5	6	2.6	2.7	1.3	300
30	40	225M	MJ225	2J22M6430000000	980	52.30	29.80	0.87	0.84	0.76	91.7	90	6.5	2.5	2.6	2.41	430
37	50	250M	MJ250	2J25M6330000000	980	63.40	36.80	0.88	0.85	0.78	92.2	91.8	6.5	2.5	2.7	3.25	573
45	60	280S	MJ280	2J28S6130000000	983	80.40	44.60	0.84	0.81	0.73	92.7	92.6	6	2.2	2.5	4.68	630
55	75	280M	MJ280	2J28M6330000000	983	96.70	54.50	0.85	0.82	0.75	93.1	92.8	6	2.2	2.5	6.18	686
75	100	315S	MJ315S/M	2J31S6130000000	988	133	73.9	0.84	0.80	0.72	93.7	93.2	6.0	2.2	2.5	11.4	919
90	120	315M	MJ315S/M	2J31M6330000000	990	159	88.6	0.84	0.80	0.72	94.0	93.5	6.0	2.2	2.5	12.6	975
110	150	315M	MJ315S/M	2J31M6530000000	990	193	108	0.84	0.79	0.70	94.3	93.5	6.0	2.3	2.5	15.9	1099
125	170	315L	MJ315L	2J31L6A30000000	990	222	123	0.83	0.79	0.70	94.5	93.5	6.5	2.2	2.5	18.9	1261
132	180	315L	MJ315L	2J31L6730000000	990	231	130	0.84	0.80	0.72	94.6	94.0	6.0	2.1	2.4	18.9	1261
150	200	315L	MJ315L	2J31L6B30000000	993	265	147	0.83	0.79	0.70	94.7	94.4	6.0	2.2	2.5	21.9	1377
160	215	315L	MJ315L	2J31L6930000000	993	280	157	0.84	0.80	0.72	94.8	94.5	6.0	2.2	2.5	21.9	1377
180	240	355L	MJ355	2J35L6A30000000	990	322	177	0.82	0.77	0.65	94.9	93.3	6.0	2.0	2.5	28.3	2437
200	270	355L	MJ355	2J35L6130000000	990	349	197	0.84	0.80	0.70	95.0	93.5	6.0	2.0	2.5	28.3	2437
250	335	355L	MJ355	2J35L6330000000	990	436	246	0.84	0.80	0.70	95.0	93.4	6.0	2.0	2.5	35.1	2612

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

## FLAME PROOF MOTORS: Type Ex 'd'

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

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

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

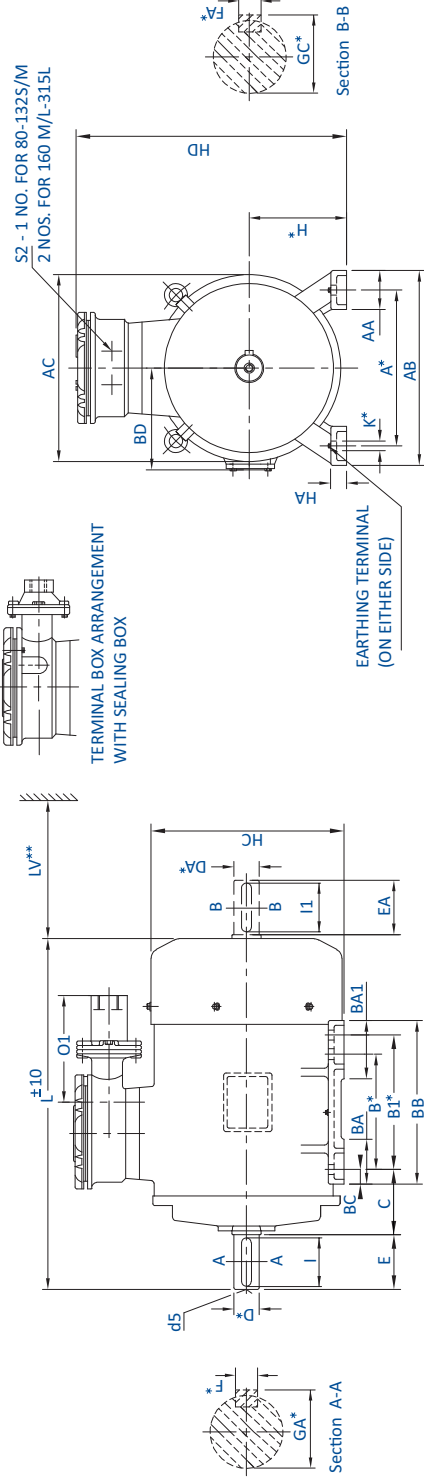
Insulation: Class F  
 Temperature Rise: Class B  
 Protection: IP55

Rated Output		Frame Size IEC	Frame Size BBL	Type Reference	Operating characteristics at rated output				With DOL starting				Net Weight					
kW	HP	80	MJ180	B3 construction	Rated Speed RPM	Rated Current Amps.	Rated Torque kg-m	Power Factor			Starting Current Ratio	Starting Torque Ratio	Pullout Torque Ratio	Rotor GD <sup>2</sup> kgm <sup>2</sup>				
								FL	3/4L	1/2L					FL	3/4L	1/2L	% Efficiency
*0.18	0.25	80	MJ180	2J08081300000	675	0.91	0.26	0.6	0.52	0.42	0.42	45.9	40	3.0	1.8	2.2	0.0054	31
*0.25	0.33	80	MJ180	2J08083300000	675	1.11	0.36	0.62	0.55	0.45	0.45	50.6	45	3.0	1.8	2.2	0.0078	32
*0.37	0.5	90L	MJ190	2J09183300000	695	1.30	0.52	0.7	0.6	0.5	0.5	56.1	53	2.8	1.7	2.1	0.011	38
0.55	0.75	90L	MJ190	2J09185300000	680	1.82	0.79	0.68	0.6	0.46	0.46	61.7	56	2.8	1.7	2.1	0.013	39
0.75	1	100L	MJ100	2J10181300000	685	2.25	1.07	0.7	0.61	0.5	0.5	66.2	66.2	3.0	1.9	2.3	0.022	50
1.1	1.5	100L	MJ100	2J10183300000	680	3.09	1.58	0.7	0.61	0.5	0.5	70.8	67	3.0	1.9	2.3	0.027	52
1.5	2	112M	MJ112	2J11181300000	695	4.02	2.10	0.7	0.61	0.49	0.49	74.1	71	3.8	1.7	2.2	0.05	58
2.2	3	132S	MJ132	2J13583300000	705	5.33	3.04	0.74	0.66	0.55	0.55	77.6	76	3.8	1.7	2.2	0.091	82
3.7	5	160M	MJ160	2J16181300000	715	8.55	5.04	0.74	0.68	0.55	0.55	81.4	80	4.4	1.7	2.2	0.202	133
5.5	7.5	160M	MJ160	2J16183300000	715	12.17	7.49	0.75	0.68	0.55	0.55	83.8	82.5	4.4	1.7	2.2	0.291	148
7.5	10	160L	MJ160	2J16186300000	715	16.31	10.2	0.75	0.7	0.58	0.58	85.3	84	4.4	1.8	2.3	0.376	161
*9.3	12.5	180L	MJ180	2J18183300000	725	19.50	12.5	0.77	0.74	0.64	0.64	86.3	85	5.0	1.7	2.1	0.705	210
11	15	180L	MJ180	2J18186300000	725	23.80	14.8	0.74	0.68	0.6	0.6	86.9	86	5.0	1.8	2.2	0.716	213
15	20	200L	MJ200	2J20184300000	725	28.90	20.2	0.82	0.77	0.65	0.65	88	87	5.5	2.3	2.5	1.36	310
18.5	25	225S	MJ225	2J22582300000	725	35.40	24.9	0.82	0.8	0.72	0.72	88.6	87.6	5.5	2.0	2.2	2.11	419
22	30	225M	MJ225	2J22583300000	725	41.90	29.6	0.82	0.8	0.72	0.72	89.1	88.1	5.5	2.0	2.2	2.41	430
30	40	250M	MJ250	2J25181300000	730	56.70	40.0	0.82	0.8	0.72	0.72	89.8	89	5.5	2.0	2.2	3.25	570
37	50	280S	MJ280	2J28582300000	730	73.10	49.4	0.78	0.74	0.65	0.65	90.3	90	5.5	2.0	2.2	6.18	725
45	60	280M	MJ280	2J28183300000	738	90.80	59.4	0.76	0.72	0.6	0.6	90.7	90.5	5.5	2.0	2.2	7.25	775
55	75	315S	MJ315S/M	2J31581300000	740	112	72.4	0.75	0.70	0.60	0.60	91.0	90.5	5.5	1.8	2.0	11.4	920
75	100	315M	MJ315S/M	2J31183300000	739	154	98.8	0.74	0.7	0.62	0.62	91.6	91	5.5	1.8	2.0	12.6	971
90	120	315M	MJ315S/M	2J31185300000	741	179	118	0.76	0.72	0.64	0.64	91.9	91.5	5.5	1.8	2.0	15.9	1096
110	150	315L	MJ315L	2J31187300000	742	224	144	0.74	0.69	0.58	0.58	92.3	92.0	5.5	2.0	2.2	18.9	1263
125	170	315L	MJ315L	2J3118A300000	742	247	164	0.76	0.70	0.6	0.6	92.5	92.0	5.5	2.0	2.2	22.9	1415
132	180	315L	MJ315L	2J31189300000	742	261	173	0.76	0.72	0.62	0.62	92.6	92.0	5.5	2.0	2.2	22.9	1415
160	215	355L	MJ355	2J35181300000	740	307	211	0.78	0.70	0.6	0.6	93.0	92.0	5.5	1.8	2.2	28.3	2437
180	240	355L	MJ355	2J3518A300000	742	344	236	0.78	0.70	0.60	0.60	93.30	92.50	5.5	1.8	2.2	35.1000	2612

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

# FLAME PROOF MOTORS: Type Ex 'd'

## D. Dimensional Drawing: Efficiency Values Complying to IE2 Efficiency Class of IS 12615 Foot Mounted IMB3/IM1001 Motors



IEC Fr. Size	BBL Fr. Size	Pole	FIXING													GENERAL										TERMINAL BOX						SHAFT					
			A*	B*	B1*	C	H*	K*	K**	AB	BB	AA	BA	BA1	BC	HA	HC	HD	L	AC	LV**	BD	O	O1	S2	DA*	E	EA	FA*	GA*	I	d5					
80	MJ80	2, 4, 6 & 8	125	100	—	50	80	10	153	126	32	36	—	16	10	162	296	330	164	30	—	214	135	M20X1.5P	19	40	6	21.5	35	M6							
90L	MJ90	2, 4, 6 & 8	140	125	—	56	90	10	180	160	50	40	—	16	13	177	336	382	174	35	—	217	141	M25X1.5P	24	50	8	27	45	M8							
100L	MJ100	2, 4, 6 & 8	160	140	—	63	100	12	200	176	54	45	—	21	14	198	358	435	195	40	—	207	131	M25X1.5P	28	60	8	31	55	M10							
112M	MJ112	2, 4, 6 & 8	190	140	—	70	112	12	230	176	50	55	—	21	15	222	374	456	220	45	—	200	124	M25X1.5P	28	60	8	31	55	M10							
132S/M	MJ132	2, 4, 6 & 8	216	140	178	89	132	12	256	218	50	53	77	23	17	262	408	551	260	50	—	175	100	M25X1.5P	38	80	10	41	70	M12							
160M/L	MJ160	4, 6 & 8	254	210	254	108	160	15	314	294	60	70	115	23	20	317	472	704	314	60	—	252	151	M25X1.5P	42	110	12	45	105	M16							
180L	MJ180	2, 4, 6 & 8	279	279	—	121	180	15	339	339	80	75	—	33	26	357	515	720	354	70	—	270	166	M25X1.5P	48	110	14	51.5	100	M16							
200L	MJ200	4, 6 & 8	318	305	—	133	200	19	398	355	85	85	—	28	32	397	556	805	394	80	—	237	133	M25X1.5P	55	110	16	59	100	M20							
225S/M	MJ225	4, 6 & 8	356	286	311	149	225	19	436	361	85	85	110	28	34	447	651	824	444	90	—	308	264	M40X1.5P	55	110	16	59	100	M20							
250M	MJ250	4, 6 & 8	406	349	—	168	250	24	506	425	100	115	—	49	42	495	688	915	489	100	—	287	242	M40X1.5P	60	140	18	64	130	M20							
280S/M	MJ280	4, 6 & 8	457	368	419	190	280	24	540	490	110	110	149	41	42	552	755	1010	544	115	—	252	207	M40X1.5P	65	140	18	69	130	M20							
315S/M	MJ315S/M	4, 6 & 8	508	406	457	216	315	28	625	540	120	115	155	46	49	617	850	1178	606	130	326	256	225	M50X1.5P	65	140	18	69	130	M20							
315L	MJ315L	2	508	508	—	216	315	28	625	593	120	115	115	46	45	617	850	1163	1343	606	145	758	276	225	M50X1.5P	65	140	18	69	130	M20						
	MJ315LX	2(200kW)																														1435					
	MJ315L	4, 6 & 8																														1328					
	MJ315LX	4(200kW)																														1420					

### Tolerances on Dimensions with\*

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

□ Key / key way fit: h9 / N9.

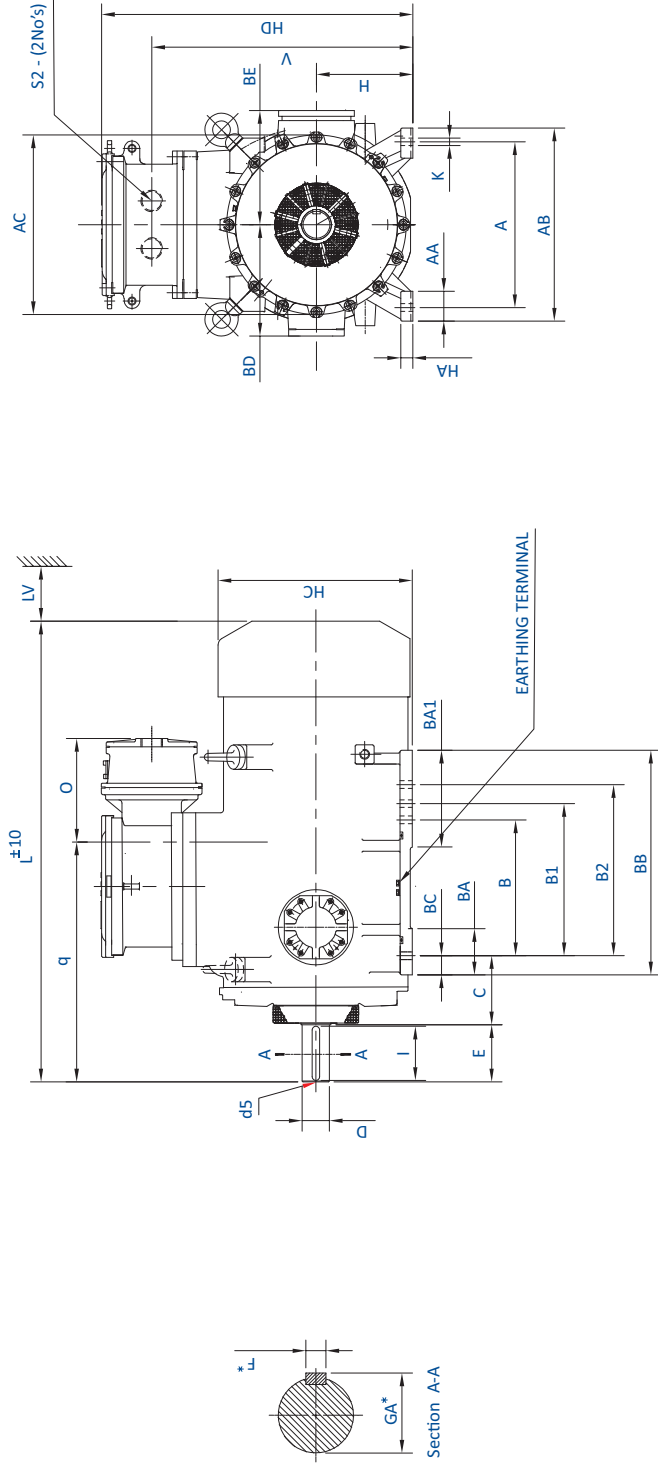
□ Double shaft extension can be provided with shaft dimension identical to D.E. shaft.

\*\* 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.

**D. Dimensional Drawing: Efficiency Values Complying to IE2 Efficiency Class of IS 12615 Foot Mounted IMB3/IM1001 Motors**



BBL Fr. Size	IEC Fr. Size	Pole	FIXING										GENERAL										TERMINAL BOX					SHAFT				
			A*	B*	B1*	B2*	C*	H	K	AB	BB	AA	BA	BA1	BC	HA	HC	HD	L	LV	AC	V	O	BD	BE	q	S2	D	E	F*	GA*	I
M1355	355S/M/L	2	610	500	560	630	254	355	28	710	826	110	170	356	65	45	715	1146	1722	145	720	959	364	420	420	864	75	170	20	79.5	160	M20
																			1727								100	210	28	106	200	M24

Tolerances on Dimensions with\*

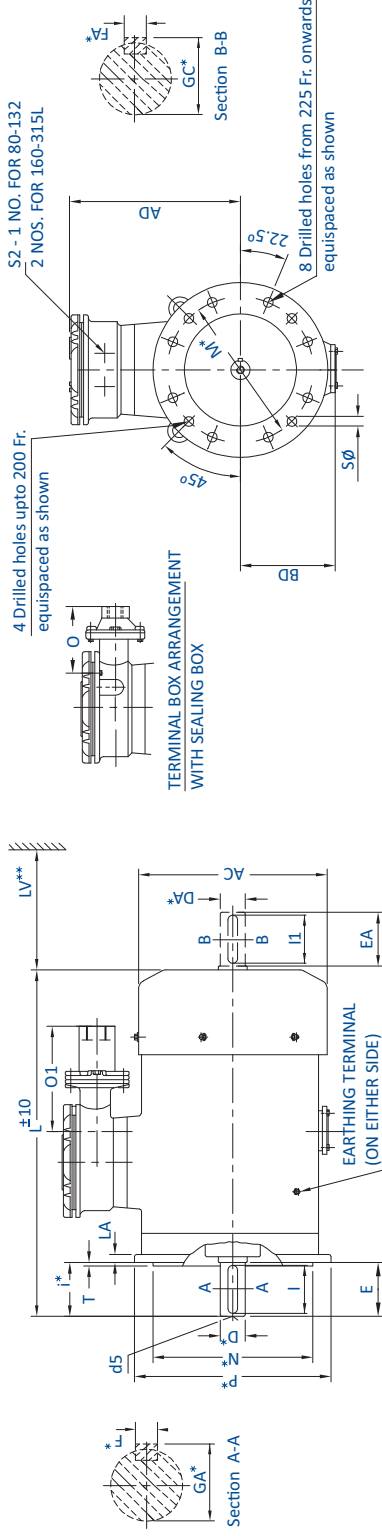
Dimension	Tolerance	Specification
A,B	±0.75	
H	-1.0	IS 1231
K	+0.520	28Ø

Dimension	Tolerance	Specification
D	m6	IS:1231/IEC:60072-1
GA, F,		IS:2048
d5(centering)		IS:2540

- Key / key way fit: h9 / N9.
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- \*\* Minimum distance for efficient cooling of motor to be maintained by user.
- Note** For non standard motors, dimensions may change. Please contact our nearest sales office for details.
- All Dimensions are in mm unless otherwise specified.

# FLAME PROOF MOTORS: Type Ex 'd'

## D. Dimensional Drawing: Efficiency Values Complying to IE2 Efficiency Class of IS 12615 Flange Mounted IMB5/IM3001 Motors



IEC Fr. Size	BBL Fr. Size	Pole	FIXING										GENERAL										TERMINAL BOX										SHAFT			
			P*	N*	M*	i*	S	T	LA	AC	L	AD	LV**	BD	O	O1	S2	DA*	E	EA	F*	FA*	GA*	GC*	I	d5										
80	MJ80	2, 4, 6 & 8	200	130	165	40	12	3.5	11	164	330	216	30	—	214	135	M20X1.5P	19	40	6	21.5	35	M6													
90L	MJ90	2, 4, 6 & 8	200	130	165	50	12	3.5	11	174	382	246	35	—	217	141	M25X1.5P	24	50	8	27	45	M8													
100L	MJ100	2, 4, 6 & 8	250	180	215	60	15	4	12	195	435	258	40	—	207	131	M25X1.5P	28	60	8	31	55	M10													
112M	MJ112	2, 4, 6 & 8	250	180	215	60	15	4	12	220	456	262	45	—	200	124	M25X1.5P	28	60	8	31	55	M10													
132S/M	MJ132	2, 4, 6 & 8	300	230	265	80	15	4	13	260	551	290	50	—	175	100	M25X1.5P	38	80	10	41	70	M12													
160M/L	MJ160	4, 6 & 8	350	250	300	110	19	5	13	314	704	312	60	—	252	151	M25X1.5P	42	110	12	45	105	M16													
180L	MJ180	2, 4, 6 & 8	350	250	300	110	19	5	16	354	745	335	70	—	270	166	M25X1.5P	48	110	14	51.5	100	M16													
200L	MJ200	4, 6 & 8	400	300	350	110	19	5	15	394	826	356	80	—	237	133	M25X1.5P	55	110	16	59	100	M20													
225S/M	MJ225	4, 6 & 8	450	350	400	140	19	5	16	444	824	426	90	—	308	264	M40X1.5P	55	110	16	59	100	M20													
250M	MJ250	4, 6 & 8	550	450	500	140	19	5	18	489	915	438	100	—	287	242	M40X1.5P	65	140	18	69	130	M20													
280S/M	MJ280	4, 6 & 8	550	450	500	140	19	5	18	544	1010	475	115	—	252	207	M40X1.5P	65	140	18	69	130	M20													
315S/M	MJ315S/M	4, 6 & 8	660	550	600	170	24	6	23	610	1178	535	130	326	276	225	M50X1.5P	65	140	18	69	130	M20													
315L	MJ315L	2	660	550	600	140	24	6	23	610	1163	535	145	326	276	225	M50X1.5P	80	170	22	85	160	M20													
	1343																																			
	1435																																			
	1328																																			
315L	MJ315L	4(200kW)	660	550	600	170	24	6	23	610	1428	535	145	326	276	225	M50X1.5P	90	170	25	95	160	M24													
	1428																																			

Tolerances on Dimensions with\*

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

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

□ 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:**

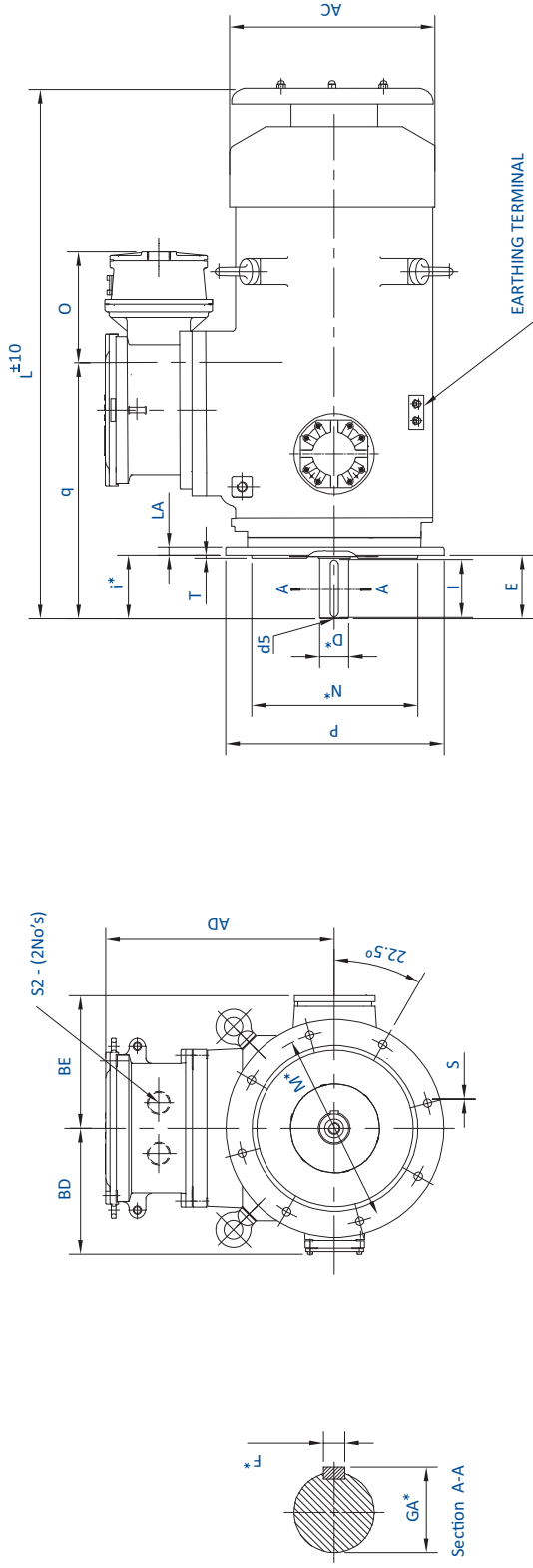
For motor in frame 180L & 200L with B3/B5 Mounting, kindly refer to our nearest sales office.

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

All Dimensions are in mm unless otherwise specified.

## FLAME PROOF MOTORS: Type Ex 'd'

### D. Dimensional Drawing: Efficiency Values Complying to IE2 Efficiency Class of IS 12615 Flange Mounted IMV1/IM3011 Motors



BBL Fr. Size	IEC Fr. Size	Pole	FIXING					GENERAL					TERMINAL BOX					SHAFT				
			N*	M*	i*	S	T	LA	AC	L	AD	O	BD	BE	q	S2	D	E	F*	GA*	I	d5
M1355	3555/M/L	2	800	740	210	24	6	28	720	1869	791	364	420	420	904	M63X1.5P	75	170	20	79.5	160	M20
		4, 6 & 8							1874								100	210	28	106	200	M24

#### Tolerances on Dimensions with\*

Dimension	Tolerance	Specification
N	js6	
M	± 1.0	IS : 2223
i	± 1.5	

Dimension	Tolerance	Specification
D	m6	IS:1231/IEC:60072-1
GA, F,		IS:2048
d5(centering)		IS:2540

- Key / key way fit: h9 / N9.
  - Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
  - \*\* Minimum distance for efficient cooling of motor to be maintained by user.
- Note** For non standard motors, dimensions may change. Please contact our nearest sales office for details.
- All Dimensions are in mm unless otherwise specified.

# CERTIFICATIONS



ISO 9001 : 2015



ISO 45001:2018



ISO 14001 : 2015



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




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

## LV MOTORS PRODUCT RANGE

Motors conform to relevant Indian Standards IS/IEC 60034 series

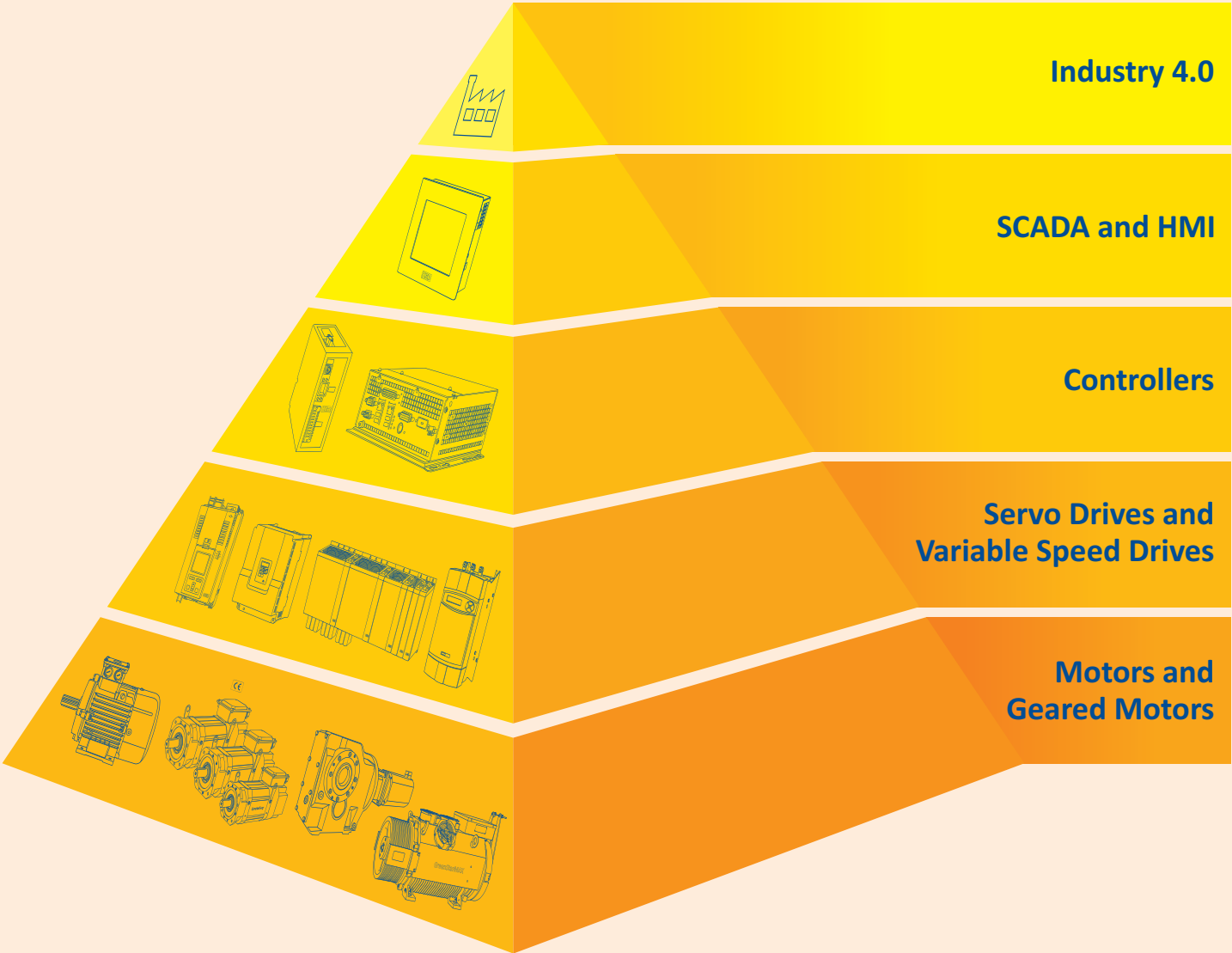
Voltage: 415V +/- 10%, Frequency: 50 Hz +/- 5%, Combined Variation: +/- 10%

Motor Type	Frame	Power (kW)	Polarity		Standard Technical Specifications
IE2 Motors	56 to 355	0.12 to 355	2, 4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Ambient for DCCA: 40° C</li> <li>• Inverter Grade Winding: For IE3 and DCCA</li> <li>• Duty: S1</li> <li>• RTD &amp; BTD: For DCCA motors</li> <li>• Mounting: B3, B5, B35, V1, B14 upto 132 Frame</li> </ul>
IE3 Motors	56 to 355	0.12 to 355	2, 4, 6, 8		
Large LT Motors (DCCA)	355 to 450	250 to 1250	2, 4, 6, 8		
IE4 Motors	112 to 225	1.5 to 45	4		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Inverter Duty Winding</li> <li>• Duty: S1</li> <li>• VPI: With Class H solvent less Resin</li> <li>• Mounting: B3, B5, B35, V1</li> </ul>
Standard Flame Proof Ex'd' Motors	80 to 315	0.37 to 200	2, 4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 45° C</li> <li>• Inverter Grade Winding: For IE3 Motors</li> <li>• Duty: S1</li> <li>• Mounting: B3, B5, B35, V1</li> </ul>
IE2 Flame Proof Ex'd' Motors	80 to 355	0.37 to 315	2, 4, 6, 8		
IE3 Flame Proof Ex'd' Motors	80 to 355	0.37 to 315	2, 4, 6, 8		
IE2 Increased Safety Ex ec Motors	63 to 355	0.12 to 355	2, 4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Duty: S1</li> <li>• Mounting: B3, B5, B35, V1 (B14 upto 132 Frame)</li> </ul>
IE3 Increased Safety Ex ec Motors	63 to 355	0.12 to 355	2, 4, 6, 8		
Crane & Hoist Duty Motors	71 to 355	0.37 to 400	4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 45° C</li> <li>• Duty: S4</li> <li>• Offered in DOL &amp; Converter Fed Supply</li> <li>• Mounting: B3, B5, B35, V1 (B14 upto 132 Frame)</li> </ul>
Brake Motors (With Integral DC Brake)	71 to 132	0.25 to 9.3	2, 4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Duty: S1</li> <li>• Mounting: B3, B5, B35</li> <li>• Integral DC Brake</li> </ul>
Brake Motors (With External Mounted Brake)	71 to 200	0.37 to 22	2, 4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Duty: S1</li> <li>• Mounting: B3, B5, B35</li> <li>• External Mounted DC Brake/Arrangement</li> </ul>
Slip Ring Motors	100 to 160	1.1 to 10	4, 6		<ul style="list-style-type: none"> <li>• Ambient: 45° C</li> <li>• Duty: S3, S4, S5</li> <li>• Mounting: B3</li> </ul>
Textile Motors	100 to 160	1.1 to 15	4, 6, 8		<ul style="list-style-type: none"> <li>• Ambient: 50° C</li> <li>• Duty: S1</li> <li>• Mounting: B3, B5, B35</li> </ul>
Cane Unloader Motors	160 to 225	11 to 30	6		<ul style="list-style-type: none"> <li>• Ambient: 45° C</li> <li>• Start/Stop per Hour: upto 900</li> <li>• Duty: S5, 50% CDF</li> <li>• Thermostat</li> <li>• Mounting: B3, B5, B35</li> <li>• Forced Cooling</li> <li>• Shaft Material: En24</li> </ul>

**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
<ul style="list-style-type: none"> <li>• Non Standard Voltage: upto 690V</li> <li>• Higher Polarity on request</li> <li>• Insulation: Class H</li> <li>• Space Heater: 90 Frame onwards</li> <li>• RTD &amp; BTD: 250 Frame onwards</li> <li>• PTC Thermistor: 80 to 355L</li> <li>• Shaft Material: EN24*</li> <li>• Enclosure: IP56 / 65 / 66</li> <li>• Forced Cooling: 132 to 450 Frame</li> <li>• Roller Bearing: 160 Frame onwards</li> </ul>	<ul style="list-style-type: none"> <li>• High Temperature Grease: Suitable up to 200° C</li> <li>• SS Hardware</li> <li>• Non standard shaft diameter/extension*</li> <li>• Non Standard Paint</li> <li>• Provision for Encoder Mounting</li> <li>• Low Vibration as per IS or IEC</li> <li>• Insulated Bearing: 132 Frame onwards</li> <li>• SPM Nipples Provision: Frame 250 onwards</li> </ul>	<p>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</p>
<ul style="list-style-type: none"> <li>• Insulation: Class H</li> <li>• Space Heater: 90 Frame onwards</li> <li>• PTC Thermistor: 80 to 225 Frame</li> <li>• Shaft Material: EN24*</li> <li>• Enclosure: IP56 / 65 / 66</li> <li>• Roller Bearing: 160 Frame onwards</li> </ul>	<ul style="list-style-type: none"> <li>• Non standard shaft diameter/extension*</li> <li>• Non Standard Paint</li> <li>• Provision for Encoder Mounting</li> <li>• Low Vibration as per IS or IEC</li> </ul>	<p>Fans, HVAC, Pumps, Textiles, Hydraulic Press</p>
<ul style="list-style-type: none"> <li>• Non Standard Voltage: 220 to 690V</li> <li>• Intermittent Duty S3, S4: In 4, 6, 8 Pole*</li> <li>• Insulation: Class H</li> <li>• PTC Thermistor: 80 to 315 L</li> <li>• Space Heater: 90 Frame onwards</li> <li>• Roller Bearing: 160 Frame onwards</li> <li>• Shaft Material: EN24*</li> <li>• Enclosure: IP56 / 65 / 66</li> </ul>	<ul style="list-style-type: none"> <li>• Insulated Bearing: 132 Frame onwards</li> <li>• Non standard shaft diameter/extension*</li> <li>• Motors for inverter duty application ; offered with <ul style="list-style-type: none"> <li>• Combined testing of motor and VFD or</li> <li>• Motors fitted with PTC Thermistor</li> </ul> </li> <li>• Test facility available for combined Testing with VFD</li> <li>• Non Standard Paint</li> <li>• Low Vibration as per IS or IEC</li> </ul>	<p>Pump, Fan, Compressor, Material Handling, Agitator, LPG Bottling Plant, Pharma Machinery, Chemical Plant Machinery, Machinery for Mines</p>
<ul style="list-style-type: none"> <li>• Insulation: Class H</li> <li>• Shaft Material: EN24*</li> <li>• Enclosure: IP56 / 65 / 66</li> <li>• Roller Bearing: 160 Frame onwards</li> </ul>	<ul style="list-style-type: none"> <li>• Insulated Bearing: 132 Frame onwards</li> <li>• Non standard shaft diameter/extension*</li> <li>• Motors for inverter duty application with combined testing of motor and VFD for temperature class certification</li> <li>• Test facility available for combined testing with VFD</li> <li>• Non Standard Paint</li> <li>• Low Vibration as per IS or IEC</li> </ul>	<p>Pump, Fan, Compressor, Material Handling, Agitator, Pharma Machinery</p>
<ul style="list-style-type: none"> <li>• Duty: S2, S3 and S5</li> <li>• Non Standard Voltage: 380 to 460V</li> <li>• Insulation: Class H</li> <li>• Space Heater: 90 Frame onwards</li> <li>• BTD: 250 Frame and above</li> <li>• PTC Thermistor: 80 to 355 L</li> <li>• Roller Bearing: 160 Frame onwards</li> <li>• Shaft Material: EN24*</li> <li>• Enclosure: IP56 / 65 / 66</li> </ul>	<ul style="list-style-type: none"> <li>• Motors for Inverter Duty</li> <li>• Insulated Bearing: 132 Frame onwards</li> <li>• Non standard shaft diameter/extension*</li> <li>• Non Standard Paint</li> <li>• Low Vibration as per IS or IEC</li> </ul>	<p>Crane, Hoist, Lift, Material Handling, Car Stacker, Door Opening</p>
<ul style="list-style-type: none"> <li>• Duty: S2 and above</li> <li>• Non Standard Voltage: upto 460V</li> <li>• Motors for Inverter Duty</li> <li>• Manual Release Arrangement: For 90 to 132 Frame</li> </ul>	<ul style="list-style-type: none"> <li>• Non standard shaft diameter/extension*</li> <li>• Non Standard Paint</li> </ul>	<p>Crane, Hoist, Material Handling, Textile, Pharma to name a few</p>
<ul style="list-style-type: none"> <li>• Duty: S2 and above</li> <li>• Non Standard Voltage: upto 460V</li> <li>• Motors for Inverter Duty</li> <li>• Manual Release Arrangement</li> </ul>	<ul style="list-style-type: none"> <li>• Double Shaft Extension for Brake Arrangement</li> <li>• Non Standard Paint</li> </ul>	<p>Crane, Hoist, Material Handling, Textile, Pharma to name a few</p>
<ul style="list-style-type: none"> <li>• Mounting: B35</li> <li>• Non standard shaft diameter and extension*</li> </ul>	<ul style="list-style-type: none"> <li>• Non Standard Paint</li> </ul>	<p>Crane, Hoist, Lift, Material Handling</p>
<ul style="list-style-type: none"> <li>• Non Standard Voltage: upto 500V</li> <li>• Insulation: Class H</li> </ul>	<ul style="list-style-type: none"> <li>• Motors for Inverter Duty</li> <li>• Non Standard Paint</li> <li>• Low Vibration as per IS</li> </ul>	<p>Ginning, Textile Machinery</p>
<ul style="list-style-type: none"> <li>• Insulation: Class H</li> <li>• PTC Thermistor</li> </ul>	<ul style="list-style-type: none"> <li>• Insulated Bearing: 132 Frame onwards</li> <li>• Non Standard Paint</li> </ul>	<p>Cane Loading-Unloading Machine</p>

**ENABLING PRODUCTIVITY,  
PRECISION & ENERGY EFFICIENCY**



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