

**Motors for Hazardous Areas**

Bharat Bijlee has been a pioneer in the field of standard & special electric motors as well as pumps.

This catalogue covers, Motors for Hazardous areas viz; Flame proof motors, Increased Safety motors and Non-Sparking motors.

**Product Range B3 Construction**

Flame proof motors  
Type 'MD' 0.37 KW (Frame 80) to 90 KW  
(Frame 280M)

Increased Safety motors  
Type 'ME' 0.12 KW (Frame 63) to 90 KW  
(Frame 280M)

Non Sparking Motors  
Type 'MN' 0.12 KW (Frame 63) to 160 KW  
(Frame 315M)

**Conformance to Standards**

IS 2148 Specifications for flame proof enclosure of electrical apparatus.

IS 6381 Specifications for construction and testing of electrical apparatus with type of protection 'e'.

IEC Pub 79-7 Electrical apparatus for explosive gas atmosphere construction and testing of electrical apparatus, type of protection 'e'.

VDE 0171 Specification for the construction of electrical apparatus for explosive gas atmosphere for industries other than mining.

IS 8289 Specification for electrical equipment with type of protection 'n'.

IS 9628 Specification for 3 phase induction motors with type of protection 'n'.

IS 325 Specification for 3 phase induction motors.

IS 1231 Dimensions of three-phase foot mounted induction motors.

IS 2223 Dimensions of flange mounted A.C. induction motors.

**Other relevant standards are**

**IS 5572 (Pt 1)** classification of Hazardous areas (other than mining) for electrical installations.

**IS 4691** Degrees of protection provided by enclosures for rotating electrical machines.

**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 (Pt 1) classifies hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present. Classification of these zones and selection of electrical equipment as per IS 5572 are given below.

Flame proof motors are suitable for application in zone 1 area. However, these motors can also be used in zone 2 area.

**Ignition Temperature Classes & Explosion Gas Groups**

To facilitate selection of equipment, the flammable gases and vapours are categorised in temperature classes or ignition temperature groups T1 to T6. The Ignition temperature is the lowest temperature at which the flammable gas-air-mixture will ignite. The ignition temperature classes are shown in Table 2. Higher ignition temperature classes also cover lower ones.

Note : BBL type references have changed.  
Please refer to page No.15 for conversion Chart.

**FLAME PROOF MOTORS Ex (d)**

Table : 1

Zone	Classification of area as per IS : 5572 (Part 1)	Selection of electrical equipment based on 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 may be permitted to be used in such areas.
Zone '1'	Hazardous atmosphere is likely to be present at any time under normal operating conditions.	For this area, electrical equipment used, must be in a flame proof enclosure type (Ex)d as specified by IS 2148.
Zone '2'	In this area hazardous atmosphere is likely to be present only under abnormal operating conditions and for a short period.	Rotating electrical machines having sliding contacts, centrifugal switches, etc. which in normal operation can cause arcing must be enclosed in flame proof enclosure. 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)n in accordance with IS:8289 are also permitted for use. Three phase induction motors having protection type (Ex)n conforming to IS - 9628.

Table : 2

Temp. Class as per IS : 6381 & 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

**Classification of Hazardous Gases :**

Hazardous gases have been classified in IS:2148, VDE 0171 & 5572 (Pt 1) and are associated only with flame proof enclosures. These gases are listed in Table 3.

Note : Flame proof motors are offered suitable for Gas Groups I, IIA & IIB only. For gases not mentioned, please refer the relevant Indian Standards.

Table : 3

Gas Group	Gas or Vapour	Temp. Class.
I	Methane (Firedamp)	T1
IIA	Ammonia	T1
	Industrial methane*	T1
	Carbon monoxide	T1
	Propane	T1
	Butane	T2
	Benzene	T1
	Cyclohexane	T2
	Acetone	T1
	Ethyl acetate	T1
	Amyl acetate	T2
	Methanol	T1
	Ethanol	T2
	n-Butanol	T2
IIB	1,3-Butadiene	T2
	Ethylene	T2
	Diethyl ether	T4
	Ethylene oxide	T2
IIC	Coke-oven gas	T1
	Hydrogen	T1

\* Industrial methane includes methane mixed with not more than 10% by volume of hydrogen.

**Approval Certificates :**

Electrical equipment used in Zone 1 must be tested by CMRI-Dhanbad.

Approval certificates are issued by the relevant authorities given below on the basis of the test report issued by CMRI. All BBL motors have been approved by the relevant authorities.

i.e. DGMS - Dhanbad  
CCE - Nagpur  
DGFASLI - Mumbai

All flame proof motors have Licence Mark IS 2148.

A DGMS identification mark must be fitted on the motor for Gas Group I or Oil Mines application.

**Pre requisites for application of motors :**

**Voltage & Frequency :** The motors are capable of delivering their rated output when operated at 415V  $\pm 10\%$  and 50Hz  $\pm 5\%$  as specified in IS : 325.

**Ambient & Altitude :** The motors are suitable for 45°C ambient temperature at altitude not exceeding 1000M above MSL.

**Rating :** The motors are suitable for continuous duty (S1) as per IS : 325.

**Mechanical features : Types of construction :** Standard motors are designed for foot mounting (B3). These are also suitable for B6, B7, B8, V5, V6 mounting without any change.

Motors can be supplied in flange mounting (B5). These motors will also be suitable for V1 & V3 mounting without any change.

**Degree of Protection :** Motors provided with a degree of protection corresponding to IP55 as per IS : 4691. A drain plug cannot be provided in FLP motors. In addition, all B5 motors have Oil Tight Shaft (OTS) protection.

**Terminals :** Motors upto and including 1.5Kw (2HP) are designed with star connected windings and are provided with three terminals suitable for DOL starting only. Motors above 1.5 KW are designed with delta connected windings and are provided with six terminals suitable for star-delta starting or DOL starting.

**Paint & Finish :** 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 polyimide base acid/ alkali resistant paint of Dark Admiralty Grey Shade ( NO. 632 as per IS:5 )

**Bearings :** All the motors are fitted with prelubricated antifriction rolling contact bearing. All motors upto 180L Frame are provided with ZZ sealed for life bearings. On line regreasing arrangement can be provided in 180 & 200 frame motors. Regreasing arrangement is provided as a standard feature in 225S frame and above. Bearing sizes are given in the table.

**Terminal box design & bearing data for Ex(d) motors**

Motor type	Frame Size	Bearing Numbers (C3 Clearance)		Terminal box Type	Terminals		No. of Cable entries	Maximum conductor cross section (mm <sup>2</sup> )
		DE	NDE		No.	Size		
MD080	80	6204	6204	MJ80	3	M 5	1	4
MD09S/L	90S,90L	6205	6205	MJ130	3/6*	M 6	2	16
MD10L	100L	6206	6206					
MD11M	112M	6206	6206					
MD 13S/M	132S, 132M	6308	6308					
MD 16M/L	160M, 160L	6309	6209	MJ200	6	M 8	2	70
MD18M/L	180M, 180L	6310	6310					
MD20L	200L	6212	6212					
MD22S/M	225S,225M	6213	6213	MJ280	6	M 12	2	150
MD25M	250M	6215	6215					
MD28S/M	280S, 280M	A-6316 B-6317	A-6316 B-6316					

\*3 terminals Upto and including 1.5 Kw, 6 terminals for higher outputs.  
A-280 frame; 2 pole B-280 frame; 4, 6, 8 pole

The flame proof motors manufactured by BBL are suitable for ignition groups G1 to G4 as per VDE 0170/0171or Temperature Class T1 to T4 as per IS 6381.

**Main Characteristics**

- Sturdy housing which prevents an internal explosion from spreading to the outside and resists the explosion pressure.
- Robust bearing shields and caps bolted to the frame in such a manner that the gaps remain unaffected in the event of an internal explosion.
- Screen on air intake with a mesh size not exceeding 8 mm.
- External earth terminals
- Protective earth conductor terminal in the terminal box.
- Ex (d) mark on the motor.
- CMRI certificate No., CCE & DGFASLI certificate No. & ISI Licence mark on the name plate.
- Special varnishing and painting treatment to resist highly corrosive atmosphere.

**Salient Features :**

**Enclosure Design :** The frame end shields, terminal boxes and bearing covers of all motors are made of grey cast iron. The motors are so designed that the frame temperature will remain below the ignition temperature of the gas-air mixture involved.

**Insulation :** All motors of standard design are provided with Class F insulation with temperature rise limited to Class 'B'.

All cast iron parts forming the flame proof enclosures are subject to hydraulic pressure test, after final machining as per IS : 2148

**Cooling :** All motors have bi-directional cast iron or fabricated fans.

**Terminal Box :** Location : flame proof motors have terminal box on the top as standard. Side terminal box can be offered on request for frame sizes 132M & above.

**Cable Entries :** Motors for mining application (Gas Group I ) are provided with cable entries with compound filling sealing boxes suitable for paper insulated lead covered double wired armoured (PILCDWA) PVC cables. Cable entries with flameproof cable glands can also be provided to suit PVC armoured cables. (for application in hazardous area Gas groups IIA & IIB only.)

Motors in all frame sizes can be supplied with termination suitable for plug & socket arrangement, against enquiry.

A cable sealing box is mandatory for all motors for use for Gas Group. I & Oil Mines.

**Maintaining the type of protection during operationm :**

Each motor must be provided with a protective circuit breaker or an equally effective device. In particular, the following should be noted.

1. The joint faces must not be remachined 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.
2. 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.
3. Care should be taken to see that all screws, bolts, nuts etc. used for fixing the parts of flameproof enclosures are provided with spring washers wherever originally supplied, to prevent them from getting loose due to shocks and vibration during operation.

Note : BBL type references have changed.  
Please refer to page No. 15 for conversion Chart.

**Flame Proof TEFC 3 Phase Squirrel Cage Motors - MD Type**

Frame size 80 to 280M, B3 construction, class 'F' insulation, suitable for 415V  $\pm 10\%$ , 50Hz  $\pm 5\%$ , Combined variation  $\pm 10\%$  Ambient temperature 45°C Degree of protection IP55. All motors conform to IS 325 for performance.

Note : Motors upto 132M Fr with Oil tight Shaft protection will have lower efficiencies as follows. 80Fr, 5% points lower; 90L to 132M 2% points lower. Partial load efficiencies will also be lower.

**3000 rpm (2 -pole)**

Rated Output		Frame size		Type Reference B3 Construction	Operating Characteristics at Rated output									With DOL starting		Rotor GD <sup>2</sup> Kg m <sup>2</sup>	Appr. Wt. Kg	
KW	HP	IEC	BBL		Speed RPM	Current AMPS	Rated Torque KGM.	Power Factor			Efficiency %			Ratio of starting Current to Rated Current	Ratio of starting torque to Rated Torque			Ratio of Pullout torque to Rated Torque
								FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	80	MJ 80	MD 0802A3	2880	0.81	0.125	0.85	0.78	0.70	75	72	67	6.0	2.7	3.0	0.0037	31
0.55	0.75	80	MJ 80	MD 0802B3	2860	1.25	0.187	0.82	0.74	0.62	75	73	68	5.5	2.7	3.0	0.0037	31
0.75	1.00	80	MJ 80	MD 080213	2845	1.7	0.256	0.82	0.74	0.62	75	75	71	5.0	2.4	2.8	0.0037	31
1.1	1.5	80	MJ 80	MD 080233	2840	2.4	0.377	0.82	0.75	0.63	79	79	76	5.9	2.7	3.1	0.0051	32
1.5	2.0	90L	MJ 90	MD 09L233	2825	3.1	0.517	0.86	0.83	0.76	78.5	78	74	5.5	2.7	3.2	0.0071	48
2.2	3.0	90L	MJ 90	MD 09L253	2850	4.55	0.752	0.83	0.80	0.70	81	79	75	6.2	3.3	3.5	0.0093	50
3.7	5.0	100L	MJ 100	MD 10L213	2900	7.20	1.24	0.87	0.82	0.72	82	81	75	6.5	2.9	3.1	0.0188	62
5.5	7.5	132M	MJ 130	MD 13M213	2920	10.2	1.835	0.89	0.85	0.77	84	82	78	6.0	2.3	3.0	0.060	101
7.5	10.0	132M	MJ 130	MD 13M253	2920	14.0	2.50	0.88	0.84	0.76	85	83	78	6.5	2.7	3.0	0.082	114
9.3	12.5	132M	MJ 130	MD 13M293	2930	16.5	3.09	0.89	0.85	0.76	88	86	81	6.5	2.4	2.9	0.098	120
11.0	15.0	160M	MJ 160	MD 16M213	2920	19.5	3.67	0.89	0.88	0.85	88.5	88	86	5.8	2.0	3.4	0.134	145
15.0	20.0	160M	MJ 160	MD 16M253	2920	25.9	5.0	0.90	0.89	0.85	89.5	89	87	6.0	2.0	3.0	0.171	154
18.5	25.0	160L	MJ 160	MD 16L273	2920	31.6	6.17	0.90	0.88	0.86	90.5	90	88	6.5	2.0	3.0	0.225	168
22.0	30.0	180L	MJ 180	MD 18L213	2930	37.5	7.31	0.89	0.87	0.80	91.5	90.5	88	6.5	2.2	2.7	0.30	220
30.0	40.0	200L	MJ 200	MD 20L233	2955	51.0	9.89	0.88	0.85	0.79	93.2	93	91.5	6.5	2.3	2.5	0.52	260
37.0	50.0	200L	MJ 200	MD 20L253	2955	63.0	12.2	0.88	0.85	0.79	93.5	93.2	91.5	6.5	2.3	2.5	0.61	320
45.0	60.0	225M	MJ 225	MD 22M233	2970	75.0	14.8	0.89	0.87	0.83	93.6	93	91.5	6.0	2.3	2.5	1.04	420
55.0	75.0	250M	MJ 250	MD 25M213	2960	89.5	18.1	0.92	0.91	0.90	93.0	92.5	91.0	6.5	2.1	2.6	2.11	570
75.0	100.0	280S	MJ 280	MD 28S213	2970	122.0	24.6	0.91	0.89	0.84	94.0	93.0	91.0	6.0	1.9	2.7	2.63	690
90.0	120.0	280M	MJ 280	MD 28M233	2970	145.0	29.5	0.92	0.90	0.85	94.0	93.0	91.0	6.0	1.9	2.7	3.01	740

**1500 rpm (4 -pole)**

0.37	0.50	80	MJ 80	MD 0804A3	1415	0.98	0.255	0.76	0.70	0.58	70	68	64	4.5	2.4	2.6	0.0061	31
0.55	0.75	80	MJ 80	MD 080413	1405	1.4	0.381	0.78	0.70	0.56	72	71	67	4.0	2.4	2.6	0.0061	31
0.75	1.00	80	MJ 80	MD 080433	1405	1.8	0.52	0.78	0.70	0.58	76	76	72	4.5	3.0	3.25	0.0072	32
1.1	1.5	90L	MJ 90	MD 09L433	1415	2.5	0.76	0.81	0.73	0.61	76.5	76	72	4.2	2.3	2.7	0.012	48
1.5	2.0	90L	MJ 90	MD 09L453	1415	3.3	1.03	0.80	0.72	0.58	78.5	78	75	4.8	2.5	3.0	0.016	50
2.2	3.0	100L	MJ 100	MD 10L433	1430	4.6	1.50	0.82	0.69	0.53	81	79	78	5.7	2.5	3.2	0.021	60
3.7	5.0	112M	MJ 112	MD 11M433	1430	7.5	2.52	0.82	0.76	0.65	84	84	81	6.0	2.8	3.2	0.053	70
5.5	7.5	132M	MJ 130	MD 13M433	1445	10.4	3.71	0.85	0.80	0.68	86	85	83	6.0	2.2	3.0	0.113	105
7.5	10.0	132M	MJ 130	MD 13M473	1440	14.5	5.07	0.83	0.78	0.68	87	87	85	6.0	2.5	3.2	0.134	113
9.3	12.5	160M	MJ 160	MD 16M413	1450	17.1	6.25	0.86	0.82	0.77	88	88	87	6.0	2.0	2.5	0.145	140
11.0	15.0	160M	MJ 160	MD 16M433	1450	20.5	7.39	0.84	0.81	0.76	89	89	89	6.0	2.1	2.5	0.175	146
15.0	20.0	160L	MJ 160	MD 16L473	1450	27.6	10.08	0.84	0.83	0.79	90	90.5	90	6.0	2.1	2.5	0.25	165
18.5	25.0	180L	MJ 180	MD 18L433	1460	33.2	12.3	0.85	0.82	0.72	91.2	91.2	90	6.0	2.4	2.5	0.46	215
22.0	30.0	180L	MJ 180	MD 18L473	1460	39.5	14.7	0.85	0.82	0.72	91.2	91.2	90	6.0	2.4	2.5	0.54	230
30.0	40.0	200L	MJ 200	MD 20L433	1465	52.0	19.9	0.87	0.84	0.77	92	92	90	6.0	2.6	2.5	0.86	305
37.0	50.0	225S	MJ 225	MD 22S413	1470	64.5	24.5	0.86	0.83	0.75	93.2	93.2	91	6.0	2.5	2.3	1.32	380
45.0	60.0	225M	MJ 225	MD 22M433	1470	78.0	29.8	0.86	0.83	0.75	93.2	93.2	91	6.0	2.5	2.3	1.60	430
55.0	75.0	250M	MJ 250	MD 25M413	1475	94.5	36.3	0.87	0.85	0.78	93.3	93.0	91.5	6.0	2.5	2.6	2.83	570
75.0	100.0	280S	MJ 280	MD 28S413	1480	123.0	49.4	0.90	0.89	0.83	94.0	94.0	93.0	6.0	2.2	2.5	5.0	705
90.0	120.0	280M	MJ 280	MD 28M433	1480	149.0	59.2	0.89	0.87	0.81	94.5	94.3	93.2	6.0	2.2	2.5	6.0	725

Note : BBL type references have changed. Please refer to page No. 15 for conversion Chart.

The following frame sizes are not yet approved for Gas Group I and Oil Mines.

a) 160 M, 160L, 200L and 280 S/M. Motors can be supplied in old frame sizes until approvals are obtained.

b) 80, 112M. Motors can be supplied in 90L & 132M Frame sizes until approvals are obtained.

Dimensions & data can be provided on request.



## 1000 rpm (6 -pole)

Rated Output		Frame size		Type Reference  B3 Construction	Operating Characteristics at Rated output									With DOL starting			Rotor GD <sup>2</sup> Kg m <sup>2</sup>	Appr. Wt. Kg
KW	HP	IEC	BBL		Speed RPM	Current AMPS	Rated Torque KGM.	Power Factor			Efficiency %			Ratio of starting Current to Rated Current	Ratio of starting torque to Rated Torque	Ratio of Pullout torque to Rated Torque		
								FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	80	MJ 80	MD 080613	910	1.15	0.396	0.70	0.60	0.48	65	65	61	3.0	2.1	2.3	0.0060	31
0.55	0.75	80	MJ 80	MD 080633	915	1.6	0.59	0.69	0.60	0.48	69	70	64	3.5	2.2	2.5	0.0084	32
0.75	1.00	90L	MJ 90	MD 09L633	925	2.0	0.79	0.72	0.61	0.50	73	70	69	3.4	2.0	2.2	0.0122	48
1.1	1.5	90L	MJ 90	MD 09L653	935	2.9	1.15	0.69	0.57	0.44	76	74	72	4.0	2.3	2.6	0.0160	50
1.5	2.0	100L	MJ 100	MD 10L633	935	3.7	1.56	0.74	0.64	0.52	76	75	72	3.9	2.0	2.5	0.025	60
2.2	3.0	112M	MJ 112	MD 11M613	930	5.05	2.3	0.77	0.68	0.55	79	78	74	4.2	2.0	2.3	0.043	65
3.7	5.0	132M	MJ 130	MD 13M633	950	8.0	3.80	0.76	0.63	0.49	85	84	82	5.4	1.8	2.8	0.130	108
5.5	7.5	132M	MJ 130	MD 13M673	960	11.5	5.58	0.78	0.71	0.59	85	83	78	5.5	2.5	2.75	0.183	113
7.5	10.0	160M	MJ 160	MD 16M633	960	14.8	7.61	0.8	0.74	0.64	88	88	86	5.4	2.0	2.5	0.276	149
9.3	12.5	160L	MJ 160	MD 16L663	960	18.4	9.44	0.8	0.74	0.64	88	88	87	5.5	2.1	2.5	0.34	160
11.0	15.0	160L	MJ 160	MD 16L673	965	21.6	11.10	0.80	0.77	0.70	88.5	88	87	6.0	1.9	2.5	0.40	169
15.0	20.0	180L	MJ 180	MD 18L613	965	28.0	15.1	0.84	0.78	0.66	89	89	86.5	5.5	2.6	2.3	0.68	210
18.5	25.0	200L	MJ 200	MD 20L613	975	34.0	18.5	0.83	0.78	0.70	91.0	91.0	88	5.8	2.6	2.3	1.00	275
22.0	30.0	200L	MJ 200	MD 20L633	975	40.5	22.0	0.83	0.78	0.70	91.0	91.0	88	5.8	2.6	2.3	1.20	290
30.0	40.0	225M	MJ 225	MD 22M633	975	53.0	30.0	0.86	0.84	0.80	92	92	90.7	5.5	2.5	2.2	2.12	430
37.0	50.0	250M	MJ 250	MD 25M613	980	66.5	36.8	0.84	0.83	0.78	92	92	91	6.0	2.5	2.2	3.51	560
45.0	60.0	280S	MJ 280	MD 28S613	980	80	44.7	0.85	0.83	0.73	92.5	92.5	92.0	6.0	2.3	2.3	5.11	615
55.0	75.0	280M	MJ 280	MD 28M633	980	96	54.7	0.85	0.81	0.72	93.5	93.0	92.0	6.0	2.3	2.3	6.16	665

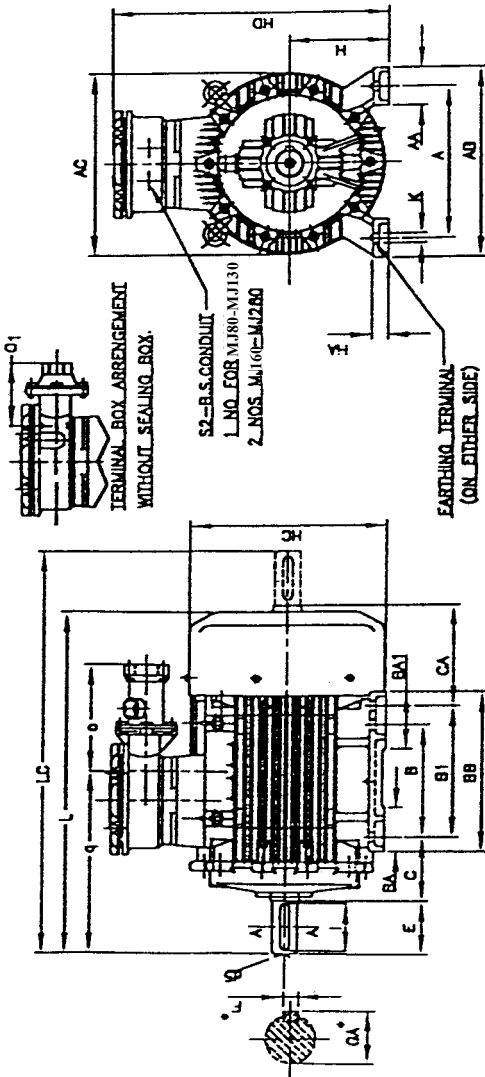
## 750 rpm (8 -pole)

0.37	0.50	90L	MJ 90	MD 09L813	700	1.32	0.515	0.63	0.52	0.41	62	55	48	2.7	1.8	2.1	0.011	45
0.55	0.75	90L	MJ 90	MD 09L853	690	1.81	0.776	0.63	0.55	0.43	67	62	58	2.9	2.0	2.4	0.014	48
0.75	1.0	100L	MJ 100	MD 10L813	685	2.05	1.07	0.73	0.63	0.50	70	70	64	3.0	1.6	1.8	0.023	55
1.1	1.5	100L	MJ 100	MD 10L833	690	2.85	1.55	0.71	0.62	0.48	76	75	73	3.3	1.9	2.3	0.027	59
1.5	2.0	112M	MJ 112	MD 11M813	705	3.90	2.07	0.70	0.62	0.50	77	77	75	3.8	1.7	2.2	0.051	65
2.2	3.0	132M	MJ 130	MD 13M813	710	5.4	3.02	0.71	0.60	0.46	80	80	78	3.7	1.6	2.0	0.099	100
3.7	5.0	160M	MJ 160	MD 16M813	720	8.25	5.01	0.78	0.74	0.65	80	80	78	4.4	1.8	2.0	0.217	137
5.5	7.5	160M	MJ 160	MD 16M833	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82	4.8	1.9	2.2	0.299	151
7.5	10.0	160L	MJ 160	MD 16L873	710	15.6	10.29	0.78	0.74	0.65	86	84	82	5.5	2.1	2.2	0.40	167
9.3	12.5	180L	MJ 180	MD 18L813	715	19.0	12.7	0.79	0.74	0.64	86.5	86.5	85	4.5	2.1	2.2	0.62	205
11.0	15.0	180L	MJ 180	MD 18L833	715	22.5	15.0	0.79	0.74	0.64	86.5	86.5	85	4.5	2.1	2.2	0.72	215
15.0	20.0	200L	MJ 200	MD 20L833	720	29.0	20.3	0.82	0.79	0.71	87.5	87.5	86.5	5.5	2.5	2.3	1.32	330
18.5	25.0	225S	MJ 225	MD 22S813	725	36.5	24.9	0.79	0.77	0.69	89.5	88.5	87.5	5.3	2.1	2.2	1.95	400
22.0	30.0	225M	MJ 225	MD 22M833	725	43.5	29.6	0.79	0.77	0.69	89.5	88.5	87.5	5.3	2.1	2.2	2.41	430
30.0	40.0	250M	MJ 250	MD 25M813	730	56.0	40.0	0.82	0.78	0.68	90.5	90.5	89.0	5.5	2.5	2.2	3.72	575
37.0	50.0	280S	MJ 280	MD 28S813	730	71	49.4	0.79	0.75	0.65	91.5	91.5	90.0	5.5	2.2	2.2	5.83	650
45.0	60.0	280M	MJ 280	MD 28M833	728	83	60.2	0.82	0.77	0.69	92.0	92.5	92.0	5.5	2.2	2.2	6.86	710

Note : BBL type references have changed. Please refer to page No.15 for conversion Chart.



Dimensional Details of Flame Proof : Foot Mounted (B3 Construction) TEFC Motor Frames 80-280 M



Tolerances on Dimensions MARKED* (I.S.A. FIT)	
Dimensions	Tolerances
A, B	±0.75 (IS 1231)
H	- 0.5 (IS 1231)
K	UPTO 110 mm ±1 OVER 110 mm ±1.5
D	190, 240, 280j6 380, 420, 480k6 550, 600, 650, 750k6
G, A, F	(IS 2048)
d5 ± CENTERING TO IS:2540	

\*A-2 POLE; \*B-4,6&8 POLE  
KEY / KEYWAY FIT : h9 / N9

FRAME DIMENSIONS

SHAFT DIMENSIONS

IEC FR. SIZE	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	CA	AC	o	q	L	LC	S2	01	D*	E*	F*	GA*	i	d5†	
80 MJ 80	125	100	50	80	10	153	126	32	36	10	166	296	156	164	214	168	329	386	3/4"	135	19	40	6	21.5	35	T6			
90L MJ 90	140	125	56	90	10	180	160	50	40	13	178	336	182	178	217	195	388	463	3/4"	141	24	50	8	27	45	T8			
100L MJ 100	160	140	63	100	12	198	176	54	45	14	198	349	197	195	206	225	435	520	1"	131	28	60	8	31	55	T10			
112M MJ 112	190	140	70	112	12	230	176	50	55	15	226	374	209	225	200	233	456	539	1"	124	28	60	8	31	55	T10			
132M MJ 130	216	178	89	132	12	256	218	64	54	17	266	422	225	260	175	282	547	652	1"	100	38	80	10	41	70	T12			
160M/L MJ 160	254	210	108	160	15	314	294	60	70	115	325	472	247	324	252	365	694	829	1"	151	42	110	12	45	105	T16			
180L MJ 180	279	279	121	180	15	339	339	80	75	26	357	515	200	354	315	395	698	820	1 1/2"	211	48	110	14	51.5	100	T16			
200L MJ 200	318	305	133	200	19	398	355	85	85	32	397	556	235	394	237	395	771	893	2"	133	55	110	16	59	100	T20			
225S/M MJ 225	*A	356	286	311	149	225	19	436	361	85	85	110	34	453	651	238	444	308	414	799	918	2"	198	55	110	16	59	100	T20
	*B																		829	948							T20		
250M MJ 250	*A	406	349	168	250	24	506	425	100	115	42	515	688	268	489	287	474	915	1065	2"	177	60	140	18	64	130	T20		
	*B																											T20	
280S/M MJ 280	*A	457	368	419	190	280	24	530	490	110	110	149	42	566	755	271	544	252	517	1010	1157	2"	142	65	140	18	69	130	T20
	*B																											T20	
S/M																												T20	

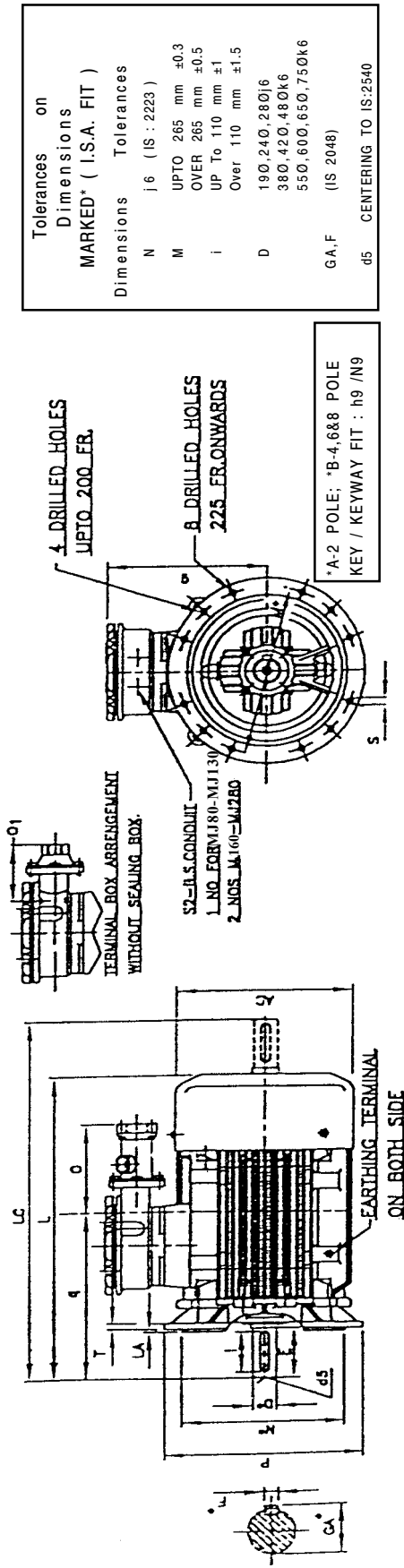
Note : All Dimensions are in mm. unless otherwise specified

● Double shaft extension can be provided with shaft dimension identical to D.E. shaft except for MJ 225 - 4, 6, 8 pole and MJ 280 - 4, 6, 8 pole where Non Drive Shaft Extension will be limited to 55 m.m. and 65 mm dia respectively.

Note : BBL type reference have changed. Please refer to Page No.15 for Conversion Chart.



Dimensional Details of Flame Proof : Flange Mounted (B5 Construction) TEFC Motor Frames 80-280 M



FRAME DIMENSIONS

SHAFT DIMENSIONS

IEC FR.	FRAME SIZE	P	N*	M*	T	LA	S	i*	g	AC	o	q	L	LC	01	S2	D*	E	F*	GA*	i	d5	
80	MJ 80	200	130	165	3.5	11	12	40	216	164	214	218	329	386	135	3/4"	19	40	6	21.5	35	T6	
90L	MJ 90	200	130	165	3.5	15	12	50	246	178	217	195	388	463	141	3/4"	24	50	8	27	45	T8	
100L	MJ 100	250	180	215	4	15	15	60	258	195	206	225	435	520	131	1"	28	60	8	31	55	T10	
112M	MJ 112	250	180	215	4	12	15	60	262	225	200	233	456	539	124	1"	28	60	8	31	55	T10	
132M	MJ 130	300	230	265	4	13	15	80	290	260	175	282	547	652	100	1"	38	80	10	41	70	T12	
160M/L	MJ 160	350	250	300	5	13	19	110	312	324	252	365	694	829	151	1"	42	110	12	45	105	T16	
180L	MJ 180	350	250	300	5	16	19	110	335	354	315	395	723	845	211	1 1/2"	48	110	14	51.5	100	T16	
200L	MJ 200	400	300	350	5	15	19	110	356	394	237	395	771	893	133	2"	55	110	16	59	100	T20	
225S/M	MJ 225	*A	450	350	400	5	16	19	110	426	444	308	414	799	918	198	2"	55	110	16	59	100	T20
		*B											829	948			60	140	18	64	130	T20	
250M	MJ 250	*A	550	450	500	5	18	19	140	438	489	287	474	915	1065	177	2"	60	140	18	64	130	T20
		*B															65	140	18	69	130	T20	
280S/M	MJ 280	*A	550	450	500	5	18	19	140	475	544	252	517	1010	1157	142	2"	65	140	18	69	130	T20
	S/M	*B															75	140	20	79.5	130	T20	

All Dimensions are in mm. unless otherwise specified

Note :

- Double shaft extension can be provided with shaft dimension identical to D.E. shaft except for MJ 225-4, 6, 8 pole and MJ 280-4, 6, 8 pole where Non Drive Shaft Extension will be limited to 55 mm. and 65 mm dia respectively.

Note : BBL type reference have changed. Please refer to Page No. 15 for Conversion Chart.



## INCREASED SAFETY MOTORS Ex (e)

The motors of Increased Safety design (type ME) have been developed from the standard TEFC, 3-Phase cage induction motors (type MA) for operation in hazardous locations classified as Zone-2 areas as per IS:5572 and VDE 0165.

### Limiting Temperatures :

Limiting temperatures for insulation and all parts as specified in IS:6381 are given in Table 4.

**Table : 4**

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 the time tE (°C)	450	300	200	135	100	85
Limiting 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
Limiting temp. of stator winding in continuous operation (°C)	Class B 110	110	110	110	100	85
	Class F 130	130	130	110	100	85
Limiting temp. permitted for all parts in continuous operation (°C)	< 450	< 300	< 200	< 135	< 100	< 85

### Manufacturing Range :

ME motors are designed for temperature class (Ignition Temperature Group) T3, Motor types, frame sizes, outputs and other performance details are furnished in the Performance/Selection Tables.

### Time 'tE' of Increased Safety Motors :

Time 'tE' is the Locked Rotor withstand time. It is the time taken for heating up any part of the motor from the steady state temperature up to the limiting temperature under locked rotor condition. 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 temperature. Time tE, temperature class and starting current are indicated on the name plate of ME motors.

The starting time normally permitted for these motors is upto 1.5 times the time tE i.e. upto 1.5 x tE. If starting time is approximately of the order of 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, and
- Speed-Torque characteristic of the driven equipment.

Increased Safety Motors have time tE of minimum 5 seconds.

### Salient Features of ME Motors :

**Terminals and Connection :** External connections of client's power cable to the motor terminals in Terminal Box must be rigidly gripped and secured against loosening

Note : BBL type references have changed. Please refer to page No. 16 for conversion Chart.

and twisting. This is achieved with the help of a specially designed Terminal Plate provided in the Terminal Box.

**Terminal Box :** The motors in frame size 63 to 80 and 180 to 280 are provided with terminal box on top. Side T Box can be provided on request in frame sizes 180 & above. The terminal box for frame size 90S to 160L is fitted on the right hand side, seen from the driving end. Terminal box on left hand side can also be provided in frame size 90S to 160L, if specified clearly in the order. An earthing terminal is provided in the Terminal Box.

Terminal Boxes in frame sizes 63 to 280M can be rotated through 360° in steps to 90° to suit the cable location.

**Air-gap :** Radial air-gap of the motors is such that the minimum air gap values specified in IS:6381 are fully satisfied.

**Enclosure :** Increased Safety Motors have a degree of protection IP55 in accordance with IS:4691 as a standard feature. In addition, all flange motors (B5 & B14) have OTS protection. When desired specifically, motors with V1, V5 and V18 mountings are provided with a canopy fitted on the top of the fan cowl.

**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 thick enamel coating as per IS : 13730.

**Name Plate :** Stainless Steel name Plate is provided with each motor. Over and above the normal name plate details, other data such as time tE, starting current, temperature-Classes, type of protection, approval certification, etc. are also provided.

**Certification :** ME motors are approved by Chief Controller of Explosives, Nagpur. A declaration to this effect is incorporated on the name plate.

### Design of Terminal Boxes for 'ME' Motors

Motor Type	Frame Size	Terminal Box Type	Terminals			Max. Conductor Cross-Section (mm <sup>2</sup> )
			No.	Size	No. of Cable Entries	
ME063	63	gk230	6	M5	2	10
ME071	71					
ME080	80					
ME090S/L	90S, 90L					
ME10L	100L	gk330	6	M5	2	16
ME11M	112M					
ME13S/M	132S, 132M					
ME16M/L	160M, 160L					
ME18M/L	180M, 180L	TB180	6	M6	2	50
ME20L	200L	TB225	6	M8	2	70
ME22S/M	225S, 225M					
ME25M	250M	TB280	6	M10	2	150
ME28S/M	280S, 280M					

For bearing sizes, refer standard motor catalogue CGA1.



**Performance Particulars of Increased Safety Motors**

Frame size 63 to 280M, B3 construction, class 'F' insulation, suitable for 415V ±10%, 50Hz ±5%, Combined variation ± 10% Ambient temperature 40°C Max, Degree of protection IP55.

Note : Motors upto 132M Fr with Oil tight Shaft protection will have lower efficiencies as follows. Upto 80Fr, 5% points lower; 90S to 132M 2% points lower. Partial load efficiencies will also be lower.

**3000 rpm (2 -pole)**

Rated Output		Frame size	Type Reference	Operating Characteristics at Rated outputs									With DOL starting		Rotor GD <sup>2</sup>	Appr. Wt.	Time for T3 Temp Class	
KW	HP			IEC	B3 Construction	Speed	Current	Rated Torque	Power Factor			Efficiency %						Ratio of starting Current to Rated Current
		RPM	AMPS			KGM.	FL	3/4L	1/2L	FL	3/4L	1/2L						
0.18	0.25	63	ME 063213	2720	0.57	0.064	0.76	0.66	0.52	58	57	52	3.2	2.7	3.0	0.00085	5	30
0.25	0.35	63	ME 063233	2720	0.71	0.090	0.79	0.75	0.63	62	59	53	3.5	2.3	2.6	0.00099	5	30
0.37	0.50	71	ME 071213	2780	1.00	0.13	0.78	0.70	0.58	67	65	61	4.0	2.1	2.8	0.0015	6	30
0.55	0.75	71	ME 071233	2805	1.33	0.19	0.79	0.72	0.62	73	74	71	4.5	2.7	3.0	0.0019	7.0	15
0.75	1.00	80	ME 080213	2845	1.7	0.256	0.82	0.74	0.62	75	75	71	5.0	2.4	2.8	0.0037	10	15
1.1	1.5	80	ME 080233	2840	2.4	0.377	0.82	0.75	0.63	79	79	76	5.9	2.7	3.1	0.0051	11	15
1.5	2.0	90S	ME 09S233	2825	3.1	0.517	0.86	0.83	0.76	78.5	78	74	5.5	2.7	3.2	0.0071	19	15
2.2	3.0	90L	ME 09L253	2850	4.55	0.752	0.83	0.80	0.70	81	79	75	6.2	3.3	3.5	0.0093	23	8
3.7	5.0	100L	ME 10L213	2900	7.20	1.24	0.87	0.82	0.72	82	81	75	6.5	2.9	3.1	0.0188	33	15
5.5	7.5	132S	ME 13S213	2920	10.2	1.835	0.89	0.85	0.77	84	82	78	6.0	2.3	3.0	0.060	62	15
7.5	10.0	132S	ME 13S253	2920	14.0	2.50	0.88	0.84	0.76	85	83	78	6.5	2.7	3.0	0.082	69	8
9.3	12.5	132M	ME 13M293	2930	16.5	3.09	0.89	0.85	0.76	88	86	81	6.5	2.4	2.9	0.098	77	8
11.0	15.0	160M	ME 16M213	2920	19.5	3.67	0.89	0.88	0.85	88.5	88	86	5.8	2.0	3.4	0.134	102	8
15.0	20.0	160M	ME 16M253	2920	25.9	5.0	0.90	0.89	0.85	89.5	89	87	6.0	2.0	3.0	0.171	117	8
18.5	25.0	160L	ME 16L293	2920	31.6	6.17	0.90	0.88	0.86	90.5	90	88	6.5	2.0	3.0	0.255	138	8
22.0	30.0	180L	ME 18L233	2930	37.5	7.31	0.89	0.87	0.80	91.5	90.5	88	6.5	2.2	2.7	0.34	185	10
30.0	40.0	200L	ME 20L253	2955	51.0	9.89	0.88	0.85	0.79	93.2	93	91.5	6.5	2.3	2.5	0.61	279	12
37.0	50.0	225S	ME 22S213	2955	63.0	12.2	0.88	0.85	0.79	93.5	93.2	91.5	6.5	2.3	2.5	1.04	336	12
45.0	60.0	225M	ME 22M253	2970	75.0	14.8	0.89	0.87	0.83	93.6	93	91.5	6.0	2.3	2.5	1.20	365	12
55.0	75.0	250M	ME 25M213	2960	89.5	18.1	0.92	0.91	0.90	93.0	92.5	91.0	6.5	2.1	2.6	2.11	523	12
75.0	100.0	280M	ME 28M233	2970	122.0	24.6	0.91	0.89	0.84	94.0	93.0	91.0	6.0	1.9	2.7	3.01	728	12
90.0	120.0	280M	ME 28M233	2970	145.0	29.5	0.92	0.90	0.85	94.0	93.0	91.0	6.0	1.9	2.7	3.01	728	12

**1500 rpm (4 -pole)**

0.12	0.16	63	ME 063413	1330	0.42	0.088	0.75	0.65	0.50	53	48	40	2.4	1.9	2.3	0.0014	5	30
0.18	0.25	63	ME 063433	1350	0.58	0.13	0.75	0.65	0.50	58	55	50	2.7	2.0	2.3	0.0016	5	30
0.25	0.35	71	ME 071413	1370	0.77	0.178	0.74	0.63	0.51	61	61	55	3.0	1.9	2.2	0.0024	6	30
0.37	0.50	71	ME 071433	1380	1.04	0.260	0.72	0.62	0.50	69	70	64	3.4	2.3	2.5	0.0033	7	30
0.55	0.75	80	ME 080413	1405	1.4	0.381	0.78	0.70	0.56	72	71	67	4.0	2.4	2.6	0.0061	10	30
0.75	1.00	80	ME 080433	1405	1.8	0.52	0.78	0.70	0.58	76	76	72	4.5	3.0	3.25	0.0072	11	15
1.1	1.5	90S	ME 09S433	1415	2.5	0.76	0.81	0.73	0.61	76.5	76	72	4.2	2.3	2.7	0.012	19	15
1.5	2.0	90L	ME 09L453	1415	3.3	1.03	0.80	0.72	0.58	78.5	78	75	4.8	2.5	3.0	0.016	23	15
2.2	3.0	100L	ME 10L433	1430	4.6	1.50	0.82	0.69	0.53	81	79	78	5.7	2.5	3.2	0.021	31	15
3.7	5.0	112M	ME 11M433	1430	7.5	2.52	0.82	0.76	0.65	84	84	81	6.0	2.8	3.2	0.053	43	8
5.5	7.5	132S	ME 13S433	1445	10.4	3.71	0.85	0.80	0.68	86	85	83	6.0	2.2	3.0	0.113	62	8
7.5	10.0	132M	ME 13M473	1440	14.5	5.07	0.83	0.78	0.68	87	87	85	6.0	2.5	3.2	0.134	73	8
9.3	12.5	160M	ME 16M413	1450	17.1	6.25	0.86	0.82	0.77	88	88	87	6.0	2.0	2.5	0.145	92	8
11.0	15.0	160M	ME 16M433	1450	20.5	7.39	0.84	0.81	0.76	89	89	89	6.0	2.1	2.5	0.175	105	8
15.0	20.0	160L	ME 16L473	1450	27.6	10.08	0.84	0.83	0.79	90	90.5	90	6.0	2.1	2.5	0.25	132	8
18.5	25.0	180M	ME 18M433	1460	33.2	12.3	0.85	0.82	0.72	91.2	91.2	90	6.0	2.4	2.5	0.46	180	10
22.0	30.0	180L	ME 18L473	1460	39.5	14.7	0.85	0.82	0.72	91.2	91.2	90	6.0	2.4	2.5	0.54	190	10
30.0	40.0	200L	ME 20L433	1465	52.0	19.9	0.87	0.84	0.77	92	92	90	6.0	2.6	2.5	0.86	266	12
37.0	50.0	225S	ME 22S413	1470	64.5	24.5	0.86	0.83	0.75	93.2	93.2	91	6.0	2.5	2.3	1.32	338	15
45.0	60.0	225M	ME 22M433	1470	78.0	29.8	0.86	0.83	0.75	93.2	93.2	91	6.0	2.5	2.3	1.60	366	12
55.0	75.0	250M	ME 25M413	1475	94.5	36.3	0.87	0.85	0.78	93.3	93.0	91.5	6.0	2.5	2.6	2.83	530	12
75.0	100.0	280M	ME 28M433	1480	123.0	49.4	0.90	0.89	0.83	94.0	94.0	93.0	6.0	2.2	2.5	6.0	703	12
90.0	120.0	280M	ME 28M433	1480	149.0	59.2	0.89	0.87	0.81	94.5	94.3	93.2	6.0	2.2	2.5	6.0	703	12

Note : BBL type references have changed. Please refer to page No.16 for conversion Chart.

+ Class F Rise





**1000 rpm (6 -pole)**

Rated Output		Frame size	Type Reference	Operating Characteristics at Rated outputs									With DOL starting			Rotor GD <sup>2</sup>	Appr. Wt.	Time t <sub>E</sub> for T <sub>3</sub> Temp Class
K W	HP			IEC	B3 Construction	Speed RPM	Current AMPS	Rated Torque KGM.	Power Factor			Efficiency %			Ratio of starting Current to Rated Current			
		FL	3/4L						1/2L	FL	3/4L	1/2L						
0.25	0.35	71	ME 071633	875	0.81	0.278	0.70	0.60	0.48	61	61	52	2.6	2.0	2.3	0.0038	7	30
0.37	0.50	80	ME 080613	910	1.15	0.396	0.70	0.60	0.48	65	65	61	3.0	2.1	2.3	0.0060	10	30
0.55	0.75	80	ME 080633	915	1.6	0.59	0.69	0.60	0.48	69	70	64	3.5	2.2	2.5	0.0084	11	30
0.75	1.00	90S	ME 09S633	925	2.0	0.79	0.72	0.61	0.50	73	70	69	3.4	2.0	2.2	0.0122	18	30
1.1	1.5	90L	ME 09L653	935	2.9	1.15	0.69	0.57	0.44	76	74	72	4.0	2.3	2.6	0.0160	22	15
1.5	2.0	100L	ME 10L633	935	3.8	1.56	0.74	0.64	0.52	75	75	72	3.9	2.0	2.5	0.025	32	15
2.2	3.0	112M	ME 11M613	930	5.05	2.3	0.77	0.68	0.55	79	78	74	4.2	2.0	2.3	0.043	39	15
3.7	5.0	132S	ME 13S633	950	8.0	3.80	0.76	0.63	0.49	85	84	82	5.4	1.8	2.8	0.13	62	15
5.5	7.5	132M	ME 13M673	960	11.5	5.58	0.78	0.71	0.59	85	83	78	5.5	2.5	2.75	0.183	79	15
7.5	10.0	160M	ME 16M633	960	14.8	7.61	0.8	0.74	0.64	88	88	86	5.4	2.0	2.5	0.276	102	15
9.3	12.5	160L	ME 16L663	960	18.4	9.44	0.8	0.74	0.64	88	88	87	5.5	2.1	2.5	0.34	119	15
11.0	15.0	160L	ME 16L673	965	21.6	11.10	0.80	0.77	0.70	88.5	88	87	6.0	1.9	2.5	0.40	129	15
15.0	20.0	200L	ME 20L613	975	28.0	15.0	0.83	0.78	0.70	90	90	87	5.5	2.6	2.3	1.00	234	12
18.5	25.0	200L	ME 20L613	975	34.0	18.5	0.83	0.78	0.70	91.0	91.0	88	5.8	2.6	2.3	1.00	234	12
22.0	30.0	200L	ME 20L633	975	40.5	22.0	0.83	0.78	0.70	91	91	88	5.8	2.6	2.3	1.20	251	12
30.0	40.0	225M	ME 22M633	975	53.0	30.0	0.86	0.84	0.80	92	92	90.7	5.5	2.5	2.2	2.12	341	12
37.0	50.0	250M	ME 25M613	980	66.5	36.8	0.84	0.83	0.78	92	92	91	6.0	2.5	2.2	3.51	515	12
45.0	60.0	280S	ME 28S613	980	80	44.7	0.85	0.83	0.73	92.5	92.5	92.0	6.0	2.3	2.3	5.11	592	12
55.0	75.0	280M	ME 28M633	980	96	54.7	0.85	0.81	0.72	93.5	93.0	92.0	6.0	2.3	2.3	6.16	640	12

**750 rpm (8 -pole)**

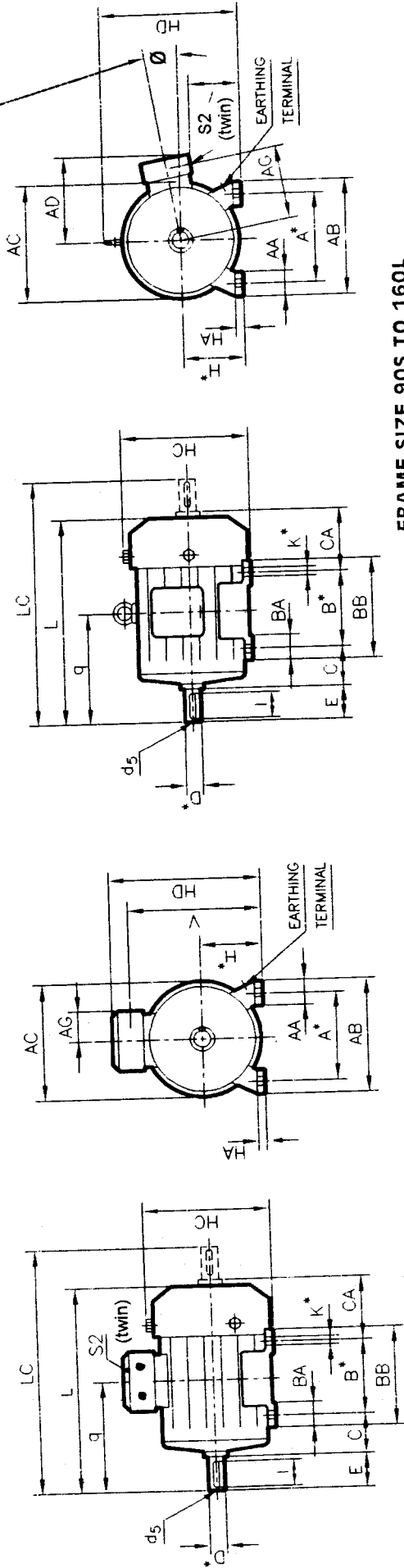
0.37	0.50	90S	ME 09S813	700	1.32	0.515	0.63	0.52	0.41	62	55	48	2.7	1.8	2.1	0.011	17	30
0.55	0.75	90L	ME 09L853	690	1.81	0.776	0.63	0.55	0.43	67	62	58	2.9	2.0	2.4	0.014	20	30
0.75	1.0	100L	ME 10L813	685	2.05	1.07	0.73	0.63	0.50	70	70	64	3.0	1.6	1.8	0.023	28	30
1.1	1.5	100L	ME 10L833	690	2.85	1.55	0.71	0.62	0.48	76	75	73	3.3	1.9	2.3	0.027	32	30
1.5	2.0	112M	ME 11M813	705	3.90	2.07	0.70	0.62	0.50	77	77	75	3.8	1.7	2.2	0.051	38	30
2.2	3.0	132S	ME 13S813	710	5.4	3.02	0.71	0.60	0.46	80	80	78	3.7	1.6	2.0	0.099	57	30
3.7	5.0	160M	ME 16M813	720	8.25	5.01	0.78	0.74	0.65	80	80	78	4.4	1.8	2.0	0.217	91	30
5.5	7.5	160M	ME 16M833	715	11.6	7.49	0.78	0.74	0.65	84.5	84.5	82	4.8	1.9	2.2	0.299	106	30
7.5	10.0	160L	ME 16L873	710	15.6	10.29	0.78	0.74	0.65	86	84	82	5.5	2.1	2.2	0.40	130	30
9.3	12.5	180L	ME 18L833	715	19.0	12.7	0.79	0.74	0.64	86.5	86.5	85	4.5	2.1	2.2	0.72	175	30
11.0	15.0	200L	ME 20L833	720	21.4	14.9	0.82	0.79	0.71	87.0	87.0	85	5.0	2.1	2.2	1.32	287	15
15.0	20.0	200L	ME 20L833	720	29.0	20.3	0.82	0.79	0.71	87.5	87.5	86.5	5.5	2.5	2.3	1.32	287	15
18.5	25.0	225S	ME 22S813	725	36.5	24.9	0.79	0.77	0.69	89.5	88.5	87.5	5.3	2.1	2.2	1.95	301	15
22.0	30.0	225M	ME 22M833	725	43.5	29.6	0.79	0.77	0.69	89.5	88.5	87.5	5.3	2.1	2.2	2.41	331	15
30.0	40.0	250M	ME 25M813	730	56.0	40.0	0.82	0.78	0.68	90.5	90.5	89.0	5.5	2.5	2.2	3.72	528	12
37.0	50.0	280S	ME 28S813	730	71	49.4	0.79	0.75	0.65	91.5	91.5	90.0	5.5	2.2	2.2	5.83	628	12
45.0	60.0	280M	ME 28M833	728	83	60.2	0.82	0.77	0.69	92.0	92.5	92.0	5.5	2.2	2.2	6.86	684	12

Note : BBL type references have changed. Please refer to page No.16 for conversion Chart.



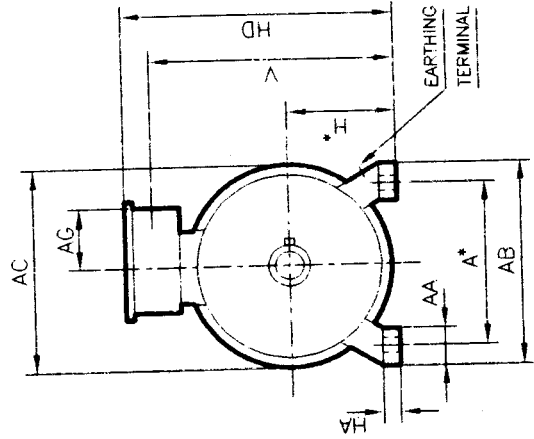
Dimensional Drawing of Increased Safety : Foot Mounted (B3 Construction) TEFC Motor Frame 63 - 280 M

Offset by 10° for 112 & 132 Ft.

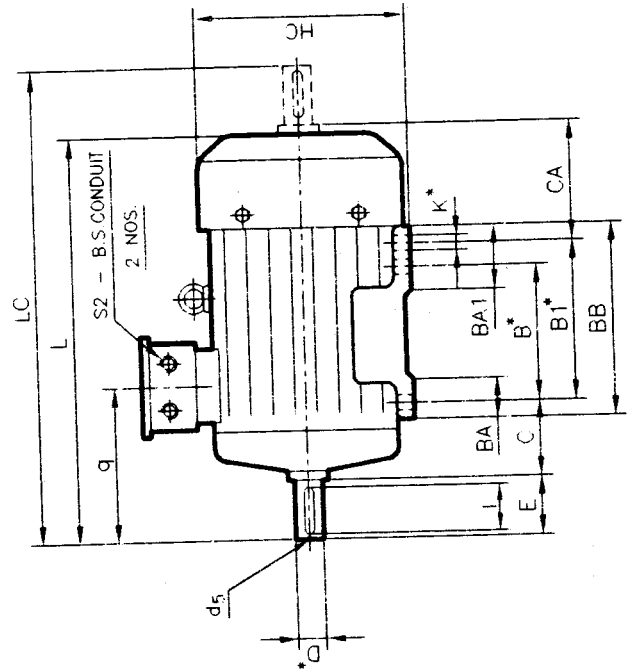


FRAME SIZE 63, 71 & 80

FRAME SIZE 90S TO 160L



FRAME SIZE 180 TO 280M





IEC Frame Motor Type	FIXING			Safety			Foot Mounted			Construction (B3)			TEFC			Motors			Frame 63-280M			SHAFT									
	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	LC	CA	AC	V	q	AC	S2	D*	E	F*	GA*	I	d		
63	ME063	100	80	-	40	63	7	126	100	30	28	-	7	128	207	-	206	241	75	124	112	103	56	3/4"	11	23	4	12.5	18	M4	
71	ME071	112	90	-	45	71	7	138	110	30	29	-	7	143.5	221	-	234	278	83	139	119	120	56	3/4"	14	30	5	16	25	M5	
80	ME080	125	100	-	50	80	10	153	124	32	32	-	10	161	237	-	267	324	94	157	126	110	56	3/4"	19	40	6	21.5	35	M6	
90S	ME09S	140	100	-	56	90	10	168	150	34	54	-	12	177	①	154	327	399	143	172	34	169	117	3/4"	24	50	8	27	45	M8	
90L	ME09L	140	125	-	56	90	10	168	150	34	54	-	12	177	①	154	327	399	143	172	34	169	117	3/4"	24	50	8	27	45	M8	
100L	ME10L	160	140	-	63	100	12	190	174	44	36	-	14	198	235	169	366	448	125	196	44	193	131	1"	28	60	8	31	55	M10	
112M	ME11M	190	140	-	70	112	12	230	176	62	50	-	15	226	269	189	388	471	141	226	82	200	150	1"	28	60	8	31	55	M10	
132S	ME13S	216	140	-	89	132	12	256	180	64	50	-	17	266	308	206	449	552	163	266	99	239	166	1"	38	80	10	41	70	M12	
132M	ME13M	216	178	-	89	132	12	256	218	64	54	-	17	266	308	206	487	590	163	266	99	258	166	1"	38	80	10	41	70	M12	
160M	ME16M	254	210	-	108	160	15	306	256	74	65	-	20	322	366	226	605	721	183	324	131	323	186	1"	42	110	12	45	105	M16	
160L	ME16L	254	254	-	108	160	15	306	300	74	65	-	20	322	366	226	649	765	183	324	131	345	186	1"	42	110	12	45	105	M16	
180M/L	ME18M/L	279	241	279	121	180	15	344	319	65	70	108	26	357	462	-	717	821	201	354	410	264	112	1-1/2"	48	110	14	51.5	100	M16	
200L	ME20L	318	305	-	133	200	19	398	355	85	65	65	32	397	512	-	770	892	234	394	449	287	172	2"	55	110	16	59	100	M20	
225S/M	ME22S/M	*A 356	286	311	149	225	19	436	361	85	85	110	34	447	562	-	825	944	239	444	498	297	172	2"	55	110	16	59	100	M20	
	*B																830	949	239	444	498	327	172	2"	60	140	18	64	130	M20	
250M	ME25M	*A 406	349	-	168	250	24	506	425	100	115	115	42	498	665	-	915	1065	268	495	578	352	205	2"	60	140	18	64	130	M20	
	*B																									65	140	18	69	130	M20
280S/M	ME28S/M	*A 457	368	419	190	280	24	557	525	100	145	155	42	552	725	-	1010	1160	271	544	638	360	205	2"	65	140	18	69	130	M20	
	*B																									75	140	20	79.5	130	M20

All Dimensions are in mm unless otherwise specified

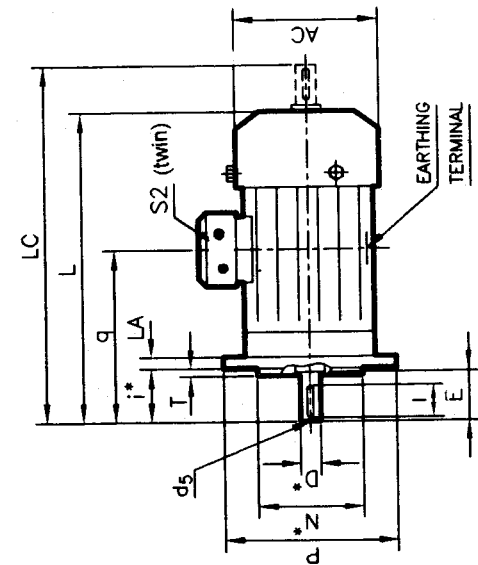
Tolerance on Dimensions with star

Dimension	Tolerance	Specification
A, B	±0.75	IS : 1231
H	0.5	IS : 1231
D	11,14,19,24,280 38,42,480	
K	m 6 +0.360 +0.430	IS : 2048 IS : 2540
GA, F d(centering)		

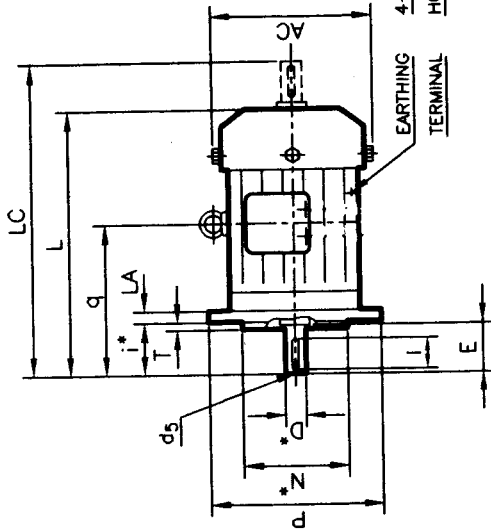
Note :

- ① Without Eye bolt.
- ☐ For 225 S/M-4,6,8 pole Non Drive Shaft Extension will be limited to 55mm dia
- ☐ \*A-2 pole, \*B-4, 6 & 8 pole.
- ☐ Also suitable for B6, B7, B8, V5 & V6 mounting as per IS 2253.
- ☐ For 280 S/M 4,6 & 8 pole Non Drive Shaft Extension will be limited to 65 mm dia.

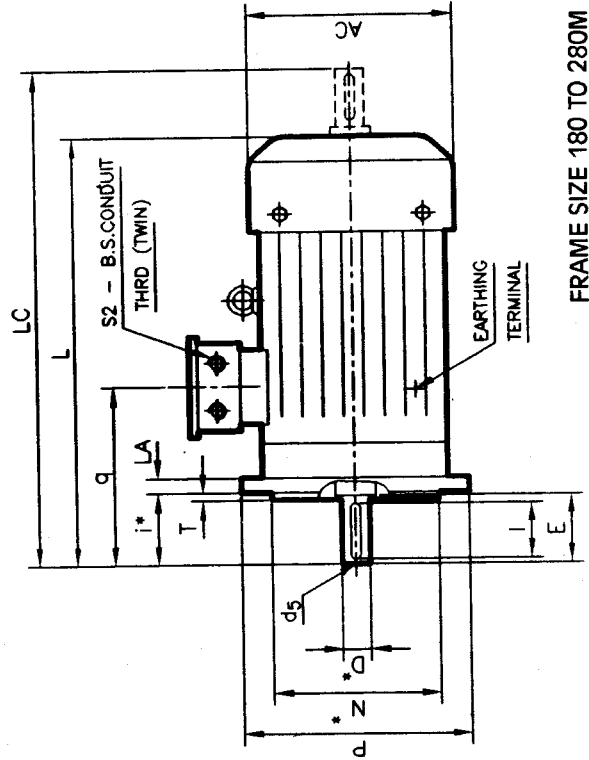
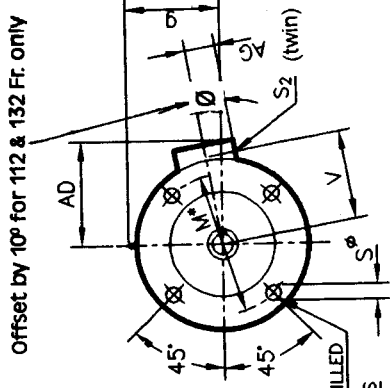
Dimensional Drawing of Increased Safety : Flange Mounted (B5 Construction) TEFC Motor Frame 63 - 280 M



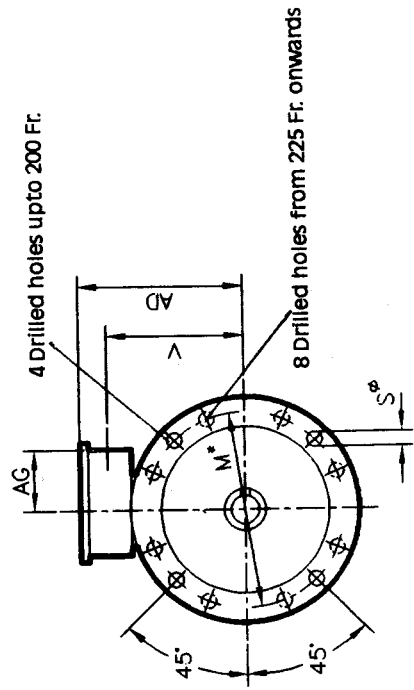
FRAME SIZE 63, 71 & 80



FRAME SIZE 90S TO 160L



FRAME SIZE 180 TO 280M





**Dimensional Details of Increased Safety : Flange Mounted (B5 Construction) TEFC Motors Frame 63-280M**

IEC Frame Motor Type Size	FIXING			GENERAL					TERMINAL BOX					SHAFT								
	P	N*	M*	i*	S	T	LA	AD	AC	L	LC	g	v	q	AG	S2	D*	E	F*	GA*	i	d
63	140	95	115	23	10	3	9	144	124	225	260	49	122	56	3/4"	11	23	4	12.5	18	M4	
71	160	110	130	30	10	3.5	9	150	139	261	305	48	147	56	3/4"	14	30	5	16	25	M5	
80	200	130	165	40	12	3.5	10	157	157	267	324	46	110	56	3/4"	19	40	6	21.5	35	M6	
90S	200	130	165	50	12	3.5	10	154	181	327	399	①	117	156	56	3/4"	24	50	8	27	45	M8
90L	200	130	165	50	12	3.5	10	154	181	327	399	①	117	169	56	3/4"	24	50	8	27	45	M8
100L	250	180	215	60	15	4	11	169	202	366	448	135	131	193	56	1"	28	60	8	31	55	M10
112M	250	180	215	60	15	4	11	189	227	388	471	157	150	200	56	1"	28	60	8	31	55	M10
132S	300	230	265	80	15	4	12	206	267	449	552	176	166	239	63	1"	38	80	10	41	70	M12
132M	300	230	265	80	15	4	12	206	267	487	590	176	166	258	63	1"	38	80	10	41	70	M12
160M	350	250	300	110	19	5	13	226	324	585	721	206	186	323	63	1"	42	110	12	45	105	M16
160L	350	250	300	110	19	5	13	226	324	629	765	206	186	345	63	1"	42	110	12	45	105	M16
180M/L	350	250	300	110	19	5	13	282	369	717	821	230	264	112	1 1/2"	48	110	14	51.5	100	M16	
200L	400	300	350	110	19	5	15	312	405	770	892	249	287	172	2"	55	110	16	59	100	M20	
225S/M	450	350	400	140	19	5	16	337	455	800	919	273	297	172	2"	55	110	16	59	100	M20	
	* B	450	350	400	140	19	5	16	337	455	830	949	273	327	172	2"	60	140	18	64	130	M20
250M	* A	550	450	500	140	19	5	16	415	495	1065	328	352	205	2"	60	140	18	64	130	M20	
	* B																					
280S/M	* A	550	450	500	140	19	5	18	445	544	1010	1160	358	360	205	2"	65	140	18	69	130	M20
	* B																					

All Dimensions are in mm unless otherwise specified

**Tolerance on Dimensions with star**

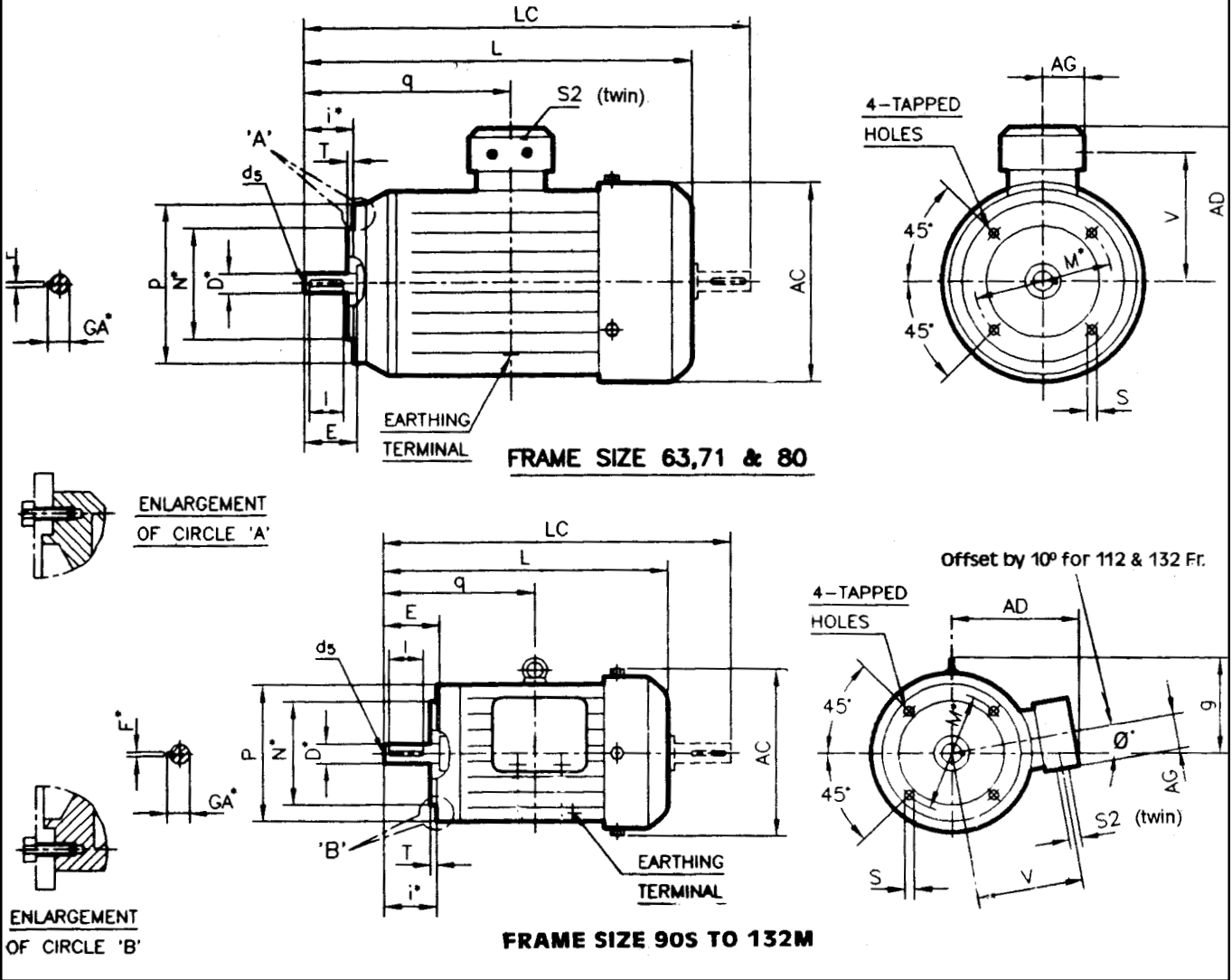
Dimension	Tolerance	Specification
N	j6	IS : 2223
M	±0.3 UPTO 265 OVER 265	
i	±1 UPTO 85 OVER 85	IS : 2048 IS : 2540
D	±1.5 j6 k6 m6	
GA, F d (centering)	11, 14, 19, 24, 28Ø 38, 42, 48Ø 55Ø, 60Ø, 65Ø, 75Ø	

**Note :**

- ① Without Eye bolt.
- \*A-2 pole, \*B-4, 6 & 8 pole.
- 8 Nos. Fixing Holes for 225 S/M Frame.
- Suitable for V1 V3 & B5 mounting as per IS 2253 : 1974.
- Key/Key way fit : h9 / N9
- Double shaft extension can be provided with shaft dimension identical to D.E. Shaft except for 225 S/M-4-6, 8 pole and 280 S/M-4, 6, 8 pole where Non Drive Shaft Extension will be limited to 55 m.m. dia and 65 mm dia respectively.



Dimensional Drawing of Increased Safety : Face Mounted (B14 Construction) TEFC Motor Frame 63 - 132 M



Dimensional Details of Increased Safety : Face Mounted (B14 Construction) TEFC Motor Frame 63 - 132 M

IEC Frame Size	Motor Type	FIXING					GENERAL						TERMINAL BOX			SHAFT						
		P	N*	M*	I*	S	T	AD	AC	L	LC	g	V	q	AG	S2	D*	E	F*	GA*	i	d*
63	ME 063	90	60	75	23	M5X10	2.5	144	124	206	241	49	103	56	3/4"	11	23	4	12.5	18	M 4	
71	ME 071	105	70	85	30	M6X13	2.5	150	139	234	278	48	120	56	3/4"	14	30	5	16	25	M 5	
80	ME 080	120	80	100	40	M6X13	3	157	157	267	324	46	110	56	3/4"	19	40	6	21.5	35	M 6	
90S	ME 09S	140	95	115	50	M8X12	3	154	172	327	399	①	117	156	56	3/4"	24	50	8	27	45	M 8
90L	ME 09L	140	95	115	50	M8X12	3	154	172	327	399	①	117	169	56	3/4"	24	50	8	27	45	M 8
100L	ME 10L	160	110	130	60	M8X12	3.5	169	196	366	448	135	131	193	56	1"	28	60	8	31	55	M10
112M	ME 11M	160	110	130	60	M8X12	3.5	189	227	388	471	157	150	200	56	1"	28	60	8	31	55	M10
132S	ME 13S	250	180	215	80	M12X12	4	206	267	449	552	176	166	239	63	1"	38	80	10	41	70	M12
132M	ME 13M	250	180	215	80	M12X12	4	206	267	487	590	176	166	258	63	1"	38	80	10	41	70	M12

All Dimensions are in mm unless otherwise specified

Tolerance on Encircled

Dimension	Tolerance	Specification
N	j6	IS : 2223
M	+ 0.3	
i	+ 1	
D	j6 Upto 28 k6 Over 28	
GA, F		IS : 2048
d (centering)		IS : 2540

Note :

- ① With Eyebolt
- 1 Suitable for B14, V19 & V18 mounting as per IS 2223.
- 1 Key/Key way fit : h9 / N9
- 1 Double shaft extension can be provided with shaft dimension identical to D.E. shaft.

Note : BBL type references have changed. Please refer to page No.16 for conversion Chart.

**NON - SPARKING MOTORS TYPE Ex (n)**

Type of protection 'n' provides protection against auto-ignition of surrounding gases/vapours. These motors conform to I. S. 8289 & I. S. 9628 and can be used in Zone 2 areas.

The special features of motors with type 'n' protection are

- i) The surface temperature does not exceed 200°C i.e. Temperature class T3.
- ii) Non-sparking terminals

**Manufacturing range :**

Ex (n) motors type 'MN' are offered in standard frame sizes. The performance of these motors is same as those

of 'MA' motors. Please refer to our standard motor catalogue for performance and dimensional details.

**Salient Features of Ex (n) Motors :**

The Terminal Box has degree of protection IP55.

A drain plug is provided on the end shields to remove condensed water.

The terminal plate is of a special design such that the terminals are protected against loosening under vibrations.

The radial air gap of the motors is such that the minimum air gap values specified in IS : 6381 are fully satisfied.

**Special Features :**

Following Special features can be offered in flame proof, increased safety & non-sparking motors against enquiry at extra charge.

Voltage	Single or dual voltage from 110V to 660V
Frequency	Ranging from 25Hz to 60Hz
Altitude	Higher than 1000 M from mean sea level.
Output	Dual output/Dual speed with dahlander connection or separate winding.
Shaft	Longer shaft Lesser diameter.
Construction	B6, B7, B8, V1, V3, V5, V6, B3/B5.
Anti Condensation Heater	For all frame sizes.
Cable entry*	Plug & socket arrangement for all frame sizes.
Re-greasing arrangement*	For all frame sizes above and including MJ160.
Flameproof motor for crane duty application can also be offered against enquiries.	
*Only for FLP motors	

**Type Reference Change**

Due to System requirements BBL have changed the type reference of motors from earlier 1MJ, 1MA, 1LA series to new MD, ME & MN types. There has been no change in design and motors are identical to the earlier types. The tables below give the old and new type references for B3 construction.

For B5 & B14 construction the last digit in the new type reference (3) should be replaced by '5' & '4' respectively.

**Conversion Chart****Flame Proof Motors B3 Construction**

Rated k W	Output H p	2 Pole		4 Pole		6 Pole		8 Pole	
		Old type	New Type	Old type	New Type	Old type	New Type	Old type	New Type
0.37	0.50							1MJ3901-8	MD09L833
0.55	0.75							1MJ3902-8	MD09L853
0.75	1.0					1MJ3903-6	MD09L633	1MJ3100-8	MD10L813
1.10	1.50			1MJ3904-4	MD09L433	1MJ3904-6	MD09L653	1MJ3101-8	MD10L833
1.50	2.0	1MJ3905-2	MD09L233	1MJ3905-4	MD09L453	1MJ3101-6	MD10L633	*	MD11M813
2.2	3.00	1MJ3906-2	MD09L253	1MJ3101-4	MD10L433	*	MD11M613	1MJ3134-8	MD13M813
3.7	5.00	1MJ3101-2	MD10L213	*	MD11M433	1MJ3133-6	MD13M633	1MJ3161-8	MD16M813
5.5	7.50	1MJ3132-2	MD13M213	1MJ3133-4	MD13M433	1MJ3134-6	MD13M673	1MJ3162-8	MD16M833
7.5	10.00	1MJ3133-2	MD13M253	1MJ3134-4	MD13M473	1MJ3162-6	MD16M633	1MJ3165-8	MD16L873
9.3	12.50	1MJ3134-2	MD13M293	1MJ3161-4	MD16M413	1MJ3164-6	MD16L663	1MJ3181-8	MD18L813
11.0	15.00	1MJ3162-2	MD16M213	1MJ3162-4	MD16M433	1MJ3165-6	MD16L673	1MJ3182-8	MD18L833
15.0	20.00	1MJ3163-2	MD16M253	1MJ3165-4	MD16L473	1MJ3182-6	MD18L613	1MJ3202-8	MD20L833
18.5	25.00	1MJ3166-2	MD16L273	1MJ3181-4	MD18L433	1MJ3201-6	MD20L613	1MJ3221-8	MD22S813
22.0	30.00	1MJ3182-2	MD18L213	1MJ3182-4	MD18L473	1MJ3202-6	MD20L633	1MJ3222-8	MD22M833
30.0	40.00	1MJ3202-2	MD20L233	1MJ3203-4	MD20L433	1MJ3222-6	MD22M633	1MJ3251-8	MD25M813
37.0	50.00	*	MD20L253	1MJ3221-4	MD22S413	1MJ3251-6	MD25M613	*	MD28S833
45.0	60.00	1MJ3222-2	MD22M233	1MJ3222-4	MD22M433	*	MD28S613	*	MD28M833
55.0	75.00	1MJ3251-2	MD25M213	1MJ3251-4	MD25M413	*	MD28M633		
75.0	100.0	*	MD28S213	*	MD28M413				
90.0	120.0	*	MD28M233	*	MD28M433				

\* New Designs



## Increased Safety Motors - B3 Construction

Rated Output		2 Pole		4 Pole		6 Pole		8 Pole	
k W	H p	Old type	New Type	Old type	New Type	Old type	New Type	Old type	New Type
0.12	0.16			1MA3015-4	ME063413				
0.18	0.25	1MA3015-2	ME063213	1MA3016-4	ME063433				
0.25	0.35	1MA3016-2	ME063233	1MA3025-4	ME071413	1MA3026-6	ME071633		
0.37	0.50	1MA3025-2	ME071213	1MA3026-4	ME071433	1MA3035-6	ME080613	1MA3044-8	ME09S813
0.55	0.75	1MA3026-2	ME071233	1MA3035-4	ME080413	1MA3036-6	ME080633	1MA3046-8	ME09L853
0.75	1.0	1MA3035-2	ME080213	1MA3036-4	ME080433	1MA3044-6	ME09S633	1MA3053-8	ME10L813
1.1	1.5	1MA3036-2	ME080233	1MA3044-4	ME09S433	1MA3046-6	ME09L653	1MA3054-8	ME10L833
1.5	2	1MA3044-2	ME09S233	1MA3046-4	ME09L453	1MA3053-6	ME10L653	1MA3066-8	ME11M813
2.2	3	1MA3046-2	ME09L253	1MA3054-4	ME10L433	1MA3066-6	ME11M633	1MA3072-8	ME13S813
3.7	5	1MA3054-2	ME10L213	1MA3066-4	ME11M453	1MA3073-6	ME13S653	1MA3082-8	ME16M813
5.5	7.5	1MA3072-2	ME13S213	1MA3072-4	ME13S433	1MA3078-6	ME13M673	1MA3084-8	ME16M833
7.5	10	1MA3073-2	ME13S253	1MA3078-4	ME13M473	1MA3084-6	ME16M633	1MA3087-8	ME16L873
9.3	12.5	1MA3079-2	ME13M293	1MA3082-4	ME16M413	1MA3086-6	ME16L653	1MA3182-8	ME18L833
11	15	1MA3084-2	ME16M213	1MA3084-4	ME16M433	1MA3087-6	ME16L673	1MA3202-8	ME20L833
15	20	1MA3087-2	ME16L273	1MA3087-4	ME16L473	1MA3201-6	ME20L613	1MA3202-8	ME20L833
18.5	25	1MA3181-2	ME16L293	1MA3181-4	ME18M433	1MA3201-6	ME20L613	1MA3221-8	ME22S813
22	30	1MA3182-2	ME18L233	1MA3182-4	ME18L473	1MA3221-6	ME22S613	1MA3222-8	ME22M833
30	40	1MA3203-2	ME20L253	1MA3203-4	ME20L433	1MA3222-6	ME22M633	1MA3251-8	ME25M813
37	50	1MA3221-2	ME22S233	1MA3221-4	ME22S413	1MA3251-6	ME25M613	1MA3281-8	ME28S813
45	60	1MA3251-2	ME25M213	1MA3222-4	ME22M433	1MA3281-6	ME28S613	1MA3282-8	ME28M833
55	75	1MA3251-2	ME25M213	1MA3251-4	ME25M413	1MA3282-6	ME28M633		
75	100	1MA3282-2	ME28M233	1MA3282-4	ME28M433				
90	120	1MA3282-2	ME28M233	1MA3282-4	ME28M433				

## Non - Sparking Motors - B3 Construction

Rated Output		2 Pole		4 Pole		6 Pole		8 Pole	
k W	H p	Old type	New Type	Old type	New Type	Old type	New Type	Old type	New Type
0.12	0.16			1LA4015-4	MN063413				
0.18	0.25	1LA4015-2	MN063213	1LA4016-4	MN063433				
0.25	0.35	1LA4016-2	MN063233	1LA4025-4	MN071413	1LA4026-6	MN071633		
0.37	0.50	1LA4025-2	MN071213	1LA4026-4	MN071433	1LA4035-6	MN080613	1LA3044-8	MN09S813
0.55	0.75	1LA4026-2	MN071233	1LA4035-4	MN080413	1LA4036-6	MN080633	1LA3046-8	MN09L853
0.75	1.0	1LA4035-2	MN080213	1LA4036-4	MN080433	1LA3044-6	MN09S633	1LA3053-8	MN10L813
1.1	1.5	1LA4036-2	MN080233	1LA3044-4	MN09S433	1LA3046-6	MN09L653	1LA3054-8	MN10L833
1.5	2	1LA3044-2	MN09S233	1LA3046-4	MN09L453	1LA3053-6	MN10L653	1LA3066-8	MN11M813
2.2	3	1LA3046-2	MN09L253	1LA3054-4	MN10L433	1LA3066-6	MN11M613	1LA3072-8	MN13S813
3.7	5	1LA3054-2	MN10L213	1LA3066-4	MN11M433	1LA3073-6	MN13S633	1LA3082-8	MN16M813
5.5	7.5	1LA3072-2	MN13S213	1LA3072-4	MN13S433	1LA3078-6	MN13M673	1LA3084-8	MN16M833
7.5	10	1LA3073-2	MN13S253	1LA3078-4	MN13M473	1LA3084-6	MN16M633	1LA3087-8	MN16L873
9.3	12.5	1LA3079-2	MN13M293	1LA3082-4	MN16M413	1LA3086-6	MN16L653	1LA3181-8	MN18M813
11	15	1LA3084-2	MN16M213	1LA3084-4	MN16M433	1LA3087-6	MN16L673	1LA3182-8	MN18L833
15	20	1LA3085-2	MN16M253	1LA3087-4	MN16L473	1LA3182-6	MN18L613	1LA3202-8	MN20L833
18.5	25	1LA3087-2	MN16L273	1LA3181-4	MN18M433	1LA3201-6	MN20L613	1LA3221-8	MN22S813
22	30	1LA3181-2	MN18M213	1LA3182-4	MN18L473	1LA3202-6	MN20L633	1LA3222-8	MN22M833
30	40	1LA3202-2	MN20L233	1LA3203-4	MN20L433	1LA3222-6	MN22M633	1LA3251-8	MN25M813
37	50	1LA3203-2	MN20L253	1LA3221-4	MN22S413	1LA3251-6	MN25M613	1LA3281-8	MN28S813
45	60	1LA3222-2	MN22M233	1LA3222-4	MN22M433	1LA3281-6	MN28S613	1LA3282-8	MN28M833
55	75	1LA3251-2	MN25M213	1LA3251-4	MN25M413	1LA3282-6	MN28M633		
75	100	1LA3281-2	MN28S213	1LA3281-4	MN28S413				
90	120	1LA3282-2	MN28M233	1LA3282-4	MN28M433				



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**Offices**

REGION	CITY	ADDRESS	PHONE	FAX
NORTH	NEW DELHI	Milap Niketan, 4th floor 8A, Bahadur Shah Zafar Marg, New Delhi 110 002.	371 14 34 331 96 94 /95/96	011-331 9413
	LUDHIANA	7, Gian Market, Opp. Ramgarhia Gurudwara, G. T. Road, Miller Ganj, Ludhiana - 141 003.	531 663 542 131	0161-533826
	INDORE	C/o. Tirupati Engineering, 128, 3rd Floor, Dawa Bazar, RNT Marg, Indore 452 001.	704 474 704 486	0731-704390
EAST	KOLKATA	Flat No.8, 'Mansarowar', 2nd Floor, 3B Camac Street, Kolkata 700 016.	217 23 82 217 2383/ 84	033-217 2467
WEST	MUMBAI	Post Box No.100, Thane-Belapur Road, Thane 400 601.	760 58 34 760 58 35 / 36	022-760 0430
	PUNE	9, Ketki Building, 2nd Floor, Next to Alka Theatre, Sadashiv Peth, Pune 411 630.	433 48 31 432 12 67	020-433 9210
	AHMEDABAD	202, Arth, 8-Rashmi Society, Behind A. K. Patel House, Mithakhali, Cross Road, Ahmedabad - 380 009.	642 76 67 643 08 98	079-656 3581
SOUTH	BANGALORE	204-207, Ramanashree Chambers, 2nd Floor, No.37, Lady Curzon Road, Bangalore 560 001.	559 26 81 559 21 37 559 62 74	080-559 2823
	CHENNAI	C/o. Arpan Corporation, AVM Studios Compound, 38, Arcol Road, Vadapalani, Chennai 600 026.	372 85 79 472 67 34	044-372 8579
	SECUNDERABAD	Krishna Mansion, 2nd Floor, Adjacent to Bible House, 134, Rashtrapati Road, Secunderabad 500 003.	753 45 12	040-753 1791

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