Bharat Bijlee

Motors for Hazardous Areas

Flame Proof Motors : 0.37kW - 200kW
Increased Safety Motors : 0.37kW - 315kW
Non Sparking Motors : 0.37kW - 315kW

(eff1) & (eff2) Motors

CHA1/E

ENERGY EFFICIENT MOTORS HAZARDOUS AREAS

Energy Efficient Induction Motors for Hazardous Areas

This catalogue covers three phase A.C. Squirrel cage energy efficient induction motors used in hazardous areas;

- Flame proof motors - Ex (d)
- Increased safety motors - Ex (e)
- Non- sparking motors - Ex (nA)

The efficiency values of these Energy efficient motors are conforming to IS : 12615-2004 as under;

- Efficiency class (eff2) Improved efficiency
- Efficiency class (eff1) High efficiency

Product Range

Flame Proof Motors - Ex (d)

Type	Frame size	kW range
Improved Efficiency - MD	80 to 280M	0.37 to 90
High Efficiency - MJ	80 to 315L	0.37 to 200

Increased Safety Motors-Ex (e)

Type	Frame size	kW range
Improved Efficiency - ME	63 to 280M	0.12 to 90
High Efficiency - MI	71 to 355L	0.37 to 315

Non-Sparking Motors-Ex (nA)

Type	Frame size	kW range
Improved Efficiency - MN	63 to 280M	0.12 to 90
High Efficiency - MS	71 to 355L	0.37 to 315

Standards

All motors comply with following Indian and International Standards, viz.:

Indian Standards

IS : 325	Three phase Induction motors-specification.
IS : 900	Code of practice for installation and maintenance of Induction motors.
IS : 1231	Dimensions of Foot mounted A.C. Induction motors.
IS : 2148	Specification for Flame proof enclosure of electrical apparatus.
IS : 2223	Dimensions of Flange mounted A.C. Induction motors.
IS : 5572	Classification of Hazardous areas (other than mining) having flammable gases and vapours for electrical installations.
IS : 6381	Electrical Apparatus Explosive Gas Atmospheres-Increased Safety 'e'
IS : 8289	Specification for Electrical Equipment with type of Protection 'n'
IS : 9628	Specification for 3Ph Induction Motors with type of Protection 'n'
IS : 12615	Energy Efficient Induction Motors- Three phase Squirrel cage.

Reference - International Standards

IEC 600 79	Electrical Apparatus for explosive gas atmosphere.
Part - 1	Flame proof enclosure Ex 'd'
Part - 7	Increased safety enclosure Ex 'e'
Part - 15	Non sparking enclosure Ex 'n'

Hazardous Areas

Hazardous areas are defined as locations where explosive Gas-air mixture may occur in dangerous concentrations.

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 inspecting authority.

IS : 5572 & IS : 15142 classifies the Hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present.

Classification of Hazardous Areas (Gases and Vapours)

Classification of these zones and selection of electrical equipment is as under;

Zone	Classification of area as per Ref std. IS:5572	Selection of electrical equipment based on Ref std. 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 : 2148.
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 : 6381 may be used without any special enclosure. Apparatus having type of protection Ex (nA) in accordance with IS : 8289 are also permitted for use. Three phase induction motors having protection type Ex (nA) conforming to IS : 9628 are permitted.

Classification of Hazardous areas (dust)

Zone	Classification of area as per IS : 15142	Selection of electrical equipment based on IS : 14154 - part 2
21	Area in which combustible dust is, or may be present, as a cloud during normal processing, handling or cleaning operations, in sufficient quantity to be capable of producing an explosive concentration of combustible or ignitable dust in a mixture with air.	Apparatus with type of protection EX (d)-flame proof motors in accordance with IS 2148:2004. Apparatus with type of protection Ex (e)-increased safety motors in accordance with IS 6381: 2004. Apparatus with type of protection Ex(nA)-Non sparking motors in accordance with IS/IEC 60079-15:2005. All motors shall have degree of protection by enclosure as at least IP6X.
22	Area not classified as Zone 21, in which accumulations or layers or combustible or ignitable dust may be present under abnormal conditions and give rise to ignitable mixtures of dust and air.	Apparatus with protection EX (d)-flame proof motors in accordance with IS 2148:2004. Apparatus with type of protection Ex (e)-increased safety motors in accordance with IS 6381: 2004. Apparatus with type of protection Ex (nA)-Non sparking motors in accordance with IS/IEC 60079-15:2005. All motors shall have degree of protection by enclosure as at least IP5X.

Energy Efficient Flame Proof Motors Ex (d)

Product Range

Type		Frame size	kW range
Improved Efficiency	- MD	80 to 280M	0.37 to 90
High Efficiency	- MJ	80 to 315L	0.37 to 200

Temperature Class

The ignition temperature of the gas classified as T1 to T6 as under:

Temp. Class as per IS:6381 and IEC 79-7	Ignition Temperature - °C	
	Above	Upto and including
T1	450	-
T2	300	450
T3	200	300
T4	135	200
T5	100	135
T6	85	100

The maximum surface temperature under the worst operating condition should 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 the case of Flame proof motors Ex (d), this refers to external surface temperatures whereas in case of Increased safety Ex (e) or Non sparking Ex (nA), this refers to the internal temperature as well.

Temperature class of BBL Motors

Frame size		Temp class
IEC frame size	BBL frame size	
80	MJ 80	T6
90L	MJ 90	T5
100L	MJ 100	T5
112M	MJ 112	T5
132M	MJ 132	T5
160L	16 LFP	T5
180L	MJ 180	T5
200L	MJ 200	T5
225M	MJ 225	T5
250M	MJ 250	T4
280M	MJ 280	T5
315 S/M, 315L	MJ 315	T4

Motors for Zone 21 & Zone 22 Area

BBL Flame Proof Motors are certified and approved for use in Zone 21 and Zone 22 (presence of combustible and ignitable dust as per IS : 15142.)

Classification of Hazardous Gases

Hazardous gases have been classified in IS : 2148 - 2004 and are associated only with Flame proof enclosures. These gases are listed below.

Note: Flame proof motors are offered suitable for Gas Gr. I, IIA and IIB only. For gases not mentioned, please refer to the

Gas Group	Gas or Vapour	Temp. Class
I	Methane [firedamp]	T1
IIA	Industrial methane*	T1
	Carbon monoxide	T1
	Decane	T3
	Xylene	T1
	Methyi acetate	T1
	Hexane	T3
	Heptane	T3
	ISO-octane	T2
	Propane	T1
	Butane	T2
	Benzene	T1
	Cyclohexane	T2
	Acetone	T1
	Ethyle acetate	T1
	choroethylene	T1
	Methanol	T1
	Ethanol	T2
	Butyl acetate	T2
IIB	1,3-Butadiene	T2
	Ethylene	T2
	Diethyleether	T4
	Ethylene oxide	T2
	Coke-oven Gas	T1
IIC	Hydrogen	T1
	Acytelene	T1

*Industrial methane includes methane mixed with not more than 10% volume of Hydrogen.

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 authority accord their approval / licence based on the test reports issued by their recognized test houses such as CIMFR Dhanbad, ERTL (East) Kolkata etc.

Statutory Authority	Scope	Area of Jurisdication
CIMFR Dhanbad	Testing & Certification	-
ERTL(East) Kolkata	Testing & Certification	-
DGMS Dhanbad	Approving	Coal mines & Oil mines.
PESO Nagpur	Approving	All areas where explosive liquids/gases are stored & transported
DGFASLI Mumbai	Approving	All areas where explosive liquids/gases are processed.
BIS	Licensing	-

All Flame Proof motors have license mark IS : 2148-2004.

DGMS identification mark is mandatory for motors used in coal mines & oil mines

Electrical Features: Operating Conditions

Supply conditions (Voltage & Frequency)

Voltage : 415 V ± 10%
Frequency : 50Hz ± 5%
Combined variation : ± 10%

Ambient

Motors are designed for ambient temperature 45°C.

Altitude

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

Re-rating Factors

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

Variation in Supply Voltage & Frequency

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

Variation in Ambient & Altitude

Amb. Temp. °C	Permissible output as % of rated value
-	-
-	-
⩽30	107
30-45	100
50	96
55	92
60	87

Altitude above 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

BBL motors are suitable for following 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 Time and Duty Cycle

Motors are designed for continuous (S1) duty. Other type of duty (S2 to S8) can be offered on request. Motors can safely withstand a starting time of 5 to 7 sec. for 2 consecutive starts from hot and 3 consecutive starts from cold condition. In applications where more severe starting conditions are encountered, a special enquiry should be made.

Insulation and Endurance

The motors are provided with Class F insulation system with temperature rise limited to Class B. These motors can be used either at ambient temperature of 50°C or overloaded continuously by 10% (SF 1.1). The temperature rise will be still within the limits of Class F.

The slot insulation consists of Nomex-Polyester-Nomex (NPN). All insulating materials used are adequately resistant to the action of microbes and fungi. Gelcoat is applied on winding overhang as an additional protection, against ingress of moisture.

Winding

Frame	Ins class	Type of winding wires	Impreg. process
80 to 280M	Class 'F'	Modified polyster enamel covered. Thermal Class 155. (part 3 IS : 13730)	Flood
315S/M, 315L	Class 'F'	Dual coated copper wire. Thermal class 200. (Part 13 IS : 13730)	VPI

Options

- Motors with class 'H' insulation can be offered on request.
- VPI can be offered for frame 80 to 280 on request.

Thermal Protection

PTC Thermisters, Thermostats or RTD's can be embedded in stator winding on request.

Earthing Terminals

Two earthing terminals are provided in the terminal box.

Anti-condensation Method

Motors can be offered with built in space heaters in frame sizes 90 and above. In case of frame sizes 315S/M & 315L, anti condensation heaters will be provided as a standard feature.

Mechanical Features

Enclosure

The motors are offered with Totally Enclosed Fan Cooled (TEFC) construction. All foot mounted motors are with integral feet construction.

The frame, end shields, terminal boxes and bearing covers of all motors are made of grey cast iron.

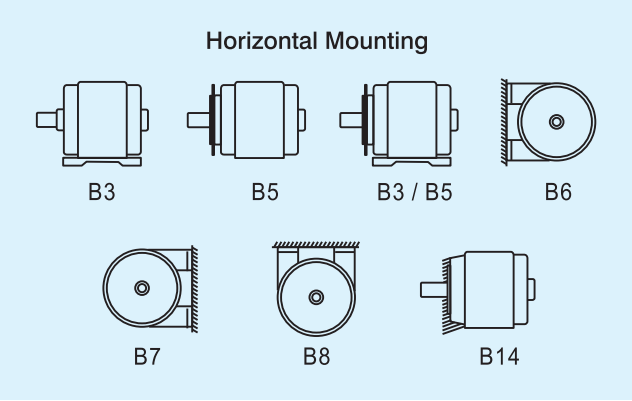
These motors are so designed that the frame temperature will remain below the ignition temperature of gas-air mixture involved as mentioned in the table title 'Classification of Hazardous Gases'.

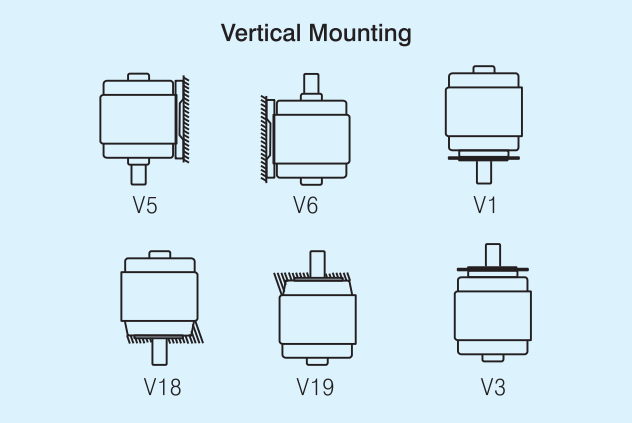
All cast iron parts forming flame proof enclosures are subjected to hydraulic pressure test, after final machining as per IS : 2148-2004.

Type of construction

Standard motors are designed for foot mounting (B3). These are also suitable for B6, B7, B8, V5 and V6 mounting without any change.

Motors can be supplied in Flange mounting (B5). These motors are also suitable for V1 and V3 mounting without any change.





Cooling

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 0411 as per IS : 6362.

Degree of Protection

All motors have IP55 degree of protection as per IS : 4691. 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 cannot be provided in FLP motors.

Bearing and Terminal Box Details

Frame size	Bearing nos. C3 Clearance		Terminal Box type/ Location	Terminal		Cable entries No. & size in B.S.C	Max cond Cross Sec. area mm2
	DE	NDE		No.	Size		
80	6204 2Z	6204 2Z	MJ80/ TOP	3	M5	1x3/4"	4
90L	6205 2Z	6205 2Z	MJ130/ TOP	3/6*	M6	1 x 3/4"	6
100L	6206 2Z	6206 2Z				1 x 1"	16
112M	6206 2Z	6206 2Z					
132M	6308 2Z	6308 2Z					
160M/L	6209 2Z	6209 2Z	MJ200/ TOP	6	M8	2 x 1"	50
180L	6310	6310				2 x 1 1/2	70
200L	6212	6212					
225S/M	6213	6213	MJ280/ TOP	6	M12	2 x 2"	150
250M	6215	6215					
280 S/M 2P 4,6 & 8p	6316	6316					
	6317	6316					
315S/M/L	6319	6319	MJ 315/TOP	6	M16	2 x 3"	240

*3 Terminals upto & including 1.5 kW & 6 for higher outputs.

Alternate T. Box location can be offered as follows:

Frame size	T. Box location
112M & 132M	RHS only
160M/L To 315L	RHS or LHS

Separate T. Box for Thermister, Thermostat / RTD's and or Space Heater etc.

Separate T. Box for thermister, thermostat / RTD's space heater etc. can be offered from frame size 200L to 315L. In such cases the Main terminal box location will be either on RHS or LHS only. In case of frames 315S/M & 315L separate space heater T. Box will be provided as a standard feature.

Cable Entries

Motors for mining application (Gas Gr. I i.e. Coal mines and Oil mines) are provided with cable entries with compound filling sealing boxes suitable for paper insulated lead covered double wire armoured (PILCDWA) PVC cables. Cable entries with flame proof cable glands can also be provided to suit PVC armoured cables. (For application in hazardous area Gas Gr. IIA and IIB only). Motors in frame sizes 160 to 280 can be supplied with termination suitable for plug and socket arrangement on request. A cable sealing box is mandatory for all motors for use in Coal mines and Oil mines.

Grease

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

Online Re-greasing

Online re-greasing arrangement is provided in frame sizes 2255/M and above. For frame sizes 180L and 200L, it can be provided on request.

Rotor

All motors are fitted with dynamically balanced aluminum diecast squirrel cage rotor.

Shaft

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

Balancing and Vibration

Rotors are dynamically balanced with a half sized key in the shaft extension. All motors conform to normal class of vibration according to IS : 12075. Precision class vibration levels (A,B or C) can be provided on request.

Noise Level

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

Paint

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

Name plate

Stainless steel Name plate is provided on each motor. Special data such as efficiency class, stating current, starting torque, gas group, temperature class and statutory approval references are also provided with usual name plate details.

Packing

Motors are packed in wooden packing boxes. Export packing (sea worthy) is also available on request.

Special Features:

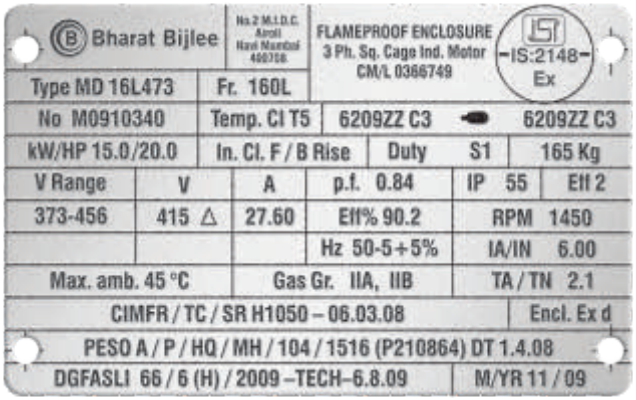
- Sturdy housing, that prevents an internal explosion from spreading to the external environment and also resists the explosion pressure.
- Robust bearing shields and caps bolted to the frame in a manner where the gaps remain unaffected in event of an internal explosion.
- Screen on air intake with a mesh size not exceeding 8mm.
- External earth terminals.
- Protective earth conductor terminal in the terminal box.
- Ex (d) mark on the motors.
- CIMFR certificate no. PESO, DGFASLI certificate no. and BIS Licence mark on the name plate. Special DGMS mark plate is provided with DGMS approval no. in case of motors to be used in coal mines or oil mines area.
- Special varnishing and painting treatment to resist highly corrosive atmosphere.

Special Maintenance Care During Operation

Each motor must be provided with a protective circuit breaker or an equally effective device.

In order to maintain the 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 or oil-grease must be applied as protection against rust. The use of gaskets at points 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 screws, bolts, nuts etc. used for fixing the parts of flame proof enclosures are provided with spring washers wherever originally supplied, to prevent them from getting loose due to shocks and vibration during operation.



FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 280S/M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)

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

Table-MD-2P **3000 rpm (2-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	80	MJ80	MD0802A3	2880	0.81	0.125	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	MD0802B3	2860	1.25	0.187	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	MD080213	2830	1.65	0.258	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	MD080233	2840	2.35	0.377	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	MD09L233	2825	3.00	0.517	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	MD09L253	2830	4.36	0.757	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	MD10L213	2900	7.05	1.25	0.86	0.80	0.70	85.0	83.0	78.0	6.5	2.8	3.0	0.0188	62
*5.5	7.5	132M	MJ132	MD13M233	2920	10.1	1.84	0.88	0.85	0.77	86.0	85.0	80.0	6.5	2.3	3.0	0.069	104
*7.5	10	132M	MJ132	MD13M253	2920	13.7	2.50	0.88	0.84	0.76	87.0	86.0	82.0	6.5	2.5	3.0	0.082	114
9.3	12.5	132M	MJ132	MD13M293	2920	16.5	3.10	0.89	0.85	0.76	88.0	86.0	83.0	6.5	2.4	2.9	0.098	120
11	15	160M	MJ160	MD16M213	2920	19.3	3.67	0.89	0.88	0.85	89.0	88.0	86.0	5.8	2.0	3.0	0.134	145
15	20	160M	MJ160	MD16M253	2920	25.9	5.00	0.90	0.89	0.85	89.5	89.0	87.0	6.0	2.0	3.0	0.171	154
18.5	25	160L	MJ160	MD16L273	2920	31.6	6.17	0.90	0.88	0.86	90.5	90.0	88.0	6.5	2.0	3.0	0.225	168
*22	30	180L	MJ180	MD18L213	2930	37.5	7.31	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	MD20L233	2955	51.2	9.89	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	MD20L253	2955	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	MD22M233	2960	74.5	14.8	0.90	0.87	0.83	93.3	92.8	91.0	6.0	2.5	2.5	1.04	420
55	75	250M	MJ250	MD25M213	2960	89.0	18.1	0.92	0.91	0.86	93.3	92.8	91.5	6.5	2.1	2.6	2.11	570
75	100	280S	MJ280	MD28S213	2970	122	24.6	0.91	0.89	0.84	94.0	93.0	91.0	6.0	1.9	2.7	2.63	690
90	120	280M	MJ280	MD28M233	2970	145	29.5	0.92	0.90	0.85	94.0	93.0	91.0	6.0	1.9	2.7	3.01	740

Note: • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with eff2 efficiency level.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 280S/M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)

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

Table-MD-4P **1500 rpm (4-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	80	MJ80	MD0804A3	1415	0.98	0.255	0.76	0.70	0.58	70.00	68.0	64.0	4.5	2.4	2.6	0.0061	31
0.55	0.75	80	MJ80	MD080413	1405	1.3	0.381	0.81	0.70	0.56	74.0	71.0	67.0	4.0	2.4	2.6	0.0061	31
0.75	1.0	80	MJ80	MD080433	1405	1.75	0.52	0.78	0.70	0.58	77.0	76.0	72.0	4.5	2.8	3.0	0.0072	32
*1.1	1.5	90L	MJ90	MD09L433	1410	2.45	0.76	0.80	0.73	0.61	78.0	77.0	72.0	4.2	2.3	2.7	0.012	48
1.5	2.0	90L	MJ90	MD09L453	1410	3.25	1.03	0.80	0.72	0.58	80.0	79.0	75.0	4.8	2.5	3.0	0.016	50
2.2	3.0	100L	MJ100	MD10L433	1420	4.55	1.51	0.82	0.69	0.53	82.0	80.0	76.0	5.7	2.5	3.0	0.021	60
3.7	5.0	112M	MJ112	MD11M433	1430	7.30	2.52	0.83	0.76	0.65	85.0	85.0	82.0	6.0	2.6	3.0	0.053	70
*5.5	7.5	132M	MJ132	MD13M433	1445	10.4	3.71	0.85	0.80	0.68	86.0	85.0	83.0	6.0	2.2	3.0	0.113	105
7.5	10	132M	MJ132	MD13M473	1445	14.5	5.06	0.83	0.78	0.68	87.0	87.0	85.0	6.0	2.5	3.0	0.134	113
9.3	12.5	160M	MJ160	MD16M4A3	1450	17.1	6.25	0.86	0.82	0.77	88.0	88.0	87.0	6.0	2.0	2.5	0.141	136
11	15	160M	MJ160	MD16M4C3	1450	20.5	7.39	0.84	0.81	0.76	89.0	89.0	86.0	6.0	2.1	2.5	0.177	143
15	20	160L	MJ160	MD16L4K3	1450	27.6	10.08	0.84	0.83	0.79	90.2	90.5	90.0	6.0	2.1	2.5	0.235	156
*18.5	25	180L	MJ180	MD18L433	1460	33.2	12.30	0.85	0.82	0.72	91.2	91.2	90.0	6.0	2.4	2.5	0.46	215
22	30	180L	MJ180	MD18L473	1460	39.0	14.70	0.86	0.82	0.72	91.8	91.5	90.0	6.0	2.4	2.5	0.54	230
30	40	200L	MJ200	MD20L433	1465	51.5	19.90	0.88	0.84	0.77	92.0	92.0	90.0	6.0	2.6	2.5	0.86	305
37	50	225S	MJ225	MD22S413	1470	64.0	24.50	0.87	0.83	0.75	93.0	93.0	91.0	6.0	2.5	2.5	1.32	380
45	60	225M	MJ225	MD22M433	1470	76.5	29.80	0.88	0.84	0.75	93.2	93.2	91.0	6.0	2.5	2.5	1.60	430
55	75	250M	MJ250	MD25M413	1475	94.0	36.30	0.87	0.85	0.78	93.8	93.3	91.5	6.0	2.5	2.6	2.83	570
75	100	280S	MJ280	MD28S413	1480	124	49.40	0.89	0.89	0.83	94.2	94.0	93.0	6.0	2.2	2.5	5.00	705
90	120	280M	MJ280	MD28M433	1480	149	59.20	0.89	0.87	0.81	94.7	94.3	93.2	6.0	2.2	2.5	6.00	725

Note: • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with eff2 efficiency level.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 280S/M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)

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

Table-MD-6P **1000 rpm (6-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	80	MJ80	MD080613	910	1.10	0.396	0.70	0.60	0.48	68.0	66.0	61.0	3.0	2.1	2.3	0.0060	31
0.55	0.75	80	MJ80	MD080633	915	1.56	0.590	0.71	0.62	0.48	69.0	70.0	64.0	4.0	2.2	2.5	0.0084	32
*0.75	1.0	90L	MJ90	MD09L633	925	2.00	0.790	0.72	0.61	0.50	73.0	70.0	69.0	3.4	2.0	2.5	0.0122	48
1.1	1.5	90L	MJ90	MD09L653	930	2.80	1.15	0.72	0.61	0.50	76.0	74.0	72.0	4.0	2.1	2.6	0.016	50
1.5	2.0	100L	MJ100	MD10L633	935	3.76	1.56	0.72	0.64	0.52	77.0	75.0	72.0	3.9	2.0	2.5	0.025	60
2.2	3.0	112M	MJ112	MD11M633	935	5.05	2.29	0.77	0.68	0.55	79.0	79.0	74.0	5.0	2.0	2.5	0.050	67
*3.7	5.0	132M	MJ132	MD13M633	950	8.00	3.80	0.76	0.63	0.49	85.0	84.0	82.0	5.5	2.0	2.5	0.130	108
5.5	7.5	132M	MJ132	MD13M673	960	11.5	5.58	0.78	0.71	0.59	85.0	83.0	78.0	5.5	2.5	2.75	0.183	113
7.5	10	160M	MJ160	MD16M633	960	14.8	7.61	0.80	0.74	0.64	88.0	88.0	86.0	5.4	2.0	2.5	0.276	149
9.3	12.5	160L	MJ160	MD16L663	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	87.0	5.5	2.1	2.5	0.34	160
11	15	160L	MJ160	MD16L673	965	21.6	11.1	0.80	0.77	0.70	88.5	88.0	87.0	6.0	2.0	2.5	0.40	169
15	20	180L	MJ180	MD18L613	965	29.0	15.1	0.80	0.75	0.62	90.0	90.0	87.0	5.5	2.6	2.3	0.68	210
18.5	25	200L	MJ200	MD20L613	975	34.0	18.5	0.83	0.78	0.70	91.0	91.0	88.0	5.8	2.6	2.3	1.00	275
22	30	200L	MJ200	MD20L633	975	40.5	22.0	0.83	0.78	0.70	91.0	91.0	88.0	5.8	2.6	2.3	1.20	290
30	40	225M	MJ225	MD22M623	975	52.3	30.0	0.87	0.84	0.76	91.8	91.0	88.0	6.0	2.3	2.2	2.10	430
37	50	250M	MJ250	MD25M603	975	63.5	37.0	0.88	0.85	0.82	92.5	92.5	91.0	6.0	2.5	2.3	3.51	560
45	60	280S	MJ280	MD28S613	980	80.7	44.7	0.83	0.80	0.70	93.5	92.5	92.0	6.0	2.5	2.3	5.11	615
55	75	280M	MJ280	MD28M633	980	96.0	54.7	0.85	0.81	0.72	93.5	93.0	92.0	6.0	2.3	2.3	6.16	665

Note: • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with eff2 efficiency level.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 280S/M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)

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

Table-MD-8P **750 rpm (8-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	90L	MJ90	MD09L833	700	1.32	0.515	0.63	0.52	0.41	62.0	55.0	48.0	2.7	1.8	2.1	0.013	46
0.55	0.75	90L	MJ90	MD09L853	690	1.81	0.776	0.63	0.55	0.43	67.0	62.0	58.0	2.9	2.0	2.4	0.014	48
0.75	1.0	100L	MJ100	MD10L813	685	2.05	1.07	0.73	0.63	0.50	70.0	70.0	64.0	3.0	1.6	1.8	0.023	55
1.1	1.5	100L	MJ100	MD10L833	690	2.91	1.55	0.71	0.62	0.48	74.0	73.0	71.0	3.3	1.9	2.3	0.027	59
1.5	2.0	112M	MJ112	MD11M813	705	3.90	2.07	0.70	0.62	0.50	77.0	77.0	75.0	3.8	1.7	2.2	0.051	65
*2.2	3.0	132M	MJ132	MD13M813	710	5.5	3.02	0.71	0.60	0.46	78.0	78.0	75.0	3.7	1.6	2.0	0.099	100
3.7	5.0	160M	MJ160	MD16M813	720	8.10	5.01	0.78	0.74	0.65	82.0	82.0	78.0	4.4	1.8	2.0	0.217	137
5.5	7.5	160M	MJ160	MD16M833	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82.0	4.8	1.9	2.2	0.299	151
7.5	10	160L	MJ160	MD16L873	710	15.6	10.29	0.78	0.74	0.65	86.0	84.0	82.0	5.5	2.1	2.2	0.40	167
*9.3	12.5	180L	MJ180	MD18L813	715	19.0	12.7	0.79	0.74	0.64	86.5	86.5	85.0	4.5	2.1	2.2	0.62	205
11	15	180L	MJ180	MD18L833	720	22.2	14.9	0.79	0.74	0.64	87.5	87.5	86.0	4.5	2.1	2.2	0.72	215
15	20	200L	MJ200	MD20L833	720	28.8	20.3	0.82	0.79	0.71	88.5	88.5	87.0	5.5	2.5	2.3	1.32	330
18.5	25	225S	MJ225	MD22S813	725	36.6	24.9	0.79	0.77	0.69	89.0	88.0	87.0	5.3	2.1	2.2	1.95	400
22	30	225M	MJ225	MD22M833	725	43.0	29.6	0.79	0.77	0.69	90.0	89.0	87.5	5.3	2.1	2.2	2.41	430
30	40	250M	MJ250	MD25M813	730	56.0	40.0	0.82	0.78	0.68	91.0	90.5	89.0	5.5	2.5	2.2	3.72	575
37	50	280S	MJ280	MD28S823	730	71.0	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	650
45	60	280M	MJ280	MD28M853	730	86.0	60.0	0.79	0.75	0.65	92.0	92.0	91.0	5.5	2.2	2.2	6.86	710

Note: • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with eff2 efficiency level.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 315L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)

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

Table-MJ-2P **3000 rpm (2-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff1			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	80	MJ80	MJ0802A3	2880	0.81	0.125	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	MJ0802B3	2860	1.25	0.187	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	MJ080213	2830	1.64	0.258	0.82	0.74	0.62	77.5	77.3	74.0	5.0	2.5	2.8	0.0037	31
1.1	1.5	80	MJ80	MJ080233	2840	2.25	0.377	0.82	0.75	0.63	82.8	82.8	78.0	5.9	2.7	3.0	0.0051	32
*1.5	2.0	90L	MJ90	MJ09L243	2840	3.0	0.514	0.82	0.78	0.68	84.1	84.1	81.0	6.5	3.3	3.5	0.0091	50
*2.2	3.0	100L	MJ100	MJ10L213	2890	4.15	0.741	0.86	0.83	0.76	86.0	86.0	83.0	7.0	2.8	3.0	0.0188	62
*3.7	5.0	112M	MJ112	MJ11M233	2890	6.84	1.24	0.86	0.84	0.76	87.5	87.5	85.5	7.0	3.0	3.3	0.0530	70
*5.5	7.5	132M	MJ132	MJ13M253	2935	9.70	1.83	0.89	0.85	0.77	88.6	88.6	84.0	7.0	2.5	3.0	0.0820	114
*7.5	10	132M	MJ132	MJ13M293	2935	13.1	2.49	0.89	0.85	0.77	89.5	89.5	84.5	7.0	2.5	3.0	0.0980	120
9.3	12.5	160M	MJ160	MJ16M233	2930	16.2	3.09	0.89	0.85	0.76	90.0	90.0	86.0	7.0	2.4	2.9	0.1500	150
11	15	160M	MJ160	MJ16M253	2930	19.0	3.66	0.89	0.86	0.82	90.5	90.5	87.5	7.0	2.3	3.0	0.171	154
15	20	160M	MJ160	MJ16M263	2930	25.7	4.99	0.89	0.88	0.82	91.3	91.3	88.0	7.0	2.3	2.8	0.203	160
18.5	25	160L	MJ160	MJ16L293	2930	31.2	6.15	0.90	0.89	0.86	91.8	91.8	90.0	7.0	2.4	3.0	0.268	177
*22	30	180L	MJ180	MJ18L233	2935	37.7	7.70	0.88	0.88	0.83	92.2	92.2	90.0	7.0	2.3	2.7	0.34	231
30	40	200L	MJ200	MJ20L2A3	2955	50.5	9.89	0.89	0.86	0.80	93.0	93.0	91.0	7.0	2.5	2.6	0.61	320
37	50	200L	MJ200	MJ20L253	2955	62.0	12.2	0.89	0.86	0.80	93.3	93.3	91.5	7.0	2.4	2.5	0.61	320
45	60	225M	MJ225	MJ22M253	2970	75.0	14.8	0.89	0.87	0.83	93.7	93.7	92.0	7.0	2.3	2.7	1.13	449
*55	75	280S	MJ280	MJ28S213	2965	88.5	18.1	0.92	0.91	0.86	94.0	94.0	92.0	7.0	2.3	2.7	2.63	690
75	100	280M	MJ280	MJ28M233	2970	121	24.6	0.91	0.89	0.84	94.6	94.6	92.0	7.0	2.2	2.8	3.01	740
90	120	280M	MJ280	MJ28M253	2970	143	29.5	0.92	0.90	0.85	95.0	95.0	92.0	7.0	2.2	2.8	3.42	765
110	150	315S	MJ315	MJ31S233	2982	177	35.9	0.91	0.87	0.79	95.0	95.0	92.5	7.0	2.2	2.70	5.0	1050
125	170	315M	MJ315	MJ31M2A3	2982	201	40.8	0.91	0.87	0.78	95.3	94.4	92.5	7.0	2.2	2.70	5.0	1050
132	180	315M	MJ315	MJ31M233	2982	212	43.1	0.91	0.87	0.79	95.3	94.4	92.5	7.0	2.2	2.70	5.0	1050
150	200	315L	MJ315	MJ31L2A3	2982	243	49.0	0.90	0.85	0.77	95.6	94.8	93.8	7.0	2.2	2.70	6.2	1240
160	215	315L	MJ315	MJ31L253	2982	259	52.3	0.90	0.86	0.79	95.6	95.0	94.0	7.0	2.2	2.70	6.2	1240
180	240	315L	MJ315	MJ31L2B3	2982	291	58.8	0.90	0.86	0.79	95.6	95.2	94.3	7.0	2.2	2.70	7.7	1500
**200	270	315L	MJ315	MJ31L273	2982	323	65.3	0.90	0.86	0.79	95.7	95.4	94.5	7.0	2.2	2.70	7.7	1500

Note: • Efficiency class 'eff1' will be punched on the name plate as per IS : 12615-2004 (Rev-1) from 0.37kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These ratings are offered in higher frame size with eff2 efficiency level.
(**) These ratings are suitable for 40°C ambient temperature.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 315L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)

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

Table-MJ-4P **1500 rpm (4-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff1			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	80	MJ80	MJ080413	1415	0.95	0.225	0.74	0.68	0.55	73.0	70.0	64.0	4.5	2.4	2.6	0.0061	31
0.55	0.75	80	MJ80	MJ080433	1420	1.33	0.377	0.74	0.64	0.50	78.0	78.0	70.0	5.0	2.8	3.0	0.0072	32
0.75	1.0	80	MJ80	MJ080453	1410	1.67	0.518	0.76	0.67	0.55	82.5	82.5	77.0	5.0	2.8	3.0	0.0082	33
*1.1	1.5	90L	MJ90	MJ09L423	1430	2.35	0.75	0.77	0.70	0.57	83.8	83.8	80.0	5.0	2.4	2.8	0.015	50
*1.5	2.0	100L	MJ100	MJ10L453	1430	3.1	1.02	0.80	0.74	0.60	85.0	85.0	82.0	6.5	2.6	3.0	0.026	63
*2.2	3.0	112M	MJ112	MJ11M433	1435	4.30	1.49	0.82	0.74	0.60	86.4	86.4	84.0	6.0	2.6	3.0	0.530	70
*3.7	5.0	132M	MJ132	MJ13M433	1445	7.10	2.49	0.82	0.78	0.63	88.3	88.3	86.0	6.5	2.7	3.0	0.113	105
*5.5	7.5	132M	MJ132	MJ13M473	1455	10.1	3.68	0.85	0.80	0.71	89.5	89.5	88.0	7.0	2.6	3.0	0.134	113
*7.5	10	160M	MJ160	MJ16M4A3	1455	13.8	5.02	0.84	0.82	0.73	90.1	90.1	88.0	6.5	2.5	2.8	0.141	142
9.3	12.5	160M	MJ160	MJ16M4C3	1460	17.0	6.20	0.84	0.82	0.73	90.5	90.5	88.0	6.5	2.5	2.8	0.177	146
11	15	160M	MJ160	MJ16M4K3	1460	19.7	7.34	0.85	0.83	0.76	91.5	91.5	89.5	7.0	2.7	2.9	0.204	158
*15	20	180L	MJ180	MJ18L433	1465	27.1	9.97	0.84	0.81	0.72	91.8	91.8	90.0	7.0	2.5	2.8	0.460	215
18.5	25	180L	MJ180	MJ18L473	1465	33.2	12.30	0.84	0.81	0.72	92.2	92.2	90.5	7.0	2.5	2.8	0.54	230
*22	30	200L	MJ200	MJ20L433	1470	38.9	14.60	0.85	0.80	0.72	92.6	92.6	91.0	7.0	2.6	3.0	0.86	305
30	40	200L	MJ200	MJ20L453	1470	52.0	19.88	0.86	0.85	0.80	93.2	93.2	91.0	7.0	2.6	2.6	0.93	319
37	50	225M	MJ225	MJ22M433	1470	63.0	24.50	0.87	085	0.77	93.6	93.6	91.6	7.0	2.6	2.6	1.60	430
45	60	250M	MJ250	MJ25M4A3	1470	75.8	29.82	0.88	0.86	0.78	93.9	93.9	91.9	7.0	2.6	2.6	2.83	530
55	75	250M	MJ250	MJ25M413	1480	93.5	36.20	0.87	0.85	0.78	94.2	94.2	92.8	7.0	2.5	2.6	2.83	530
75	100	280S	MJ280	MJ28S413	1480	122	49.40	0.88	0.86	0.80	94.7	94.7	93.0	7.0	2.2	2.5	5.00	705
90	120	280M	MJ280	MJ28M433	1480	150	59.20	0.88	0.86	0.80	95.0	95.0	93.2	7.0	2.2	2.5	6.00	725
110	150	315S	MJ315	MJ31S413	1485	185	72.10	0.87	0.85	0.79	95.2	95.2	93.2	6.0	2.2	2.5	8.70	1020
125	170	315M	MJ315	MJ31M4A3	1486	207	81.90	0.88	0.85	0.79	95.5	95.5	94.0	6.0	2.2	2.5	10.20	1090
132	180	315M	MJ315	MJ31M433	1486	218	86.50	0.88	0.86	0.80	95.5	95.5	94.0	6.0	2.2	2.5	10.20	1090
150	200	315L	MJ315	MJ31L4A3	1487	248	98.30	0.88	0.86	0.80	95.7	95.5	94.1	6.0	2.2	2.5	12.20	1270
160	215	315L	MJ315	MJ31L453	1487	264	104.8	0.88	0.87	0.80	95.8	95.5	94.2	6.0	2.2	2.5	12.20	1270
180	240	315L	MJ315	MJ31L463	1487	294	117.90	0.89	0.87	0.80	95.8	95.5	94.3	6.0	2.2	2.5	13.40	1340
**200	270	315L	MJ315	MJ31L473	1487	330	131.00	0.88	0.87	0.80	95.8	95.5	94.3	6.0	2.2	2.5	14.60	1400

Note: • Efficiency class 'eff1' will be punched on the name plate as per IS : 12615-2004 (Rev-1) from 0.37kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with 'eff1' efficiency level.
(**) These ratings are suitable for 40°C ambient temperature.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 280S/M

eff1

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

Ambient : 45°c
Duty : S1 (Continuous)

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

Table-MJ-6P **1000 rpm (6-Pole)**

Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff1			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	80	MJ80	MJ080613	910	1.05	0.396	0.70	0.60	0.48	70.0	70.0	68.0	3.0	2.1	2.3	0.0060	31
0.55	0.75	80	MJ80	MJ080633	915	1.50	0.59	0.71	0.62	0.48	72.0	72.0	68.0	4.0	2.2	2.5	0.0084	32
*0.75	1.0	90L	MJ90	MJ09L633	925	1.93	0.79	0.72	0.61	0.50	75.0	75.0	72.0	4.0	2.0	2.5	0.0122	48
1.1	1.5	90L	MJ90	MJ09L653	930	2.75	1.15	0.72	0.61	0.50	77.3	77.3	73.0	4.0	2.0	2.6	0.0160	50
1.5	2.0	100L	MJ100	MJ10L633	935	3.60	1.56	0.72	0.60	0.52	79.6	79.6	75.0	4.5	2.0	2.5	0.025	60
2.2	3.0	112M	MJ112	MJ11M653	940	5.00	2.28	0.75	0.65	0.58	82.2	82.2	80.5	5.0	2.1	2.5	0.065	71
*3.7	5.0	132M	MJ132	MJ13M633	950	8.00	3.80	0.76	0.68	0.51	85.1	85.1	82.0	5.5	2.0	2.5	0.130	108
5.5	7.5	132M	MJ132	MJ13M693	960	11.2	5.58	0.78	0.71	0.60	86.8	86.8	79.0	6.0	2.5	2.7	0.193	115
7.5	10	160M	MJ160	MJ16M633	960	14.7	7.61	0.80	0.74	0.64	88.5	88.5	86.5	5.4	2.0	2.5	0.276	149
9.3	12.5	160L	MJ160	MJ16L663	960	18.1	9.44	0.80	0.74	0.64	89.3	89.3	88.0	5.5	2.1	2.5	0.34	160
11	15	160L	MJ160	MJ16L673	965	21.3	11.10	0.80	0.77	0.70	89.7	89.7	88.0	6.0	2.0	2.5	0.40	169
15	20	180L	MJ180	MJ18L613	965	28.8	15.10	0.80	0.75	0.62	90.5	90.5	89.0	5.5	2.6	2.3	0.68	210
18.5	25	200L	MJ200	MJ20L613	975	34.0	18.50	0.83	0.78	0.70	91.3	91.3	89.0	6.0	2.6	2.3	1.00	275
22	30	200L	MJ200	MJ20L633	975	40.5	22.00	0.82	0.77	0.69	91.8	91.8	90.0	6.0	2.6	2.3	1.20	290
30	40	225M	MJ225	MJ22M643	975	52.5	30.00	0.86	0.84	0.80	92.6	92.6	90.0	7.0	2.5	2.2	2.41	444
37	50	250M	MJ250	MJ25M633	980	63.0	36.80	0.88	0.85	0.80	93.0	93.0	92.0	6.0	2.5	2.3	3.72	573
45	60	280S	MJ280	MJ28S613	980	80.7	44.70	0.83	0.80	0.70	93.5	93.5	92.0	6.0	2.5	2.4	5.11	615
55	75	280M	MJ280	MJ28M633	980	96.0	54.70	0.85	0.83	0.73	93.8	93.8	92.0	6.0	2.4	2.4	6.16	665
75	100	315S	MJ315	MJ31S613	985	130	74.10	0.85	0.82	0.75	94.6	94.6	93.5	6.0	2.4	2.5	10.70	940
90	120	315M	MJ315	MJ31M633	987	157	88.80	0.84	0.81	0.72	94.8	94.8	93.5	6.0	2.3	2.5	12.40	1005
110	150	315M	MJ315	MJ31M653	988	189	108.4	0.85	0.82	0.73	95.0	95.0	94.0	6.0	2.3	2.5	15.50	1110
125	170	315L	MJ315	MJ31L6A3	988	215	123.2	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	18.00	1295
132	180	315L	MJ315	MJ31L673	988	227	130.0	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	18.00	1295
150	170	315L	MJ315	MJ31L6B3	988	258	147.8	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	21.50	1425
160	215	315L	MJ315	MJ31L693	988	275	158.0	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	21.50	1425

Note: • Efficiency class 'eff1' will be punched on the name plate as per IS : 12615-2004 (Rev-1) from 0.37kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with 'eff1' efficiency level.

FLAME PROOF MOTORS Ex(d)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 315L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)

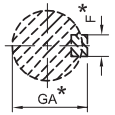
Ins. Class : F
Temp. Rise : B
Protection : IP55

Table-MJ-8P **750 rpm (8-Pole)**

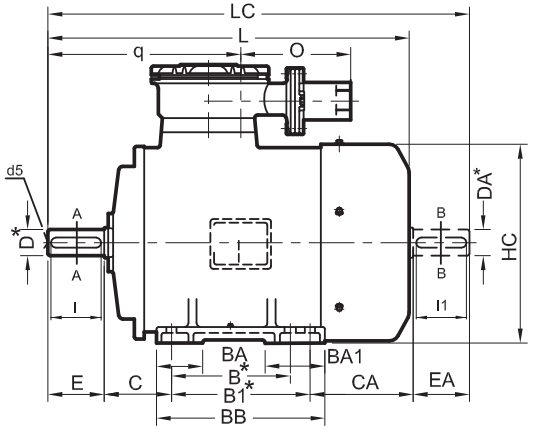
Rated Output		Frame size		Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg
					Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff1)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	BBL					FL	3/4L	1/2L	FL	3/4L	1/2L					
*0.37	0.50	90L	MJ90	MJ09L833	700	1.22	0.515	0.63	0.52	0.41	66.8	60.0	52.0	2.7	1.8	2.1	0.013	46
0.55	0.75	90L	MJ90	MJ09L853	690	1.71	0.776	0.63	0.53	0.43	71.1	67.0	62.0	2.9	2.0	2.4	0.014	48
0.75	1.0	100L	MJ100	MJ10L813	685	1.94	1.07	0.73	0.63	0.50	73.8	73.8	67.0	3.0	1.7	2.0	0.023	55
1.1	1.5	100L	MJ100	MJ10L833	690	2.83	1.55	0.71	0.62	0.48	76.2	76.2	73.0	3.3	1.9	2.3	0.027	59
1.5	2.0	112M	MJ112	MJ11M813	705	3.82	2.07	0.70	0.62	0.50	77.9	77.9	75.0	3.8	1.7	2.2	0.051	65
*2.2	3.0	132M	MJ132	MJ13M813	710	5.35	3.02	0.71	0.60	0.46	80.5	80.5	78.0	3.7	1.6	2.2	0.099	100
3.7	5.0	160M	MJ160	MJ16M813	720	8.00	5.01	0.78	0.74	0.65	83.0	83.0	78.0	4.4	1.8	2.0	0.217	137
5.5	7.5	160M	MJ160	MJ16M833	720	11.5	7.44	0.78	0.74	0.65	85.1	85.1	82.0	4.8	1.9	2.2	0.299	151
7.5	10	160L	MJ160	MJ16L873	715	15.5	10.2	0.78	0.74	0.65	86.4	86.4	84.0	5.5	2.1	2.2	0.40	167
*9.3	12.5	180L	MJ180	MJ18L813	720	18.8	12.6	0.79	0.74	0.64	87.3	87.3	85.0	5.0	2.1	2.2	0.62	205
11	15	180L	MJ180	MJ18L833	720	22.0	14.9	0.79	0.74	0.64	88.1	88.1	87.0	5.0	2.1	2.2	0.72	215
15	20	200L	MJ200	MJ20L833	720	28.6	20.3	0.82	0.79	0.71	89.0	89.0	88.0	6.0	2.5	2.3	1.32	330
18.5	25	225S	MJ225	MJ22S823	725	36.3	24.9	0.79	0.77	0.69	89.8	89.8	88.0	5.5	2.1	2.2	2.10	419
22	30	225M	MJ225	MJ22M833	725	43.0	29.6	0.79	0.77	0.69	90.2	90.2	88.0	5.5	2.1	2.2	2.41	430
30	40	250M	MJ250	MJ25M813	730	55.5	40.0	0.82	0.78	0.68	91.5	91.5	89.0	6.0	2.5	2.2	3.72	575
37	50	280S	MJ280	MJ28S823	730	71.0	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	650
45	60	280M	MJ280	MJ28M853	730	86.0	60	0.79	0.75	0.65	92.4	92.4	90.0	5.5	2.2	2.2	6.86	710
55	75	315S	MJ315	MJ31S813	740	105	72.4	0.78	0.73	0.64	93.0	92.5	90.5	5.5	2.1	2.4	10.70	945
75	100	315M	MJ315	MJ31M833	740	143	98.7	0.78	0.73	0.64	93.5	93.5	92.0	5.5	2.1	2.4	12.40	1010
90	120	315M	MJ315	MJ31M853	740	171	118.5	0.78	0.73	0.64	94.0	94.0	93.0	5.5	2.1	2.4	15.50	1120
110	150	315L	MJ315	MJ31L873	740	208	145	0.78	0.73	0.64	94.3	94.0	93.0	5.5	2.1	2.4	18.00	1300
125	170	315L	MJ315	MJ31L8A3	740	236	164.5	0.78	0.73	0.64	94.6	94.4	93.6	5.5	2.1	2.4	21.50	1425
132	180	315L	MJ315	MJ31L893	740	248	174	0.78	0.73	0.64	94.8	94.7	94.0	5.5	2.1	2.4	21.50	1425

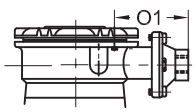
Note: • All motors conform to efficiency class 'eff1' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS:325.
• Efficiency measurements are without seals.(*) These motors are offered in higher frame size with 'eff1' efficiency level.

DIMENSIONAL DETAILS: FLAME PROOF MOTORS TYPE MD/MJ FOOT MOUNTED (B3) TEFC eff2/eff1 SERIES FRAME 80-315L



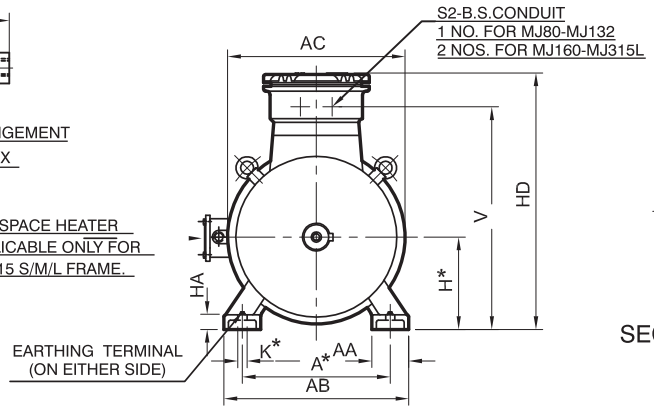
SECTION A–A

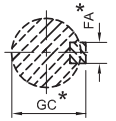




TERMINAL BOX ARRANGEMENT
WITHOUT SEALING BOX

FOR SPACE HEATER
APPLICABLE ONLY FOR
MJ 315 S/M/L FRAME.





SECTION B–B

			FIXING			GENERAL														TERMINAL BOX				SHAFT					
IEC Fr. size	BBL Fr. size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	L	LC	CA	AC	V	O	O1	q	S2 B.S.C	D, DA*	E EA	F* FA*	GA* GC*	I I1	d5
80	MJ80	2,4 & 6	125	100	-	50	80	10	153	126	32	36	-	10	162	296	330	386	156	164	236	214	135	168	3/4"	19	40	6	21.5	35	M6
90L	MJ90	2,4,6 & 8	140	125	-	56	90	10	180	160	50	40	-	13	177	336	382	463	182	174	269	217	141	195	3/4"	24	50	8	27	45	M8
100L	MJ100	2,4,6 & 8	160	140	-	63	100	12	200	176	54	45	-	14	198	358	435	520	197	195	291	207	131	225	1"	28	60	8	31	55	M10
112M	MJ112	2,4,6 & 8	190	140	-	70	112	12	230	176	50	55	-	15	222	374	456	539	209	220	316	200	124	233	1"	28	60	8	31	55	M10
132M	MJ132	2	216	178	-	89	132	12	256	218	64	54	-	17	262	422	551	660	225	260	355	175	100	282	1"	38	80	10	41	70	M12
		4,6 & 8															543	652												
160M/L	MJ160	2	254	210	254	108	160	15	314	294	60	70	115	20	317	472	704	839	247	314	404	252	151	365	1"	42	110	12	45	105	M16
		4,6 & 8															694	829												
180L	MJ180	2,4,6 & 8	279	279	-	121	180	15	339	339	80	75	-	26	357	515	720	842	200	354	447	270	238	370	1 ½"	48	110	14	51.5	100	M16
200L	MJ200	2	318	305	-	133	200	19	398	355	85	85	-	32	397	556	805	927	235	394	488	237	133	395	2"	55	110	16	59	100	M20
		4,6 & 8															771	893												
225S/M	MJ225	2	356	286	311	149	225	19	436	361	85	85	110	34	447	651	799	918	238	444	564	308	264	414	2"	55	110	16	59	100	M20
		4,6 & 8															829	948						444		60	140	18	64	130	
250M	MJ250	2	406	349	-	168	250	24	506	425	100	115	-	42	495	688	915	1065	268	489	601	287	242	474	2"	60	140	18	64	130	M20
		4,6 & 8																								65	140	18	69	130	
280S/M	MJ280 S/M	2	457	368	419	190	280	24	540	490	110	110	149	42	552	755	1010	1157	271	544	668	252	207	517	2"	65	140	18	69	130	M20
		4,6 & 8																								75	140	20	79.5	130	
315S/M	MJ315 S/M	2	508	406	457	216	315	28	625	540	120	115	155	45	617	850	1133	1293	336	606	758	323	323	584	2 ½"	65	140	18	69	130	M20
		4,6 & 8															1163	1353						614		80	170	22	85.5	160	
315L	MJ315L	2	508	508	-	216	315	28	625	593	120	115	115	45	617	850	1298	1458	454	606	758	323	323	666	2 ½"	65	140	18	69	130	M20
		4,6 & 8															1328	1518						696		80	170	22	85.5	160	

TABLE A

eff1 series		
Pole	L	LC
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
4	551	660
–	–	–
4	704	839
–	—	–
–	–	–
4	805	927
–	–	–
4	847	966
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–

Tolerances on Dimensions with*

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

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

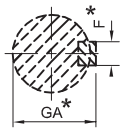
- Separate sp. heater T. Box will be provided as a std. feature in case of MJ 315 S/M/L frames.
- Key / key way fit: h9 / N9.
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.

Special Remarks for eff1 series motors
TABLE A indicates overall length of eff1 series motors wherever different from eff2 series motors

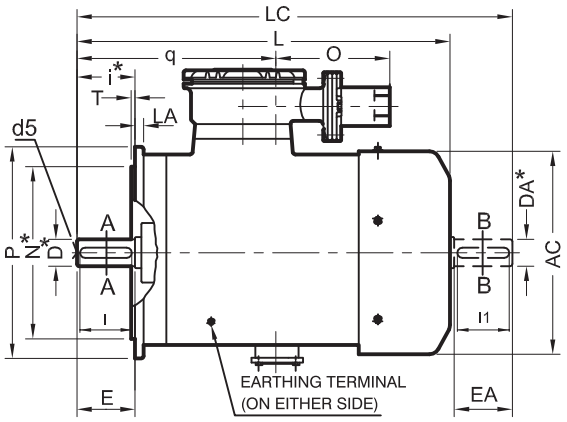
All Dimensions are in mm unless otherwise specified.

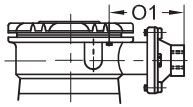
CAT-D-8031-3-1

DIMENSIONAL DETAILS: FLAME PROOF MOTORS TYPE MD/MJ FLANGE MOUNTED (B5) TEFC eff2/eff1 SERIES FRAME 80-315L

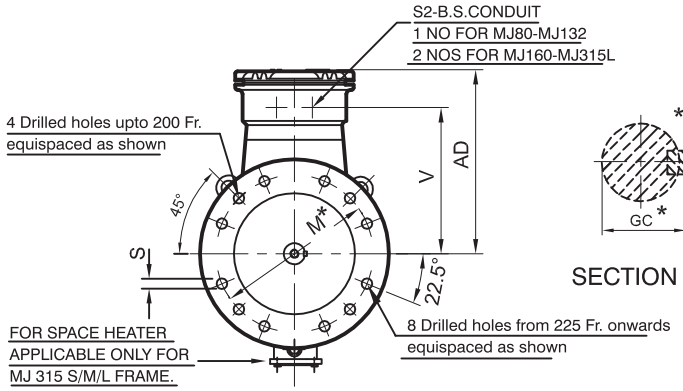


SECTION A-A





TERMINAL BOX ARRANGEMENT
WITHOUT SEALING BOX



SECTION B–B

TABLE A

IEC Fr. size	BBL Fr. size	Pole	FIXING P	FIXING N*	FIXING M*	FIXING i*	FIXING S	GENERAL T	GENERAL LA	GENERAL AC	GENERAL L	GENERAL LC	GENERAL AD	TERMINAL BOX V	TERMINAL BOX O	TERMINAL BOX O1	TERMINAL BOX q	TERMINAL BOX S2 B.S.C	SHAFT D,DA*	SHAFT E EA	SHAFT F* FA*	SHAFT GA* GC*	SHAFT I I1	SHAFT d5
80	MJ80	2,4 & 6	200	130	165	40	12	3.5	11	164	330	386	216	156	214	135	168	3/4"	19	40	6	21.5	35	M6
90L	MJ90	2,4,6 & 8	200	130	165	50	12	3.5	11	174	382	463	246	179	217	141	195	3/4"	24	50	8	27	45	M8
100L	MJ100	2,4,6 & 8	250	180	215	60	15	4	12	195	435	520	258	191	207	131	225	1"	28	60	8	31	55	M10
112M	MJ112	2,4,6 & 8	250	180	215	60	15	4	12	220	456	539	262	204	200	124	233	1"	28	60	8	31	55	M10
132M	MJ132	2	300	230	265	80	15	4	13	260	551	660	290	223	175	100	282	1"	38	80	10	41	70	M12
		4,6 & 8									543	652												
160M/L	MJ160	2	350	250	300	110	19	5	13	314	704	839	312	244	252	151	365	1"	42	110	12	45	105	M16
		4,6 & 8									694	829												
180L	MJ180	2,4,6 & 8	350	250	300	110	19	5	16	354	745	867	335	267	270	238	395	1 ½"	48	110	14	51.5	100	M16
200L	MJ200	2	400	300	350	110	19	5	15	394	805	927	356	288	237	133	395	2"	55	110	16	59	100	M20
		4,6 & 8									771	893												
225S/M	MJ225	2	450	350	400	110	19	5	16	444	799	918	426	339	308	264	414	2"	55	110	16	59	100	M20
		4,6 & 8				140					829	948					444		60	140	18	64	130	
250M	MJ250	2	550	450	500	140	19	5	18	489	915	1065	438	351	287	242	474	2"	60	140	18	64	130	M20
		4,6 & 8																	65	140	18	69	130	
280S/M	MJ280 S/M	2	550	450	500	140	19	5	18	544	1010	1157	475	388	252	207	517	2"	65	140	18	69	130	M20
		4,6 & 8																	75	140	20	79.5	130	
315S/M	MJ315 S/M	2	660	550	600	140	24	6	22	610	1133	1293	535	443	323	323	584	2 ½"	65	140	18	69	130	M20
		4,6 & 8				170					1163	1353					614		80	170	22	85.5	160	
315L	MJ315L	2	660	550	600	140	24	6	22	610	1298	1458	535	443	323	323	666	2 ½"	65	140	18	69	130	M20
		4,6 & 8				170					1328	1518					696		80	170	22	85.5	160	

TABLE A
eff1 series

Pole	L	LC
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
4	551	660
–	–	–
4	704	839
–	—	–
–	–	–
4	805	927
–	–	–
4	847	966
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–

Tolerances on Dimensions with*

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

Dimension	Tolerance		Specification
D, DA	j6	19,24,28Ø	IS : 1231
	k6	38,42,48Ø	
	m6	55,60,65,75,80Ø	
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.

Special Remarks for eff1 series motors
TABLE A indicates overall length of eff1 series motors wherever different from eff2 series motors

All Dimensions are in mm unless otherwise specified.

Energy Efficient Increased Safety Motors – EX(e)

BBL has developed energy efficient increased safety motors for use in hazardous area-Zone 2 as per IS:5572 / IEC 60079-7:2001

These motors are conforming to IS:6381-2004 (Rev-1) as regards to all safety aspects. The efficiency values of these Energy efficient motos are conforming to IS:12615-2004 as under;

- Efficiency class (eff2) Improved efficiency
- Efficiency class (eff1) High efficiency

Product Range

Type	Frame size	kW range
Improved Efficency - ME	63 to 280M	0.12 to 90
High Effficiency - MI	71 to 355L	0.37 to 315

Special Features

Limiting Temperatures

Limiting temperatures for insulation and all parts as specified in IS : 6381 are as under;

Temp. class		T1	T2	T3	T4	T5	T6
Lower limit of ignition Temp. °C		450	300	200	135	100	85
Limiting Temp. of rotor at the end of time tE °C		450	300	200	135	100	85
Limited temp. of stator winding at the end of time tE °C	Class B	185	185	185	135	100	85
	Class F	210	210	200	135	100	85
	Class H	235	235	200	135	100	85
Limiting temp. of stator winding in continuous operation °C	Class B	110	110	110	110	100	85
	Class F	135	135	135	110	100	85
	Class H	155	155	155	110	100	85
Limiting temp. for all parts in continuous operation °C		<450	<300	<200	<135	<100	<85

Time 'tE' of Increased Safety Motors

It is the time taken for an a.c. rotor or stator winding, when carrying the initial starting current (Locked rotor current) to be heated up to the limiting temperature from the temperature reached in a rated service at the maximum ambient temperature . This time is determined separately for stator and rotor and the minimum one is taken as time 'tE'.

The current dependent protective devices must be so selected that the stalled motor will be disconnected positively within the time 'tE' i.e. before reaching the limiting temp. Temp. class and starting current are indicated on the nameplate of ME and MI type motors.

Time tE should generally be more than 1.5 times the starting time. If starting time is approximately of the order of time 'tE' motor protection becomes difficult since over current protection may operate spuriously in a repeated start. Hence for heavy and frequent starting, an enquiry should be made stating;

- Duty cycle.
- GD2 value of driven equipment referred to motor.
- Speed – Torque characteristic of driven equipment

Increased safety motor have time 'tE' of minimum 5 seconds as per IS : 6381

Operating Conditions

Supply Conditions (Voltage & Frequency)

Voltage : 415 V± 10%
Frequency : 50Hz ± 5%
Combined variation : ± 10%

Ambient

Motors are designed for ambient temperature 45°C.

Altitude

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

Terminals and Connection

External connection of power cable to the motor terminals in the terminal box must be rigidly gripped and secured against loosening and twisting. This is achieved with specially designed Terminal Plate provided in Terminal Box.

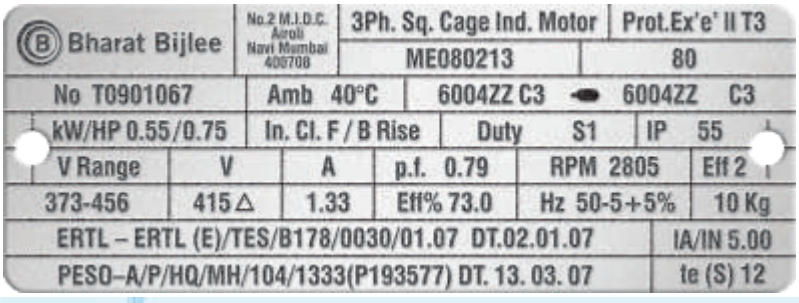
Bearing and Terminal Box Details

Frame size		Bearing nos. C3 Clearance		Terminal Box type/ Location	Terminal		Cable entries No. & size in B.S.C	Max cond Cross Sec. area mm2
		DE	NDE		No.	size		
63		6201 2Z	6201 2Z	Gk130/ TOP	3*	M5	1x 3/4'	6
71		6202 2Z	6202 2Z					
80		6004 2Z	6004 2Z					
90S, 90L		6205 2Z	6205 2Z	Gk130/ RHS	3*			
100L		6206 2Z	6205 2Z	gk230/ RHS	3*		2x1"	10
112M		6206 2Z	6205 2Z					
132S.132M		6208 2Z	6208 2Z	gk330 RHS	6	M6		16
160M,160L		6309 2Z	6209 2Z					
160M/L 4P-eff1)		6309 2Z	6210 2Z	TB180				
**180M, 180L		6310 2Z	6210 2Z				2x 1½"	50
180M, 180L (4P-eff1)		63102Z	6309 2Z					
200L		6312	6212	TB225/ RHS	6	M8	2x2"	70
225S, 225M		6313	6213					
250M		6315	6215	TB280 TOP	6	M10		150
280 S/M	2p	6316	6316					
	4, 6, & 8P	6317	6316					
315S, 315M		6319	6319	TB315/ TOP	6	M12	2x2"	240
315L							2x2½"	
355L		6322	6322	TB355/ TOP	6	M16	2x3"	300

**22kW / 4P ME type eff2 series motors will have 6309 2Z bearing on NDE
*3 Terminals upto & including 1.5 kW & 6 for higher outputs.

Alternate T. Box location can be offered as follows:

Frame size	T. Bo. Location
90S to 225M	LHS and TP
250M to 355L	RHS and LHS



Winding and Rotor Cage

The stator winding and rotor cage are so designed that limiting temperature specified in IS : 6381 are not exceeded even at the end of time tE. Winding wires used have dual enamel coating as per IS : 13730 part 13. Gel coat is applied on winding overhang as an additional protection against ingress of moisture.

Air gap

Radial air gap of the motor is such that the minimum air gap values specified in IS : 6381 are complied with.

Enclosure and Degree of Protection

All Increased safety motors are with totally enclosed fan cooled (TEFC) consutruction with degree of protection IP55 as per IS : 4691 as a standard feature. In addition all flange mounted motors (B5 and B14) have Oil Tight Shaft (OTS) protection. Motor with V1, V5 and V18 mounting are provide with a canopy fitted on the top of the fan cover.

Paint

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

Name plate

Stainless Steel name plate is provided with each motor. Special data such as efficiency class, time tE, ratio of Starting current to rated current, temperature class and statutory approval reference are also provided on the nameplate along with the usual name plate details.

Certification

Increased safety motors are approved by Petroleum and Explosive Safety Organisation (PESO), Nagpur. A declaration to this effect is incorporated on the nameplate.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 63 to 280M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-ME-2P **3000 rpm (2-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff2)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.18	0.25	63	ME063213	2720	0.57	0.064	0.76	0.66	0.52	58.0	57.0	52.0	3.2	2.7	3.0	0.00085	5	20
0.25	0.35	63	ME063233	2720	0.66	0.090	0.82	0.75	0.63	65.0	60.0	54.0	3.5	2.4	2.6	0.00099	5	20
0.37	0.50	71	ME071213	2790	0.95	0.130	0.80	0.72	0.60	68.0	65.0	61.0	4.0	2.3	2.8	0.0015	6	15
0.55	0.75	71	ME071233	2805	1.33	0.190	0.79	0.72	0.58	73.0	73.0	71.0	5.0	2.7	3.0	0.0019	7	15
0.75	1.0	80	ME080213	2830	1.65	0.258	0.82	0.74	0.62	77.0	76.0	72.0	5.0	2.5	2.8	0.0037	10	12
1.1	1.5	80	ME080233	2840	2.35	0.377	0.82	0.75	0.63	79.0	79.0	76.0	5.9	2.7	3.0	0.0051	11	12
1.5	2.0	90S	ME09S233	2825	3.0	0.517	0.86	0.83	0.76	80.6	78.0	74.0	5.5	2.7	3.0	0.0071	19	10
2.2	3.0	90L	ME09L253	2830	4.36	0.757	0.85	0.82	0.74	82.5	80.0	76.0	6.0	3.0	3.0	0.0093	23	10
3.7	5.0	100L	ME10L213	2900	7.05	1.24	0.86	0.80	0.70	85.0	83.0	78.0	6.5	2.8	3.0	0.0188	33	8
5.5	7.5	132S	ME13S233	2920	10.1	1.84	0.88	0.85	0.77	86.0	85.0	80.0	6.5	2.3	3.0	0.0690	65	10
7.5	10.0	132S	ME13S253	2920	13.7	2.50	0.88	0.84	0.76	87.0	86.0	82.0	6.5	2.5	3.0	0.0820	69	10
9.3	12.5	132M	ME13M293	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	77	10
11	15	160M	ME16M233	2920	19.3	3.67	0.89	0.88	0.85	89.0	88.0	86.0	5.8	2.0	3.0	0.150	108	8
15	20	160M	ME16M263	2920	25.9	5.00	0.90	0.89	0.85	89.5	89.0	87.0	6.0	2.0	3.0	0.203	122	8
18.5	25	160L	ME16L293	2920	31.6	6.17	0.90	0.88	0.86	90.5	90.0	88.0	6.5	2.0	3.0	0.268	141	7
22	30	180M	ME18M233	2930	37.5	7.31	0.89	0.87	0.80	91.5	90.5	88.0	6.5	2.2	2.7	0.34	177	8
30	40	200L	ME20L253	2955	51.2	9.89	0.88	0.85	0.79	92.6	92.0	89.5	6.5	2.5	2.5	0.61	274	8
37	50	200L	ME20L273	2955	62.9	12.2	0.88	0.85	0.79	93.0	92.5	91.0	6.5	2.5	2.5	0.64	285	7
45	60	225M	ME22M253	2960	74.5	14.8	0.90	0.87	0.83	93.3	92.8	91.0	6.0	2.5	2.5	1.31	361	12
55	75	250M	ME25M213	2960	89.0	18.1	0.92	0.91	0.86	93.3	92.8	91.5	6.5	2.1	2.6	2.11	523	12
*75	100	280M	ME28M233	2970	122	24.6	0.91	0.89	0.84	94.0	93.0	91.0	6.0	1.9	2.7	3.01	728	12
90	120	280M	ME28M253	2970	145	29.5	0.92	0.90	0.85	94.0	93.0	91.0	6.0	1.9	2.7	3.42	750	12

Note : • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with 'eff2' efficiency level.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 63 to 280M

eff2

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

Ambient : 45°C
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-ME-4P **1500 rpm (4-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.12	0.16	63	ME063413	1330	0.41	0.088	0.75	0.65	0.50	54.0	48.0	40.0	2.4	1.9	2.3	0.0014	5	20
0.18	0.25	63	ME063433	1350	0.56	0.130	0.75	0.65	0.50	60.0	56.0	50.0	3.0	2.0	2.3	0.0016	5	20
0.25	0.35	71	ME071413	1370	0.72	0.178	0.76	0.63	0.51	64.0	62.0	55.0	3.0	2.0	2.5	0.0024	6	15
0.37	0.50	71	ME071433	1360	1.02	0.265	0.71	0.62	0.50	71.0	70.0	64.0	3.4	2.3	2.5	0.0033	7	15
0.55	0.75	80	ME080413	1405	1.30	0.381	0.81	0.70	0.56	74.0	71.0	67.0	4.0	2.4	2.6	0.0061	10	15
0.75	1.0	80	ME080433	1405	1.75	0.52	0.78	0.70	0.58	77.0	76.0	72.0	4.5	2.8	3.0	0.0072	11	15
1.1	1.5	90S	ME09S433	1410	2.45	0.76	0.80	0.73	0.61	78.0	77.0	72.0	4.2	2.3	2.7	0.012	19	15
1.5	2.0	90L	ME09L453	1410	3.25	1.03	0.80	0.72	0.58	80.0	79.0	75.0	4.8	2.5	3.0	0.016	23	15
2.2	3.0	100L	ME10L433	1420	4.55	1.51	0.82	0.69	0.53	82.0	80.0	76.0	5.7	2.5	3.0	0.021	31	15
3.7	5.0	112M	ME11M433	1430	7.30	2.52	0.83	0.76	0.65	85.0	85.0	82.0	6.0	2.6	3.0	0.053	46	8
5.5	7.5	132S	ME13S453	1445	10.4	3.71	0.85	0.80	0.68	86.0	85.0	83.0	6.0	2.2	3.0	0.127	66	8
7.5	10.0	132M	ME13M483	1445	14.5	5.06	0.83	0.78	0.68	87.0	87.0	85.0	6.0	2.5	3.0	0.150	78	8
9.3	12.5	160M	ME16M4C3	1450	17.1	6.25	0.86	0.82	0.77	88.0	88.0	87.0	6.0	2.0	2.5	0.177	100	8
11	15	160M	ME16M4F3	1450	20.5	7.39	0.84	0.81	0.76	89.0	89.0	86.0	6.0	2.1	2.5	0.193	107	8
15	20	160L	ME16L4P3	1450	27.6	10.08	0.84	0.83	0.79	90.2	90.5	90.0	6.0	2.1	2.5	0.265	132	8
*18.5	25	180L	ME18L473	1460	33.2	12.30	0.85	0.82	0.72	91.2	91.2	90.0	6.0	2.4	2.5	0.54	188	10
22	30	180L	ME18L493	1460	39.0	14.70	0.86	0.82	0.72	91.8	91.5	90.0	6.0	2.4	2.5	0.59	195	10
30	40	200L	ME20L433	1465	51.5	19.90	0.88	0.84	0.77	92.0	92.0	90.0	6.0	2.6	2.5	0.86	261	10
37	50	225S	ME22S413	1470	64.0	24.50	0.87	0.83	0.75	93.0	93.0	91.0	6.0	2.5	2.5	1.32	326	8
45	60	225M	ME22M433	1470	76.5	29.80	0.88	0.84	0.75	93.2	93.2	91.0	6.0	2.5	2.5	1.60	362	10
55	75	250M	ME25M413	1475	94.0	36.30	0.87	0.85	0.78	93.8	93.3	91.5	6.0	2.5	2.6	2.83	530	12
*75	100	280M	ME28S433	1480	124	49.40	0.89	0.89	0.83	94.2	94.0	93.0	6.0	2.2	2.5	6.00	703	10
90	120	280M	ME28M453	1480	149	59.20	0.89	0.87	0.81	94.7	94.3	93.2	6.0	2.2	2.5	6.63	735	10

Note : •All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with 'eff2' efficiency level.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 71 to 280S/M

eff2

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

Ambient : 45°c
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-ME-6P **1000 rpm (6-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff2)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.25	0.35	71	ME071633	875	0.81	0.278	0.70	0.60	0.48	61.0	61.0	52.0	2.6	2.0	2.3	0.0038	7	15
0.37	0.50	80	ME080613	910	1.10	0.396	0.70	0.60	0.48	68.0	66.0	61.0	3.0	2.1	2.3	0.0060	10	15
0.55	0.75	80	ME080633	915	1.56	0.590	0.71	0.62	0.48	69.0	70.0	64.0	4.0	2.2	2.5	0.0084	11	15
0.75	1.0	90S	ME09S633	925	2.00	0.790	0.72	0.61	0.50	73.0	70.0	69.0	3.4	2.0	2.5	0.0122	18	15
1.1	1.5	90L	ME09L653	930	2.80	1.15	0.72	0.61	0.50	76.0	74.0	72.0	4.0	2.1	2.6	0.0160	23	15
1.5	2.0	100L	ME10L633	935	3.76	1.56	0.72	0.64	0.52	77.0	75.0	72.0	3.9	2.0	2.5	0.025	31	15
2.2	3.0	112M	ME11M633	935	5.05	2.29	0.77	0.68	0.55	79.0	79.0	74.0	5.0	2.0	2.5	0.050	43	15
3.7	5.0	132S	ME13S633	950	8.00	3.80	0.76	0.63	0.49	85.0	84.0	82.0	5.5	2.0	2.5	0.130	62	10
5.5	7.5	132M	ME13M673	960	11.5	5.58	0.78	0.71	0.59	85.0	83.0	78.0	5.5	2.5	2.75	0.183	79	10
7.5	10.0	160M	ME16M633	960	14.8	7.61	0.80	0.74	0.64	88.0	88.0	86.0	5.4	2.0	2.5	0.276	102	12
9.3	12.5	160L	ME16L663	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	87.0	5.5	2.1	2.5	0.34	119	12
11	15	160L	ME16L673	965	21.6	11.1	0.80	0.77	0.70	88.5	88.0	87.0	6.0	2.0	2.5	0.40	129	12
15	20	180L	ME18L613	965	29.0	15.1	0.80	0.75	0.62	90.0	90.0	87.0	5.5	2.6	2.3	0.68	175	10
18.5	25	200L	ME20L613	975	34.0	18.5	0.83	0.78	0.70	91.0	91.0	88.0	5.8	2.6	2.3	1.00	229	10
22	30	200L	ME20L633	975	40.5	22.0	0.83	0.78	0.70	91.0	91.0	88.0	5.8	2.6	2.3	1.20	246	10
30	40	225M	ME22M623	975	52.3	30.0	0.87	0.84	0.76	91.8	91.0	88.0	6.0	2.3	2.2	2.1	334	12
37	50	250M	ME25M603	975	63.5	37.0	0.88	0.85	0.82	92.5	92.5	91.0	6.0	2.5	2.3	3.51	515	12
45	60	280S	ME28S613	980	80.7	44.7	0.83	0.80	0.70	93.5	92.5	92.0	6.0	2.5	2.3	5.11	592	12
55	75	280M	ME28M633	980	96.0	54.7	0.85	0.81	0.72	93.5	93.0	92.0	6.0	2.3	2.3	6.16	640	12

Note : • All motors conform to Efficiency class eff2 as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 90S to 280S/M

eff2

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

Ambient : 45°C
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-ME-8P **750 rpm (8-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency eff2			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.37	0.50	90S	ME09S813	700	1.32	0.515	0.63	0.52	0.41	62.0	55.0	48.0	2.7	1.8	2.1	0.011	17	15
0.55	0.75	90L	ME09L853	690	1.81	0.776	0.63	0.55	0.43	67.0	62.0	58.0	2.9	2.0	2.4	0.014	20	15
0.75	1.0	100L	ME10L813	685	2.05	1.07	0.73	0.63	0.50	70.0	70.0	64.0	3.0	1.6	1.8	0.023	28	15
1.1	1.5	100L	ME10L833	690	2.91	1.55	0.71	0.62	0.48	74.0	73.0	71.0	3.3	1.9	2.3	0.027	32	15
1.5	2.0	112M	ME11M813	705	3.90	2.07	0.70	0.62	0.50	77.0	77.0	75.0	3.8	1.7	2.2	0.051	38	15
2.2	3.0	132S	ME13S813	710	5.5	3.02	0.71	0.60	0.46	78.0	78.0	75.0	3.7	1.6	2.0	0.099	57	10
3.7	5.0	160M	ME16M813	720	8.10	5.01	0.78	0.74	0.65	82.0	82.0	78.0	4.4	1.8	2.0	0.217	91	15
5.5	7.5	160M	ME16M833	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82.0	4.8	1.9	2.2	0.299	106	15
7.5	10.0	160L	ME16L873	710	15.6	10.29	0.78	0.74	0.65	86.0	84.0	82.0	5.5	2.1	2.2	0.40	130	15
9.3	12.5	180M	ME18M813	715	19.0	12.7	0.79	0.74	0.64	86.5	86.0	85.0	4.5	2.1	2.2	0.62	151	15
11	15	180L	ME18L833	720	22.2	14.9	0.79	0.74	0.64	87.5	86.5	86.0	4.5	2.1	2.2	0.72	182	15
15	20	200L	ME20L833	720	28.8	20.3	0.82	0.79	0.71	88.5	87.5	87.0	5.5	2.5	2.3	1.32	282	10
18.5	25	225S	ME22S813	725	36.6	24.9	0.79	0.77	0.69	89.0	88.0	87.0	5.3	2.1	2.2	1.95	318	12
22	30	225M	ME22M833	725	43.0	29.6	0.79	0.77	0.69	90.0	89.0	87.5	5.3	2.1	2.2	2.41	358	12
30	40	250M	ME25M813	730	56.0	40.0	0.82	0.78	0.68	91.0	90.5	89.0	5.5	2.5	2.2	3.72	528	12
37	50	280S	ME28S823	730	71.0	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	628	12
45	60	280M	ME28M853	730	86.0	60.0	0.79	0.75	0.65	92.0	92.0	91.0	5.5	2.2	2.2	6.86	684	12

Note : • All motors conform to Efficiency class 'eff2' as per IS : 12615-2004 (Rev-1) • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 71 to 355L

eff1

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

Ambient : 45°c
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-MI-2P **3000 rpm (2-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff1)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.37	0.50	71	MI0712A3	2800	0.97	0.130	0.74	0.68	0.60	72.0	72.0	66.0	5.5	2.6	3.0	0.0019	7	15
0.55	0.75	71	MI071233	2805	1.29	0.190	0.79	0.72	0.58	75.0	75.0	72.0	5.0	2.7	3.0	0.0019	7	15
0.75	1.0	80	MI080213	2830	1.64	0.256	0.82	0.74	0.62	77.5	77.5	74.0	5.0	2.5	2.8	0.0037	10	12
1.1	1.5	80	MI080233	2840	2.25	0.377	0.82	0.75	0.63	82.8	82.5	78.0	5.9	2.7	3.0	0.0051	11	12
1.5	2.0	90S	MI09S243	2840	3.00	0.514	0.82	0.78	0.68	84.1	84.1	81.0	6.5	3.3	3.5	0.0091	22	10
2.2	3.0	90L	MI09L273	2840	4.40	0.755	0.82	0.78	0.68	85.6	85.6	84.0	6.5	3.3	3.5	0.0113	28	10
3.7	5.0	100L	MI10L233	2890	6.84	1.24	0.86	0.84	0.76	87.5	87.5	85.5	7.0	3.0	3.3	0.0212	34	8
5.5	7.5	132S	MI13S253	2935	9.70	1.83	0.89	0.85	0.77	88.6	88.6	84.0	7.0	2.5	3.0	0.0820	69	10
7.5	10.0	132S	MI13S293	2935	13.1	2.49	0.89	0.85	0.77	89.5	89.5	84.5	7.0	2.5	3.0	0.0980	77	10
9.3	12.5	160M	MI16M233	2930	16.2	3.09	0.89	0.85	0.76	90.0	90.0	86.0	7.0	2.4	2.9	0.150	108	8
11	15	160M	MI16M253	2930	19.0	3.66	0.89	0.86	0.82	90.5	90.5	87.5	7.0	2.3	3.0	0.171	117	8
15	20	160M	MI16M263	2930	25.7	4.99	0.89	0.88	0.82	91.3	91.3	88.0	7.0	2.3	2.8	0.203	122	8
18.5	25	160L	MI16L293	2930	31.2	6.15	0.90	0.89	0.86	91.8	91.8	90.0	7.0	2.4	3.0	0.268	141	7
22	30	180M	MI18M233	2935	37.7	7.70	0.88	0.88	0.83	92.2	92.2	90.0	7.0	2.3	2.7	0.34	177	8
30	40	200L	MI20L253	2955	50.5	9.89	0.89	0.86	0.80	93.0	93.0	91.0	7.0	2.5	2.6	0.61	274	8
37	50	200L	MI20L273	2955	62.0	12.2	0.89	0.86	0.80	93.3	93.3	91.5	7.0	2.4	2.5	0.64	279	7
45	60	225M	MI22M253	2970	75.0	14.8	0.89	0.87	0.83	93.7	93.7	92.0	7.0	2.3	2.7	1.13	361	12
55	75	250M	MI25M233	2965	88.5	18.1	0.92	0.91	0.86	94.0	94.0	92.0	7.0	2.3	2.7	2.60	600	12
*75	100	280M	MI28M233	2970	121	24.6	0.91	0.89	0.84	94.6	94.6	92.0	7.0	2.2	2.8	3.01	728	12
90	120	280M	MI28M253	2970	143	29.5	0.92	0.90	0.88	95.0	95.0	92.0	7.0	2.2	2.8	3.42	750	12
*110	150	315S	MI31M2A3	2982	177	35.9	0.91	0.87	0.79	95.0	95.0	92.5	7.0	2.2	2.7	5.0	940	14
125	170	315M	MI31M2B3	2982	201	40.8	0.91	0.87	0.78	95.3	94.4	92.5	7.0	2.2	2.7	5.0	940	14
132	180	315M	MI31M233	2982	212	43.1	0.91	0.87	0.79	95.3	94.4	92.5	7.0	2.2	2.7	5.0	940	14
150	200	315L	MI31L2A3	2982	243	49.0	0.90	0.85	0.77	95.6	94.8	93.8	7.0	2.2	2.7	7.7	1100	14
160	215	315L	MI31L2B3	2982	259	52.3	0.90	0.86	0.79	95.6	95.0	94.0	7.0	2.2	2.7	7.7	1100	14
180	240	315L	MI31L2C3	2982	291	58.8	0.90	0.86	0.79	95.6	95.2	94.3	7.0	2.2	2.7	7.7	1100	14
**200	270	315L	MI31L273	2982	323	65.3	0.90	0.86	0.79	95.7	95.4	94.5	7.0	2.2	2.7	7.7	1100	14
250	335	355L	MI35L2A3	2985	398	81.6	0.91	0.89	0.83	96.0	95.8	95.0	7.0	1.6	2.4	14.7	1870	9
**315	425	355L	MI35L233	2985	500	102.8	0.91	0.89	0.83	96.2	96.1	95.2	7.0	1.6	2.4	14.7	1870	9

Note : • Efficiency class 'eff1' will be punched on the nameplae as per IS : 12615-2004 (Rev-1) from 0.37 kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These motors are offered in higher frame size with 'eff1' efficiency level. These rating are suitable for 40°C.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 71 to 355L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)
Temp. Class : T1, T2, T3

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

Table-MI-4P **1500 rpm (4-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD^2 kgm^2	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff1)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.37	0.50	71	MI071433	1380	1.00	0.26	0.71	0.62	0.50	73.0	73.0	68.0	3.4	2.3	2.5	0.0033	7	15
0.55	0.75	80	MI080433	1420	1.33	0.337	0.74	0.64	0.50	78.0	78.0	70.0	5.0	2.8	3.0	0.0072	11	15
0.75	1.0	80	MI080453	1410	1.67	0.518	0.76	0.67	0.55	82.5	82.5	77.0	5.0	2.8	3.0	0.0082	12	15
1.1	1.5	90S	MI09S423	1430	2.35	0.75	0.77	0.70	0.57	83.8	83.8	80.0	5.0	2.4	2.8	0.015	20	15
1.5	2.0	90L	MI09L473	1430	3.19	1.02	0.77	0.70	0.57	85.0	85.0	81.0	5.5	2.7	3.0	0.019	25	15
2.2	3.0	100L	MI10L473	1435	4.30	1.49	0.82	0.74	0.60	86.4	86.4	84.0	6.0	2.6	3.0	0.028	35	15
3.7	5.0	112M	MI11M473	1445	7.10	2.49	0.82	0.78	0.63	88.3	88.3	86.0	6.5	2.7	3.0	0.066	50	8
5.5	7.5	132S	MI13S473	1455	10.1	3.68	0.85	0.80	0.71	89.5	89.5	88.0	7.0	2.6	3.0	0.134	73	8
7.5	10.0	132M	MI13M443	1455	13.4	5.02	0.86	0.83	0.76	90.3	90.3	89.0	7.0	2.6	3.0	0.171	84	8
9.3	12.5	160M	MI16M4C3	1460	17.0	6.20	0.84	0.82	0.73	90.5	90.5	88.0	6.5	2.5	2.8	0.177	105	8
11	15	160M	MI16M4K3	1460	19.7	7.34	0.85	0.83	0.76	91.5	91.5	89.5	7.0	2.7	2.9	0.204	117	8
15	20	160L	MI16L4B3	1465	26.6	9.97	0.85	0.83	0.76	92.2	92.2	91.0	7.0	2.7	2.9	0.460	167	8
*18.5	25	180L	MI18L473	1470	32.8	12.25	0.85	0.82	0.76	92.4	92.4	91.0	7.0	2.7	2.9	0.54	188	10
22	30	180L	MI18L483	1470	38.8	14.60	0.85	0.80	0.72	92.8	92.8	92.0	7.0	2.6	3.0	0.61	200	10
30	40	200L	MI20L453	1470	52.0	19.88	0.86	0.85	0.80	93.2	93.2	91.0	7.0	2.6	2.6	0.93	280	10
37	50	225S	MI22S433	1470	63.0	24.50	0.87	0.85	0.77	93.6	93.6	91.6	7.0	2.6	2.6	1.60	362	10
45	60	225M	MI22M453	1470	75.8	29.82	0.88	0.86	0.78	93.9	93.9	91.9	7.0	2.6	2.6	1.85	390	10
55	75	250M	MI25M433	1480	93.5	36.20	0.87	0.85	0.78	94.2	94.2	92.8	7.0	2.5	2.6	3.06	550	12
*75	100	280M	MI28M433	1480	122	49.40	0.88	0.86	0.80	94.7	94.7	93.0	7.0	2.2	2.5	6.00	703	10
90	120	280M	MI28M453	1480	150	59.20	0.88	0.86	0.80	95.0	95.0	93.2	7.0	2.2	2.5	6.63	735	10
110	150	315S	MI31S413	1485	185	72.10	0.87	0.85	0.79	95.2	95.2	93.2	6.0	2.2	2.5	8.70	1020	14
125	170	315L	MI31L4A3	1486	207	81.90	0.88	0.85	0.79	95.5	95.5	94.0	6.0	2.2	2.5	12.20	1090	14
*132	180	315L	MI31L453	1486	218	86.50	0.88	0.86	0.80	95.5	95.5	94.0	6.0	2.2	2.5	12.20	1270	14
150	200	315L	MI31L4B3	1487	248	98.30	0.88	0.86	0.80	95.7	95.5	94.1	6.0	2.2	2.5	13.40	1270	14
160	215	315L	MI31L463	1487	264	104.8	0.88	0.87	0.80	95.8	95.5	94.2	6.0	2.2	2.5	13.40	1270	14
180	240	315L	MI31L4C3	1487	297	117.90	0.88	0.87	0.80	95.8	95.5	94.3	6.0	2.2	2.5	14.60	1400	14
**200	270	315L	MI31L473	1487	330	131.00	0.88	0.87	0.80	95.8	95.5	94.5	6.0	2.2	2.5	14.60	1400	14
250	335	355L	MI35L4A3	1488	410	163.6	0.88	0.85	0.75	96.3	96.2	95.3	6.5	2.2	2.5	32.70	1855	9
**315	422	355L	MI35L433	1488	517	206.2	0.88	0.85	0.75	96.4	96.3	95.5	6.5	2.2	2.5	32.70	1855	9

Note : • Efficiency class 'eff1' will be punched on the nameplae as per IS : 12615-2004 (Rev-1) from 0.37 kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals. • (*) These rating are offered in higher frame size with eff1 efficiency level.
(**) Temperature rise limited to class F.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 355L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)
Temp. Class : T1, T2, T3

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

Table-MI-6P **1000 rpm (6-Pole)**

Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff1)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.37	0.50	80	MI080613	910	1.05	0.396	0.70	0.60	0.48	70.0	70.0	68.0	3.0	2.1	2.3	0.0060	10	15
0.55	0.75	80	MI080633	915	1.50	0.59	0.71	0.62	0.48	72.0	72.0	68.0	4.0	2.2	2.5	0.0084	11	15
0.75	1.0	90S	MI09S633	925	1.93	0.79	0.72	0.61	0.50	75.0	75.0	72.0	4.0	2.0	2.5	0.0122	18	15
1.1	1.5	90L	MI09L653	930	2.75	1.15	0.72	0.61	0.50	77.3	77.3	73.0	4.0	2.0	2.6	0.0160	23	15
1.5	2.0	100L	MI10L633	935	3.6	1.56	0.72	0.60	0.52	79.6	79.6	75.0	4.5	2.0	2.5	0.025	31	15
2.2	3.0	112M	MI11M653	940	5.00	2.28	0.75	0.65	0.58	82.2	82.2	80.5	5.0	2.1	2.5	0.065	47	15
3.7	5.0	132S	MI13S633	950	8.00	3.80	0.76	0.68	0.51	85.1	85.1	82.0	5.5	2.0	2.5	0.130	62	10
5.5	7.5	132M	MI13M693	960	11.2	5.58	0.78	0.71	0.60	86.8	86.8	79.0	6.0	2.5	2.7	0.193	81	10
7.5	10.0	160M	MI16M633	960	14.7	7.61	0.80	0.74	0.64	88.5	88.5	86.5	5.4	2.0	2.5	0.276	102	12
9.3	12.5	160L	MI16L663	960	18.1	9.44	0.80	0.74	0.64	89.3	89.3	88.0	5.5	2.1	2.5	0.34	119	12
11	15	160L	MI16L673	965	21.3	11.1	0.80	0.77	0.70	89.7	89.7	88.0	6.0	2.0	2.5	0.40	129	12
15	20	180L	MI18L613	965	28.8	15.1	0.80	0.75	0.62	90.5	90.5	89.0	5.5	2.6	2.3	0.68	176	10
18.5	25	200L	MI20L613	975	34.0	18.5	0.83	0.78	0.70	91.3	91.3	89.0	6.0	2.6	2.3	1.00	234	10
22	30	200L	MI20L633	975	40.5	22.0	0.82	0.77	0.69	91.8	91.8	90.0	6.0	2.6	2.3	1.20	251	10
30	40	225M	MI22M643	975	52.5	30.0	0.86	0.84	0.80	92.6	92.6	90.0	7.0	2.5	2.2	2.45	355	12
37	50	250M	MI25M633	980	63.0	36.8	0.88	0.85	0.79	93.0	93.0	92.0	6.0	2.5	2.3	3.72	528	12
45	60	280S	MI28S613	980	80.7	44.7	0.83	0.80	0.70	93.5	93.5	92.0	6.0	2.5	2.4	5.11	592	12
55	75	280M	MI28M633	980	96.0	54.7	0.85	0.83	0.73	93.8	93.8	92.0	6.0	2.4	2.4	6.16	640	12
75	100	315S	MI31S613	985	130	74.10	0.85	0.82	0.75	94.6	94.6	93.5	6.0	2.4	2.5	10.70	940	16
90	120	315M	MI31M633	987	157	88.80	0.84	0.81	0.72	94.8	94.8	93.5	6.0	2.3	2.5	12.40	1005	16
110	150	315M	MI31M653	988	189	108.4	0.85	0.82	0.73	95.0	95.0	94.0	6.0	2.3	2.5	15.50	1110	16
125	170	315L	MI31L6A3	988	215	123.2	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	18.00	1295	16
132	180	315L	MI31L673	988	227	130.0	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	18.00	1295	16
150	170	315L	MI31L6B3	988	258	147.8	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	21.50	1425	16
**160	215	315L	MI31L693	988	275	158.0	0.85	0.82	0.73	95.2	95.2	94.0	6.0	2.3	2.5	21.50	1425	16
180	240	355L	MI35L613	990	309	177	0.85	0.80	0.72	95.3	95.3	93.5	6.0	2.0	2.5	28.7	1670	10
200	270	355L	MI35L6A3	990	343	196.7	0.85	0.80	0.72	95.3	95.3	93.5	6.0	2.0	2.5	35.5	1780	10
**250	335	355L	MI35L633	990	428	246	0.85	0.80	0.72	95.7	95.7	93.6	6.0	2.0	2.5	35.5	1780	10

Note : • Efficiency class 'eff1' will be punched on the nameplae as per IS : 12615-2004 (Rev-1) from 0.37 kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals.
(**) Temperature rise limited to class F.

INCREASED SAFETY MOTORS Ex(e)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 90 to 355L

eff1

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

Ambient : 45°C
Duty : S1 (Continuous)
Temp. Class : T1, T2, T3

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

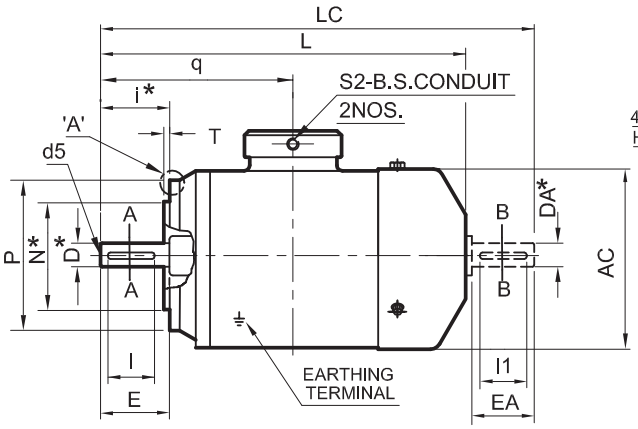
Table-MI-8P **750 rpm (8-Pole)**

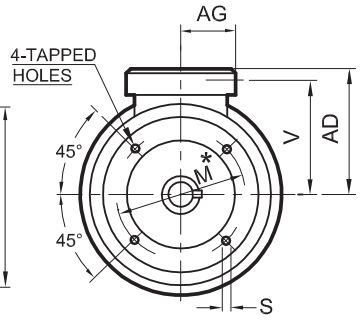
Rated Output		Frame size	Type Ref. B3 Construction	Operating Characteristics at Rated output									With DOL Starting		Pullout Toque to Rated Toque Ratio	Rotor GD² kgm²	Net Weight B3 Constrn. Kg	Time tE for Temp. class T3 Sec
				Speed RPM	Current Amps.	Rated Torque Kg-m.	Power Factor			%Efficiency (eff1)			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio				
kW	HP	IEC					FL	3/4L	1/2L	FL	3/4L	1/2L						
0.37	0.50	90S	MI09S813	700	1.22	0.515	0.63	0.52	0.41	66.8	60.0	52.0	2.7	1.8	2.1	0.011	17	15
0.55	0.75	90L	MI09L853	690	1.71	0.776	0.63	0.53	0.43	71.1	67.0	62.0	2.9	2.0	2.4	0.014	20	15
0.75	1.0	100L	MI10L813	685	1.94	1.07	0.73	0.63	0.50	73.8	73.8	67.0	3.0	1.7	2.0	0.023	28	15
1.1	1.5	100L	MI10L833	690	2.83	1.55	0.71	0.62	0.48	76.2	76.2	73.0	3.3	1.9	2.3	0.027	32	15
1.5	2.0	112M	MI11M813	705	3.82	2.07	0.70	0.62	0.50	77.9	77.9	75.0	3.8	1.7	2.2	0.051	38	15
2.2	3.0	132S	MI13S813	710	5.35	3.02	0.71	0.60	0.46	80.5	80.5	78.0	3.7	1.6	2.2	0.099	57	10
3.7	5.0	160M	MI16M813	720	8.00	5.01	0.78	0.74	0.65	83.0	83.0	78.0	4.4	1.8	2.0	0.217	91	15
5.5	7.5	160M	MI16M833	720	11.5	7.44	0.78	0.74	0.65	85.1	85.1	82.0	4.8	1.9	2.2	0.299	106	15
7.5	10.0	160L	MI16L873	715	15.5	10.2	0.78	0.74	0.65	86.4	86.4	84.0	5.5	2.1	2.2	0.40	130	15
9.3	12.5	180M	MI18M813	720	18.8	12.6	0.79	0.74	0.64	87.3	87.3	85.0	5.0	2.1	2.2	0.62	153	15
11	15	180L	MI18L833	720	22.0	14.9	0.79	0.74	0.64	88.1	88.1	87.0	5.0	2.1	2.2	0.72	184	15
15	20	200L	MI20L833	720	28.6	20.3	0.82	0.79	0.71	89.0	89.0	88.0	6.0	2.5	2.3	1.32	287	10
18.5	25	225S	MI22S823	725	36.3	24.9	0.79	0.77	0.69	89.8	89.8	88.0	5.5	2.1	2.2	2.09	320	12
22	30	225M	MI22M833	725	43.0	29.6	0.79	0.77	0.69	90.2	90.2	88.0	5.5	2.1	2.2	2.41	331	12
30	40	250M	MI25M813	730	55.5	40.0	0.82	0.78	0.68	91.5	91.5	89.0	6.0	2.5	2.2	3.72	528	12
37	50	280S	MI28S823	730	71.0	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	628	12
45	60	280M	MI28M853	730	86.0	60.0	0.79	0.75	0.65	92.4	92.4	90.0	5.5	2.2	2.2	6.86	684	12
55	75	315S	MI31S813	740	105	72.4	0.78	0.73	0.64	93.0	92.5	90.5	5.5	2.1	2.4	10.70	945	16
75	100	315M	MI31M833	740	143	98.7	0.78	0.73	0.64	93.5	93.5	92.0	5.5	2.1	2.4	12.40	1010	16
90	120	315M	MI31M853	740	171	118.5	0.78	0.73	0.64	94.0	94.0	93.0	5.5	2.1	2.4	15.50	1120	16
110	150	315L	MI31L873	740	208	145	0.78	0.73	0.64	94.3	94.0	93.0	5.5	2.1	2.4	18.00	1300	16
125	170	315L	MI31L8A3	740	236	164.5	0.78	0.73	0.64	94.6	94.4	93.6	5.5	2.1	2.4	21.50	1425	16
**132	180	315L	MI31L893	740	248	174	0.78	0.73	0.64	94.8	94.7	94.0	5.5	2.1	2.4	21.50	1425	16
150	200	355L	MI35L813	740	282	197.4	0.78	0.70	0.60	95.0	95.0	93.0	5.5	1.8	2.2	28.70	1670	10
160	215	355L	MI35L8A3	740	300	210.6	0.78	0.70	0.60	95.0	95.0	93.0	5.5	1.8	2.2	35.50	1780	10
180	240	355L	MI35L8B3	740	337	237	0.78	0.70	0.60	95.2	95.2	93.2	5.5	1.8	2.2	35.50	1780	10
**200	270	355L	MI35L833	740	375	263.2	0.78	0.70	0.60	95.3	95.3	93.3	5.5	1.8	2.2	35.50	1780	10

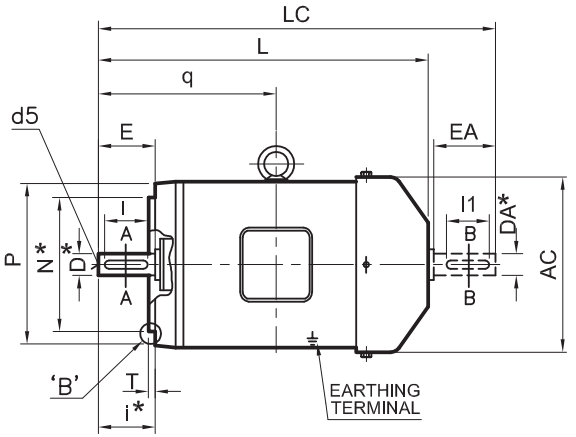
Note : • Efficiency class 'eff1' will be punched on the nameplae as per IS : 12615-2004 (Rev-1) from 0.37 kW to 160kW • All performance value are subject to IS tolerance as per IS : 325.
• Efficiency measurement are without seals.
(**) Temperature rise limited to class F.

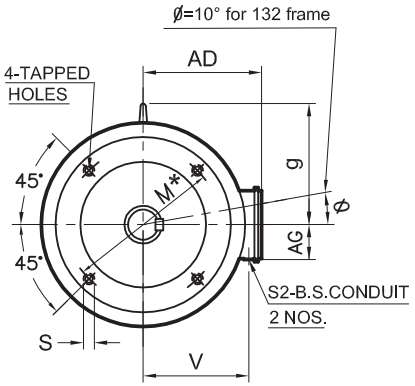
DIMENSIONAL DRAWING: INCREASED SAFETY MOTORS (TYPE ME/MI)) AND NON-SPARKING MOTORS (TYPE MN/MS)

Face Mounted (B14) TEFC (eff2)/(eff1) series Frame 63-132M



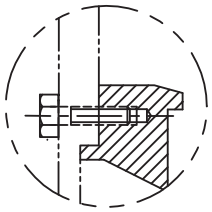




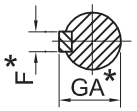


FRAME SIZE 63 to 80

FRAME SIZE 90S to 132M



ENLARGEMENT OF CIRCLE "A"

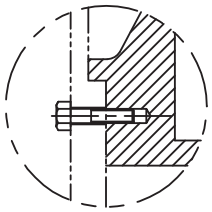


SECTION A—A

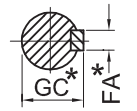
	FIXING					GENERAL						TERINAL BOX			SHAFT						
IEC Fr. size	Pole	P	N*	M*	I*	S	T	AD	AC	L	LC	g	V	q	AG	S2 B.S.C.	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5
63	2 & 4	90	60	75	23	M5X10	2.5	127	124	206	241	-	96	104	52	3/4"	11	23	4	12.5	18	M4
71	2,4 & 6	105	70	85	30	M6X10	2.5	135	140	234	278	-	104	122	52	3/4"	14	30	5	16	25	M5
80	2,4 & 6	120	80	100	40	M6X13	3	145	157	267	324	-	114	142	52	3/4"	19	40	6	21.5	35	M6
90S	2,4,6 & 8	140	95	115	50	M8X12	3	141	174	302	374	①	110	156	53	3/4"	24	50	8	27	45	M8
90L	2,4,6 & 8	140	95	115	50	M8X12	3	141	174	327	399	①	110	169	53	3/4"	24	50	8	27	45	M8
100L	2,4,6 & 8	160	110	130	60	M8X12	3.5	179	195	366	448	135	138	193	56	1"	28	60	8	31	55	M10
112M	4,6 & 8	160	110	130	60	M8X12	3.5	191	220	388	471	148	151	200	56	1"	28	60	8	31	55	M10
132S	2	250	180	215	80	M12X20	4	206	260	464	567	176	167	239	63	1"	38	80	10	41	70	M12
	4,6 & 8									449	552										
132M	2									502	605			258							
	4 & 6									487	590										

TABLE B (eff1) series

Pole	L	LC
-	-	-
-	-	-
-	-	-
2&4	332	404
2&4	357	429
2&4	381	463
4	413	496
2&4	494	597
-	-	-
4	532	635



ENLARGEMENT OF CIRCLE "B"



SECTION B—B

TABLE A

Dimension	Tolerance	Specification
N	J6	IS : 2223
M	±0.3	
i	±1.0	

Dimension	Tolerance		Specification
D,DA	j6	11,14,19,24,28Ø	IS : 1231
	K6	38Ø	
GA,GC,F,FA			IS : 2048
d5 (centering)			IS : 2540

Special Remarks for (eff1) series motors
1) TABLE B indicates overall length of eff1 series motors wherever different from eff2 series motors
2) 5.5 kW/2P (Frame 132S) rating will have same dimensions as that of eff2 series motor

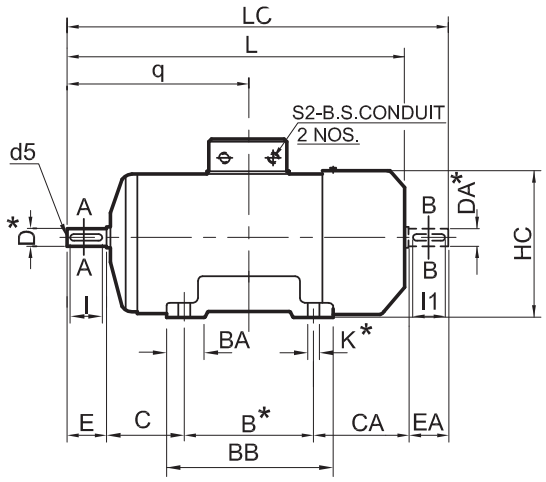
①Without Eye boit
- Also suitable for V19 & V18 mounting as per IS 2253
- Key / Key way fit : h9/N9

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

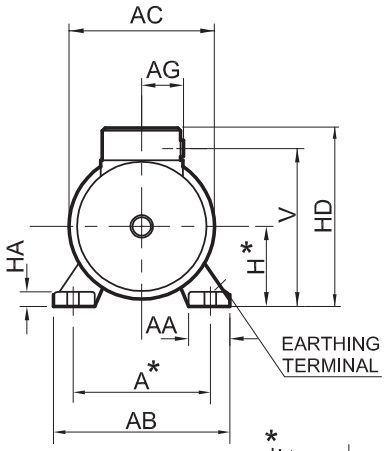
*Refer TABLE A for toreranses

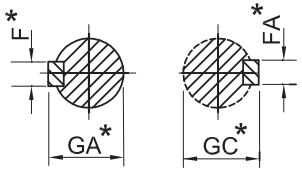
All Dimensions are in mm unless otherwise specified. CAT-E-6313-4-1

Foot Mounted (B3) TEFC (eff2)/(eff1) series Frame 63-355L

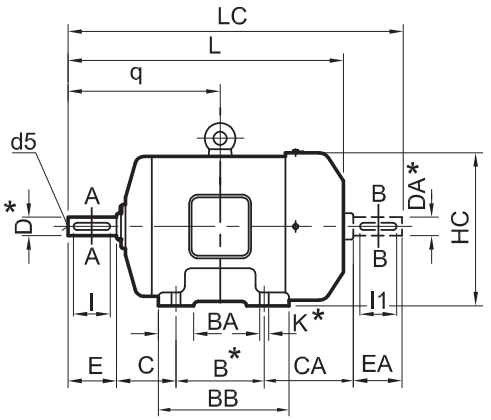


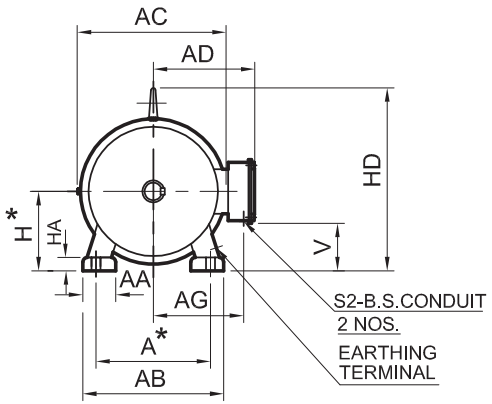
FRAME SIZE 63TO 80



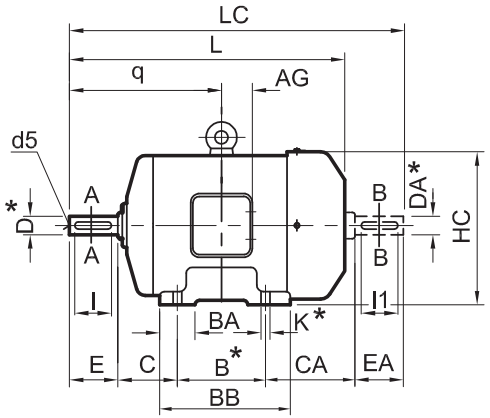


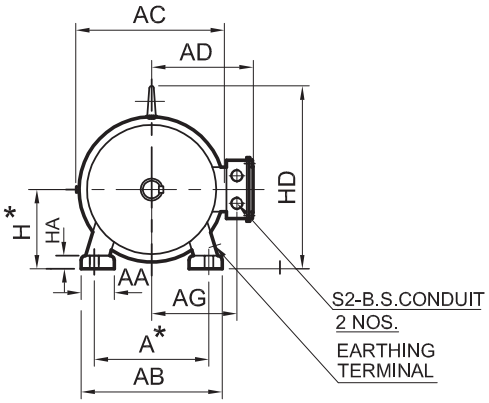
SECTION A-A SECTION B-B



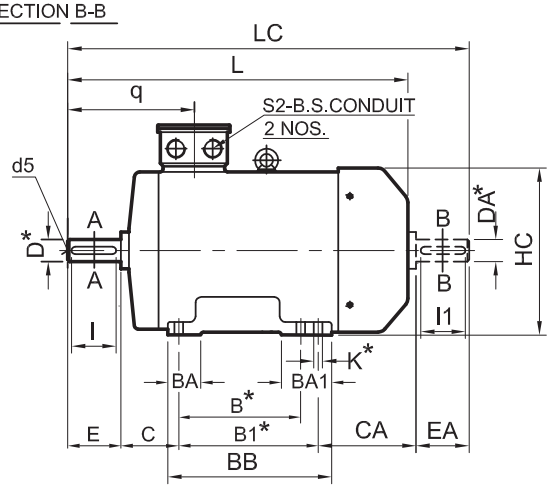


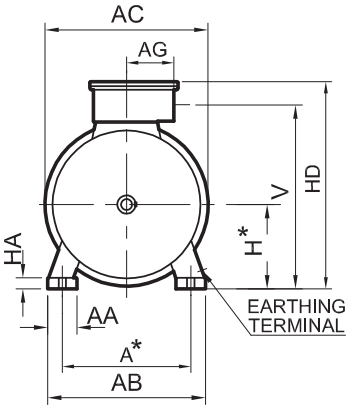
FRAME SIZE 90S TO 160L





FRAME SIZE 180M TO 225M





FRAME SIZE 250M TO 355L

* Refer TABLE A for tolerances

DIMENSIONAL DRAWING: INCREASED SAFETY MOTORS (TYPE ME/MI) AND NON-SPARKING MOTORS (TYPE MN/MS)

Foot Mounted (B3) TEFC eff2 / eff1 series Frame 63-355L

		FIXING						GENERAL													TERMINAL BOX			SHAFT						
IEC Fr. size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	LC	CA	AC	V	q	AG	S2 B.S.C	D, DA*	E EA	F* FA*	GA* GC	I I1	d5
63	2 & 4	100	80	-	40	63	7	126	100	28	30	-	7	125	190	-	206	241	75	124	159	122	52	3/4"	11	23	4	12.5	18	M4
71	2,4 & 6	112	90	-	45	71	7	135	110	31	30	-	7	141	206	-	234	278	83	140	175	122	52	3/4"	14	30	5	16	25	M5
80	2,4 & 6	125	100	-	50	80	10	150	124	31	35	-	9	159	225	-	267	324	94	157	194	142	52	3/4"	19	40	6	21.5	35	M6
90S	2,4,6 & 8	140	100	-	56	90	10	180	130	50	43	-	13	177	①	141	302	374	143	174	57	156	110	3/4"	24	50	8	27	45	M8
90L	2,4,6 & 8		125						155								327	399				169								
100L	2,4,6 & 8	160	140	-	63	100	12	200	176	54	50	-	14	198	235	179	366	448	125	195	66	193	138	1"	28	60	8	31	55	M10
112M	4,6 & 8	190	140	-	70	112	12	230	176	62	51	-	15	222	260	191	388	471	141	220	80	200	151	1"	28	60	8	31	55	M10
132S	2	216	140	-	89	132	12	256	180	64	50	-	17	262	308	206	464	567	163	260	99	239	167	1"	38	80	10	41	70	M12
	4,6 & 8																449	552												
132M	2		178						218		54						502	605				258								
	4 & 6																487	590												
160M	2	254	210	-	108	160	15	310	250	58	70	-	20	318	366	226	605	741	183	316	98	323	186	1"	42	110	12	45	105	M16
	4,6 & 8																585	721												
160L	2		254						294								649	785				345								
	4, 6 & 8																629	765												
180M	2,4,6 & 8	279	241	-	121	180	15	344	281	65	70	-	26	357	412	280	679	799	218	354	-	352	225	1 ½"	48	110	14	51.5	100	M16
180L	2,4,6 & 8		279						319								717	838				371								
200L	2	318	305	-	133	200	19	398	355	85	85		32	397	462	312	795	920	234	394	-	396	249	2"	55	110	16	59	100	M20
	4,6 & 8																772	897												
225S	4,6 & 8	356	286	-	149	225	19	436	336	85	85		34	450	509	337	817	936	239	450	-	432.5	273	2"	60	140	18	64	130	M20
225M	2		311						361								837	956				415			55	110	16	59	100	
	4,6 & 8																842	961				445			60	140	18	64	130	
250M	2	406	349	-	168	250	24	506	425	100	115		42	495	665	-	914	1065	268	489	578	352	205	2"	60	140	18	64	130	M20
	4,6 & 8																								65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	100	110	149	42	552	725	-	1010	1160	271	544	638	360	205	2"	65	140	18	69	130	M20
	4,6 & 8																								75	140	20	79.5	130	
315S/M	2	508	406	457	216	315	28	625	540	100	115	155	45	620	830		1137	1293	336	610	728	386	218	2"	65	140	18	69	130	M20
	4,6 & 8																1167	1353				416			80	170	22	85.5	160	
315L	2		508	-					593	120	120						1302	1458	454			386		2 ½"	65	140	18	69	130	
	4,6 & 8																1332	1518				416			80	170	22	85.5	160	
355L	2	610	630	-	254	355	28	710	770	110	170	-	45	693	939	-	1461	1622	458	685	850	434	305	3"	75	140	20	79.5	130	M24
	4,6 & 8																1491	1682				464			95	170	25	100	160	

TABLE B (eff1 series)

Pole	L	LC
-	-	-
-	-	-
-	-	-
2 & 4	332	404
2 & 4	357	429
2 & 4	381	463
4	413	496
2 & 4	494	597
-	-	-
4	532	635
-	-	-
4	605	741
-	-	-
4	644	780
4	698	802
4	737	841
-	-	-
4	795	920
4	877	996
-	-	-
4	902	1021
2	983	1134
-	-	-
-	-	-
-	-	-
-	-	-

Tolerances on Dimensions with*

Dimension	Tolerance		Specification
A, B	±0.75		
H	-0.5	UPTO 280	IS : 1231
	-1.0	OVER 280	
K	+0.360	7,10Ø	
	+0.430	12,15Ø	
	+0.520	19,24,28Ø	

Table A

Dimension	Tolerance		Specification
D, DA	j6	11,14,19,24,28Ø	IS : 1231
	k6	38,42,48Ø	
	m6	55,60,65,75,80,95Ø	
GA,GC,F,FA			IS : 2048
d5 (centering)			IS : 2540

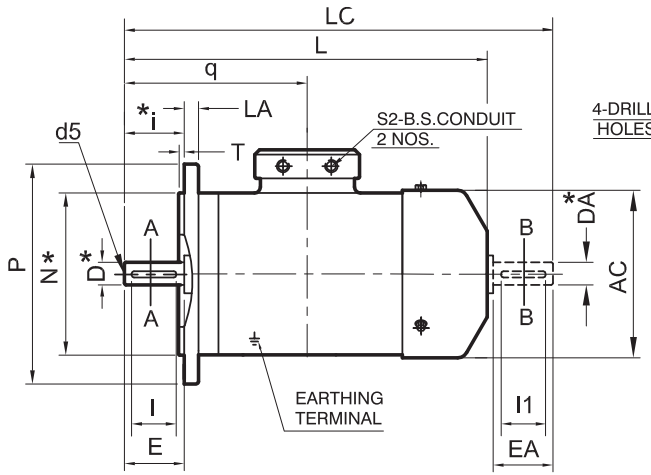
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- Also suitable for B6, B7, B8, V5 & V6 mounting as per IS 2253

Special Remarks for eff1 series motors
1) TABLE B indicates overall length of eff1 series motors wherever different from eff2 series motors
2) 5.5 kW/2P (Frame 132S) rating will have same dimensions as that of eff2 series motor
3) 37 kW/4P (Frame 225S) will have L=862 & LC=981

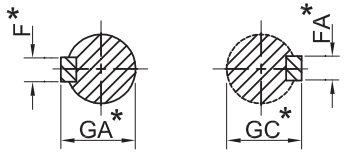
All Dimensions are in mm unless otherwise specified. CAT-E-6335-3-2

① Without Eye bolt • Key / key way fit : h9 / N9

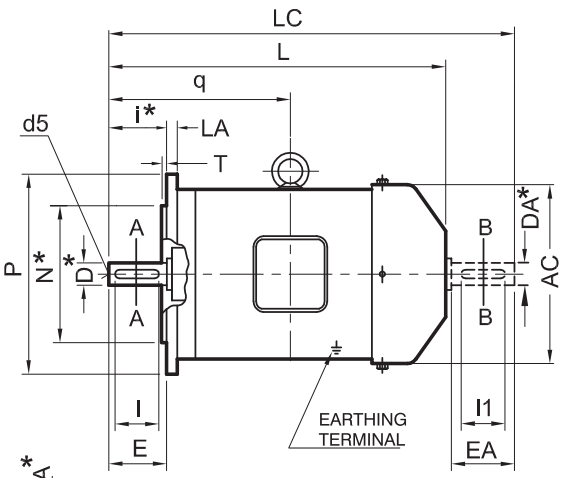
Flange Mounted (B5) TEFC eff2/eff1 series Frame 63-355L

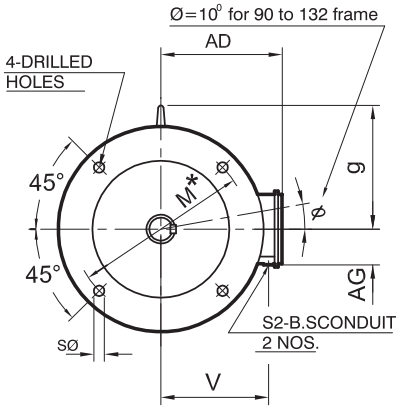


FRAME SIZE 63 TO 80

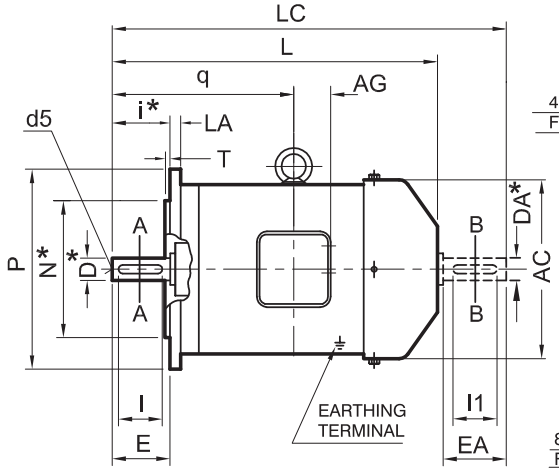


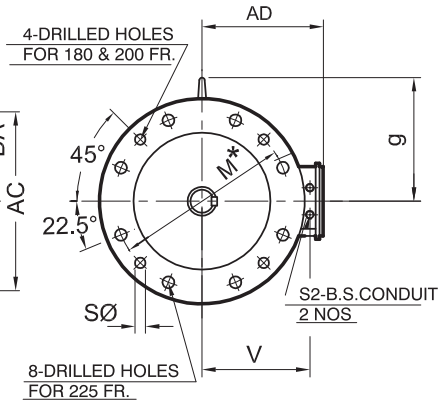
SECTION A-A SECTION B-B



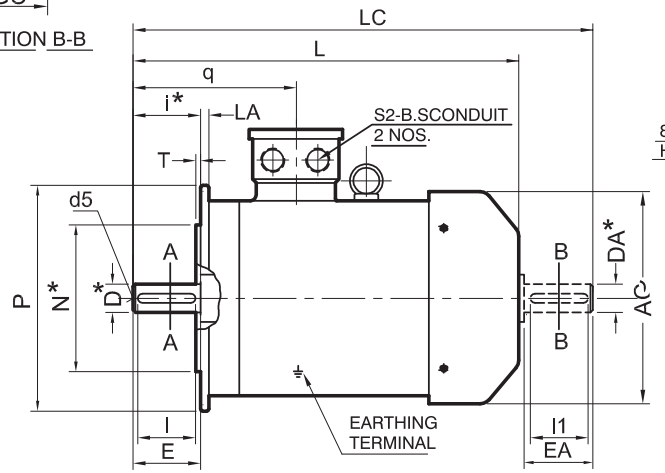


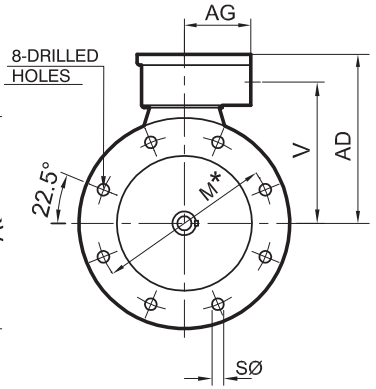
FRAME SIZE 90S TO 160L





FRAME SIZE 180M TO 225M





FRAME SIZE 250M TO 355L

* Refer TABLE A for tolerances

Flange Mounted (B5) TEFC eff2/eff1 series Frame 63-355L

	FIXING					GENERAL							TERMINAL BOX				SHAFT					
IEC Fr. size	Pole	P	N*	M*	i*	S	T	LA	AD	AC	L	LC	g	V	q	AG	S2 B.S.C	D, DA*	E EA	F* FA*	GA* GC*	I I1	d5
63	2 & 4	140	95	115	23	10	3	9	127	124	225	260	-	96	122	52	3/4"	11	23	4	12.5	18	M4
71	2, 4 & 6	160	110	130	30	10	3.5	9	135	140	261	305	-	104	147	52	3/4"	14	30	5	16	25	M5
80	2, 4 & 6	200	130	165	40	12	3.5	10	145	157	267	324	-	114	142	52	3/4"	19	40	6	21.5	35	M6
90S	2,4,6 & 8	200	130	165	50	12	3.5	10	141	174	302	374	(1)	110	156	53	3/4"	24	50	8	27	45	M8
90L	2,4,6 & 8										327	399			169								
100L	2,4,6 & 8	250	180	215	60	15	4	11	179	195	366	448	135	138	193	56	1"	28	60	8	31	55	M10
112M	4,6 & 8	250	180	215	60	15	4	11	191	220	388	471	148	151	200	56	1"	28	60	8	31	55	M10
132S	2	300	230	265	80	15	4	12	206	260	464	567	176	167	239	63	1"	38	80	10	41	70	M12
	4,6 & 8										449	552										
132M	2										502	605			258							
	4 & 6										487	590										
160M	2	350	250	300	110	19	5	13	226	316	605	741	206	186	323	63	1"	42	110	12	45	105	M16
	4,6 & 8										585	721										
160L	2										649	785			345							
	4,6 & 8										629	765										
180M	2,4,6 & 8	350	250	300	110	19	5	13	280	354	678	799	232	225	352	118	1 ½"	48	110	14	51.5	100	M16
180L	2,4,6 & 8										717	838			371							
200L	2	400	300	350	110	19	5	15	312	394	795	920	262	249	396	172	2"	55	110	16	59	100	M20
	4,6 & 8										772	897										
225S	4,6 & 8	450	350	400	140	19	5	16	337	450	817	936	284	273	432.5	172	2"	60	140	18	64	130	M20
225M	2				110						837	956			415			55	110	16	59	100	
	4,6 & 8				140						842	961			445			60	140	18	64	130	
250M	2	550	450	500	140	19	5	18	415	489	914	1065	-	328	352	205	2"	60	140	18	64	130	M20
	4,6 & 8																	65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	445	544	1010	1160	-	358	360	205	2"	65	140	18	69	130	M20
	4,6 & 8																	75	140	20	79.5	130	
315S/M	2	660	550	600	140	24	6	22	515	610	1137	1293	-	413	386	218	2"	65	140	18	69	130	M20
	4,6 & 8				170						1167	1353			416			80	170	22	85.5	160	
315L	2				140						1302	1458			386		2 ½"	65	140	18	69	130	
	4,6 & 8				170						1332	1518			416			80	170	22	85.5	160	
355L	2	800	680	740	140	24	6	25	584	690	1461	1622	-	495	434	305	3"	75	140	20	79.5	130	M24
	4,6 & 8				170						1491	1682			464			95	170	25	100	160	

TABLE B
eff1 series

Pole	L	LC
-	-	-
-	-	-
-	-	-
2 & 4	332	404
2 & 4	357	429
2 & 4	381	463
4	413	496
2 & 4	494	597
-	-	-
4	532	635
-	-	-
4	605	741
-	-	-
4	651	787
4	698	802
4	737	841
-	-	-
4	795	920
4	877	996
-	-	-
4	902	1021
2	983	1134
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Tolerances on Dimensions with*

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

Table A

Dimension	Tolerance		Specification
D, DA	j6	11,14,19,24,28Ø	IS : 1231
	k6	38,42,48Ø	
	m6	55,60,65,75,80,95Ø	
GA,GC,F,FA			IS : 2048
d5 (centering)			IS : 2540

- Double shaft extension can be provided with shaft dimension identical to D.E. shaft.
- Also suitable for V1, V3 and B5 mounting as per IS 2253
- (1) Without Eye bolt
- Key / key way fit : h9 / N9
- 8 Nos. Fixing Holes from 225 S/M frame onwards

Special Remarks for eff1 series motors
1) TABLE B indicates overall length of eff1 series motors wherever different from eff2 series motors
2) 5.5 kW/2P (Frame 132S) rating will have same dimensions as that of eff2 series motor
3) 37 kW/4P (Frame 225S) will have L=862 & LC=981

All Dimensions are in mm unless otherwise specified. CAT-E-6335-5-2

ENERGY EFFICIENT NON - SPARKING MOTORS Ex(nA)

Energy Effcient Non-Sparking Motors Ex (nA)

BBL has developed energy efficient non-sparking motors for use in hazardous area - Zone 2 as per IS : 5572

These motors are conforming to IS/IEC 60079-15 : 2005 as regards to all safety aspects.These motors are also certified for use in zone 22 area as per IS : 15142

The efficiency values of these Energy Efficient motors are conforming to IS: 12615-2004 as under;

- Efficiency class (eff2) Improved efficiency
- Efficiency class (eff1) High efficiency

Product Range

Type	Frame size	kW range
Improved Efficency - MN	63 to 280M	0.12 to 90
High Effficiency - MS	71 to 355L	0.37 to 315

Special Features

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

Limiting Temperature

These motors are designed such that the limiting temperature of all part in continuous operation does not exceed 200°C i.e. Temperature Class T3, as per IS / IEC 60079 -15 : 2005

Operating Conditions

Supply conditions (Voltage & Frequency)

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

Ambient

Motors are designed for ambient temperature 50 C.

Altitude

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

Terminals and Connection

External connection of Client's power cable to the motors terminals in the terminal box must be rigidly gripped and secured against lossening and twisting. This is achieved with specially designed terminal plate provided in Terminal Box.

Enclosure and Degree of Protection

All Non-Sparking motors are with totally enclosed fan cooled (TEFC) construction with degree of protection IP55 as per IS : 4691 as a standard feature. 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.

Terminal Box and Bearing Details

Please refer Terminal box and bearing details and alternate Terminal Box location as specified in the increased safety motor section.

Winding and Rotor cage

The stator winding and rotor cage are so designed that limiting temperature specified in IS/IEC 60079–15:2005 is not exceeded. Gel coat is applied on winding overhang as an additional protection against ingress of moisture.

Air-gap

Radial air gap of the motor is such that the minimum air gap specified in IS / IEC 60079 –15 : 2005

Paint

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

Name plate

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

Certification

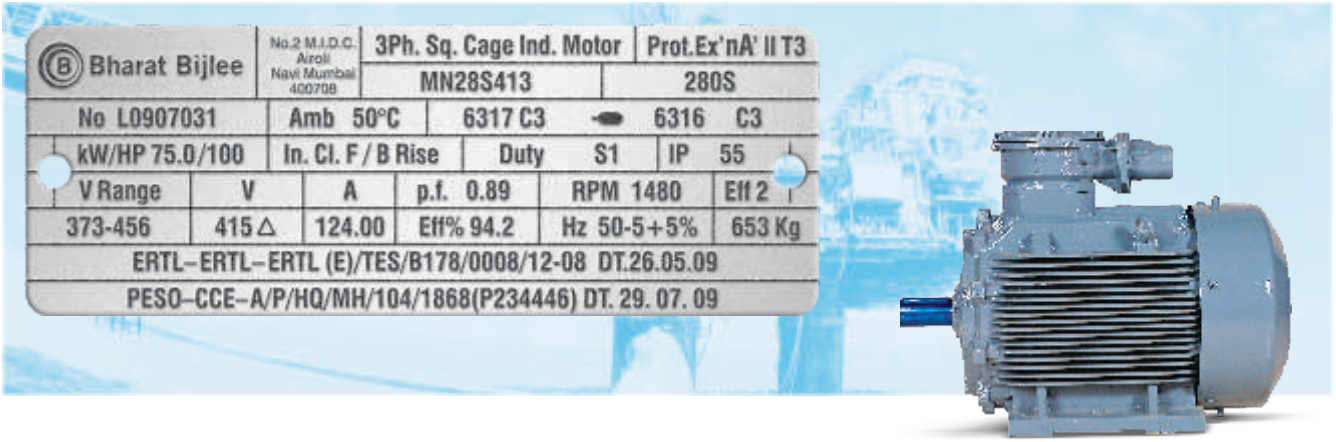
Non-Sparking motors are approved by Petroleum Explosive and Safety Organisation (PESO), Nagpur. A declaration to this effect is incorporation on the nameplate.

Performance details

Non-Sparking motors type MN and MS are offered in standard frame sizes. The performance of MN type eff2 series motors is identical to that of MA type eff2 series motors. The performance of MS type eff1 series motors is identical to that of MH type eff1 series motors.

Refer to our catalogue CGA1/D for performance details.

Table MN and table MS specify the kW rating and their corresponding type references.



NON SPARKING MOTORS Ex(nA)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 63 to 280M

eff2

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

Ambient : 50°C
Duty : S1 (Continuous)
Temp. Class : T1, T2 & T3

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

Table-MN

3000 rpm (2-pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
-		-	-
0.18	0.25	63	MN063213
0.25	0.35	63	MN063233
0.37	0.50	71	MN071213
0.55	0.75	71	MN071233
0.75	1.0	80	MN080213
1.1	1.5	80	MN080233
1.5	2.0	90S	MN09S233
2.2	3.0	90L	MN09L253
3.7	5.0	100L	MN10L213
5.5	7.5	132S	MN13S233
7.5	10	132S	MN13S253
9.3	12.5	132M	MN13M293
11	15	160M	MN16M233
15	20	160M	MN16M253
18.5	25	160L	MN16L293
22	30	180M	MN18M213
30	40	200L	MN20L233
37	50	200L	MN20L253
45	60	225M	MN22M233
55	75	250M	MN25M213
75	100	280S	MN28S213
90	120	280M	MN28M233

1500 rpm (4-pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
0.12	0.16	63	MN063413
0.18	0.25	63	MN063433
0.25	0.35	71	MN071413
0.37	0.50	71	MN071433
0.55	0.75	80	MN080413
0.75	1.0	80	MN080433
1.1	1.5	90S	MN09S433
1.5	2.0	90L	MN09L453
2.2	3.0	100L	MN10L433
3.7	5.0	112M	MN11M433
5.5	7.5	132S	MN13S433
7.5	10	132M	MN13M473
9.3	12.5	160M	MN16M4A3
11	15	160M	MN16M4C3
15	20	160L	MN16L4K3
18.5	25	180M	MN18M433
22	30	180L	MN18L473
30	40	200L	MN20L433
37	50	225S	MN22S413
45	60	225M	MN22M433
55	75	250M	MN25M413
75	100	280S	MN28S413
90	120	280M	MN28M433

1000rpm (6-pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
-	-	-	-
-	-	-	-
0.25	0.35	71	MN071633
0.37	0.50	80	MN080613
0.55	0.75	80	MN080633
0.75	1.0	90S	MN09S633
1.1	1.5	90L	MN09L653
1.5	2.0	100L	MN10L633
2.2	3.0	112M	MN11M633
3.7	5.0	132S	MN13S633
5.5	7.5	132M	MN13M673
7.5	10	160M	MN16M633
9.3	12.5	160M	MN16L663
11	15	160L	MN16L673
15	20	160L	MN18L613
18.5	25	200L	MN20L613
22	30	200L	MN20L633
30	40	225M	MN22M623
37	50	250M	MN25M603
45	60	280S	MN28S613
55	75	280M	MN28M633

750rpm (8-pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
-	-	-	-
-	-	-	-
-	-	-	-
0.37	0.50	90S	MN09S813
0.55	0.75	90L	MN09L853
0.75	1.0	100L	MN10L813
1.1	1.5	100L	MN10L833
1.5	2.0	112M	MN11M813
2.2	3.0	132S	MN13S813
3.7	5.0	160M	MN16M813
5.5	7.5	160M	MN16M833
7.5	10	160L	MN16L873
9.3	12.5	180M	MN18M813
11	15	180L	MN18L833
15	20	200L	MN20L833
18.5	25	225S	MN22S813
22	30	225M	MN22M833
30	40	250M	MN25M813
37	50	280S	MN28S823
45	60	280M	MN28M853

NON SPARKING MOTORS Ex(nA)
TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 63 to 355L

eff1

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

Ambient : 50°c
Duty : S1 (Continuous)

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

Table-MS

300 rpm (2-Pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
0.37	0.50	71	MS0712A3
0.55	0.75	71	MS071233
0.75	1.0	80	MS080213
1.1	1.5	80	MS080233
1.5	2.0	90S	MS09S243
2.2	3.0	90L	MS09L273
3.7	5.0	100L	MS10L233
5.5	7.5	132S	MS13S253
7.5	10	132S	MS13S293
9.3	12.5	160M	MS16M233
11	15	160M	MS16M253
15	20	160M	MS16M263
18.5	25	160L	MS16L293
22	30	180M	MS18M233
30	40	200L	MS20L2A3
37	50	200L	MS20L253
45	60	225M	MS22M253
55	75	250M	MS25M233
75	100	280S	MS28S233
90	120	280M	MS28M253
110	150	315S	MS31S233
125	170	315M	MS31M1A3
132	180	315M	MS31M233
150	200	315L	MS31L2A3
160	215	315L	MS31L253
180	240	315L	MS31L2B3
*200	270	315L	MS31L273
*250	335	355L	MS35L213
*315	425	355L	MS35L233

1500 rpm (4-Pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
0.37	0.50	71	MS071433
0.55	0.75	80	MS080433
0.75	1.0	80	MS080453
1.1	1.5	90S	MS09S423
1.5	2.0	90L	MS09L473
2.2	3.0	100L	MS10L473
3.7	5.0	112M	MS11M473
5.5	7.5	132S	MS13S473
7.5	10	132M	MS13M443
9.3	12.5	160M	MS16M4C3
11	15	160M	MS16M4K3
15	20	160L	MS16L4B3
18.5	25	180M	MS18M473
22	30	180L	MS18L483
30	40	200L	MS20L453
37	50	225S	MS22S433
45	60	225M	MS22M453
55	75	250M	MS25M433
75	100	280S	MS28S413
90	120	280M	MS28M433
110	150	315S	MS31S413
125	170	315M	MS31M4A3
132	180	315M	MS31M433
150	200	315L	MS31L4A3
160	215	315L	MS31L453
180	240	315L	MS31L463
*200	270	315L	MS31L473
*250	335	355L	MS35L413
*315	422	355L	MS35L433
**355	475	355L	MS35L453

1000 rpm (6-Pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
0.37	0.50	80	MS080613
0.55	0.75	80	MS080633
0.75	1.0	90S	MS09S633
1.1	1.5	90L	MS09L653
1.5	2.0	100L	MS10L633
2.2	3.0	112M	MS11M653
3.7	5.0	132S	MS13S633
5.5	7.5	132M	MS13M693
7.5	10	160M	MS16M633
9.3	12.5	160L	MS16L663
11	15	160L	MS16L673
15	20	180L	MS18L613
18.5	25	200L	MS20L613
22	30	200L	MS20L633
30	40	225M	MS22M643
37	50	250M	MS25M633
45	60	280S	MS28S613
55	75	280M	MS28M633
75	100	315S	MS31S613
90	120	315M	MS31M633
110	150	315M	MS31M653
125	170	315L	MS31L6A3
132	180	315L	MS31L673
150	200	315L	MS31L6B3
160	215	315L	MS31L693
180	240	355L	MS35L6A3
200	270	355L	MS35L613
250	335	355L	MS35L633

750 rpm (8-Pole)

Rated Output		Frame size	Type Ref. B3 Construction
kW	HP	IEC	
0.37	0.50	90S	MS09S813
0.55	0.75	90L	MS09L853
0.75	1.0	100L	MS10L813
1.1	1.5	100L	MS10L833
1.5	2.0	112M	MS11M813
2.2	3.0	132S	MS13S813
3.7	5.0	160M	MS16M813
5.5	7.5	160M	MS16M833
7.5	10	160L	MS16L873
9.3	12.5	180M	MS18M813
11	15	180L	MS18L833
15	20	200L	MS20L833
18.5	25	225S	MS22S823
22	30	225M	MS22M833
30	40	250M	MS25M813
37	50	280S	MS28S823
45	60	280M	MS28M853
55	75	315S	MS31S813
75	100	315M	MS31M833
90	120	315M	MS31M853
110	150	315L	MS31L873
125	170	315L	MS31L8A3
132	180	315L	MS31L893
150	200	355L	MS35L8A3
160	215	355L	MS35L813
180	240	355L	MS35L8B3
200	270	355L	MS35L833

Note : All performance value are subject to IS tolerance as per IS : 325 1996 Efficiency measurement are without seals. (*) These ratings are suitable for ambient temp of 45°C.
** These ratings are suitable for ambient temp of 40°C.

Design Features Offered

Electrical

Non standard voltage	Other than 415V
Motors for wide variation	
Voltage variation	>10%
Frequency variation	>5%
Motors with higher ambient Temperatures	>50°C
Dual Voltage motors	In ratio 1:√3, 1:2
Dual speed motors	
Class 'H' insulation scheme	
Motors with Thermal Protection	PTC Thermisters, thermostat, RTD & BTD etc.
Space heaters	90 Frame onwards
Inverter Duty motors	
Motors with Service factors	
Motors with starting current limitations	e.g. <600% including tolerance
Motors for high inertia load	
Motors with intermittent duties	

Mechanical

Non standard shaft material	e.g. EN24
Non standard shaft Extension dimension	
Non standard cable entries	
Motors with cable glands	Single/Double compression
Motors with separate T. box for space heater, thermister	200L frame and above
Non standard bearing	e.g. roller bearing on driving inside
Low vibration motors	Precision class vibration levels (A, B or C) as per IS : 12075
Paint shade	
Special accessories like arrow plate, Aux. name plate etc	

Other BBL Product Range

Energy Efficient Motors for General Applications	Frame 63 to 450L (MA/MH)
Brake motors	Frame 71 to 132M (MB)
Slip ring motors	Frame 100L to 160L (MP)
Ring frame motors	Frame 63 to 315L (MR)
Roller table motors	As per requirement
Crane duty motors	Frame 63 to 355L (MC)
Railway motors (Auxiliary drives)	Frame 180M to 225M
Cane unloader motors	Frame 180M to 225M
Marine Duty motors	Frame 63 to 355L

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