



Standard and Energy Efficient motors

Three Phase squirrel cage standard and energy efficient motors

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

This catalogue covers TEFC Standard and Energy Efficient 3 phase squirrel cage motors.

Product Range

Standard motors 0.12 KW (Frame 63) to 132 KW
Type 'MA' (Frame 315M)

Energy Efficient Motors 1.1 KW (Frame 90S) to 18.5 KW
Type 'MH' (Frame 160L)

Conformance to Standards

All motors comply with the following indian and international standard, viz.;

- IS 325** Three phase induction motors.
- IS 1231** Dimension of three-phase foot mounted induction motors.
- IS 2223** Dimensions of flange mounted A.C. induction motors.
- IS 12075** Mechanical vibration of rotating electric machines with shaft heights 56 mm & higher measurement evaluation and limits of vibration severity.
- IS 12065** Permissible limits of noise level for rotating electrical machines.
- IS 12615** Induction motor - Energy Efficient three phase, squirrel cage specification.
- IS 4691** Degrees of protection provided by enclosures for rotating electrical machines.
- VDE 0530** Specification of electrical machines.
- BS 2613** Electrical performance of rotating electrical machines.
- IEC Pub72** Dimension of output ratings for rotating electrical machines - Frame No. 56 to 400 and Flange No. F55 to F1080
- IEC 60034** Rotating electrical machines.
- IEEMA 19-2000** Energy Efficient Induction Motors Three Phase Squirrel Cage.

Pre-requisites for application of Standard & Energy Efficient Motors**Voltage and Frequency**

The motors are designed for a rated voltage of 415V and frequency of 50 Hz. The motors give the rated output for a variation of $\pm 10\%$ in voltage and $\pm 5\%$ in frequency and $\pm 10\%$ combined variation.

Ambient Duty and Altitude

The output ratings listed in the selection table are based on ambient temperature of 50°C for motors upto and including 160 Fr and 45°C for 180 Fr. and above, altitude upto 1000m above mean sea level and continuous duty (Duty type S1 as defined in IS 325). For other conditions of ambient temperatures and altitudes the output obtainable from standard motors is as tabulated below.

When both ambient temperatures and altitude vary, then, respective factors have to be multiplied to obtain the permissible output. When motors are operated at lower outputs arrived at by the above factors, the performance parameters may be unfavourable. To prevent this, it is recommended that such motors be specially ordered when the reduction in output/rating exceeds 10%.

Note : *BBL type references have changed. Please refer to page No.11 for conversion Chart.

Ambient temperature °C	Permissible output as percentage of the rated value		Altitude above sea level m	Permissible output as percentage of the rated value
	160 Fr	180 Fr		
30	107	107	1000	100
30-45	103	100	1500	97
50	100	96	2000	94
55	96	92	2500	90
60	92	87	3000	86
			3500	82
			4000	77

Electrical Features

Polarities of motors offered are below :

- 2 Pole** 3000 RPM **6 Pole** 1000 RPM
- 4 Pole** 1500 RPM **8 Pole** 750 RPM

Performance of these motors are given in the tables.

Efficiency Class : As per CEMEP / IEEMA standard, motors with higher efficiency levels have efficiency class 'eff2' (Improved efficiency) and 'eff1' (High Efficiency). All BBL Standard motors conform to efficiency class 'eff2'.

CE Mark : All Standard motors have CE mark on the name plate.

Method of starting and start-up time

All motors upto and including 1.5 KW are connected in star internally and three terminals are brought out in the terminal box for DOL starting. Motors above 1.5 KW output are designed for continuous operation in Delta connection and six terminal are brought out in the terminal box for Star-delta starting. By suitable connection, the motors can be started DOL or in Star-delta.

The motors can safely withstand a starting up time of 5 to 7 seconds for two consecutive starts from cold condition. In applications where more severe starting condition are encountered, a special enquiry should be made eg.

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

The enquiry should be accompanied with the following information

- (a) GD^2 and relevant speed of driven equipment
- (b) Period of acceleration if available
- (c) Duty cycle / sequence of operation
- (d) Speed-Torque diagram of the driven equipment
- (e) Method of braking (Mechanical or Electrical)

Insulation and endurance

All motors of standard design are provided with class 'F' insulation with temperature rise limited to 'B' class. These motors can also be used for ambient temperature upto 55°C or can be overloaded continuously by 10% without deration. The temperature rise will still be within the safe limits of class 'F'. The insulating material used are adequately resistant to the action of microbes and fungi. The motor windings are specially treated to withstand the climatic conditions prevailing in the tropics, which also provides protection against chemically aggressive gases and vapours as well as conductive dust.

At rated voltage, the motors can withstand 1.5 times the rated current for two minutes without suffering permanent damage or distortion.

Earthing

Two earthing terminals are provided, one on the body and other in the terminal box.

**Mechanical features****Construction**

The motors are in 'MA' & 'MH' series and have bearing covers integral with the endshield upto 280 M Frame. This results in greater ease of assembly and reassembly of motors.

Housing

Motors in frame sizes 63 to 100L are made with pressure die cast aluminium body and motors in frame size 112 and above are with cast iron body. All foot-mounted motors are with intergral feet.

Cooling

Cooling in all the motors is effected by a balanced bidirectional fan protected by a M.S. cover.

Degree of protection

All standard motors and energy efficient motors are provided with degree of protection IP 55. All B5 and B14 motors are additionally provided with oil tight shaft protection.

Terminal box

Motors in frames 63 to 80 and 180 M to 315 M are provided with terminal box on top. Other frames are with terminal box on the right hand side as seen from the driving end. Terminal boxes in all frames are rotatable through 360° in step of 90°.

Terminal box design & bearing data for standard and energy efficient motors

Motor type	Frame Size	Bearing Numbers (C3 Clearance)		Terminal box Type	Terminals		No. of Cable entries	Maximum conductor cross section (mm ²)
		DE	NDE		No.	Size		
MA063	63	6201	6201					
MA071	71	6202	6202	gk030	3 *	M 4	1	4
MA080	80	6004	6004					
MA09S/L	90S,90L	6205	6205	gk130	3/6 *	M 4	2	6
MA10L	100L	6206	6205	gk230	3/6 *	M 5	2	10
MA11M	112M	6206	6205					
MA 13S /M	132S, 132M	6208	6208	gk330	6	M 5	2	16
MA 16M/L	160M, 160L	6309	6209					
MA 18M/L	180M, 180L	6210	6210	TB180	6	M 6	2	50
MA20L	200L	6212	6212	TB225	6	M 8	2	70
MA22S/M	225S, 225M	6213	6213					
MA25M	250M	6215	6215	TB280	6	M 10	2	150
MA28S/M	280S, 280M	A-6316	A-6316					
		B-6317	B-6316					
MA 31S/M	315S, 315M	NU 319	6319	TB 315	6	M 12	2	240

*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

Rotor

All the motors are fitted with dynamically balanced aluminium die cast squirrel cage rotors except 315 Frame 2 pole which has fabricated copper Rotor.

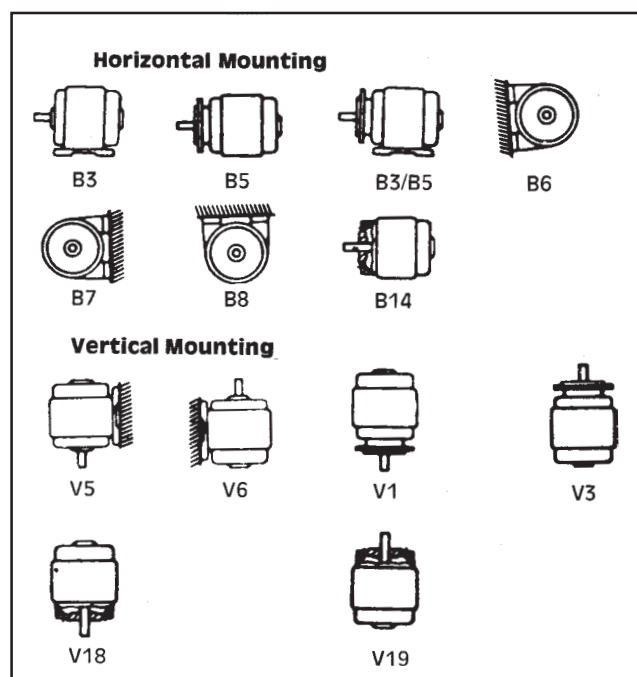
Bearings

All the motors are fitted with prelubricated antifriction rolling contact bearing. All motors upto 180L Frame are provided with 2Z 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.

Anti condensation method

In order to avoid condensation of water inside the motor, motors can be heated up by connecting a voltage 4% to 10 % of rated motor voltage to the motor terminals. Adequate heating is obtained with current equal to 20-25% of rated motor current. Alternatively any of the methods indicated in IS 900 for heating the stator winding could be adopted. Motors can also be offered with built in space heaters in frame sizes 90 and above.

Note : * BBL type references have changed. Please refer to page No.11 for conversion Chart.

Mounting

Standard motor are designed for foot mounting (B3) Motors can also be provided with flange mounting (B5), or with face mounting (B14). Bharat Bijlee motors can be mounted horizontally or vertically as shown above without any reduction in bearing life. For constructions and mounting other than those indicated here, please enquire with us.

Performance of Standard motors

The performance data of these motors including efficiency and power factor at various loads are given in tables 3-6.

Energy Efficient Motors**Need for energy efficient motors**

The government is emphasising on the conservation of electric energy in order to bridge the gap between demand and supply. In addition to this, the increasing cost of captive power generation also calls for the use of energy efficient electrical drives to reduce costs. 70% of all electrical energy consumed in india is used for driving electrical Motors.

Energy efficient motors are of significance in such a scenario wherein they contribute to the national cause of energy conservation and also enable power intensive industries increase their profitability.

Advantages of energy efficient motors

- ⊠ Saves energy and money
- ⊠ Near uniform efficiency from 50% to 100 % of full load ensuring savings at part load conditions also
- ⊠ Short payback period
- ⊠ Substantial savings after payback period

Applications

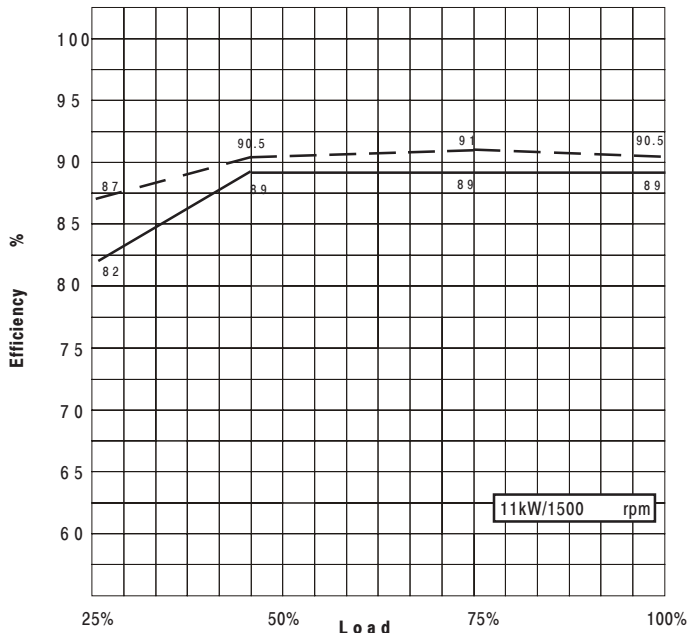
Energy efficient motors are specially suited for industries which are power intensive and equipments which run on constant load for long duration.

Ring Frames, Fans, Blowers, Mixers, Pumps, Compressors etc. are some of the driven equipment's and industries such as textile, paper, rubber, petrochemicals, cement, power generation etc are those that are suited for such motors.



Features :

- Efficiency higher or equal to I.S. 12615
- Near uniform efficiency from 50% to 100% of full load.
- Insulation class F. Temp. rise limited to 70°C over ambient of 50°C.
- Voltage variation : ± 1.0 %
Frequency variation : ± 5 %
Combined Variation : ± 10%
- Enclosure : IP55
- Presently available in 2 pole & 4 pole variety.



Potential Annual Savings for Energy Efficient Motors

15% Additional Cost of E.E. Motors Recovered in 10 months

Payback period for 11 KW 1500 rpm energy efficient motor

Load	100%	75%	50%
Working hrs p.a.	1000hrs.	3000 hrs.	1000 hrs
Eff of Std BB motor	89%	89%	89%
Eff of EE BB motor	90.5%	91.0%	90.5%
Power savings	0.205 KW	0.204KW	0.102 KW
Energy saving p.a.@	Rs.718	Rs.2140	Rs. 358
Rs. 3.5/K Wh			

Total energy saving per annum : Rs 3,216

Additional price (15%) of EE motor over Std motor : Rs 2,700

Payback Period (5,000 hrs p.a.) is 10 months

Performance of energy efficient motors

The efficiency of these motors are higher than or equal to the values specified in IS 12615. These have near uniform efficiencies from 50% to 100% load as shown in fig.. The performance of 2 and 4 pole are listed in table 1 & 2. Performance of 6 and 8 poles are available on request.

Bharat Bijlee Standard Motors in outputs greater than 25 HP already have High Efficiencies, & hence it is not required to specifically order energy efficient motors for these ratings. For ratings lower than those listed in the tables, please enquire with us.

Energy Efficient Motors - MH Type

B3 construction class 'F' insulation, suitable for 415 V ± 10%, 50 Hz ± 5%, combined variation ± 10%. Ambient temperature 50°C, Degree of protection IP 55. Note : Motors upto 132 Fr. with Oil Tight 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.

Table - 1 : 3000 rpm (2 -pole)

Rated Output	Frame size	Type Reference	Operating at Rated outputs									With DOL starting		Conforms to		
			Speed	Current	Power Factor			Efficiency %			Ratio of starting Current to Rated Current	Ratio of starting torque to Rated Torque	Ratio of Pullout torque to Rated Torque	Eff Class eff1	IS 12615	
KW	HP	IEC			B3 Construction	RPM	AMPS	FL	3/4L	1/2L						FL
1.5	2.0	90S	MH 09S233	2860	3.3	0.80	0.73	0.63	80	80	76	5.6	2.7	3.0		Yes
2.2	3.0	100L	MH 10L213	2900	4.1	0.86	0.82	0.72	86.5	85.5	79	7.0	2.6	2.8	Yes	Yes
3.7	5.0	112M	MH 11M233	2910	6.8	0.87	0.86	0.83	87	87.5	87	6.4	2.2	2.4		Yes
5.5	7.5	132S	MH 13S233	2925	10.6	0.85	0.82	0.77	85	84	82	6.0	2.0	3.0		Yes
7.5	10.0	132M	MH 13M293	2925	14.3	0.85	0.80	0.71	86	85	83	6.3	2.0	2.3		Yes
11.0	15.0	160M	MH 16M253	2940	19.3	0.89	0.88	0.84	89	88.5	86.5	6.3	2.1	2.8		Yes
15.0	20.0	160L	MH 16L283	2940	25.8	0.90	0.88	0.84	90	89.5	87.5	6.3	2.1	2.8		Yes
18.5	25.0	160L	MH 16L293	2940	31.4	0.90	0.88	0.84	91	91	89	6.3	2.1	2.8		Yes

Table - 2 1500 rpm (4 -pole)

1.1	1.5	90S	MH 09S433	1415	2.6	0.74	0.64	0.50	79.5	79.5	77	4.2	2.3	2.7		Yes
1.5	2.0	90L	MH 09L453	1410	3.3	0.79	0.71	0.58	80	81	78	4.8	2.4	2.5		Yes
2.2	3.0	100L	MH 10L453	1430	4.8	0.77	0.69	0.53	83	82.5	80	5.7	2.5	3.2		Yes
3.7	5.0	112M	MH 11M453	1430	7.6	0.78	0.68	0.56	86.5	87	86.5	6.5	2.8	3.4		Yes
5.5	7.5	132S	MH 13S453	1445	10.5	0.83	0.76	0.65	87.5	87	83.5	6.7	2.2	3.0		Yes
7.5	10.0	132M	MH 13M483	1440	14.2	0.82	0.75	0.65	88.3	88.3	86	7.5	2.6	3.2		Yes
9.3	12.5	160M	MH 16M443	1450	16.3	0.88	0.87	0.84	90.5	91	90.5	6.0	2.0	2.6	Yes	Yes
11.0	15.0	160M	MH 16M453	1450	19.2	0.88	0.87	0.84	90.5	91	90.5	6.0	2.0	2.6		Yes
13.0	17.5	160L	MH 16L483	1450	22.6	0.88	0.87	0.84	90.8	91.5	90.8	6.0	2.0	2.6		Yes
15.0	20.0	160L	MH 16L493	1450	26.1	0.88	0.87	0.84	90.8	91.5	90.8	6.0	2.0	2.6		Yes

Note : * BBL type references have changed. Please refer to page No.11 for conversion Chart.

Nominal Values. Tolerance as per IS 325.



TEFC 3 Phase Squirrel Cage Motors - MA Type

Frame size 63 to 315M, B3 construction, class 'F' insulation, suitable for 415V $\pm 10\%$, 50Hz $\pm 5\%$, Combined variation $\pm 10\%$ Ambient temperature 50°C for motors upto & including 160L Fr. and 45°C for 180 Fr & above, Degree of protection IP55. All motors conform to IS 325.

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.

Table - 3 : 3000 rpm (2 -pole)

Rated Output		Frame size	Type Reference	Operating Characteristics at Rated output									With DOL starting		Ratio of Pullout torque to Rated Torque	Rotor GD ²	Appr. Wt.
KW	HP			IEC	B3 Construction	Speed RPM	Current AMPS	Rated Torque KGM.	Power Factor			Efficiency %					
		FL	3/4L						1/2L	FL	3/4L	1/2L					
0.18	0.25	63	MA 063213	2720	0.57	0.064	0.76	0.66	0.52	58	57	52	3.2	2.7	3.0	0.00085	5
0.25	0.35	63	MA 063233	2720	0.71	0.090	0.79	0.75	0.63	62	59	53	3.5	2.3	2.6	0.00099	5
0.37	0.50	71	MA 071213	2780	1.00	0.13	0.78	0.70	0.58	67	65	61	4.0	2.1	2.8	0.0015	6
0.55	0.75	71	MA 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
0.75	1.00	80	MA 080213	2845	1.7	0.256	0.82	0.74	0.62	75	75	71	5.0	2.4	2.8	0.0037	10
1.1	1.5	80	MA 080233	2840	2.4	0.377	0.82	0.75	0.63	79	79	76	5.9	2.7	3.1	0.0051	11
1.5	2.0	90S	MA 09S233	2825	3.1	0.517	0.86	0.83	0.76	78.5	78	74	5.5	2.7	3.2	0.0071	15
2.2	3.0	90L	MA 09L253	2850	4.55	0.752	0.83	0.80	0.70	81	79	75	6.2	3.3	3.5	0.0093	18
3.7	5.0	100L	MA 10L213	2900	7.20	1.24	0.87	0.82	0.72	82	81	75	6.5	2.9	3.1	0.0188	25
5.5	7.5	132S	MA 13S213	2920	10.2	1.835	0.89	0.85	0.77	84	82	78	6.0	2.3	3.0	0.060	62
7.5	10.0	132S	MA 13S253	2920	14.0	2.50	0.88	0.84	0.76	85	83	78	6.5	2.7	3.0	0.082	69
9.3	12.5	132M	MA 13M293	2930	16.5	3.09	0.89	0.85	0.76	88	86	81	6.5	2.4	2.9	0.098	77
11.0	15.0	160M	MA 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
15.0	20.0	160M	MA 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
18.5	25.0	160L	MA 16L273	2920	31.6	6.17	0.90	0.88	0.86	90.5	90	88	6.5	2.0	3.0	0.225	132
22.0	30.0	180M	MA 18M213	2930	37.5	7.31	0.89	0.87	0.80	91.5	90.5	88	6.5	2.2	2.7	0.30	174
30.0	40.0	200L	MA 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	216
37.0	50.0	200L	MA 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	279
45.0	60.0	225M	MA 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	336
55.0	75.0	250M	MA 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
75.0	100.0	280S	MA 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	670
90.0	120.0	280M	MA 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
110.0	150.0	315S	MA 31S213	2980	179.0	36.0	0.91	0.90	0.89	94.0	93.5	92.0	6.5	1.6	2.5	4.3	870
132.0	180.0	315M	MA 31M233	2980	214.0	43.1	0.91	0.90	0.89	94.5	93.8	92.5	6.5	1.6	2.5	5.0	940

Table - 4 : 1500 rpm (4 -pole)

0.12	0.16	63	MA 063413	1330	0.42	0.088	0.75	0.65	0.50	53	48	40	2.4	1.9	2.3	0.0014	5
0.18	0.25	63	MA 063433	1350	0.58	0.13	0.75	0.65	0.50	58	55	50	2.7	2.0	2.3	0.0016	5
0.25	0.35	71	MA 071413	1370	0.77	0.178	0.74	0.63	0.51	61	61	55	3.0	1.9	2.2	0.0024	6
0.37	0.50	71	MA 071433	1380	1.04	0.260	0.72	0.62	0.50	69	70	64	3.4	2.3	2.5	0.0033	7
0.55	0.75	80	MA 080413	1405	1.4	0.381	0.78	0.70	0.56	72	71	67	4.0	2.4	2.6	0.0061	10
0.75	1.00	80	MA 080433	1405	1.8	0.52	0.78	0.70	0.58	76	76	72	4.5	3.0	3.25	0.0072	11
1.1	1.5	90S	MA 09S433	1415	2.5	0.76	0.81	0.73	0.61	76.5	76	72	4.2	2.3	2.7	0.012	14
1.5	2.0	90L	MA 09L453	1415	3.3	1.03	0.80	0.72	0.58	78.5	78	75	4.8	2.5	3.0	0.016	17
2.2	3.0	100L	MA 10L433	1430	4.6	1.50	0.82	0.69	0.53	81	79	78	5.7	2.5	3.2	0.021	22
3.7	5.0	112M	MA 11M433	1430	7.5	2.52	0.82	0.76	0.65	84	84	81	6.0	2.8	3.2	0.053	43
5.5	7.5	132S	MA 13S433	1445	10.4	3.71	0.85	0.80	0.68	86	85	83	6.0	2.2	3.0	0.113	62
7.5	10.0	132M	MA 13M473	1440	14.5	5.07	0.83	0.78	0.68	87	87	85	6.0	2.5	3.2	0.134	73
9.3	12.5	160M	MA 16M413	1450	17.1	6.25	0.86	0.82	0.77	88	88	87	6.0	2.0	2.5	0.145	92
11.0	15.0	160M	MA 16M433	1450	20.5	7.39	0.84	0.81	0.76	89	89	89	6.0	2.1	2.5	0.175	105
15.0	20.0	160L	MA 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
18.5	25.0	180M	MA 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
22.0	30.0	180L	MA 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
30.0	40.0	200L	MA 20L433	1465	52.0	19.9	0.87	0.84	0.77	92	92	90	6.0	2.6	2.5	0.86	266
37.0	50.0	225S	MA 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
45.0	60.0	225M	MA 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
55.0	75.0	250M	MA 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
75.0	100.0	280S	MA 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	686
90.0	120.0	280M	MA 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
110.0	150.0	315S	MA 31S413	1485	186	72.1	0.87	0.85	0.79	94.7	94.5	93	6.0	2.2	2.5	8.7	898
132.0	180.0	315M	MA 31M433	1486	222	86.5	0.87	0.85	0.79	95.0	95.0	93.5	6.0	2.2	2.5	10.2	970

Note : *BBL type references have changed. Please refer to page No.11 for conversion Chart.
All motors conform to efficiency class 'eff2' except 5.5 Kw and 7.5 Kw 2 pole which are under development.



Table - 5 : 1000 rpm (6 -pole)

Rated Output		Frame size	Type Reference	Operating Characteristics at Rated outputs									With DOL starting		Rotor GD ²	Appr. Wt.	
KW	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	MA 071633	875	0.81	0.278	0.70	0.60	0.48	61	61	52	2.6	2.0	2.3	0.0038	7
0.37	0.50	80	MA 080613	910	1.15	0.396	0.70	0.60	0.48	65	65	61	3.0	2.1	2.3	0.0060	10
0.55	0.75	80	MA 080633	915	1.6	0.59	0.69	0.60	0.48	69	70	64	3.5	2.2	2.5	0.0084	11
0.75	1.00	90S	MA 09S633	925	2.0	0.79	0.72	0.61	0.50	73	70	69	3.4	2.0	2.2	0.0122	14
1.1	1.5	90L	MA 09L653	935	2.9	1.15	0.69	0.57	0.44	76	74	72	4.0	2.3	2.6	0.0160	17
1.5	2.0	100L	MA 10L633	935	3.7	1.56	0.74	0.64	0.52	76	75	72	3.9	2.0	2.5	0.025	22
2.2	3.0	112M	MA 11M613	930	5.05	2.3	0.77	0.68	0.55	79	78	74	4.2	2.0	2.3	0.043	39
3.7	5.0	132S	MA 13S633	950	8.0	3.80	0.76	0.63	0.49	85	84	82	5.4	1.8	2.8	0.130	62
5.5	7.5	132M	MA 13M673	960	11.5	5.58	0.78	0.71	0.59	85	83	78	5.5	2.5	2.75	0.183	79
7.5	10.0	160M	MA 16M633	960	14.8	7.61	0.8	0.74	0.64	88	88	86	5.4	2.0	2.5	0.276	102
9.3	12.5	160L	MA 16L663	960	18.4	9.44	0.8	0.74	0.64	88	88	87	5.5	2.1	2.5	0.34	119
11.0	15.0	160L	MA 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
15.0	20.0	180L	MA 18L613	965	28.0	15.1	0.84	0.78	0.66	89	89	86.5	5.5	2.6	2.3	0.68	182
18.5	25.0	200L	MA 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
22.0	30.0	200L	MA 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	251
30.0	40.0	225M	MA 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
37.0	50.0	250M	MA 25M613	980	66.5	36.8	0.84	0.83	0.78	92	92	91	6.0	2.5	2.2	3.51	515
45.0	60.0	280S	MA 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
55.0	75.0	280M	MA 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
75.0	100.0	315S	MA 31S613	985	133	74.1	0.84	0.81	0.72	93.7	93.2	92.0	6.0	2.0	2.5	10.7	830
90	120	315M	MA 31M633	987	158	88.8	0.84	0.81	0.72	94.2	94	92.5	6.0	2.1	2.5	12.4	890
110	150	315M	MA 31M653	988	191	108.4	0.86	0.83	0.75	94.5	94.5	93	6.0	2.0	2.5	15.5	1000

Table - 6 : 750 rpm (8 -pole)

0.37	0.50	90S	MA 09S813	700	1.32	0.515	0.63	0.52	0.41	62	55	48	2.7	1.8	2.1	0.011	13
0.55	0.75	90L	MA 09L853	690	1.81	0.776	0.63	0.55	0.43	67	62	58	2.9	2.0	2.4	0.014	14
0.75	1.0	100L	MA 10L813	685	2.05	1.07	0.73	0.63	0.50	70	70	64	3.0	1.6	1.8	0.023	18
1.1	1.5	100L	MA 10L833	690	2.85	1.55	0.71	0.62	0.48	76	75	73	3.3	1.9	2.3	0.027	22
1.5	2.0	112M	MA 11M813	705	3.90	2.07	0.70	0.62	0.50	77	77	75	3.8	1.7	2.2	0.051	38
2.2	3.0	132S	MA 13S813	710	5.4	3.02	0.71	0.60	0.46	80	80	78	3.7	1.6	2.0	0.099	57
3.7	5.0	160M	MA 16M813	720	8.25	5.01	0.78	0.74	0.65	80	80	78	4.4	1.8	2.0	0.217	91
5.5	7.5	160M	MA 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
7.5	10.0	160L	MA 16L873	710	15.6	10.29	0.78	0.74	0.65	86	84	82	5.5	2.1	2.2	0.40	130
9.3	12.5	180M	MA 18M813	715	19.0	12.7	0.79	0.74	0.64	86.5	86.5	85	4.5	2.1	2.2	0.62	161
11.0	15.0	180L	MA 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	175
15.0	20.0	200L	MA 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
18.5	25.0	225S	MA 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
22.0	30.0	225M	MA 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
30.0	40.0	250M	MA 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
37.0	50.0	280S	MA 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
45.0	60.0	280M	MA 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
55.0	75.0	315S	MA 31S813	740	103	72.4	0.80	0.76	0.65	93.0	92.5	91	5.5	2.1	2.4	10.7	830
75.0	100.0	315M	MA 31M833	740	140	98.7	0.80	0.76	0.65	93.5	93.0	92	5.5	2.1	2.4	12.4	900
90	120	315M	MA 31M853	740	167	118.5	0.80	0.76	0.65	93.5	93	92	5.5	2.1	2.4	15.5	1000

Note : *BBL type references have changed. Please refer to page No.11 for conversion Chart.

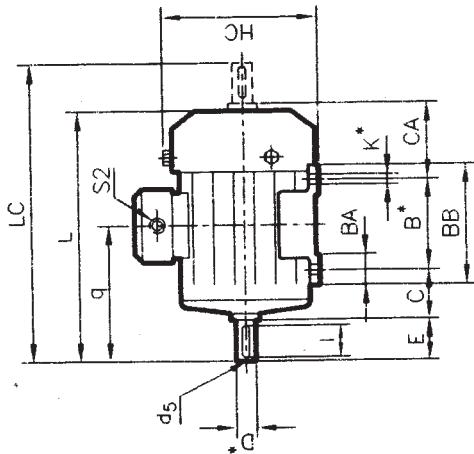
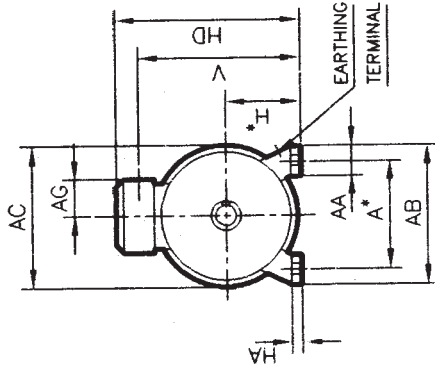
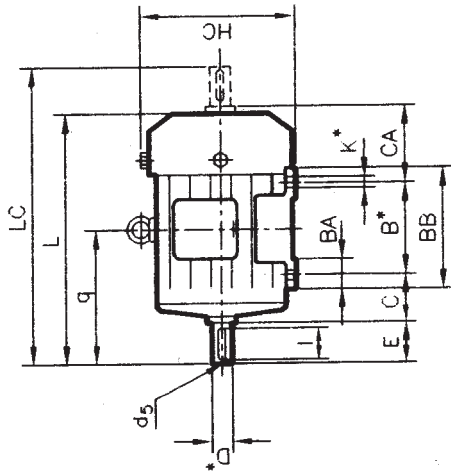
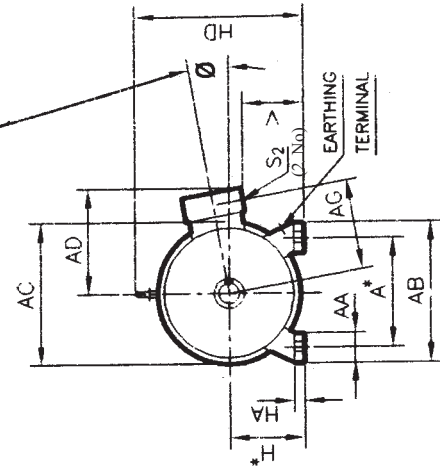
CEMEP : European Committee of Manufacturers of Electrical Machines & Power Electronics

IEEMA : Indian Electrical & Electronics Manufacturers Association.



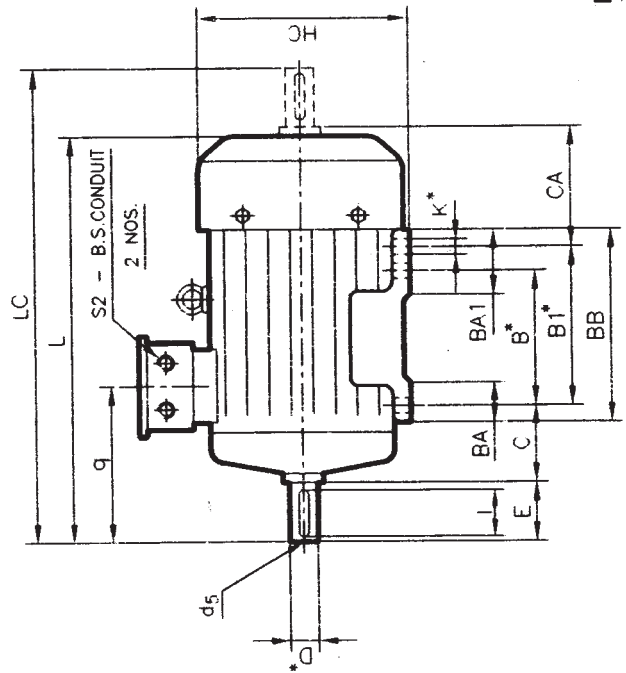
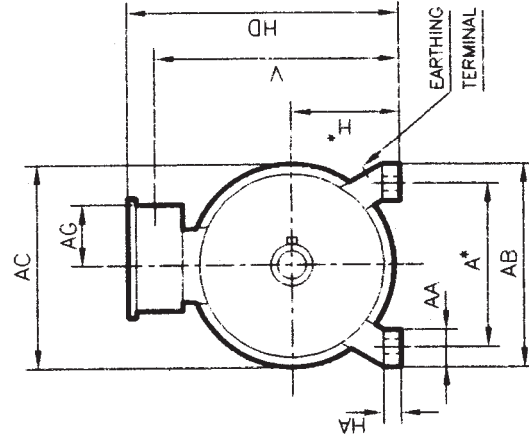
Dimensional Drawing : Foot Mounted (B3 Construction) TEFC Standard Motors Frame 63-315M

Offset by 10° for 112 & 132 Fr.

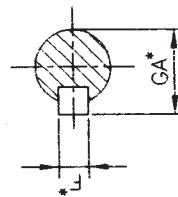


FRAME SIZE 90S TO 160L

FRAME SIZE 63, 71 & 80



FRAME SIZE 180 TO 315S/M





Dimensional Details : Foot Mounted (B3 Construction) TEFC Standard Motors Frame 63-315M

IEC Frame Motor Type	FIXING				GENERAL										TERMINAL BOX				SHAFT											
	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	HA	HC	HD	AD	L	LC	CA	AC	V	q	AG	S2	D*	E	F*	GA*	I	d	
63 MA 063	100	80	-	40	63	7	126	100	30	28	-	7	128	177	-	206	241	75	124	149	103	40	3/4"	11	23	4	12.5	18	M 4	
71 MA 071	112	90	-	45	71	7	138	110	30	29	-	7	143.5	191	-	234	278	83	139	163	120	40	3/4"	14	30	5	16	25	M 5	
80 MA 080	125	100	-	50	80	10	153	124	32	32	-	10	161	207	-	267	324	94	157	179	110	40	3/4"	19	40	6	21.5	35	M 6	
90S MA 09S	140	100	-	56	90	10	168	150	34	54	-	12	177	①	142	327	399	143	172	34	169	104	3/4"	24	50	8	27	45	M 8	
90L MA 09L	140	125	-	56	90	10	168	150	34	54	-	12	177	①	142	327	399	143	172	34	169	104	3/4"	24	50	8	27	45	M 8	
100L MA 10L	160	140	-	63	100	12	190	174	44	36	-	14	198	235	162	366	448	125	196	44	193	125	1"	28	60	8	31	55	M 10	
112M MA 11M	190	140	-	70	112	12	230	176	62	50	-	15	226	269	182	388	471	141	226	82	200	144	1"	28	60	8	31	55	M 10	
132S MA 13S	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	M 12	
132M MA 13M	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	M 12	
160M MA 16M	254	210	-	108	160	15	306	256	74	65	-	20	322	366	226	605	741	183	324	131	323	186	1"	42	110	12	45	105	M 16	
160L MA 16L	254	254	-	108	160	15	306	300	74	65	-	20	322	366	226	649	785	183	324	131	345	186	1"	42	110	12	45	105	M 16	
180M/L MA 18M/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	M 16	
200L MA 20L	318	305	-	133	200	19	398	355	85	65	65	32	397	512	-	793	944	234	394	449	287	172	2"	55	110	16	59	100	M 20	
225S/M MA 22S/M	* A	356	286	311	149	225	19	436	361	85	85	110	34	447	562	-	825	974	239	444	498	297	172	2"	55	110	16	59	100	M 20
250M MA 25 M	* A	406	349	-	168	250	24	506	425	100	115	115	42	498	665	-	830	949	239	444	498	327	172	2"	60	140	18	64	130	M 20
280S/M MA 28S/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	M 20
315S/M MA 31S/M	* A	508	406	457	216	315	28	625	541	100	115	155	45	629	830	-	1133	1273	406	604	728	386	218	2"	65	140	18	69	130	M 20
	* B																1163	1333	457						80	170	22	88.5	160	M 20

Tolerance on Dimensions with

Dimension	Tolerance	Specification
A, B	±0.75	IS : 1231
H	0.5	IS : 1231
D	j6 k6	11,14,19,24,28Ø 38,42,48Ø
K	m 6 +0.360 +0.430	55,66Ø,65Ø,75,80 10Ø
GA, F d(centering)		IS : 2048 IS : 2540

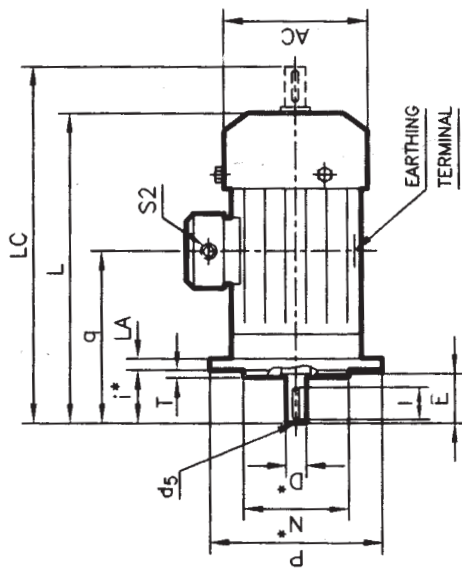
Note :

- 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.

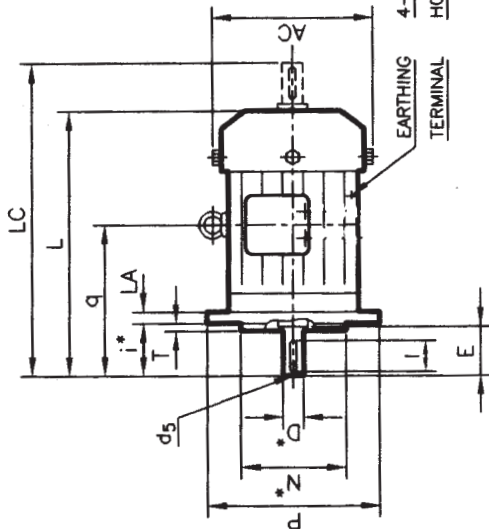
All Dimensions are in mm unless otherwise specified



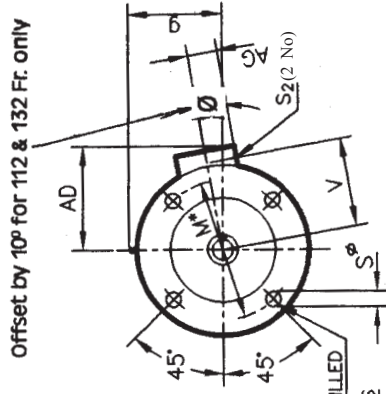
Dimensional Drawing : Flange Mounted (B5 Construction) TEFC Standard Motor Frames 63-315 M



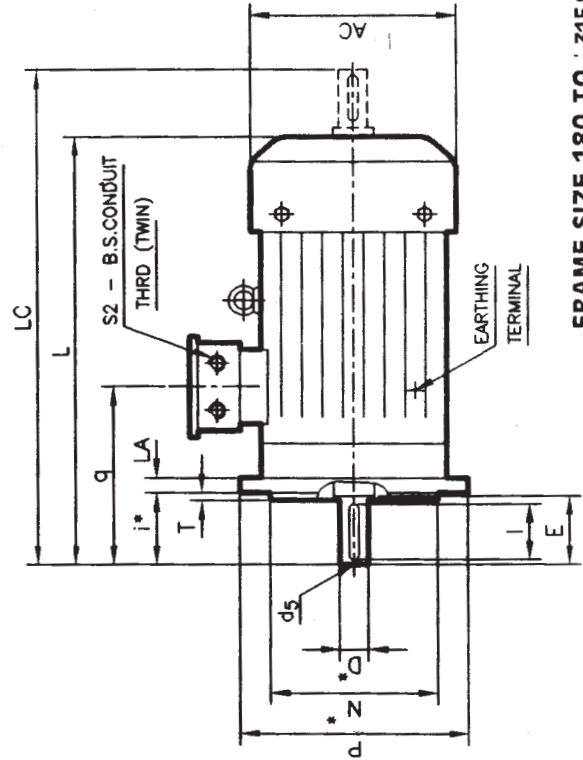
FRAME SIZE 63, 71 & 80



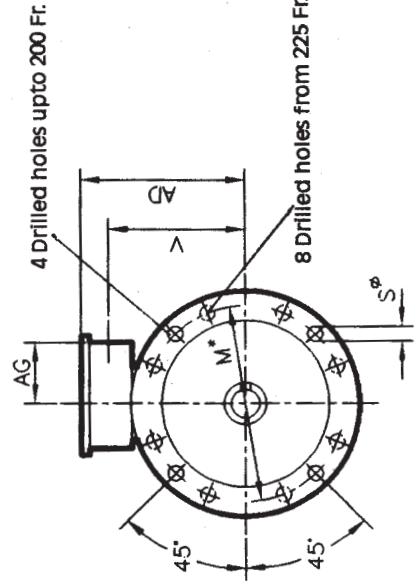
FRAME SIZE 90S TO 160L



Offset by 10° for 112 & 132 Fr. only



FRAME SIZE 180 TO : 315S/M





Dimensional Details : Flange Mounted (B5 Construction) TEFC Standard Motor Frames 63-315 M

IEC Frame Size	Motor Type	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	MA 063	140	95	115	23	10	3	9	114	124	225	260				86	122	40	3/4"	11	23	4	12.5	18	M 4
71	MA 071	160	110	130	30	10	3.5	9	120	139	261	305				92	147	40	3/4"	14	30	5	16	25	M 5
80	MA 080	200	130	165	40	12	3.5	10	127	157	267	324				99	110	40	3/4"	19	40	6	21.5	35	M 6
90S	MA 09S	200	130	165	50	12	3.5	10	142	181	327	399				104	156	52	3/4"	24	50	8	27	45	M 8
90L	MA 09L	200	130	165	50	12	3.5	10	142	181	327	399				104	169	52	3/4"	24	50	8	27	45	M 8
100L	MA 10L	250	180	215	60	15	4	11	162	202	366	448				125	193	56	1"	28	60	8	31	55	M 10
112M	MA 11M	250	180	215	60	15	4	11	182	227	388	471				144	200	56	1"	28	60	8	31	55	M 10
132S	MA 13S	300	230	265	80	15	4	12	206	267	449	552				166	239	63	1"	38	80	10	41	70	M 12
132M	MA 13M	300	230	265	80	15	4	12	206	267	487	590				166	258	63	1"	38	80	10	41	70	M 12
160M	MA 16M	350	250	300	110	19	5	13	226	324	605	741				186	323	63	1"	42	110	12	45	105	M 16
160L	MA 16L	350	250	300	110	19	5	13	226	324	649	785				186	345	63	1"	42	110	12	45	105	M 16
180M/L	MA 18M/L	350	250	300	110	19	5	13	282	369	717	821				230	264	112	1 1/2"	48	110	14	51.5	100	M 16
200L	MA 20L	400	300	350	110	19	5	15	312	405	793	944				249	287	172	2"	55	110	16	59	100	M 20
225S/M	MA 22S/M * A	450	350	400	110	19	5	16	337	455	825	974				273	297	172	2"	55	110	16	59	100	M 20
	* B	450	350	400	140	19	5	16	337	455	830	949				273	327	172	2"	60	140	18	64	130	M 20
250M	MA 25 M * A	550	450	500	140	19	5	16	415	495	915	1065				328	352	205	2"	60	140	18	64	130	M 20
	* B																			65	140	18	69	130	M 20
280S/M	MA 28S/M * A	550	450	500	140	19	5	18	445	544	1010	1160				358	360	205	2"	65	140	18	69	130	M 20
	* B																			75	140	20	79.5	130	M 20
315S/M	MA 31S/M * A	660	550	600	140	24	6	22	515	604	1133	1273				413	386	218	2"	65	140	18	69	130	M 20
	* B																			80	170	20	88.5	160	M 20

All Dimensions are in mm unless otherwise specified

Tolerance on Dimensions with

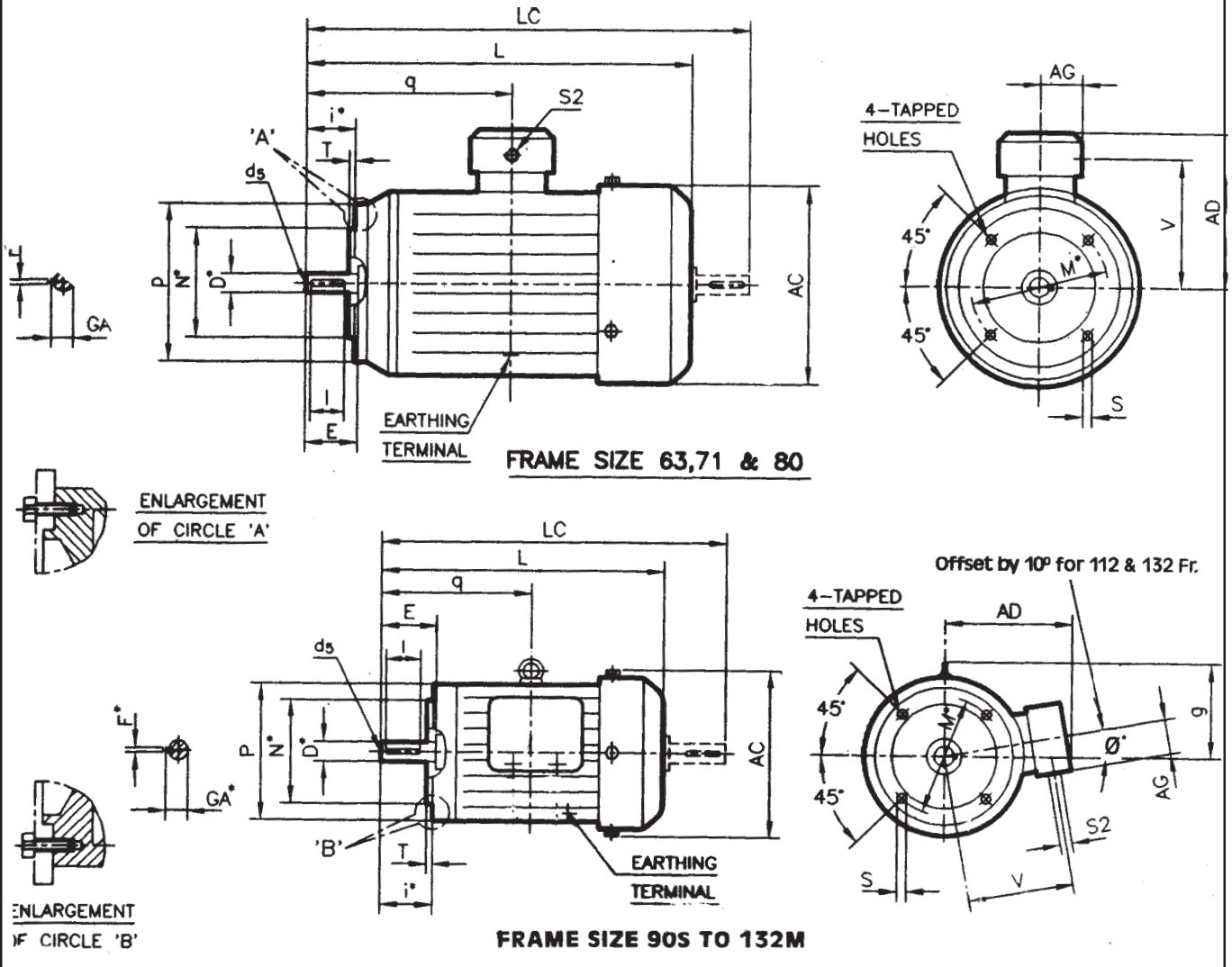
Dimension	Tolerance	Specification
N	j 6	IS : 2223
M	±0.3	
i	±0.5	UPTO 265 OVER 265
	±1	
D	±1.5	UPTO 85 OVER 85
	j 6	
GA,F d(centering)	k 6	11, 14, 19, 24, 28Ø 38, 42, 48Ø 55Ø, 60Ø, 65Ø, 75Ø, 80Ø
	m 6	
		IS : 2048 IS : 2540

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 : Face Mounted (B14 Construction) TEFC Standard Motor Frames 63 - 132 M



Dimensional Details : Face Mounted (B14 Construction) TEFC Standard Motor Frames 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	MA 063	90	60	75	23	M5X10	2.5	114	124	206	241		86	103	40	3/4"	11	23	4	12.5	18	M 4
71	MA 071	105	70	85	30	M6X13	2.5	120	139	234	278		92	120	40	3/4"	14	30	5	16	25	M 5
80	MA 080	120	80	100	40	M6X13	3	127	157	267	324		99	110	40	3/4"	19	40	6	21.5	35	M 6
90S	MA 09S	140	95	115	50	M8X12	3	142	172	327	399	①	104	156	52	3/4"	24	50	8	27	45	M 8
90L	MA 09L	140	95	115	50	M8X12	3	142	172	327	399	①	104	169	52	3/4"	24	50	8	27	45	M 8
100L	MA 10L	160	110	130	60	M8X12	3.5	162	196	366	448	135	125	193	56	1"	28	60	8	31	55	M 10
112M	MA 11M	160	110	130	60	M8X12	3.5	182	227	388	471	157	144	200	56	1"	28	60	8	31	55	M 10
132S	MA 13S	250	180	215	80	M12X12	4	206	267	449	552	176	166	239	63	1"	38	80	10	41	70	M 12
132M	MA 13M	250	180	215	80	M12X12	4	206	267	487	590	176	166	258	63	1"	38	80	10	41	70	M 12

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 IS : 2540
d (centering)		

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.11 for conversion Chart.



Special Features

Following extra features may be provided wherever feasible at extra charge and against specific enquiry.

1. Mechanical features

- 1.1 Special Mounting
- 1.2 Non Standard shaft extension
- 1.3 Non Standard keyway
- 1.4 Degree of protection IP56, IP 65 as per IS 4691
- 1.5 Low vibration motors as per IS 12075
- 1.6 Acid alkali proof epoxy paint
- 1.7 Epoxy gelcoat on overhangs
- 1.8 auxiliary nameplate
- 1.9 Direction indicating arrows
- 1.10 Non standard colour scheme
- 1.11 Additional earthing terminal
- 1.12 Single compression/double compression cable gland

- 1.13 Terminal box on LHS for frames 90 to 160 and RHS/LHS for frames 180 onwards*
- 1.14 CI body in 90S, 90L & 100L
- 1.15 Cable Spreader box for larger cable sizes

2. Electrical features

- 2.1 Motors suitable for voltages 110V to 660V
- 2.2 Motors suitable for frequency 25 Hz to 60Hz
- 2.3 Dual voltage motors
- 2.4 Polarities higher than 8 pole
- 2.5 2,3 speed motors
- 2.6 P.T.C. thermistor protection
- 2.7 Class H insulation scheme

* Optional at no extra cost

Type Reference Change

Due to System requirements BBL have changed the type reference of motors from earlier 1LA & 1LE series to new MA & MH type. 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 eg.'3' should be replaced by '5' & '4' respectively.

Conversion Chart

Energy Efficient Motors - B3 Construction

k W	H p	2 Pole		4 Pole	
		Old type	New Type	Old type	New Type
1.1	1.5			1LE3044-4	MH 09S433
1.5	2.0	1LE3044-2	MH 09S233	1LE3046-4	MH 09L453
2.2	3.0	1LE3054-2	MH 10L213	1LE3055-4	MH 10L453
3.7	5.0	1LE3067-2	MH 11M233	1LE3067-4	MH 11M453
5.5	7.5	1LE3074-2	MH 13S233	1LE3074-4	MH 13S453
7.5	10.0	1LE3079-2	MH 13M293	1LE3079-4	MH 13M483
9.3	12.5			1LE3084-4	MH 16M443
11.0	15.0	1LE3085-2	MH 16L253	1LE3085-4	MH 16M453
13.0	17.5			1LE3088-4	MH 16L483
15.0	20.0	1LE3087-2	MH 16L273	1LE3089-4	MH 16L493
18.5	25.0		MH 16L293		

TEFC 3 Phase Standard Motor - B3 Construction

k W	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
0.12	0.16			1LA4015-4	MA063413				
0.18	0.25	1LA4015-2	MA063213	1LA4016-4	MA063433				
0.25	0.35	1LA4016-2	MA063233	1LA4025-4	MA071413	1LA4026-6	MA071633		
0.37	0.50	1LA4025-2	MA071213	1LA4026-4	MA071433	1LA4035-6	MA080613	1LA3044-8	MA09S813
0.55	0.75	1LA4026-2	MA071233	1LA4035-4	MA080413	1LA4036-6	MA080633	1LA3046-8	MA09L853
0.75	1.00	1LA4035-2	MA080213	1LA4036-4	MA080433	1LA3044-6	MA09S633	1LA3053-8	MA10L813
1.10	1.50	1LA3036-2	MA080233	1LA4044-4	MA09S433	1LA3046-6	MA09L653	1LA3054-8	MA10L833
1.50	2.00	1LA3044-2	MA09S233	1LA3046-4	MA09L453	1LA3053-6	MA10L633	1LA3066-8	MA11M813
2.20	3.00	1LA3046-2	MA09L253	1LA3054-4	MA10L433	1LA3066-6	MA11M613	1LA3072-8	MA13S813
3.70	5.00	1LA3054-2	MA10L213	1LA3066-4	MA11M433	1LA3073-6	MA13S633	1LA3082-8	MA16M813
5.50	7.50	1LA3072-2	MA13S213	1LA3072-4	MA13S433	1LA3078-6	MA13M673	1LA3084-8	MA16M833
7.50	10.00	1LA3073-2	MA13S253	1LA3078-4	MA13M473	1LA3084-6	MA16M633	1LA3087-8	MA16L873
9.30	12.50	1LA3079-2	MA13M293	1LA3082-4	MA16M413	1LA3086-6	MA16L663	1LA3181-8	MA18M813
11.00	15.00	1LA3084-2	MA16M213	1LA3084-4	MA16M433	1LA3087-6	MA16L673	1LA3182-8	MA18L833
15.00	20.00	1LA3085-2	MA16M253	1LA3087-4	MA16L473	1LA3182-6	MA18L613	1LA3202-8	MA20L833
18.50	25.00	1LA3087-2	MA16L273	1LA3181-4	MA18M433	1LA3201-6	MA20L613	1LA3221-8	MA22S813
22.00	30.00	1LA3181-2	MA18M213	1LA3182-4	MA18L473	1LA3202-6	MA20L633	1LA3222-8	MA22M833
30.00	40.00	1LA3202-2	MA20L233	1LA3203-4	MA20L433	1LA3222-6	MA22M633	1LA3251-8	MA25M813
37.00	50.00	1LA3203-2	MA20L253	1LA3221-4	MA22S413	1LA3251-6	MA25M613	1LA3281-8	MA28S813
45.00	60.00	1LA3222-2	MA22M233	1LA3222-4	MA22M433	1LA3281-6	MA28S613	1LA3282-8	MA28M833
55.00	75.00	1LA3251-2	MA25M213	1LA3251-4	MA25M413	1LA3282-6	MA28M633		
75.00	100.00	1LA3281-2	MA28S213	1LA3281-4	MA28S413				
90.00	120.00	1LA3282-2	MA28M233	1LA3282-4	MA28M433				

* New Design

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	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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