



ENERGY EFFICIENT A.C. ELECTRIC MOTORS AS PER IS-12615:2018



MEGHA
ROTO - TECH PVT. LTD

- ◆ AN ISO 9001:2015 CERTIFIED COMPANY
- ◆ NAVY (DEFENCE) APPROVED UNIT

◆ STANDARD MOTORS :



- ◆ 'CE' CERTIFIED PRODUCTS
- ◆ 'UL/CUL' CERTIFIED PRODUCTS



ENERGY EFFICIENT HORSE POWER FOR INDUSTRY



◆ FLAME PROOF MOTORS :

Ex_d



- ◆ IS/IEC 60079-1-2007 APPROVED
- ◆ 'CIMFR' (FORMERLY CMRS) APPROVED
- ◆ 'PESO' APPROVED

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RANGE OF SPECIAL CUSTOM BUILD MOTORS

GEARED MOTOR



LONG SHAFT MOTOR



**SUBMERSIBLE
HOLLOW
SHAFT MOTOR**



STATOR - ROTOR SET



TORQUE MOTOR



VIBRATOR



TECHNICAL INFORMATION FOR STANDARD MOTORS

Product Range :

Product	Efficiency Class	Frame Size	KW Range
High Efficiency 2 & 4 Pole Motors	IE2 / IE3	63 to 250 M	0.18 to 55
High Efficiency 6 Pole Motors	IE2 / IE3	71 to 250 M	0.18 to 37
High Efficiency 8 Pole Motors	IE2 / IE3	80 to 250 M	0.18 to 30

Reference Standards :

Motors Comply with following Indian & International Standards.

IS/IEC 60034-1	Three Phase Induction Motor specifications ("Rotating Electrical Machines - Part 1 : Rating & Performance")
IS : 1231	Dimensions of foot mounted A.C. Induction Motors
IS : 2223	Dimensions of flange mounted A.C. Induction Motors
IS : 4029	Guide for testing three phase induction motors (For Standard TEFC SCR Motors)
IS : 4889	Degree of determination of efficiency of rotating electric machine (For Standard TEFC SCR Motors)
IS/IEC 60034-5	Degree of protection provided by the integral design of Rotating Electrical Machine (IP code classification)
IS : 6362 / IEC 60034-6	Degree of method of cooling for Rotating Electrical Machines / Method of cooling (IC code)
IS : 12065 / IEC 60034-9	Permissible limits of noise level for Rotating Electric Machines
IS : 12075 / 2008	Mechanical Vibration of Rotating Electrical Machines
IS : 12615 / 2018	Energy Efficient Induction Motors Three phase Squirrel Cage (For IE2 / IE3 Series Motors)
IS:15999 (Part 2 / Sec 1)	Standard Methods for determining Losses and Efficiency from Tests (For IE Series Motors)

CE MARK : All motors have CE mark on the nameplate.

ELECTRICAL FEATURES :

Standard Operating Conditions Supply Conditions (Voltage & Frequency) :

Voltage	: 415 V $\pm$ 10%
Frequency	: 50 Hz $\pm$ 5%
Combined Variation	: $\pm$ 10%

Ambient :

Motors are designed for ambient temperature of 50°C. Higher ambient temperature motors can be offered on request.

Altitude :

Motors are designed for an altitude up to 1000 M above mean sea level. Motors can be offered for higher altitudes on request.

Re-rating Factors :

The re-rating applicable under different conditions of variations in Supply voltage, frequency, ambient & altitude are obtained by multiplying following factors.

Variation in Supply Voltage & Frequency :

Voltage Variation (%)	Frequency Variation (%)	Combined Variation & Frequency Variation (%)	Permissible Output as % of rated value
$\pm$ 10	$\pm$ 5	$\pm$ 10	100
$\pm$ 12.5	$\pm$ 5	$\pm$ 12.5	95
$\pm$ 15	$\pm$ 5	$\pm$ 15	90

Variation in Ambient for all Motors :

Amb. Temp. (° C)	Permissible Output as % of rated value
< 30	107
30-45	103
50	100
55	94
60	89

Variation in Altitude for all Motors :

Altitude above Sea Level (m)	Permissible output as % of rated value
1000	100
1500	97
2000	94
2500	90
3000	86
3500	82
4000	77

TECHNICAL INFORMATION FOR STANDARD MOTORS

Method of Starting :

“MEGHA” motors are suitable for direct on line (DOL) or STAR / DELTA starting as per details given below.

kW Rating	Method of Starting	No. Of Leads
Up to & including 2.2 KW (2 & 4 Pole) & 1.5 KW (6 & 8 Pole)	DOL	3 (Internal Star Connection) Can be Supplied with 6 Leads suitable for 415 λ or 240 Δ volts
Above 2.2 KW	DOL or STAR/DELTA	6

Duty, Starting Time & Number of Consecutive Starts :

Motors are designed for continuous (S1) Duty. Other types of duty (S2 to S9) can be offered on request. For load $GD^2 \leq$ Motor GD^2 the motors can safely with stand 3 consecutive starts from cold condition & 2 consecutive starts from hot condition. In application where more severe starting conditions are encountered, motors can be offered against request.

Insulation :

The motors are provided with Class ‘F’ insulation with temperature rise limited to Class ‘B’.

Standard Winding :

The stators are wound with modified polyester enamel covered (IS 13730: Part 3, thermal class 155 °C) copper wires and are flood impregnated.

Insulation for inverter Duty Motors :

- The stators are wound with polyesterimide coated with polyamide-imide top Coat, (dual coated) wires as per IS 13730: part 13, thermal class 200 °C copper wires.
- Vacuum Pressure Impregnation (VPI) is provided to windings on request.
- Class ‘H’ insulation can be provided on request

Thermal Protection (for Winding) :

PTC thermistors / thermostats etc. can be embedded in stator winding on request.

Earthing Terminals :

One earthing terminal is provided on the body and one earthing terminal is provided in the terminal box.

Anti-condensation Heaters :

In order to avoid condensation of water inside the motors, they can be heated up by connecting a voltage 4 to 10% of rated 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 stator winding can be adopted.

Motors can also be offered with built in space heaters in frame size 90 and above.

MECHANICAL FEATURES :

Enclosures :

All foot mounted motors in cast iron body are supplied with integral feet construction. All foot mounted motors in aluminium body (up to 112M frame) are supplied with detachable feet.

Types Of Duties :

The various operating cycle of driven machines can be classified in to nine basic duties, ranging from S1 to S9. They are as follows:

S1	Continuous running duty
S2	Short time duty
S3	Intermittent periodic duty
S4	Intermittent duty with starting
S5	Intermittent duty with electric braking
S6	Continuous operation periodic duty
S7	Continuous operation periodic duty with electrical braking
S8	Continuous operation periodic duty with related loads/ speed variations
S9	Duty with non-periodic load and speed variation

- Duties S2, S3, S4 and S5 are explained in details in crane and hoist duty section.

Type of Construction :

Standard motors are designed for foot mounting (B3). Foot mount Motors are also suitable for B6, B7, B8, V5 and V6 mounting. Motors can be supplied in flange mounting (B5). Flange mounted motors are also suitable for V1 and V3 mounting. Motors can be supplied in face mounting (B14) up to 132 Frame.

Cooling :

All motors are Totally Enclosed Fan Cooled (TEFC-IC 411 as per IS: 6362 & IEC 60034-6). The cooling is effected by self driven, bi-directional centrifugal fan protected by fan cover. Following cooling types can be provided on request.

- Natural ventilation. [TESC or TENV (IC 410)]
- Forced cooling for frame sizes 80 and above. (IC 416)

Bearing Lubrication :

Sealed bearing (2Z) are filled with Lithium base rust and corrosion resistance grease are used. Special high temperature grease can be provided on request.

On line Greasing :

On line greasing arrangement is provided in frame Sizes 100L and above.

TECHNICAL INFORMATION FOR STANDARD MOTORS

Degree of Protection :

All motors have IP55 degree of protection as per IS/IEC 60034-5. Higher degree of protection such as IP56, IP66 can be provided on request.

Rotor :

Entire range of motors is fitted with dynamically balanced aluminum pressure die cast squirrel cage rotors.

Shaft :

All motors are provided with single shaft extension in accordance with IS: 1231. The shaft material is EN8 steel.

Special shaft extension and /or special shaft material can be provided on request.

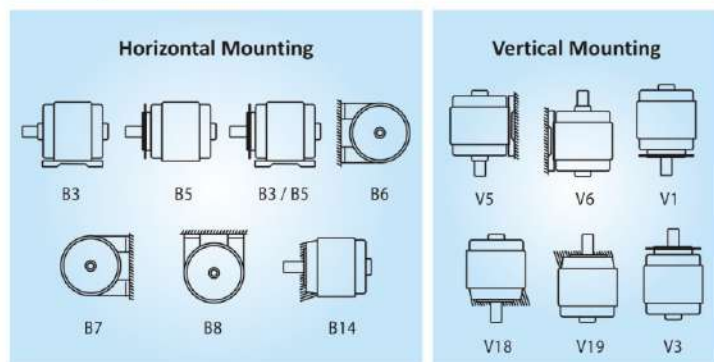
Balancing & Vibration :

The balancing grade is G 2.5 as per ISO: 1940. Rotors are dynamically balanced with a half key in the shaft extension. All motors have vibration grade A as per IEC 60034-14. Other grades can be offered on request.

Bearing and Terminal Box Position details :

Frame	Bearing Nos. C3 clearance		T. Body Position	Option
	DE	NDE		
63 (CI / AL)	6201 2Z	6201 2Z	Top	—
71 (CI / AL)	6203 2Z	6203 2Z	Top	RHS / LHS Only for CI
80 (CI / AL)	6204 2Z	6204 2Z	Top	RHS / LHS Only for CI
90S, 90L (CI / AL)	6205 2Z	6205 2Z	Top	RHS / LHS Only for CI
100L (CI / AL)	6206 2Z	6206 2Z	Top	RHS / LHS
112M (CI / AL)	6306 2Z	6306 2Z	Top	RHS / LHS
132S, 132M (CI)	6208 2Z	6208 2Z	Top	RHS / LHS
160M, 160L (CI)	6309 2Z C3	6309 2Z C3	Top	RHS / LHS
180M, 180L (CI)	6311 2Z C3	6311 2Z C3	Top	RHS / LHS
200L (CI)	6312 2Z C3	6312 2Z C3	Top	RHS / LHS
225S, 225M (CI)	6315 2Z C3	6315 2Z C3	Top	RHS / LHS
250M (CI)	6314 2Z C3	6314 2Z C3	Top	RHS / LHS

Mounting :



Direction of Rotation :

All motors are suitable for bi - directional rotation.

Lifting Arrangement :

All motors from frame size 100 and above are provided with lifting hooks.

Noise Level :

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

Paint :

All motors are painted with corrosion resistant epoxy based paint, shade RAL 7015. Any other shade or material can be offered on request.

Packing :

Motors up to 132 frame are packed in hot die moulded thermocol / corrugated boxes. Wooden packing boxes are provided for higher frame size. Sea worthy / Export packing case is also available on request.

Shipping Dimension and Appx. Gross Weight of Motors :

FRAME	PACKING BOX DIMENSIONS All Dimensions are in MM			MOTOR GROSS WEIGHT IN Kg. (CI / AL)
	LENGTH	WIDTH	HEIGHT	
63	310	260	210	8 / 5.5
71	310	260	210	8 / 6
80	355	255	245	13 / 10
90S/L	355	255	245	16 / 13
100L	465	360	340	28 / 22
112M	465	360	340	38 / 29
132S/M	575	410	390	70 / —
160M/L	575	440	390	77 / —
180M/L	765	345	460	155 / —
200L	870	460	485	167 / —
225S/M	920	550	525	235 / —
250M	970	550	625	248 / —

Parameters Customer to Specify for Motors to be Operated on VFD Supply

Base voltage, Speed and kW rating at 50Hz	Duty Details (Torque at different speeds and time duration)
Speed Range (frequency variation)	Time duration for which motor is running at minimum speed
Insulation class / Temperature rise (F to F / F to B / H to F)	Force cooling for speed below 40% of rated speed
Accessories	
Encoder	Thermistors / RTD / BTD

Installation Requirements / Recommendation :

- Special high frequency earthing to be provided. (at customer's end)
- Shielded cables recommended.
- For higher length of cable, customer to use sine filters /dv/dt filters / chokes.

ENERGY EFFICIENT IE2 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 63 to 250M

Applicable Standard IS 12615:2018

Voltage : 415 V $\pm$ 10%
Frequency : 50 Hz $\pm$ 5%
Combined Variation : $\pm$ 10%

Ambient : 50 °C
Duty : S1 (Continuous)
3000 RPM (2-Pole)

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

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
															KW	HP
0.18	0.25	63	2750	0.84	0.06	0.77	0.68	0.60	60.4	59.6	57.8	5.0	2.6	3.0	0.0011	6
0.37	0.50	71	2750	1.2	0.13	0.74	0.68	0.60	69.5	68.3	66.1	5.0	2.6	3.0	0.0019	7
0.55	0.75	71	2800	1.6	0.18	0.79	0.72	0.58	74.1	74.1	73.2	5.0	2.7	3.0	0.0019	7
0.75	1.0	80	2820	2.0	0.24	0.82	0.74	0.62	77.4	76.5	73.5	5.0	2.5	2.8	0.0037	10
1.1	1.5	80	2825	2.8	0.36	0.82	0.75	0.63	79.6	79.6	75.5	6.0	2.7	3.0	0.0051	11
1.5	2.0	90S	2830	3.7	0.49	0.82	0.78	0.68	81.3	81.3	78.0	6.5	3.3	3.5	0.0091	17
2.2	3.0	90L	2830	5.0	0.71	0.82	0.78	0.68	83.2	83.2	81.7	6.5	3.3	3.5	0.0113	20
3.7	5.0	100L	2880	8.0	1.20	0.88	0.83	0.75	85.5	85.5	84.0	6.5	3.0	3.3	0.0212	26
5.5	7.5	132S	2925	11.0	1.78	0.90	0.88	0.83	87.0	86.0	82.0	6.5	2.6	3.0	0.0820	55
7.5	10.0	132S	2925	15.0	2.41	0.90	0.87	0.82	88.1	87.5	85.0	6.5	2.6	3.0	0.0980	67
11.0	15.0	160M	2925	21.5	3.58	0.89	0.84	0.76	89.4	89.4	87.0	6.5	2.3	3.0	0.171	112
15.0	20.0	160M	2930	29.0	4.88	0.89	0.88	0.82	90.3	90.0	88.0	6.5	2.0	2.5	0.203	120
18.5	25.0	160L	2930	35.0	6.05	0.90	0.89	0.86	90.9	90.7	89.0	6.5	2.0	2.5	0.268	137
22.0	30.0	180M	2935	41.5	7.21	0.89	0.87	0.82	91.3	91.0	88.8	7.0	2.4	2.7	0.34	177
30.0	40.0	200L	2955	54.0	9.80	0.89	0.86	0.80	92.0	92.0	90.0	7.0	2.6	3.0	0.61	274
37.0	50.0	200L	2955	67.0	11.9	0.87	0.84	0.76	92.5	92.5	91.0	7.0	2.2	2.5	0.64	275
45.0	60.0	225M	2965	80.0	14.1	0.88	0.85	0.78	92.9	92.7	91.0	7.0	2.5	2.5	1.13	353
55.0	75.0	250M	2965	95.0	17.8	0.91	0.89	0.86	93.2	92.7	90.0	7.0	2.3	2.7	2.60	550

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

ENERGY EFFICIENT IE2 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 63 to 250M

Applicable Standard IS 12615:2018

Voltage : 415 V $\pm$ 10%

Frequency : 50 Hz $\pm$ 5%

Combined Variation : $\pm$ 10%

Ambient : 50 °C

Duty : S1 (Continuous)

1500 RPM (4-Pole)

Ins. Class : F

Temp. Rise : B

Protection : IP55

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.18	0.25	63	1320	0.82	0.12	0.70	0.62	0.50	64.7	63.8	61.3	3.4	2.3	2.5	0.0017	6
0.37	0.50	71	1380	1.4	0.25	0.71	0.62	0.50	72.7	72.5	71.3	3.4	2.3	2.5	0.0033	7
0.55	0.75	80	1390	1.7	0.36	0.74	0.64	0.50	77.1	76.9	75.8	5.0	2.8	3.0	0.0072	11
0.75	1.0	80	1400	2.2	0.50	0.75	0.66	0.53	79.6	79.6	74.0	5.0	2.8	3.0	0.0082	12
1.1	1.5	90S	1405	2.9	0.71	0.77	0.70	0.57	81.4	81.4	77.5	6.0	2.4	2.8	0.015	15
1.5	2.0	90L	1415	3.8	0.99	0.78	0.70	0.57	82.8	82.8	80.0	5.5	2.7	3.0	0.019	19
2.2	3.0	100L	1415	5.1	1.43	0.81	0.74	0.60	84.3	84.3	82.0	6.0	2.6	3.0	0.28	26
3.7	5.0	112M	1425	8.1	2.44	0.80	0.76	0.62	86.3	86.3	84.0	6.5	2.7	3.0	0.066	36
5.5	7.5	132S	1440	11.4	3.61	0.85	0.82	0.74	87.7	87.7	86.0	6.5	2.2	2.8	0.126	64
7.5	10.0	132M	1440	15.4	5.00	0.85	0.82	0.74	88.7	88.7	87.0	6.5	2.2	2.8	0.163	74
11.0	15.0	160M	1455	22.0	7.27	0.84	0.80	0.70	89.8	89.8	88.0	6.5	2.5	2.8	0.229	115
15.0	20.0	160L	1455	30.0	9.91	0.85	0.82	0.72	90.6	90.7	89.5	6.5	2.5	2.7	0.300	128
18.5	25.0	180M	1455	36.0	12.1	0.85	0.82	0.76	91.2	91.2	89.5	6.5	2.7	2.9	0.540	188
22.0	30.0	180L	1465	43.0	14.3	0.84	0.78	0.70	91.6	91.6	89.8	6.5	2.8	3.0	0.61	200
30.0	40.0	200L	1465	56.0	19.6	0.86	0.82	0.72	92.3	92.0	90.0	7.0	2.6	2.6	0.93	275
37.0	50.0	225S	1465	69.0	24.2	0.87	0.85	0.77	92.7	92.5	90.5	7.0	2.6	2.6	1.60	362
45.0	60.0	225M	1465	84.0	29.5	0.87	0.85	0.77	93.1	93.8	91.0	7.0	2.6	2.6	1.85	377
55.0	75.0	250M	1470	99.0	35.9	0.86	0.84	0.76	93.5	93.0	91.0	7.0	2.5	2.6	3.06	500

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

ENERGY EFFICIENT IE2 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 71 to 250M

Applicable Standard IS 12615:2018

Voltage : 415 V $\pm$ 10%

Frequency : 50 Hz $\pm$ 5%

Combined Variation : $\pm$ 10%

Ambient : 50 °C

Duty : S1 (Continuous)

1000 RPM (6-Pole)

Ins. Class : F

Temp. Rise : B

Protection : IP55

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.18	0.25	71	850	1.1	0.16	0.70	0.60	0.48	56.6	55.3	54.1	3.0	2.1	2.3	0.0031	8
0.37	0.50	80	890	1.4	0.38	0.70	0.60	0.48	67.6	66.9	64.8	3.0	2.1	2.3	0.0060	10
0.55	0.75	80	890	1.9	0.55	0.71	0.62	0.48	73.1	72.6	70.9	4.0	2.2	2.5	0.0084	11
0.75	1.0	90S	900	2.3	0.76	0.72	0.61	0.50	75.9	75.9	72.3	4.0	2.0	2.5	0.0122	14
1.1	1.5	90L	905	3.2	1.11	0.72	0.61	0.50	78.1	78.1	74.0	4.0	2.0	2.6	0.0160	17
1.5	2.0	100L	915	4.0	1.51	0.72	0.60	0.52	79.8	79.6	75.0	4.5	2.0	2.5	0.0250	22
2.2	3.0	112M	920	5.5	2.22	0.75	0.65	0.58	81.8	81.8	76.8	5.0	2.1	2.5	0.065	33
3.7	5.0	132S	935	8.8	3.70	0.74	0.70	0.60	84.3	83.5	82.0	5.5	2.0	2.5	0.130	52
5.5	7.5	132M	935	12.7	5.51	0.74	0.70	0.60	86.0	84.5	82.0	6.0	2.0	2.5	0.193	75
7.5	10.0	160M	950	16.7	7.55	0.80	0.74	0.64	87.2	87.2	85.2	5.5	2.0	2.5	0.276	103
11.0	15.0	160L	950	23.0	10.9	0.80	0.77	0.66	88.7	88.7	87.0	6.0	2.0	2.5	0.40	123
15.0	20.0	180L	950	30.5	14.8	0.80	0.75	0.62	89.7	89.7	87.2	5.5	2.6	2.3	0.82	200
18.5	25.0	200L	960	37.5	18.5	0.82	0.77	0.69	90.4	90.4	88.3	5.5	2.6	2.3	1.20	254
22.0	30.0	200L	960	44.0	21.8	0.82	0.77	0.69	90.9	90.9	88.8	6.0	2.6	2.3	1.37	270
30.0	40.0	225M	960	59.0	29.7	0.86	0.84	0.76	91.7	91.2	88.7	7.0	2.5	2.2	2.41	358
37.0	50.0	250M	970	72.0	36.2	0.88	0.85	0.82	92.2	92.2	91.0	6.0	2.5	2.3	3.72	528

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

ENERGY EFFICIENT IE2 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 80 to 250M

Applicable Standard IS 12615:2018

Voltage : 415 V $\pm$ 10%
Frequency : 50 Hz $\pm$ 5%
Combined Variation : $\pm$ 10%

Ambient : 50 °C
Duty : S1 (Continuous)

750 RPM (8-Pole)

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

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
															KW	HP
0.18	0.25	80	680	1.0	0.24	0.63	0.52	0.41	45.9	41.0	35.2	2.7	1.8	2.1	0.0052	8
0.37	0.50	90S	685	1.5	0.49	0.63	0.52	0.41	56.1	52.3	47.2	2.7	1.8	2.1	0.0110	11
0.55	0.75	90L	685	2.1	0.75	0.63	0.53	0.43	61.7	57.3	52.1	2.9	2.0	2.4	0.0140	14
0.75	1.0	100L	685	2.7	1.01	0.73	0.63	0.50	66.2	64.2	61.3	3.0	1.7	2.0	0.0230	18
1.1	1.5	100L	690	3.5	1.50	0.71	0.62	0.48	70.8	68.8	64.9	3.3	1.9	2.3	0.0270	21
1.5	2.0	112M	700	4.5	2.01	0.70	0.62	0.50	74.1	72.9	69.3	3.8	1.7	2.2	0.0510	25
2.2	3.0	132S	700	6.1	2.99	0.78	0.74	0.64	77.6	76.8	74.2	3.5	1.8	2.3	0.0990	57
3.7	5.0	160M	715	9.8	4.95	0.78	0.74	0.65	81.4	80.6	77.3	4.4	1.8	2.0	0.217	88
5.5	7.5	160M	715	14.2	7.39	0.78	0.74	0.65	83.8	83.0	81.6	4.8	1.9	2.2	0.299	101
7.5	10.0	160L	715	19.0	10.2	0.78	0.74	0.65	85.3	84.4	82.1	5.5	2.1	2.2	0.400	119
11.0	15.0	180L	720	26.0	14.5	0.79	0.74	0.64	86.9	86.1	84.9	5.0	2.1	2.2	0.720	182
15.0	20.0	200L	720	35.0	20.1	0.82	0.79	0.71	88.0	87.3	86.6	6.0	2.5	2.3	1.32	282
18.5	25.0	225S	725	45.0	24.5	0.79	0.77	0.69	88.6	88.3	87.6	5.5	2.1	2.2	2.10	329
22.0	30.0	225M	725	52.0	29.3	0.79	0.77	0.69	89.1	88.9	88.1	5.5	2.1	2.2	2.41	369
30.0	40.0	250M	730	70.0	39.6	0.82	0.78	0.68	89.8	89.3	88.6	6.0	2.5	2.2	3.72	472

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

HIGH EFFICIENCY IE3 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 63 to 250M

Applicable standard IS 12615:2018

Voltage : 415 V $\pm$ 10%

Frequency : 50 Hz $\pm$ 5%

Combined Variation : $\pm$ 10%

Ambient : 50 °C

Duty : S1 (Continuous)

3000 RPM (2-Pole)

Ins. Class : F

Temp. Rise : B

Protection : IP55

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.18	0.25	63	2750	1.0	0.06	0.77	0.69	0.60	65.9	62.1	61.8	6.0	3.0	3.5	0.007	6
0.37	0.50	71	2750	1.2	0.13	0.77	0.69	0.60	73.8	73.1	72.2	6.0	3.0	3.5	0.012	7
0.55	0.75	71	2800	1.6	0.18	0.75	0.65	0.59	77.8	77.4	76.6	6.0	3.0	3.5	0.018	8
0.75	1.0	80	2820	2.0	0.24	0.84	0.80	0.68	80.7	80.7	78.0	6.0	3.0	3.5	0.009	17
1.1	1.5	80	2825	2.8	0.36	0.86	0.80	0.68	82.7	82.7	80.0	6.0	3.0	3.5	0.011	18
1.5	2.0	90S	2830	3.7	0.49	0.86	0.81	0.70	84.2	84.2	83.2	6.5	3.0	3.3	0.013	25
2.2	3.0	90L	2830	5.0	0.71	0.87	0.83	0.75	85.9	85.9	85.9	6.5	3.0	3.3	0.016	27
3.7	5.0	100L	2880	8.0	1.20	0.87	0.82	0.70	87.8	87.8	87.3	6.5	3.0	3.3	0.021	37
5.5	7.5	132S	2925	11.0	1.78	0.87	0.84	0.75	89.2	89.2	87.8	6.5	2.3	3.0	0.134	79
7.5	10.0	132S	2925	15.0	2.41	0.87	0.84	0.75	90.1	90.1	88.7	6.5	2.3	3.0	0.150	82
11.0	15.0	160M	2925	21.5	3.58	0.86	0.83	0.76	91.2	91.2	89.2	6.5	2.5	3.0	0.220	127
15.0	20.0	160M	2930	29.0	4.88	0.87	0.84	0.77	91.9	91.9	90.0	6.5	2.5	3.0	0.300	144
18.5	25.0	160L	2930	35.0	6.05	0.88	0.86	0.79	92.4	92.4	90.8	6.5	2.5	3.0	0.374	161
22.0	30.0	180M	2935	41.5	7.21	0.88	0.84	0.78	92.7	92.7	91.0	6.5	2.6	3.0	0.500	192
30.0	40.0	200L	2955	54.0	9.80	0.87	0.85	0.79	93.3	93.3	91.5	6.5	2.2	2.8	0.910	306
37.0	50.0	200L	2955	67.0	11.9	0.87	0.85	0.79	93.7	93.7	92.0	6.5	2.2	2.8	1.13	315
45.0	60.0	225M	2965	80.0	14.1	0.90	.088	0.82	94.0	94.0	93.0	6.5	2.1	2.7	2.11	475
55.0	75.0	250M	2965	95.0	17.8	0.89	0.86	0.80	94.3	94.3	93.0	6.5	2.4	2.8	2.60	550

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

HIGH EFFICIENCY IE3 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 63 to 250M

Applicable standard IS 12615:2018

Voltage : 415 V $\pm$ 10%

Frequency : 50 Hz $\pm$ 5%

Combined Variation : $\pm$ 10%

Ambient : 50 °C

Duty : S1 (Continuous)

1500 RPM (4-Pole)

Ins. Class : F

Temp. Rise : B

Protection : IP55

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.18	0.25	63	1320	0.82	0.12	0.70	0.62	0.54	69.9	68.7	61.9	5.0	2.6	2.8	0.006	6
0.37	0.50	71	1380	1.4	0.25	0.70	0.62	0.55	77.3	76.1	71.2	5.0	2.6	2.8	0.012	7
0.55	0.75	80	1390	1.7	0.36	0.72	0.63	0.57	80.8	79.9	73.8	5.0	2.6	2.8	0.013	17
0.75	1.0	80	1400	2.2	0.50	0.78	0.74	0.60	82.5	82.5	82.5	5.0	2.6	2.8	0.015	19
1.1	1.5	90S	1405	2.9	0.71	0.82	0.78	0.68	84.1	84.1	84.1	5.5	2.8	3.3	0.017	24
1.5	2.0	90L	1415	3.8	0.99	0.82	0.78	0.68	85.3	85.3	85.3	5.5	2.8	3.3	0.023	28
2.2	3.0	100L	1415	5.1	1.43	0.78	0.74	0.60	86.7	86.7	85.8	6.0	2.5	3.0	0.028	35
3.7	5.0	112M	1425	8.1	2.44	0.80	0.74	0.60	88.4	88.4	86.5	6.5	3.0	3.5	0.066	49
5.5	7.5	132S	1440	11.4	3.61	0.82	0.78	0.68	89.6	89.6	89.0	6.5	2.6	3.0	0.141	75
7.5	10.0	132M	1440	15.4	5.00	0.83	0.78	0.68	90.4	90.4	90.4	6.5	2.6	3.3	0.193	87
11.0	15.0	160M	1455	22.0	7.27	0.82	0.77	0.68	91.4	91.4	90.8	6.5	2.7	3.2	0.375	135
15.0	20.0	160L	1455	30.0	9.91	0.83	0.78	0.70	92.1	92.1	91.1	6.5	2.7	3.2	0.520	153
18.5	25.0	180M	1455	36.0	12.1	0.87	0.84	0.76	92.6	92.6	92.0	6.5	2.5	3.0	0.750	200
22.0	30.0	180L	1465	43.0	14.3	0.87	0.84	0.76	93.0	93.0	92.5	6.5	5.5	3.0	0.860	220
30.0	40.0	200L	1465	56.0	19.6	0.87	0.84	0.77	93.6	93.6	91.5	6.5	2.6	3.0	1.38	295
37.0	50.0	225S	1465	69.0	24.2	0.83	0.80	0.74	93.9	93.9	93.4	6.0	2.0	2.6	2.30	400
45.0	60.0	225M	1465	84.0	29.5	0.83	0.80	0.740	94.2	94.2	93.6	6.0	2.0	2.6	2.83	430
55.0	75.0	250M	1470	99.0	35.9	0.84	0.80	0.72	94.6	94.6	93.8	6.0	2.0	2.6	3.06	500

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

HIGH EFFICIENCY IE3 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 71 to 250M

Applicable standard IS 12615:2018

Voltage : 415 V $\pm$ 10%
 Frequency : 50 Hz $\pm$ 5%
 Combined Variation : $\pm$ 10%

Ambient : 50 °C
 Duty : S1 (Continuous)
1000 RPM (6-Pole)

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

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L				kgm ²	kg
0.18	0.25	71	850	0.92	0.16	0.60	0.54	0.48	63.9	63.1	62.9	4.0	2.1	2.5	0.008	7
0.37	0.5	80	890	1.4	0.38	0.60	0.54	0.48	73.5	72.1	70.0	4.0	2.1	2.5	0.011	8
0.55	0.75	80	890	1.9	0.55	0.63	0.57	0.50	77.2	76.1	74.2	4.0	2.1	2.5	0.014	11
0.75	1.0	90S	900	2.3	0.76	0.72	0.62	0.52	78.9	78.9	78.9	4.0	2.1	2.5	0.017	25
1.1	1.5	90L	905	3.2	1.11	0.72	0.62	0.52	81.0	81.0	81.0	4.0	2.1	2.5	0.025	27
1.5	2.0	100L	915	4.0	1.51	0.72	0.62	0.54	82.5	82.5	82.5	4.5	2.3	2.5	0.029	36
2.2	3.0	112M	920	5.5	2.22	0.75	0.70	0.58	84.3	84.3	81.0	6.0	2.3	2.5	0.074	50
3.7	5.0	132S	935	8.8	3.70	0.80	0.75	0.64	86.5	86.5	86.5	5.0	1.8	2.3	0.202	72
5.5	7.5	132M	935	12.7	5.51	0.78	0.74	0.62	88.0	88.0	88.0	5.0	1.8	2.3	0.276	83
7.5	10.0	160M	950	16.7	7.55	0.80	0.76	0.68	89.1	89.1	89.1	5.5	2.5	3.0	0.450	125
11.0	15.0	160L	950	23.0	10.9	0.80	0.76	0.68	90.3	90.3	90.3	5.5	2.5	3.0	0.646	145
15.0	20.0	180L	950	30.5	14.8	0.83	0.78	0.72	91.2	91.2	91.2	5.5	2.5	3.0	1.20	210
18.5	25.0	200L	960	37.5	18.5	0.87	0.83	0.75	91.7	91.7	91.5	6.5	2.6	3.2	1.81	295
22.0	30.0	200L	960	44.0	21.8	0.88	0.85	0.76	92.2	92.2	92.2	6.5	2.6	3.2	2.10	302
30.0	40.0	225M	960	59.0	29.7	0.88	0.84	0.77	92.9	92.9	92.5	6.5	3.0	3.5	3.51	410
37.0	50.0	250M	970	72.0	36.2	0.89	0.86	0.79	93.3	93.3	92.8	6.5	2.8	3.2	3.72	528

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

HIGH EFFICIENCY IE3 EFFICIENCY CLASS MOTORS

TEFC 3 Phase Squirrel Cage Induction Motors - Frame Size 80 to 250M

Applicable Standard IS 12615:2018

Voltage : 415 V $\pm$ 10%
Frequency : 50 Hz $\pm$ 5%
Combined Variation : $\pm$ 10%

Ambient : 50 °C
Duty : S1 (Continuous)

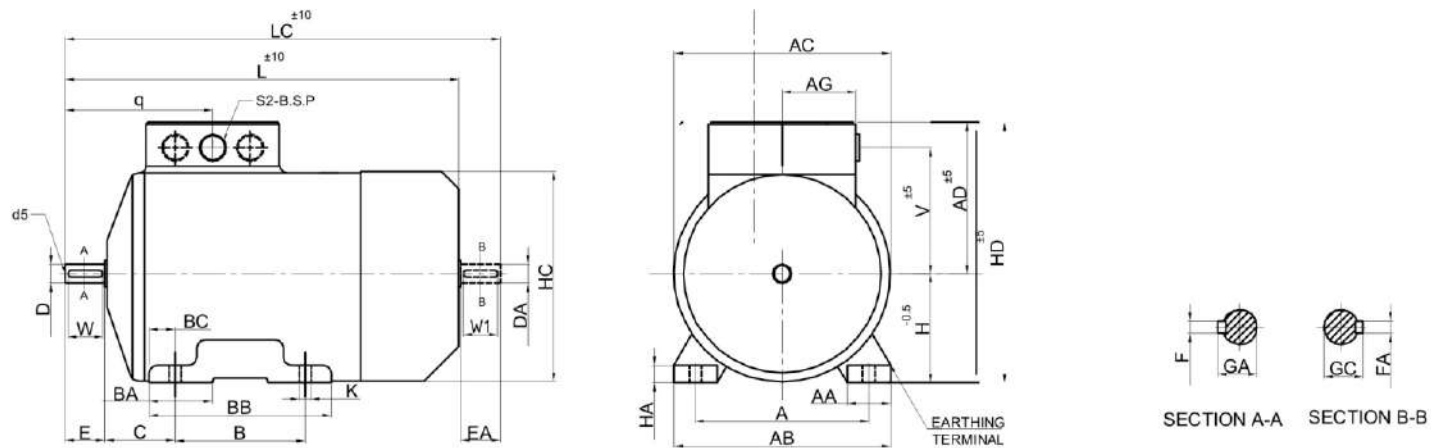
750 RPM (8-Pole)

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

Rated Output		Frame Size	Rated Speed	Maximum Rated Current	Rated Torque	Operating Characteristics at Rated output						With DOL Starting			Rotor GD ²	Motor Weight
						Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
															FL	3/4L
KW	HP	IEC	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.18	0.25	80	680	1.0	0.24	0.63	0.52	0.41	58.7	52.1	45.2	2.7	1.8	2.1	0.0052	9
0.37	0.50	90S	685	1.5	0.49	0.63	0.52	0.41	69.3	65.8	60.8	2.7	1.8	2.1	0.0110	13
0.55	0.75	90L	685	2.1	0.75	0.63	0.53	0.43	73.0	71.1	67.8	2.9	2.0	2.4	0.0140	16
0.75	1.0	100L	685	2.7	1.01	0.73	0.63	0.50	75.0	73.2	72.1	3.0	1.7	2.0	0.0230	20
1.1	1.5	100L	690	3.5	1.50	0.71	0.62	0.48	77.7	75.8	73.2	3.3	1.9	2.3	0.0270	24
1.5	2.0	112M	700	4.5	2.01	0.70	0.62	0.50	79.7	78.1	76.3	3.8	1.7	2.2	0.0510	29
2.2	3.0	132S	700	6.1	2.99	0.78	0.74	0.64	81.9	80.2	78.2	3.5	1.8	2.3	0.0990	64
3.7	5.0	160M	715	9.8	4.95	0.78	0.74	0.65	84.5	83.2	80.6	4.4	1.8	2.0	0.217	95
5.5	7.5	160M	715	14.2	7.39	0.78	0.74	0.65	86.2	85.8	84.1	4.8	1.9	2.2	0.299	110
7.5	10.0	160L	715	19.0	10.2	0.78	0.74	0.65	87.3	86.9	84.3	5.5	2.1	2.2	0.400	130
11.0	15.0	180L	720	26.0	14.5	0.79	0.74	0.64	88.6	87.7	85.8	5.0	2.1	2.2	0.720	195
15.0	20.0	200L	720	35.0	20.1	0.82	0.79	0.71	89.6	89.1	88.3	6.0	2.5	2.3	1.32	305
18.5	25.0	225S	725	45.0	24.5	0.79	0.77	0.69	90.1	89.6	88.4	5.5	2.1	2.2	2.10	350
22.0	30.0	225M	725	52.0	29.3	0.79	0.77	0.69	90.6	90.1	88.9	5.5	2.1	2.2	2.41	390
30.0	40.0	250M	730	70.0	39.6	0.82	0.78	0.68	91.3	90.6	89.1	6.0	2.5	2.2	3.72	505

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

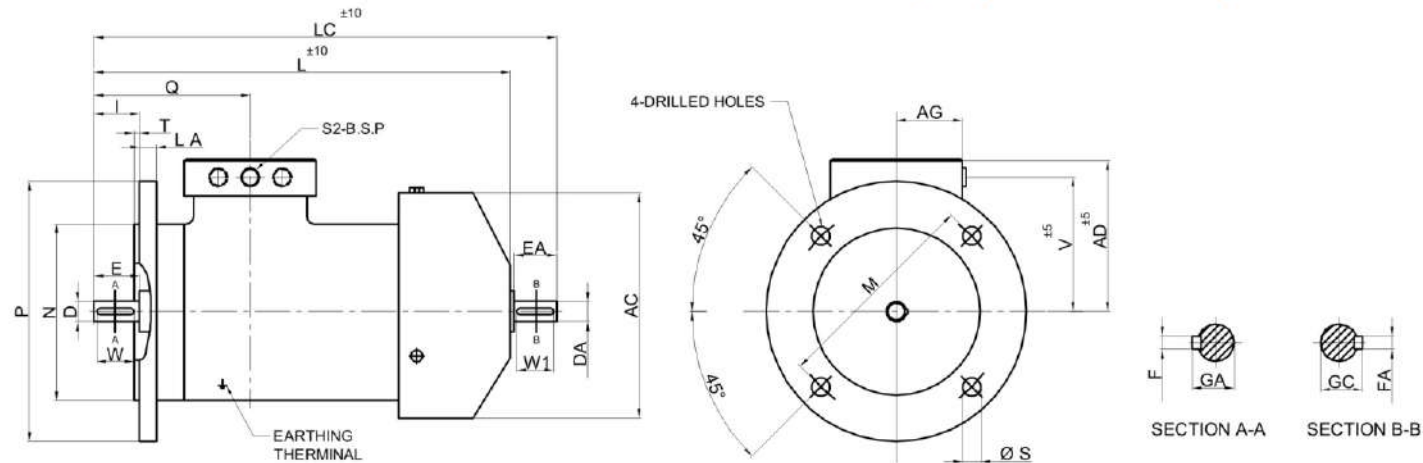
DIMENSION DETAILS OF TEFC FOOT MOUNTED (B3) MOTORS (CAST IRON BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	A	B	C	^{-0.5} H	K	AB	BB	AA	BA	BC	HA	HC	^{±5} HD	^{±5} AD	^{±10} L	^{±10} LC	AC	^{±5} V	q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5
63	100	80	40	63	7	125	105	25	25	13	10	121	162	99	210	250	125	80	85	35	5/8"	11	23	4	12.5	20	M4
71	112	90	45	71	7	144	115	32	35	15	14	141	188	117	252	295	140	96	95	53	5/8"	14	30	5	16	21	M5
80	125	100	50	80	10	160	130	35	40	15	13	160	210	130	281	330	165	110	115	50	3/4"	19	40	6	21.5	31	M6
90 S	140	100	56	90	10	176	135	40	45	18	14	177	227	137	315	375	175	117	120	52	3/4"	24	50	8	27	40	M8
90 L	140	125	56	90	10	176	157	40	45	18	14	177	227	137	335	395	175	117	120	52	3/4"	24	50	8	27	40	M8
100 L	160	140	63	100	12	203	180	43	58	19	15	202	250	150	390	465	207	130	140	55	3/4"	28	60	8	31	50	M10
112 M	190	140	70	112	12	235	193	46	60	25	16	222	270	158	405	480	225	138	135	50	3/4"	28	60	8	31	50	M10
132 S	216	140	89	132	12	257	200	56	75	29	20	266	319	187	470	550	265	162	175	65	7/8"	38	80	10	41	70	M12
132 M	216	178	89	132	13	257	226	56	75	24	20	266	319	187	502	590	265	162	175	65	7/8"	38	80	10	41	70	M12
160 M	254	210	108	160	15	315	270	70	78	30	24	365	367	207	585	720	307	183	240	65	7/8"	42	110	12	45	100	M16
160 L	254	254	108	160	15	315	315	70	78	30	24	365	367	207	640	765	307	183	240	65	7/8"	42	110	12	45	100	M16
180 M	279	241	121	180	15	345	335	80	94	31	24	367	428	248	700	840	345	232	250	65	7/8"	48	110	14	51.5	100	M16
180 L	279	279	121	180	15	345	335	80	94	31	24	367	428	248	700	840	345	232	250	65	7/8"	48	110	14	51.5	100	M16
200 L	318	305	133	200	19	400	390	100	97	43	30	422	475	275	830	950	410	245	300	90	1 1/2"	55	110	16	59	100	M20
225 S	356	286	149	225	19	435	390	117	97	62	30	422	500	275	830	1030	410	245	350	90	1 1/2"	60	110	18	64	100	M20
225 M	356	311	149	225	19	435	390	117	97	62	30	422	500	275	830	1030	410	245	350	90	1 1/2"	60	110	18	64	100	M20
250 M	406	349	168	250	24	485	435	125	110	40	30	445	620	370	920	1080	505	305	350	130	1 1/2"	65	140	18	69	130	M20

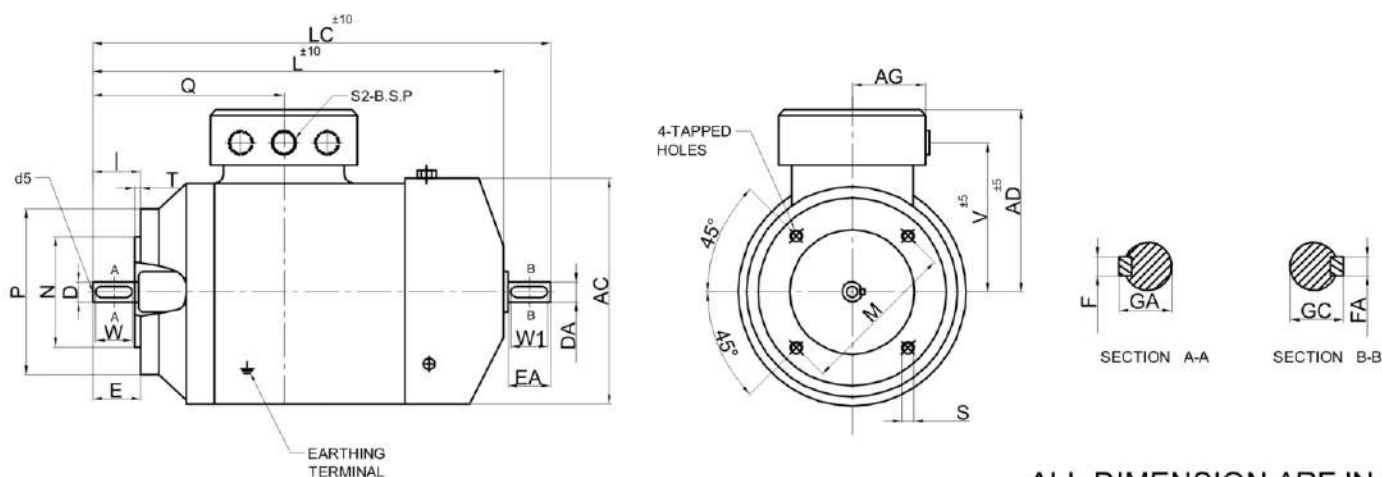
DIMENSION DETAILS OF TEFC FLANGE MOUNTED (B5) MOTORS (CAST IRON BODY)



ALL DIMENSIONS ARE IN MM.

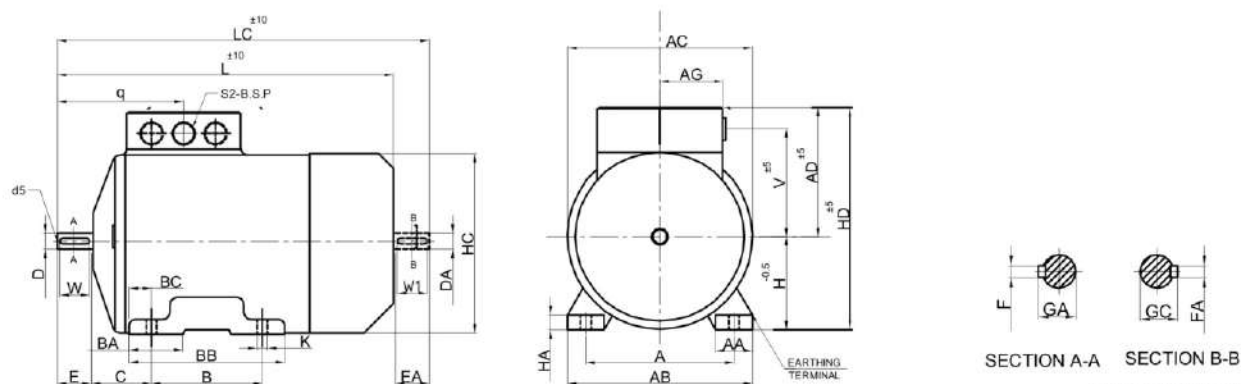
FRAME SIZE	P	N	M	I	S	T	LA	AD ^{±5}	AC	L ^{±10}	LC ^{±10}	V ^{±5}	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5
63	140	95	115	23	10	3	9	100	121	210	250	80	85	35	5/8"	11	23	4	12.5	20	M4
71	160	110	130	30	10	3.5	9	120	141	255	295	95	95	55	5/8"	14	30	5	16	20	M5
80	200	130	165	40	12	3.5	10	130	160	280	330	110	115	50	3/4"	19	40	6	21.5	30	M6
90 S	200	130	165	50	12	3.5	10	140	177	315	375	120	120	55	3/4"	24	50	8	27	40	M8
90 L	200	130	165	50	12	3.5	10	140	177	335	395	120	120	55	3/4"	24	50	8	27	40	M8
100 L	250	180	215	60	15	4	11	150	202	390	465	130	140	55	3/4"	28	60	8	31	50	M10
112 M	250	180	215	60	15	4	11	160	222	405	480	140	135	50	3/4"	28	60	8	31	50	M10
132 S	300	230	265	80	15	4	12	190	266	470	550	165	175	65	7/8"	38	80	10	41	70	M12
132 M	300	230	265	80	15	4	12	190	266	505	590	165	175	65	7/8"	38	80	10	41	70	M12
160 M	350	250	300	110	19	5	13	210	365	585	720	185	240	65	7/8"	42	110	12	45	100	M16
160 L	350	250	300	110	19	5	13	210	365	640	765	185	240	65	7/8"	42	110	12	45	100	M16
180 M	350	250	300	110	19	5	13	240	367	700	840	235	250	55	7/8"	48	110	14	51.5	100	M16
180 L	350	250	300	110	19	5	13	240	367	700	840	235	250	55	7/8"	48	110	14	51.5	100	M16
200 L	400	300	350	110	19	5	15	275	422	830	950	245	300	90	1 1/2"	55	110	16	59	100	M20
225 S	450	350	400	110	19	5	15	275	422	850	1030	245	350	90	1 1/2"	60	110	16	59	100	M20
225 M	450	350	400	110	19	5	15	275	422	850	1030	245	350	90	1 1/2"	60	110	16	59	100	M20
250 M	550	450	500	140	19	5	18	370	445	920	1080	305	350	130	1 1/2"	65	140	18	69	130	M20

DIMENSION DETAILS OF TEFC FACE MOUNTED (B14) MOTORS (CAST IRON BODY)



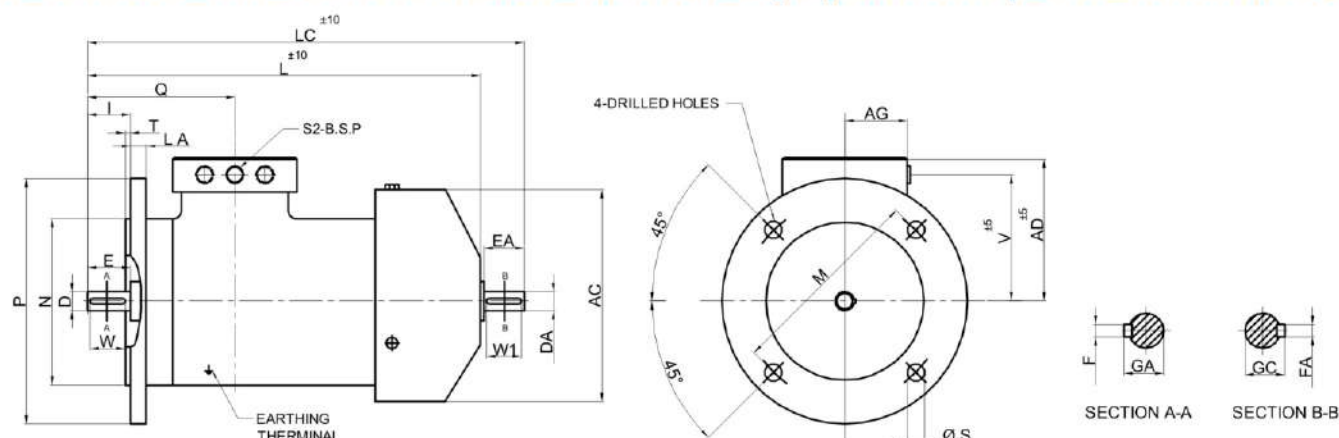
FRAME SIZE	P	N	M	I	S	T	AD ^{±5}	AC	L ^{±10}	LC ^{±10}	V ^{±5}	Q	AG	S2 BSP	D / DA	E / EA	F / FA	GA / GC	W / W1	d5
63	90	60	75	23	M5 X 10	2.5	100	122	210	250	80	84	35	5/8"	11	23	4	12.5	20	M4
71	105	70	85	30	M6 X 10	2.5	120	140	255	295	95	95	53	5/8"	14	30	5	16	20	M5
80	120	80	100	40	M6 X 13	3	130	160	280	330	110	115	50	3/4"	19	40	6	21.5	30	M6
90 S	140	95	115	50	M8 X 12	3	140	177	315	375	120	121	52	3/4"	24	50	8	27	40	M8
90 L	140	95	115	50	M8 X 12	3	140	177	335	395	120	121	52	3/4"	24	50	8	27	40	M8
100	160	110	130	60	M8 X 12	3.5	150	202	390	465	130	135	56	3/4"	28	60	8	31	50	M10
112	160	110	130	60	M8 X 12	3.5	158	224	405	480	140	138	55	3/4"	28	60	8	31	50	M10
132 S	250	180	215	80	M12 X 20	4	190	265	470	550	165	175	65	7/8"	38	80	10	41	70	M12
132 M	250	180	215	80	M12 X 20	4	190	265	505	590	165	175	65	7/8"	38	80	10	41	70	M12

DIMENSION DETAILS OF TEFC FOOT MOUNTED (B3) MOTORS (IEC ALUMINIUM BODY)



FRAME SIZE	A	B	C	H ^{-0.5}	K	AB	BB	AA	BA	BC	HA	HC	HD ^{±5}	AD ^{±5}	L ^{±10}	LC ^{±10}	AC	V ^{±5}	q	AG	S2 BSP	D / DA	E / EA	F / FA	GA / GC	W / W1	d5
63	100	80	40	63	7	125	105	26	25	12	10	124	163	100	215	250	120	80	85	42	5/8"	11	23	4	12.5	20	M4
71	112	90	45	71	7	142	105	26	25	12	10	138	188	120	240	285	135	100	100	42	5/8"	14	30	5	16	20	M5
80	125	100	50	80	10	160	125	38	30	12	11	158	224	145	280	330	155	120	120	58	3/4"	19	40	6	21.5	30	M6
90 S	140	100	56	90	10	187	131	42	30	15	13	176	235	145	305	370	170	120	135	58	3/4"	24	50	8	27	40	M8
90 L	140	125	56	90	10	187	155	42	30	15	13	176	235	145	330	395	175	120	135	58	3/4"	24	50	8	27	40	M8
100	160	140	63	100	12	195	168	45	38	13	11	196	260	160	375	455	190	135	155	58	3/4"	28	60	8	31	50	M10
112	190	140	70	112	12	227	176	48	35	18	14	220	282	170	395	475	215	145	150	58	3/4"	28	60	8	31	50	M10

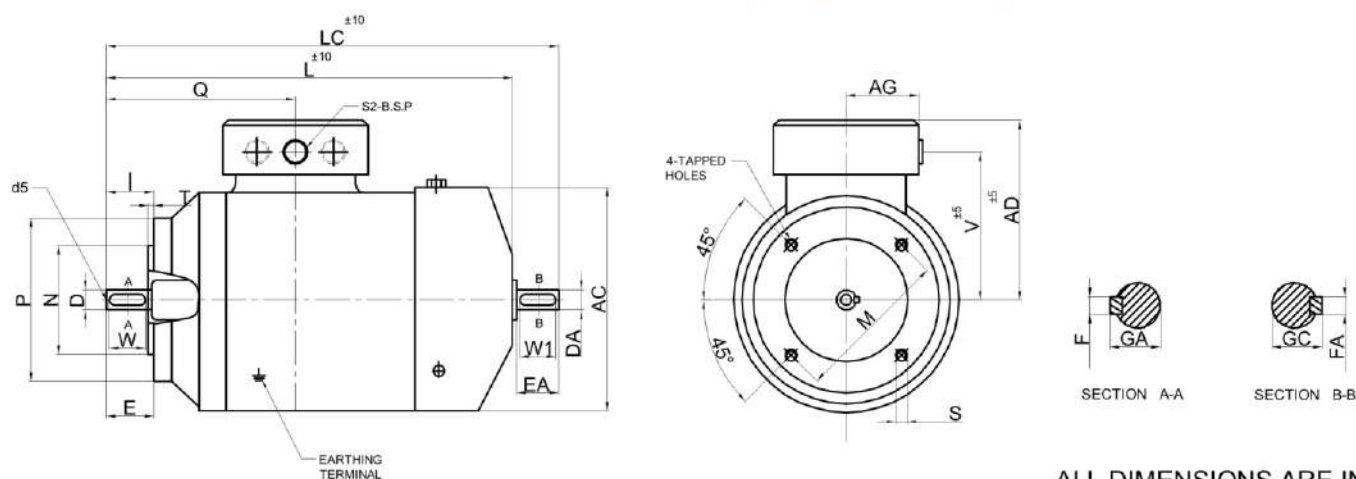
DIMENSION DETAILS OF TEFC FLANGE MOUNTED (B5) MOTORS (IEC ALUMINIUM BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	LA	AD	AC	L	LC	V	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5
63	140	95	115	23	10	3	9	100	124	220	250	80	85	42	5/8"	11	23	4	12.5	20	M4
71	160	110	130	30	10	3.5	9	120	138	240	285	100	100	42	5/8"	14	30	5	16	20	M5
80	200	130	165	40	12	3.5	10	145	158	280	330	120	120	58	3/4"	19	40	6	21.5	30	M6
90 S	200	130	165	50	12	3.5	10	145	176	305	370	120	135	58	3/4"	24	50	8	27	40	M8
90 L	200	130	165	50	12	3.5	10	145	176	330	395	120	135	58	3/4"	24	50	8	27	40	M8
100 L	250	180	215	60	15	4	11	160	196	375	455	135	155	58	3/4"	28	60	8	31	50	M10
112 M	250	180	215	60	15	4	11	170	220	395	475	150	150	58	3/4"	28	60	8	31	50	M10

DIMENSION DETAILS OF TEFC FACE MOUNTED (B14) MOTORS (IEC ALUMINIUM BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	AD	AC	L	LC	V	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5
63	90	60	75	23	M5 X 10	2.5	100	124	215	250	80	85	42	5/8"	11	23	4	12.5	20	M4
71	105	70	85	30	M6 X 10	2.5	120	138	240	285	100	100	42	5/8"	14	30	5	16	20	M5
80	120	80	100	40	M6 X 13	3	145	158	280	330	120	120	58	3/4"	19	40	6	21.5	30	M6
90 S	140	95	115	50	M8 X 12	3	145	176	305	370	120	135	58	3/4"	24	50	8	27	40	M8
90 L	140	95	115	50	M8 X 12	3	145	176	330	395	120	135	58	3/4"	24	50	8	27	40	M8
100	160	110	130	60	M8 X 12	3.5	160	196	375	455	135	155	58	3/4"	28	60	8	31	50	M10
112	160	110	130	60	M8 X 12	3.5	170	220	395	475	145	150	58	3/4"	28	60	8	31	50	M10

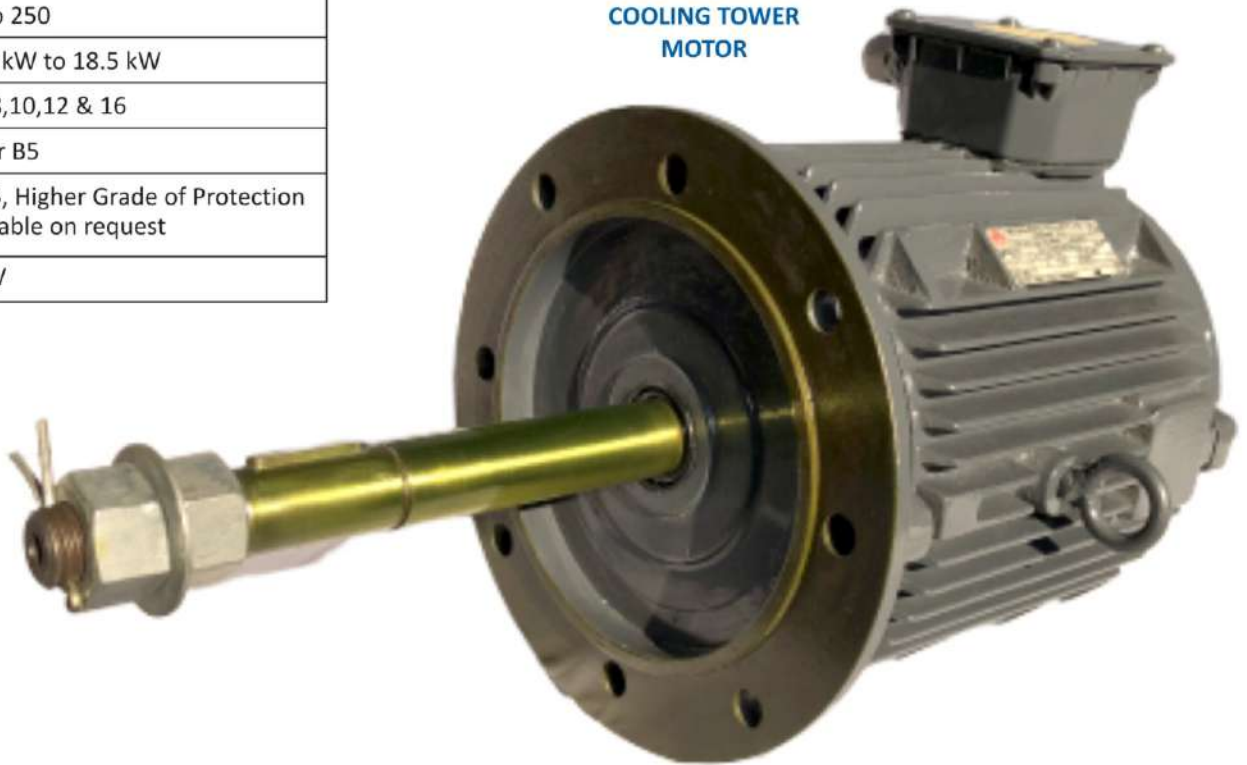
COOLING TOWER MOTORS

"MEGHA" make cooling tower motors are specially designed to suit bottle neck round / square cooling towers. Cooling tower motors are flange mounted with extended threaded shaft. Cotter pin is provided to prevent unlocking of nuts. Cooling tower motors are totally sealed (IP 55 Protection) to prevent ingress of water inside the motors. Cooling tower motors are without fan and totally enclosed. Cooling tower motors are painted with epoxy paint to prevent corrosion of motor outer casting components. Cooling tower motors are available as standard catalogue products as per dimensions given below. Special custom build motors can be manufactured against details / drawings submitted.

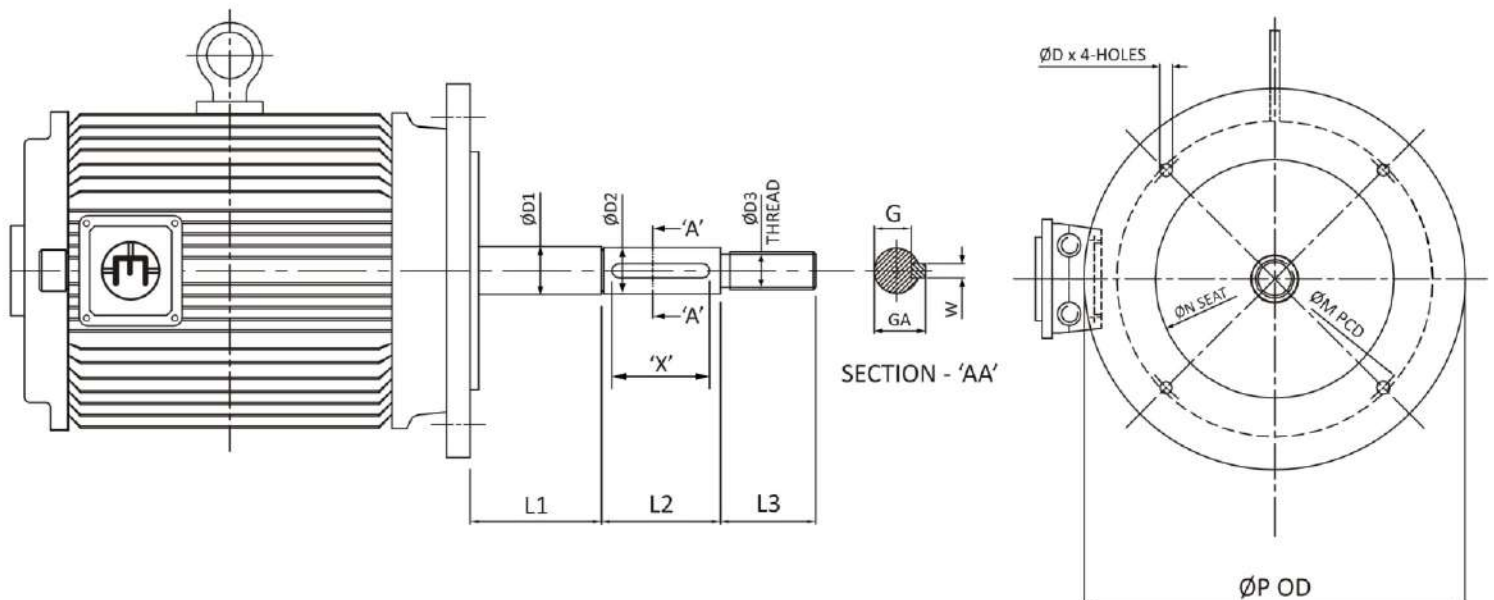
Range :

Frame	63 to 250
KW Rating	0.18 kW to 18.5 kW
Pole	4,6,8,10,12 & 16
Mountings	B3 or B5
Protection	IP 55, Higher Grade of Protection available on request
Enclosure	TENV

COOLING TOWER MOTOR



Dimension Details of Cooling Tower Motors on next page :



COOLING TOWER MOTORS

FRAME	H.P	POLE	MAXIMUM CURRENT	ØD1	ØD2	ØD3	L1	L2	L3	GA	G	W	X	L ± 10	ØN SEAT	ØM PCD	ØM OD	ØD	STARTING
63	0.25	4	0.7	12	11	M10	60	20	20	12.5	9.5	4	20	250	95	115	140	10	DOL
71	0.33	4	1.0	17	14	M12	85	28	30	16	11	5	20	340	110	130	160	10	DOL
71	0.5	4	1.2	17	14	M12	85	28	30	16	11	5	20	340	110	130	160	10	DOL
80	0.5	6	1.3	20	19	M16	100	40	45	21.5	16	6	30	380	130	165	200	12	DOL
80	0.75	6	1.5	20	19	M16	100	40	45	21.5	16	6	30	380	130	165	200	12	DOL
80	1.0	4	1.9	20	19	M16	100	40	45	21.5	16	6	30	380	130	165	200	12	DOL
90S	1.0	6	2.1	25	24	M20	112	55	55	27	20	8	45	415	130	165	200	12	DOL
90S	1.5	4	3.0	25	24	M20	112	55	55	27	20	8	45	415	130	165	200	12	DOL
90L	2.0	4	3.8	25	24	M20	112	55	55	27	20	8	45	445	130	165	200	12	DOL
90L	1.5	6	3.5	25	24	M20	112	55	55	27	20	8	45	445	130	165	200	12	DOL
100L	2.0	6	3.9	30	28	M24	112	55	65	31	24	8	55	480	180	215	250	15	DOL/STAR-DELTA
100L	3.0	4	4.6	30	28	M24	112	55	65	31	24	8	55	480	180	215	250	15	DOL/STAR-DELTA
100L	1.0	8	3.0	30	28	M24	112	55	65	31	24	8	55	480	180	215	250	15	DOL/STAR-DELTA
100L	1.5	8	3.5	30	28	M24	112	55	65	31	24	8	55	480	180	215	250	15	DOL/STAR-DELTA
112M	3.0	6	5.2	30	28	M24	112	55	65	31	24	8	55	495	180	215	250	15	DOL/STAR-DELTA
112M	2.0	8	4.6	30	28	M24	112	55	65	31	24	8	55	495	180	215	250	15	DOL/STAR-DELTA
132S	3.0	8	5.6	40	38	M30	90	75	65	41	33	10	55	545	230	265	300	15	DOL/STAR-DELTA
132S	5.0	6	8.5	40	38	M30	90	75	65	41	33	10	55	545	230	265	300	15	DOL/STAR-DELTA
132M	5.0	8	9.5	40	38	M30	90	75	65	41	33	10	55	585	230	265	300	15	DOL/STAR-DELTA
132M	7.5	6	12	40	38	M30	90	75	65	41	33	10	55	585	230	265	300	15	DOL/STAR-DELTA
160M	5.0	8	9.5	45	42	M30	90	75	65	45	37	12	55	633	250	300	350	19	DOL/STAR-DELTA
160M	7.5	8	12	45	42	M30	90	75	65	45	37	12	55	633	250	300	350	19	DOL/STAR-DELTA
160M	10	6	16	45	42	M30	90	75	65	45	37	12	55	633	250	300	350	19	DOL/STAR-DELTA
160L	5.0	12	11	45	42	M30	90	75	65	45	37	12	55	680	250	300	350	19	DOL/STAR-DELTA
160L	5.0	10	10	45	42	M30	90	75	65	45	37	12	55	680	250	300	350	19	DOL/STAR-DELTA
160L	10	8	16	45	42	M30	90	75	65	45	37	12	55	680	250	300	350	19	DOL/STAR-DELTA
160L	12.5	6	18	45	42	M30	90	75	65	45	37	12	55	680	250	300	350	19	DOL/STAR-DELTA
160L	15	6	21	45	42	M30	90	75	65	45	37	12	55	680	250	300	350	19	DOL/STAR-DELTA
180L	7.5	12	14	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	10	12	18	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	7.5	10	14	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	10	10	18	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	12.5	10	21	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	15	10	24	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	20	10	28	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	12.5	8	18	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA
180L	15	8	21	55	48	M30	100	105	65	51.5	42.5	14	90	770	250	300	350	19	DOL/STAR-DELTA

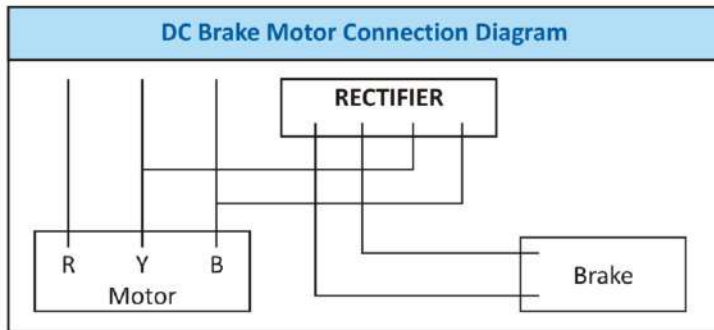
TECHNICAL INFORMATION FOR BRAKE MOTORS

Construction :

Brake Motors are used for various applications where instantaneous stopping of the driven load is required. The operation of the brake is **"FAIL SAFE TYPE"** i.e. normally ON. When the electrical power to the motor is cut-off or the power fails, the brake is applied.

Brake motor is a combination of an A.C. induction motor and an electromagnetic AC or DC brake. The electromagnetic brake is mounted on the non-driving end of the motor.

DC brake motors are provided with in built rectifier which provides the required DC voltage to the brake coil which in turn operates the brake. The supply to the rectifier is fed from any two terminals in the main terminal box of the motor. Details given below.



Range of 'MEGHA' Brand Brake Motors :

KW	: 0.18 to 22.0 KW.
Pole	: 2P, 4P, 6P & 8P.
Mounting	: B3, B5, B14 & Any of combinations there of.
Frame	: 63 to 250 M.
Motor Voltage	: 415 V $\pm$ 10% or as required.
Frequency	: 50 Hz $\pm$ 5% or as required.
Braking torque	: Up to 800 Nm.
Brake coil voltage	: 190 V DC (Other voltages on request).
Protection	: IP55.
Duty cycle	: S1 – S8.

Enclosures (Material & T-Box Location) :

Frame Size	Enclosure Materials	Terminal Box Location	
		Standard	Option Available
63-80	Aluminum/Cast Iron	Top	—
90-112	Aluminum/Cast Iron	Top	LHS / RHS
132-250	Cast Iron	Top	LHS
			RHS

MOTOR PERFORMANCE DETAILS ARE AVAILABLE ON PAGE NUMBER 6 TO 13.

The Brakes are rated by torque & selection of suitable model can be made by calculating the required torque, rating of the brake & then matching it with static torque.

$$\text{Torque (Nm)} = 9550 \times (\text{KW} / \text{RPM}) \times \text{Safety Factor (SF)}$$

where kW-Kilowatts of motor,

RPM-Speed of motor,

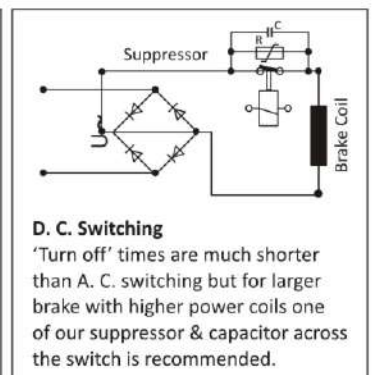
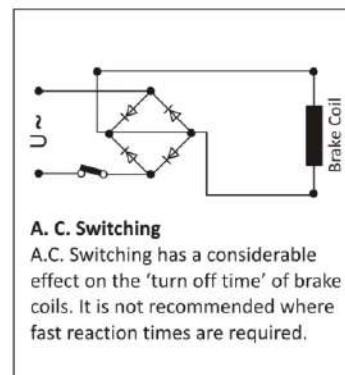
SF-Safety Factor to be considered

For electric motor, SF = 2 to 3

BRAKE MOTOR WITH MANUAL RELEASE



Connection Details for AC / DC Switching :



Applications :

"MEGHA" Brake motors can be used in many applications. A few of them are listed below;

- Machine tools
- Textile machinery
- Cranes & hoists
- Printing Machinery
- Material handling equipments
- Geared motors
- Cable reeling drums
- Rolling mills

Enquiry Details :

When placing an enquiry, please furnish the following details :

- Application details
- Motor power & speed
- Brake size / required braking torque
- No. of start/stops per hour
- Mounting
- Duty cycle

TECHNICAL INFORMATION FOR BRAKE MOTORS

DC BRAKE MOTORS DETAILS

Voltage : 415 V $\pm$ 10%
Frequency : 50 Hz $\pm$ 5%
Combined Variation : $\pm$ 10%

Ambient : 50°C
Duty : S1

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

Performance Table - For Brake Part :

Frame Size	Output (kW)				* Brake release time (ms)	* Brake Application time (ms)		Braking Torque (kgm)
	2P	4P	6P	8P		AC Side Interruption	DC Side Interruption	
71	0.37	0.25	0.25	—	50	135	25	0.5
	0.55	0.37	—	—	50	135	25	0.5
80	0.75	0.55	0.37	—	55	225	45	1.0
	1.1	0.75	0.55	—	55	225	45	1.0
90S	1.5	1.1	0.75	0.37	100	260	50	2.0
90L	2.2	1.5	1.1	0.55	100	260	50	2.0
100L	3.7	2.2	1.5	0.75	135	270	50	4.0
	—	—	—	1.1	135	270	50	4.0
112M	—	3.7	2.2	1.5	145	290	60	5.0
132M	5.5, 7.5	5.5	3.7	2.2	145	270	60	5.0
132M	9.3	7.5	5.5	—	145	270	60	5.0

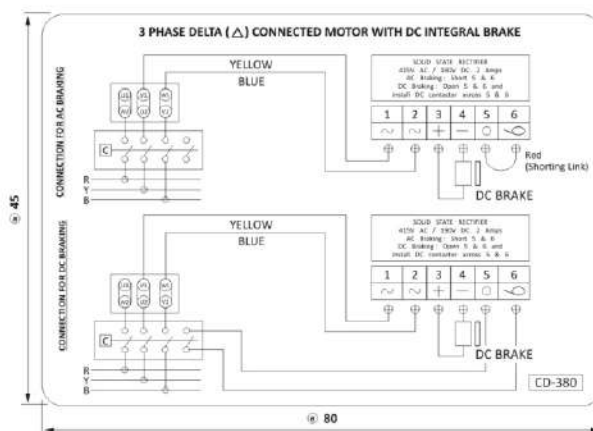
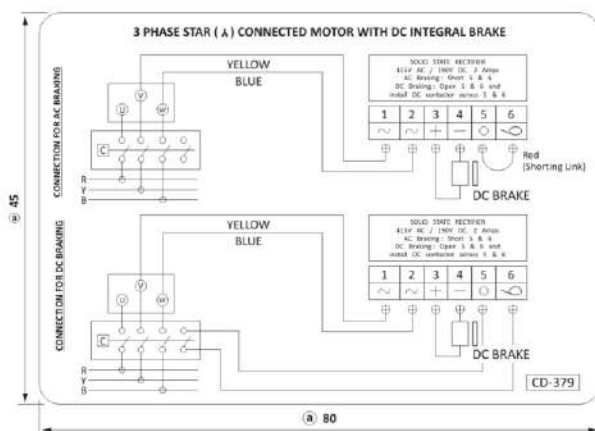
1. Other Braking torque values up to 40% higher can be given for special applications.
2. Other output can be offered on request where feasible.

* Brake release time: The time interval between the instant the supply to the brake coil is switched on, to the instant the brake is released.

** Brake application time: The time interval between the instant the supply to the brake coil is interrupted to the instant the brake is applied.

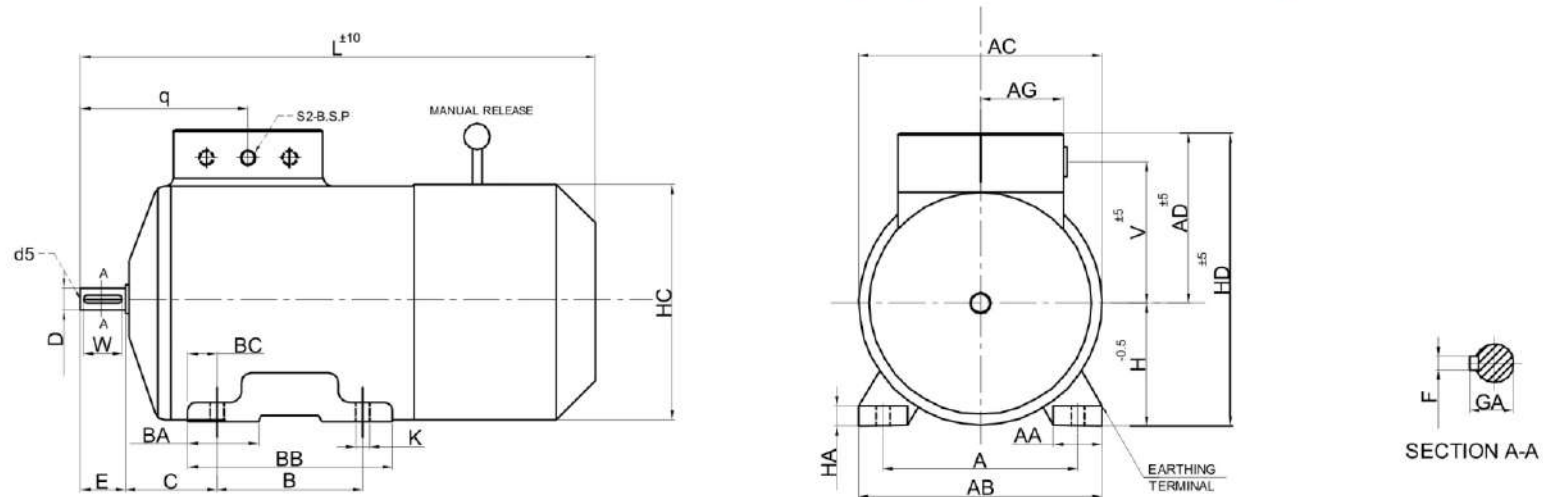
The value depends on whether the circuit is interrupted on AC side or DC side. For performance details of motor parts, please refer performance section in this catalogue.

Brake Coil Connections :



THE MOTOR MUST NEVER BE SWITCHED ON UNLESS THE BRAKE IS ENERGISED AND BRAKE SHOULD NEVER BE DE-ENERGISED WHEN THE MOTOR IS ON, THE INTERLOCKING OF TWO CONTACTS IS ABSOLUTELY NECESSARY.

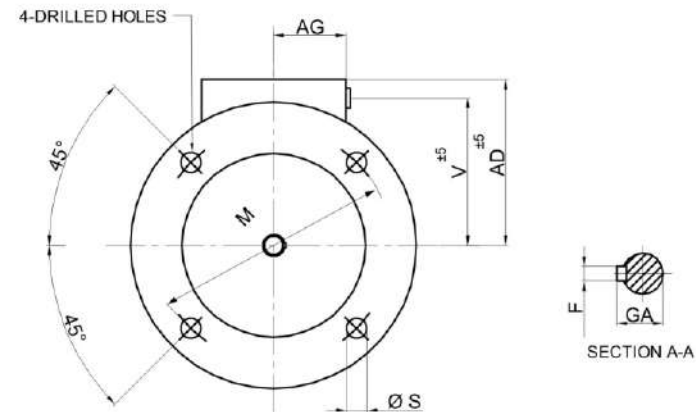
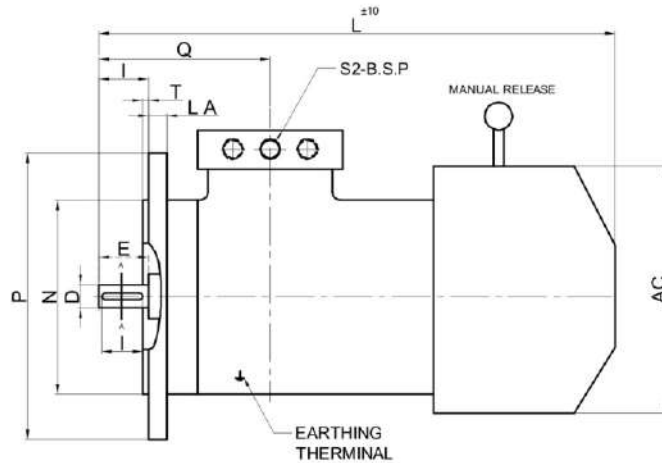
DIMENSION DETAILS OF TEFC FOOT MOUNTED (B3) BRAKE MOTORS (CAST IRON BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	A	B	C	H ^{-0.5}	K	AB	BB	AA	BA	BC	HA	HC	HD ^{±5}	AD ^{±5}	L ^{±10}	AC	V ^{±5}	q	AG	S2 BSP	D/ DA	E/ EA	F/ FA	GA/ GC	W / W1	d5	T.BOX SIZE FOR BRAKE	
63	100	80	40	63	7	125	105	25	25	13	10	121	162	99	285	125	80	85	35	5/8"	11	23	4	12.5	20	M4	AC*	DC*
71	112	90	45	71	7	144	115	32	35	15	14	141	188	117	330	140	96	95	53	5/8"	14	30	5	16	21	M5		
80	125	100	50	80	10	160	130	35	40	15	13	160	210	130	350	165	110	115	50	3/4"	19	40	6	21.5	31	M6	106 X 106	145 X 108
90 S	140	100	56	90	10	176	135	40	45	18	14	177	227	137	415	175	117	120	52	3/4"	24	50	8	27	40	M8		
90 L	140	125	56	90	10	176	157	40	45	18	14	177	227	137	435	175	117	120	52	3/4"	24	50	8	27	40	M8		
100 L	160	140	63	100	12	203	180	43	58	19	15	202	250	150	480	207	130	140	55	3/4"	28	60	8	31	50	M10		
112 M	190	140	70	112	12	235	193	46	60	25	16	222	270	158	505	225	138	135	50	3/4"	28	60	8	31	50	M10		
132 S	216	140	89	132	12	257	200	56	75	29	20	266	319	187	555	265	162	175	65	7/8"	38	80	10	41	70	M12		
132 M	216	178	89	132	13	257	226	56	75	24	20	266	319	187	585	265	162	175	65	7/8"	38	80	10	41	70	M12		
160 M	254	210	108	160	15	315	270	70	78	30	24	365	367	207	670	307	183	240	65	7/8"	42	110	12	45	100	M16		
160 L	254	254	108	160	15	315	315	70	78	30	24	365	367	207	725	307	183	240	65	7/8"	42	110	12	45	100	M16		
180 M	279	241	121	180	15	345	335	80	94	31	24	367	428	248	820	345	232	250	65	7/8"	48	110	14	51.5	100	M16		
180 L	279	279	121	180	15	345	335	80	94	31	24	367	428	248	820	345	232	250	65	7/8"	48	110	14	51.5	100	M16		
200 L	318	305	133	200	19	400	390	100	97	43	30	422	475	275	----	410	245	300	90	1 1/2"	55	110	16	59	100	M20	180 X 180	
225 S	356	286	149	225	19	435	390	117	97	62	30	422	500	275	----	410	245	350	90	1 1/2"	60	110	18	64	100	M20		
225 M	356	311	149	225	19	435	390	117	97	62	30	422	500	275	----	410	245	350	90	1 1/2"	60	110	18	64	100	M20		
250	406	349	168	250	24	485	435	125	110	40	30	445	620	370	----	505	305	350	130	1 1/2"	65	140	18	69	130	M20		

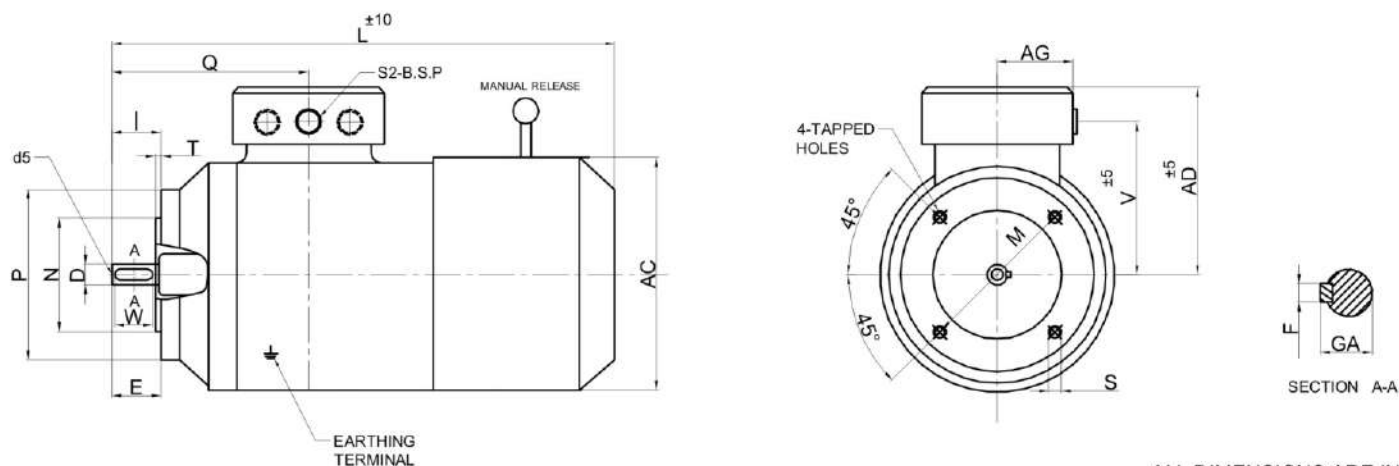
DIMENSION DETAILS OF TEFC FLANGE MOUNTED (B5) BRAKE MOTORS (CAST IRON BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	LA	AD ^{±5}	AC	L ^{±10}	V ^{±5}	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5	T.BOX SIZE FOR BRAKE	
63	140	95	115	23	10	3	9	100	121	285	80	85	35	5/8"	11	23	4	12.5	20	M4	106 X 106	145 X 108
71	160	110	130	30	10	3.5	9	120	141	330	95	95	55	5/8"	14	30	5	16	20	M5		
80	200	130	165	40	12	3.5	10	130	160	350	110	115	50	3/4"	19	40	6	21.5	30	M6		
90 S	200	130	165	50	12	3.5	10	140	177	415	120	120	55	3/4"	24	50	8	27	40	M8		
90 L	200	130	165	50	12	3.5	10	140	177	435	120	120	55	3/4"	24	50	8	27	40	M8		
100 L	250	180	215	60	15	4	11	150	202	480	130	140	55	3/4"	28	60	8	31	50	M10		
112 M	250	180	215	60	15	4	11	160	222	505	140	135	50	3/4"	28	60	8	31	50	M10		
132 S	300	230	265	80	15	4	12	190	266	555	165	175	65	7/8"	38	80	10	41	70	M12		
132 M	300	230	265	80	15	4	12	190	266	585	165	175	65	7/8"	38	80	10	41	70	M12		
160 M	350	250	300	110	19	5	13	210	365	670	185	240	65	7/8"	42	110	12	45	100	M16		
160 L	350	250	300	110	19	5	13	210	365	725	185	240	65	7/8"	42	110	12	45	100	M16		
180 M	350	250	300	110	19	5	13	240	367	820	235	250	55	7/8"	48	110	14	51.5	100	M16		
180 L	350	250	300	110	19	5	13	240	367	820	235	250	55	7/8"	48	110	14	51.5	100	M16		
200 L	400	300	350	110	19	5	15	275	422	1000	245	300	90	1 1/2"	55	110	16	59	100	M20	180 X 180	
225 S	450	350	400	110	19	5	15	275	422	1070	245	350	90	1 1/2"	60	110	16	59	100	M20		
225 M	450	350	400	110	19	5	15	275	422	1070	245	350	90	1 1/2"	60	110	16	59	100	M20		
250 M	550	450	500	140	19	5	18	370	445	1160	305	350	130	1 1/2"	65	140	18	69	130	M20		

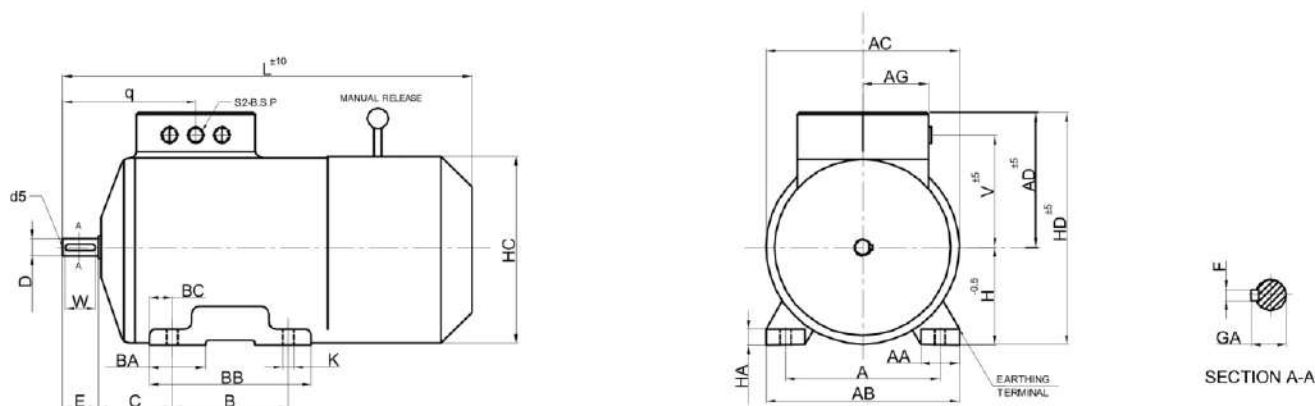
DIMENSION DETAILS OF TEFC FACE MOUNTED (B14) BRAKE MOTORS (CAST IRON BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	AD	AC	L	LC	V	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5	T.BOX SIZE FOR BRAKE
63	90	60	75	23	M5 X 10	2.5	100	122	285	250	80	85	35	5/8"	11	23	4	12.5	20	M4	106 X 106 145 X 108
71	105	70	85	30	M6 X 10	2.5	120	140	330	295	95	95	53	5/8"	14	30	5	16	20	M5	
80	120	80	100	40	M6 X 13	3	130	160	350	330	110	115	50	3/4"	19	40	6	21.5	30	M6	
90 S	140	95	115	50	M8 X 12	3	140	177	415	375	115	120	52	3/4"	24	50	8	27	40	M8	
90 L	140	95	115	50	M8 X 12	3	140	177	435	395	115	120	52	3/4"	24	50	8	27	40	M8	
100	160	110	130	60	M8 X 12	3.5	150	202	480	465	130	135	56	3/4"	28	60	8	31	50	M10	
112	160	110	130	60	M8 X 12	3.5	160	224	505	480	140	140	55	3/4"	28	60	8	31	50	M10	
132 S	250	180	215	80	M12 X 20	4	190	265	555	550	165	175	65	7/8"	38	80	10	41	70	M12	
132 M	250	180	215	80	M12 X 20	4	190	265	585	590	165	175	65	7/8"	38	80	10	41	70	M12	

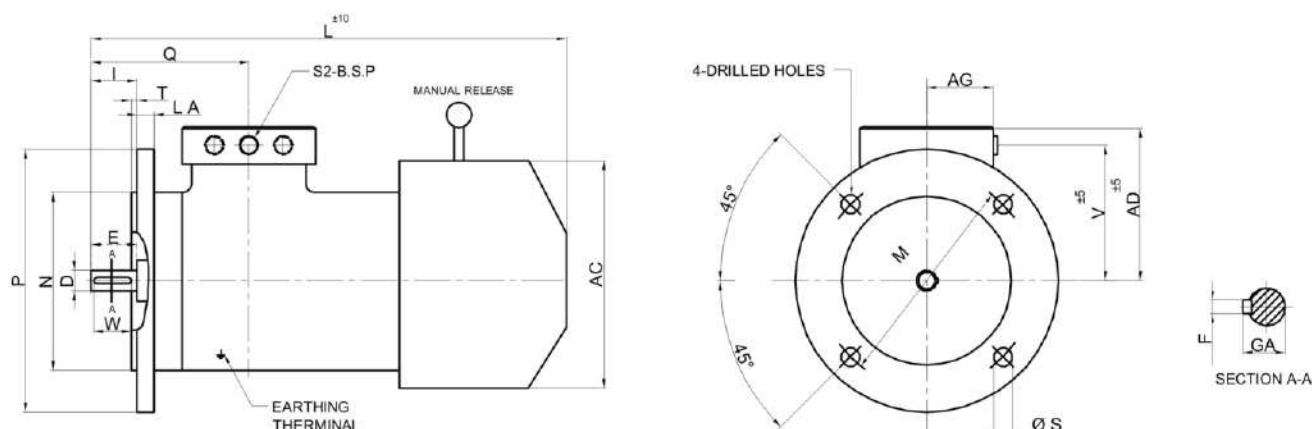
DIMENSION DETAILS OF TEFC FOOT MOUNTED (B3) BRAKE MOTORS (IEC ALUMINIUM BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	A	B	C	H	K	AB	BB	AA	BA	BC	HA	HC	HD	AD	L	AC	V	q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5	T.BOX SIZE FOR BRAKE
63	100	80	40	63	7	125	105	26	25	12	10	124	163	100	290	120	80	85	42	5/8"	11	23	4	12.5	20	M4	106 X 106 145 X 108
71	112	90	45	71	7	142	105	26	25	12	10	138	188	120	320	135	100	100	42	5/8"	14	30	5	16	20	M5	
80	125	100	50	80	10	160	125	38	30	12	11	158	224	145	350	155	120	120	58	3/4"	19	40	6	21.5	30	M6	
90 S	140	100	56	90	10	187	131	42	30	15	13	176	235	145	405	170	120	135	58	3/4"	24	50	8	27	40	M8	
90 L	140	125	56	90	10	187	155	42	30	15	13	176	235	145	430	175	120	135	58	3/4"	24	50	8	27	40	M8	
100	160	140	63	100	12	195	168	45	38	13	11	196	260	160	465	190	135	155	58	3/4"	28	60	8	31	50	M10	
112	190	140	70	112	12	227	176	48	35	18	14	220	282	170	495	215	145	150	58	3/4"	28	60	8	31	50	M10	

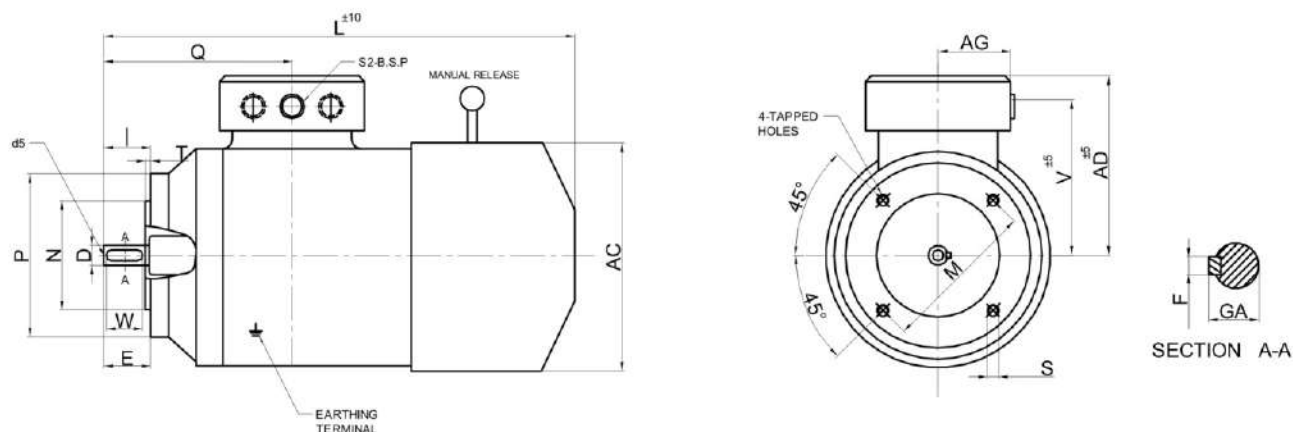
DIMENSION DETAILS OF TEFC FLANGE MOUNTED (B5) BRAKE MOTORS (IEC ALUMINIUM BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	LA	AD ^{±5}	AC	L ^{±10}	V ^{±5}	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5	T.BOX SIZE FOR BRAKE	
63	140	95	115	23	10	3	9	100	124	290	80	85	42	5/8"	11	23	4	12.5	20	M4	106 X 106	145 X 108
71	160	110	130	30	10	3.5	9	120	138	320	100	100	42	5/8"	14	30	5	16	20	M5		
80	200	130	165	40	12	3.5	10	145	158	350	120	120	58	3/4"	19	40	6	21.5	30	M6		
90 S	200	130	165	50	12	3.5	10	145	176	405	120	135	58	3/4"	24	50	8	27	40	M8		
90 L	200	130	165	50	12	3.5	10	145	176	430	120	135	58	3/4"	24	50	8	27	40	M8		
100 L	250	180	215	60	15	4	11	160	196	470	135	155	58	3/4"	28	60	8	31	50	M10		
112 M	250	180	215	60	15	4	11	170	220	495	150	150	58	3/4"	28	60	8	31	50	M10		

DIMENSION DETAILS OF TEFC FACE MOUNTED (B14) BRAKE MOTORS (IEC ALUMINIUM BODY)



ALL DIMENSIONS ARE IN MM.

FRAME SIZE	P	N	M	I	S	T	AD ^{±5}	AC	L ^{±10}	V ^{±5}	Q	AG	S2 BSP	D/DA	E/EA	F/FA	GA/GC	W/W1	d5	T.BOX SIZE FOR BRAKE	
63	90	60	75	23	M5 X 10	2.5	100	124	290	80	85	42	5/8"	11	23	4	12.5	20	M4	106 X 106	145 X 108
71	105	70	85	30	M6 X 10	2.5	120	138	320	100	100	42	5/8"	14	30	5	16	20	M5		
80	120	80	100	40	M6 X 13	3	145	158	350	120	120	58	3/4"	19	40	6	21.5	30	M6		
90 S	140	95	115	50	M8 X 12	3	145	176	405	120	135	58	3/4"	24	50	8	27	40	M8		
90 L	140	95	115	50	M8 X 12	3	145	176	430	120	135	58	3/4"	24	50	8	27	40	M8		
100 L	160	110	130	60	M8 X 12	3.5	160	196	465	135	155	58	3/4"	28	60	8	31	50	M10		
112 M	160	110	130	60	M8 X 12	3.5	170	220	495	145	150	58	3/4"	28	60	8	31	50	M10		

TECHNICAL INFORMATION FOR CRANE AND HOIST DUTY MOTORS

Introduction :

"MEGHA" make Crane and Hoist duty motors are suitable for short time and intermittent duties. These motors are specially designed for frequent starts/stops and reversals.

Major Applications :

These motors are widely used in following application:

- Crane and Hoist duty application
- Material handling
- Lift duty

Product Range :

Frame Size	KW range
63 to 250 M	0.18 to 55 (4 Pole)
71 to 250 M	0.18 to 30 (6 Pole)
80 to 250 M	0.18 to 22 (8 Pole)

Standards :

In general these motors conform to following standards.

IS : 12615	Three phase squirrel cage energy efficient induction motor
IS : 4722	Rotating electrical machines
IS : 1231	Dimensions of foot mounted A.C. induction motors
IS : 2223	Dimensions of flange mounted A.C. induction motors.

'CE' Marks :

All Motors have 'CE' marking on the nameplate.

ELECTRICAL FEATURES :

Operating conditions

Supply conditions (Voltage & Frequency)

Voltage : 415 V $\pm$ 10%

Frequency : 50 Hz $\pm$ 5%

Combined Variation : $\pm$ 10%

Insulation :

The motors are provided with class 'F' insulation with temperature rise limited to class 'B' limits.

'H' Class insulation available on request.

Winding :

The stators are wound with modified polyester enamel covered (Temperature 155°C) copper wires and impregnated with class 'F' Varnish.

Insulation for inverter Duty Motors :

- The stators are wound with polyesterimide coated with polyamide-imide top Coat, (dual coated) wires as per IS 13730: part 13, thermal class 200 °C Copper wires.
- Vacuum Pressure Impregnation (VPI) is provided to windings on request.
- Class 'H' insulation can be provided on request

Ambient :

Motors are designed for ambient temperature 50 °C.

Altitude :

Motors are designed for altitude up to 1000 M above mean sea level.

Re-Rating Factors :

The rating applicable under different conditions of ambient and altitude are obtained by multiplying following factors.

Variation in Ambient & Altitude :

Amb. Temp. °C	Permissible output as % of rated value	Altitude above sea level m	Permissible output as % of rated value
< 30	107	1000	100
30-45	103	1500	97
50	100	2000	94
55	94	2500	90
60	89	3000	86
		3500	82
		4000	77

Thermal Protection For Winding :

PTC thermistors / thermostats / RTD etc. can be embedded in stator winding on request.

Earthing Terminals :

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

Anti-condensation Heater :

In order to avoid condensation of water inside the motors they can be heated up by connecting voltage 4 - 10 % of rated voltage to the motor terminals. Adequate heating is obtained with current equal 20-25 % of rated motor current. Motors can also be offered with built in space heaters in frame sizes 90S and above.

Types Of Duties :

The various operating cycle of driven machines can be classified in to nine basic duties, ranging from S1 to S9. They are as follows :

S1	Continuous running duty
S2	Short time duty
S3	Intermittent periodic duty
S4	Intermittent duty with starting
S5	Intermittent duty with electric braking
S6	Continuous operation periodic duty
S7	Continuous operation periodic duty with electrical braking
S8	Continuous operation periodic duty with related loads/ speed variations
S9	Duty with non-periodic load and speed variation

- Duties S2, S3, S4 and S5 are explained in details.

TECHNICAL INFORMATION FOR CRANE AND HOIST DUTY MOTORS

DUTY CYCLE DETAILS FOR CRANE AND HOIST DUTY MOTORS

A) S2 - Short Time Duty :

This includes a period of operation at constant load which are too short to attain thermal equilibrium, followed by rest period of sufficient duration to reestablish equality of temperature with cooling medium in one cycle.

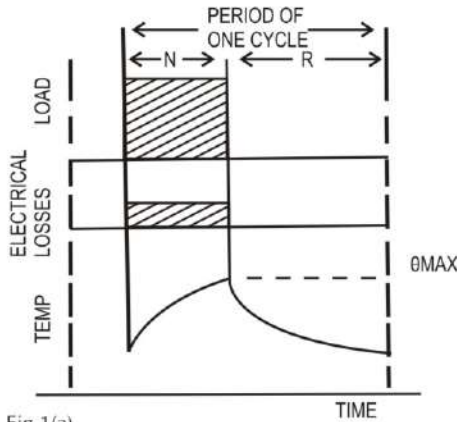


Fig 1(a)

- N = Operation under rated conditions
- R = At rest de-energised
- ØMAX = Maximum temperature attained during the duty cycle

B) S3 - Intermittent Period Duty :

This includes a period of operation at constant load and a de-energised period, which are too short to attain thermal equilibrium during one cycle. The starting current does not significantly affect the temperature rise for this type of duty.

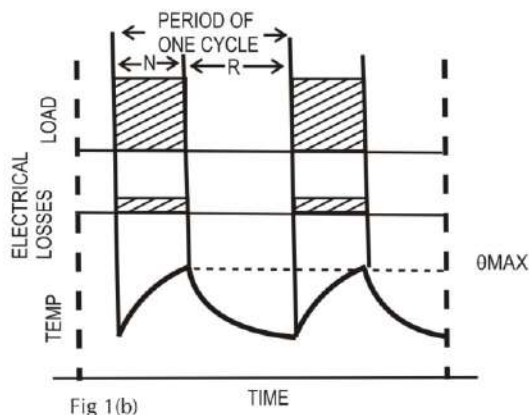


Fig 1(b)

$$\text{Cyclic duration factor} = \frac{N}{N + R}$$

C) S4 - Intermittent Duty with Starting :

This includes a period of starting, a period of operation at constant load and a de-energised period, which is too short to attain thermal equilibrium during one cycle. The starting affects temperature rise, as load GD^2 is higher than rotor GD^2 and/or no. of starts/hour is high, for this type of duty. The motor is stopped after switching off, either by natural deceleration, or by a mechanical brake, without additional heating of the windings.

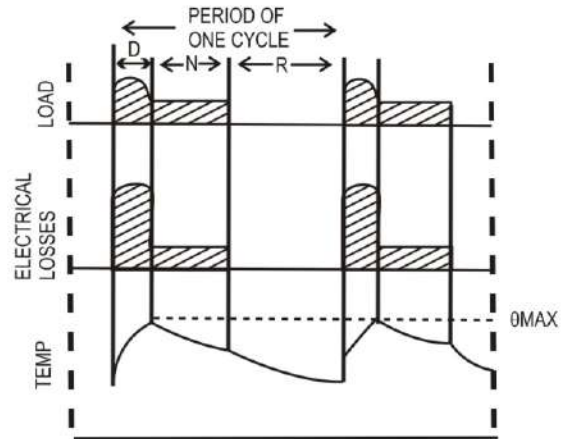


Fig 1(c)

$$\text{Cyclic duration factor} = \frac{D + N}{D + N + R}$$

Where D = Starting

D) S5-Intermittent Duty with Electrical Braking :

This includes a period of starting, a period of operation at constant load, a period of electrical braking, and a de-energised period, which are too short to attain thermal equilibrium during one duty cycle. It is understood that the starting affect temperature rise, as in (c) above, and the stopping also affect temperature rise as braking is carried out electrically.

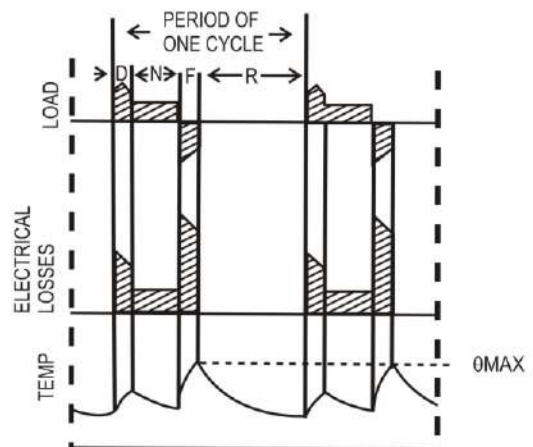


Fig 1(d)

$$\text{Cyclic duration factor} = \frac{D + N + F}{D + N + F + R}$$

Where F = Electric braking

The common Cyclic Duration Factors (CDF) for the above duties are 25%, 40 % and 60 %. We also supply, on enquiry, motors for other CDF's. The CDF calculations are shown in figures 1(a), 1(b), 1(c), 1(d).

TECHNICAL INFORMATION FOR CRANE AND HOIST DUTY MOTORS

Selection of motors for Hoisting and similar duties :

The formula to establish the rated output Pn in kW is :

$$P_n > = \frac{F \times V}{102 \times \text{eff.}} \text{ KW}$$

Where

F = Maximum total load in Kg.

V = Hoisting speed in mtrs / sec.

eff. = Overall mechanical efficiency of driving unit.

Motors with Integral Brakes :

These motors can be supplied with integral fail safe D.C. / A.C. Brakes. Motors with DC brakes are supplied with in built rectifier suitable for A.C. or D.C. switching.

Inverter Applications :

All crane duty motors are suitable up to certain range of inverter feed supply.

Crane and Hoist duty Motors suitable for lower range of frequency can be supplied against inquiry.

These motors are wound with dual coated winding wires and impregnated with VPI process.

Flame-proof Crane Duty Motors :

Crane and Hoist duty Motors with FLAME PROOF enclosures are available against inquiry. Also, Crane and Hoist duty Motors with FLAME PROOF enclosures are available with FLAME PROOF BRAKES against inquiry.

CRANE DUTY DOUBLE
SHAFT MOTOR



CRANE DUTY
GEAR SHAFT
MOTOR



CRANE DUTY
D.C. BRAKE
MOUNTING MOTOR



CRANE DUTY
A.C. BRAKE MOUNTING
MOTOR



TECHNICAL INFORMATION FOR FLAME PROOF MOTORS

Product Range :

Motor Type	Series Type	Frame Size	kW Range
High Efficiency Flame Proof Motors- Ex (d)	IE2 / IE3	63 To 160	0.18 to 15 (4 P) 11 (6 P) 7.5 (8 P)

Reference Standards :

All motors comply with following Standards, viz. :

IS/IEC 60079-0:2004	Electrical apparatus for Explosive gas atmosphere-Part 0 General Requirements
IS/IEC 60079-1:2007	Electrical apparatus for Explosive gas atmosphere - Equipment protection by Flame proof enclosures "d"
IS 5572:2009	Classification of Hazardous areas (other than mining) having flammable gases and vapors for electrical installations
IS 5571:2009	Guide for selection and installation of electrical equipment for hazardous areas (other than mines)
IS/IEC 60034-1	Three Phase induction motor specifications ("Rotating Electrical Machines Part 1 Rating & Performance")
IS 12615:2018	Energy Efficient Induction Motors Three Phase Squirrel Cage (For IE2 / IE3 Series Motors)
IS 4029	Guide for testing three phase induction motors (For Standard TEFC SCR Motors)
IS 4889	Methods of determination of efficiency of rotating electric Machine (For Standard TEFC SCR Motors)
IS 15999- (Part 2 / Sec 1):2011	Standard Methods for determining Losses and Efficiency from Tests (For IE Series Motors)
IS/IEC 60034-1	Rotating Electrical Machines- Rating & Performance
IS 12065 / IEC 60034-9	Permissible limits of noise level for Rotating Electrical Machines
IS 12075	Mechanical Vibration of Rotating Electrical Machines

IS 900	Code of practice for installation and maintenance of induction motors
IS 1231	Dimensions of Foot Mounted AC Induction motors
IS 2223	Dimensions of Flange mounted AC Induction motors

Hazardous Areas :

Hazardous areas are defined as areas where explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment.

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 5572:2009 classifies the hazardous areas into three zones, depending on the frequency and duration for which dangerous concentrations are likely to be present.

Classification of Hazardous Areas (Gases and Vapors) and selection of Electrical Equipment :

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

Zone	Classification of area as per ref. std. IS 5572:2009	Selection of electrical equipment based on ref. std. IS 5571:2009
Zone '0'	An area in which Hazardous atmosphere is continuously present.	Generally, use of electrical equipment is to be avoided. But when this is not practicable, intrinsically safe or pressurized electrical equipment to be used.
Zone '1'	Hazardous atmosphere is likely to be present under normal operating conditions.	For this area, electrical equipment used, must be in flame proof enclosure type Ex (d) conforming to IS/IEC 60079-1.
Zone '2'	In this area hazardous atmosphere is likely to be present only under abnormal operating conditions and for a short period.	Apparatus with type of protection Ex (e) in accordance with IS/IEC 60079-7 may be used without any special enclosure. Apparatus having type of protection Ex (n) in accordance with IS/IEC 60079-15 are also permitted for use.

TECHNICAL INFORMATION FOR FLAME PROOF MOTORS

Duty, Starting Time & Number of Consecutive Starts :

Motors are designed for continuous (S1) Duty. Other types of duty (S2 to S9) can be offered on request. For load $GD^2 \leq$ motor GD^2 , the motors can safely withstand 3 consecutive starts from cold condition & 2 consecutive starts from hot condition. For more severe starting conditions a special enquiry should be made.

Insulation and Standard Winding :

The motors are provided with class 'F' Insulation with temperature rise limited to class 'B'.

- Motors are wound with modified polyester enamel covered (IS 13730: Part 3 Thermal class 155 °C) copper wires and are flood impregnated.
- Gel coat is applied on winding overhangs as an additional protection against ingress of moisture.

Insulation for VFD Suitable Motors :

- The stators are wound with polyesterimide coated with polyamide-imide top coat, (dual coated) wires as per IS 13730: part 13, thermal class 200 °C copper wires.
- Vacuum Pressure Impregnation (VPI) is provided to windings on request

Options (On request) :

- Class 'H' Insulation.
- For thermal protection of winding, PTC thermistor can be embedded in stator winding on request.

Earthing Terminals :

Two earthing terminals are provided, one on motor body. And one in the terminal box.

Anti-condensation Heater :

Motors can be offered with built in space heaters in frame sizes 90 and above.

Mechanical Features :

Enclosure :

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

The frame, end shields and terminals boxes of all motors are made of S.G. cast iron.

These motors are so designed that the motor body temperature will remain below the ignition temperature of gas-air mixture involved.

All cast iron parts forming flame proof enclosures are subjected to hydraulic pressure test, after final machining as per IS/IEC 60079-1.

Cooling :

All motors are totally Enclosed Fan cooled (TEFC). The cooling is effected by self-driven, bi-directional aluminium centrifugal fan protected by fan cover. The type of cooling is IC 411 as per IS 6362/IEC 60034-6.

Degree of Protection :

All motors have IP55 Degree of protection as per IS/IEC 60034-5. Higher degree of protection can be provided on request.

Temperature Class :

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

Temp. Class as required by the area Classification	Ignition Temperature of Gas or vapor in °C	Allowable temperature classes of equipment
T1	> 450	T1 - T6
T2	> 300	T2 - T6
T3	> 200	T3 - T6
T4	> 135	T4 - T6
T5	> 100	T5 - T6
T6	> 85	T6

The Maximum Surface temperature under the worst Operating condition must not exceed the ignition temperature of gas.

The Maximum Surface temperature refers to that surface which is coming in contact with the explosive gas.

Temperature Class of "MEGHA" Motors :

Frame Size	
IEC Frame Size	Temp Class
63	T5
71	T6
80	T6
90 S/L	T5
100 L	T6
112 M	T5
132 S/M	T5

Classification of Hazardous Gases :

Hazardous Gases have been classified in IS/IEC 60079-1 and are associated only with flame proof enclosures.

TECHNICAL INFORMATION FOR FLAME PROOF MOTORS

Statutory Approvals and Licenses :

Motors used in hazardous areas need statutory approvals from various statutory authorities depending upon their area of jurisdiction before selling to the customer. Statutory / Licensing authorities accord their approval / License based on the test reports issued by any of recognized test houses listed below.

Statutory Authority	Scope
CIMFR, Dhanbad.	Testing & Certification
ERTL (East), Kolkata.	Testing & Certification
PESO, Nagpur.	Approving
DGFASLI, Mumbai.	Approving
BIS.	Licensing

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

Electrical Features :

Standard operating Conditions Supply Conditions (Voltage & Frequency)

Voltage	: 415 V $\pm$ 10%
Frequency	: 50 Hz $\pm$ 5%
Combined Variation	: $\pm$ 10%

Ambient :

Motors are designed for ambient temperature of 50°C as mentioned in the performance table.

Higher ambient temperature motors can be offered on request.

Altitude :

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

Motors suitable for higher altitude can be offered on request.

Variation in Supply Voltage & Frequency :

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

Re-Rating Factors :

The Re-Rating factors applicable under different conditions of supply voltage, frequency, ambient and altitude are obtained by multiplying rated output kW by given below factors.

Variation in Ambient & Altitude :

Amb. Temp °C	Permissible output as % of rated value	Altitude above sea level (m)	Permissible Output as % of rated Value
—	—	1000	100
—	—	1500	97
<30	107	2000	94
30-45	103	2500	90
50	100	3000	86
55	94	3500	82
60	89	4000	77

Method of Starting :

"MEGHA" Motors are suitable for following methods of starting.

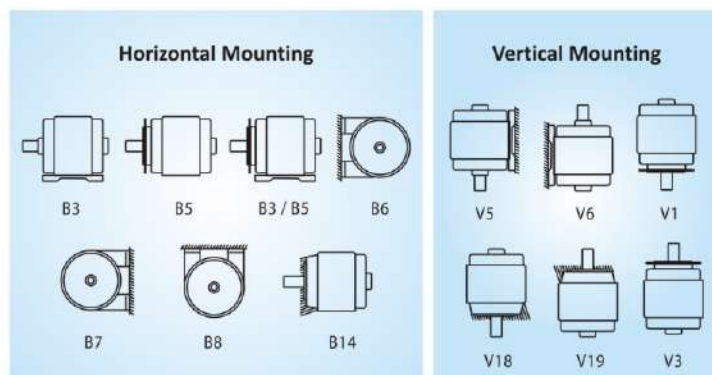
kW Rating	Method of Starting	No. of Leads
Up to & Including 2.2 KW	DOL	3 (Internal star) 6 (Suitable for 240Δ/415Δ volts)
Above 2.2 KW	DOL or Star / Delta	6

Mounting :

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

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

- Motors can be supplied in face mounting (B14)
- Motors can be supplied in any of above combinations



TECHNICAL INFORMATION FOR FLAME PROOF MOTORS

“MEGHA” Flame proof motors are offered Suitable for gas Group I, IIA and IIB only.

List of hazardous gases, their group specification and ignition temperatures have been specified in IS/IEC 60079-20. Some of the gases are listed in the following table.

Gas Group	Gas or Vapor	Temp. Class
I	Methane (firedamp)	T1
IIA	Industrial Methane*	T1
	Carbon monoxide	T1
	Decane	T3
	Xylene	T1
	Methyl acetate	T1
	Hexane	T3
	Heptane	T3
	Iso-octane	T2
	Propane	T1
	Butane	T2
	Benzene	T1
	Cyclohexane	T2
	Acetone	T1
	Ethyl acetate	T1
	Chloroethylene	T1
	Methanol	T1
	Ethanol	T2
IIB	Butyl acetate	T2
	1,3-Butadiene	T2
	Ethylene	T2
	Diethyl ether	T4
	Ethylene Oxide	T2
	Coke-oven Gas	T1
IIC	Hydrogen	T1
	Acetylene	T1

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

MOTOR PERFORMANCE DETAILS ARE AVAILABLE ON PAGE NUMBER 6 TO 13.

Bearing and Terminal Box Details :

Frame Size	Bearing Nos. C3 Clearance		Terminal Box Type / Location	Terminal Nos.
	DE	NDE		
63	6201 2Z	6201 2Z	TOP	3/6
71	6203 2Z	6203 2Z	TOP	3/6
80	6204 2Z	6204 2Z	TOP	3/6
90	6205 2Z	6205 2Z	TOP	3/6
100	6206 2Z	6206 2Z	TOP	3/6
112	6306 2Z	6306 2Z	TOP	6
132	6208 2Z	6208 2Z	TOP	6
160	6309 2Z C3	6309 2Z C3	TOP	6

Shipping Dimension :

Frame	PACKING BOX DIMENSIONS All Dimensions are in MM			Motors Gross Weight In Kg.
	LENGTH	WIDTH	HEIGHT	
63	340	290	260	20
71	340	290	260	25
80	440	440	310	34
90L	510	470	340	51
100L	510	310	510	66
112M	510	310	510	73
132M	610	330	550	118
160ML	790	440	540	216

Bearing Lubrication :

Sealed bearing 2Z are filled with lithium base rust and corrosion resistance grease are used. Special high temperature grease can be provided on request.

Cable Entries :

Cable entries with flame proof glands are provided to suit PVC armoured cables (For application in hazardous area Gas Group IIA and IIB only).

Rotors :

All motors are fitted with dynamically balanced aluminum pressure die cast squirrel cage rotors.

Shaft :

All motors are provided with single shaft extension in accordance with IS:1231. The shaft material is EN8 steel. However, special shaft extension and / or special shaft material is provided on request.

TECHNICAL INFORMATION FOR FLAME PROOF MOTORS

Balancing and Vibration :

Rotors are dynamically balanced with a half key in the shaft extension.

The balancing grade is G2.5 as per ISO:1940. Vibration grade is 'Normal grade' conforming to IS : 12075:2008. Other as per IS : 12075:2008 or IEC 60034-14 can be provided on request.

Direction of Rotation :

All motors are suitable for bi-directional rotation.

Lifting Arrangement :

Motors From 90 frame and above are provided with lifting hooks.

Noise Level :

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

Paint :

Motors are painted with epoxy base paint RAL 7015 shade.

Name Plate :

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

Packing :

Motors are packed in thermocol / corrugated box up to 112 frame and above in wooden boxes. Export packing / sea worthy packing is also available on request.

Special Features :

Sturdy housing hydraulic tested that prevents an internal explosion from spreading to the external environment and also resists the explosion pressure.

- Exd mark on the motors.
- CIMFR certificate number, PESO certificate number and BIS License mark with licence number on the name plate.

Industrial Applications :

- Petro Chemicals & Chemicals
- Fertilizers
- Solvent Plant
- Paints & Varnish Industry
- LPG Bottling Plants
- Agro Chemicals
- Drugs & Pharmaceuticals
- General Industry

Special Features Available :

- Non standard voltage and frequency variation
- Dual Voltage ($1:\sqrt{3}$ ratio)
- Special performance requirements
- Class 'H' insulated motors
- Low vibration and noise level
- Special Shaft Material
- Flange/Foot or face/foot mounting motors
- Motors for use with variable frequency inverter Supply (VFD)
- Crane and hoist duty motors
- AC / DC brake motors
- Vibrators
- Geared motors
- Space Heater, Thermistors
- Multispeed Motors
- Non standard shaft extension
- Special paint Shade

FLP DC BRAKE MOTOR



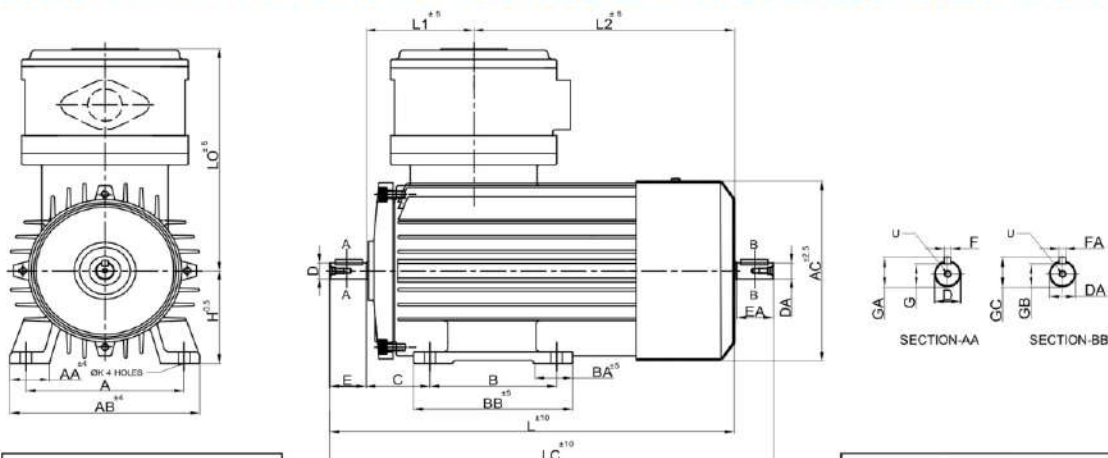
FLP GEARED MOTOR



FLP AC BRAKE MOTOR



DIMENSION DETAILS OF TEFC FLP FOOT MOUNTED (B3) MOTORS (S.G. IRON BODY)

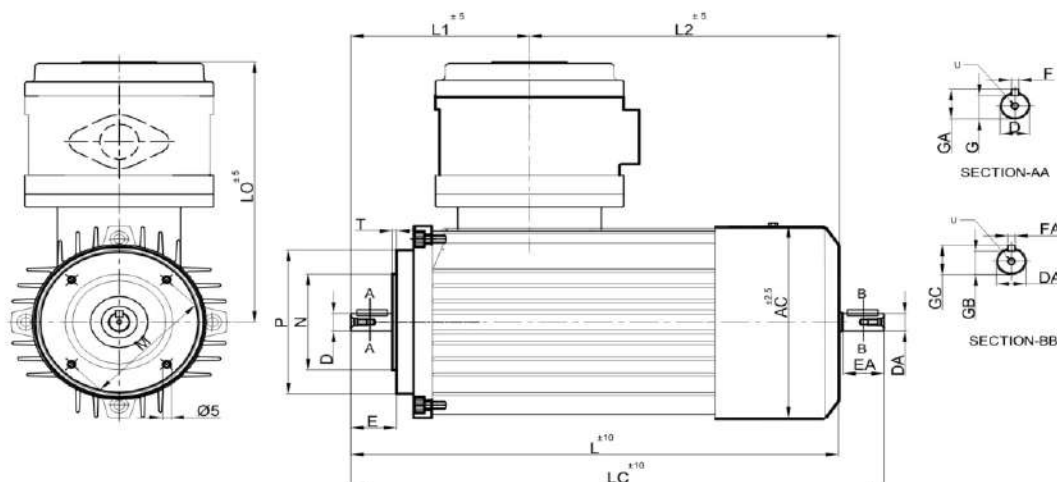


FOOT - DETAILS

FRAME SIZE	A	B	C	ØK	HA	^{-0.5} H	^{±5} L1	^{±5} L2	^{±10} L	^{±5} LO	^{±4} AA	^{±4} AB	^{±2.5} AC	^{±5} BA	^{±5} BB	D / DA	E / EA	F / FA	G / GB	GA / GC	^{±10} LC	U
63	100	80	40	7	8	63	75	165	270	165	25	120	121	30	100	11	23	4	8.5	12.5	300	M4
71	112	90	45	7	10	71	75	190	295	180	25	135	139	30	115	14	30	5	11	16	330	M5
80	125	100	50	10	12	80	85	205	330	185	40	160	159	30	125	19	40	6	15.5	21.5	372	M6
90 S/L	140	¹⁰⁰ ₁₂₅	56	10	12	90	85	255	390	190	40	175	176	60	150	24	50	8	20	27	445	M8
100 L	160	140	63	12	14	100	110	265	435	230	45	200	201	45	180	28	60	8	24	31	500	M10
112 M	190	140	70	12	15	112	110	295	465	240	50	230	223	45	180	28	60	8	24	31	530	M10
132 S/M	216	¹⁴⁰ ₁₇₈	89	12	20	132	135	385	600	275	60	265	260	105	240	38	80	10	33	41	690	M12
160 M/L	254	²¹⁰ ₂₅₄	108	15	24	160	150	430	690	300	60	310	307	105	300	42	110	12	36	45	810	M16

SHAFT - DETAILS

DIMENSION DETAILS OF TEFC FLP FACE MOUNTED (B14) MOTORS (S.G. IRON BODY)

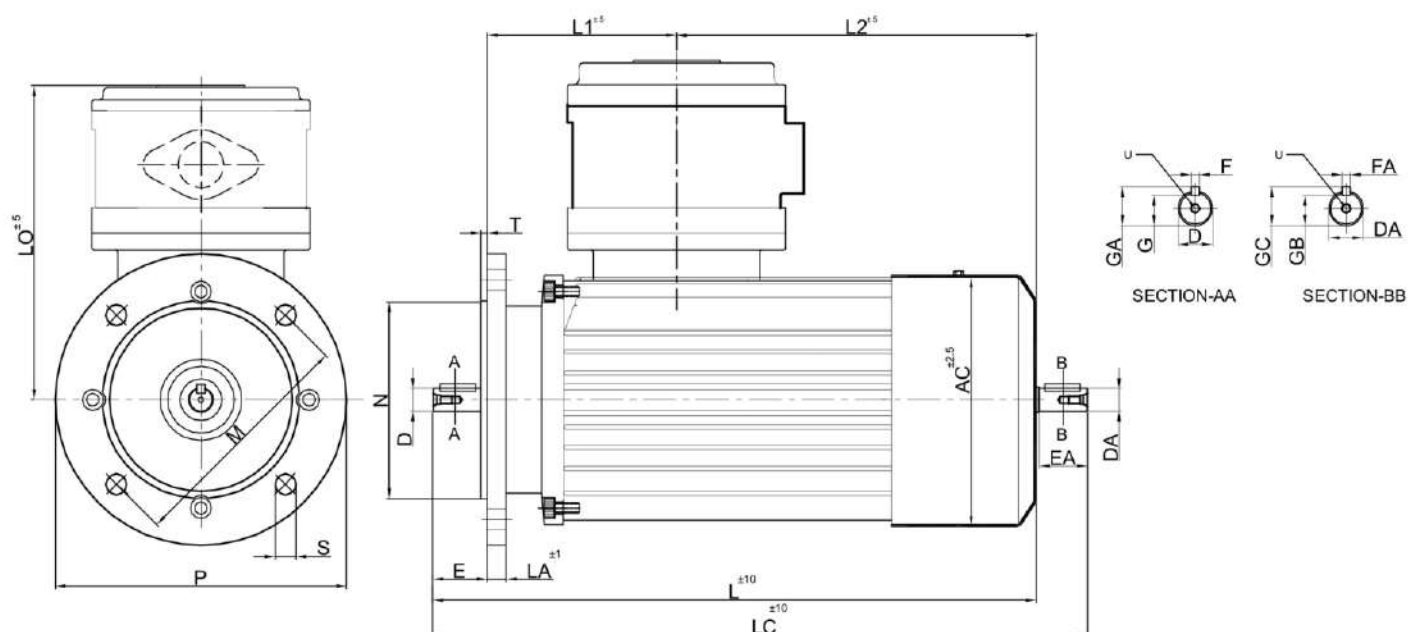


FACE - DETAILS

FRAME SIZE	M	N	P	S	T	^{±5} L1	^{±5} L2	^{±10} L	^{±5} LO	^{±2.5} AC	D / DA	E / EA	F / FA	G / GB	GA / GC	^{±10} LC	U
63	75	60	90	M5	2.5	75	165	270	165	121	11	23	4	8.5	12.5	300	M4
71	85	70	105	M6	2.5	75	190	295	180	139	14	30	5	11	16	330	M5
80	100	80	120	M6	3	85	205	330	185	159	19	40	6	15.5	21.5	372	M6
90 S/L	115	95	140	M8	3	85	255	390	190	176	24	50	8	20	27	445	M8
100 L	130	110	160	M8	3.5	110	265	435	230	201	28	60	8	24	31	500	M10
112 M	130	110	160	M8	3.5	110	295	465	240	223	28	60	8	24	31	530	M10
132 S/M	215	180	250	M12	4	135	385	600	275	260	38	80	10	33	41	680	M12

SHAFT - DETAILS

DIMENSION DETAILS OF TEFC FLP FLANGE MOUNTED (B5) MOTORS (S.G. IRON BODY)



	FLANGE - DETAILS											SHAFT - DETAILS							
FRAME SIZE	M	N	P	S	T	^{±5} L1	^{±5} L2	^{±10} L	^{±1} LA	^{±5} LO	^{±2.5} AC	D / DA	E / EA	F / FA	G / GB	GA / GC	^{±10} LC	U	
63	115	95	140	10	3	75	165	270	9	165	121	11	23	4	8.5	12.5	300	M4	
71	130	110	160	10	3.5	75	190	295	9	180	139	14	30	5	11	16	330	M5	
80	165	130	200	12	3.5	85	205	330	10	185	159	19	40	6	15.5	21.5	372	M6	
90 S/L	165	130	200	12	3.5	85	255	390	10	190	176	24	50	8	20	27	445	M8	
100 L	215	180	250	15	4	110	265	435	11	230	201	28	60	8	24	31	500	M10	
112 M	215	180	250	15	4	110	295	465	11	240	223	28	60	8	24	31	530	M10	
132 S/M	265	230	300	15	4	135	385	600	12	275	260	38	80	10	33	41	690	M12	
160 M/L	300	250	350	19	5	150	430	690	17	300	307	42	110	12	36	45	810	M16	

**FLP FOOT CUM
FACE MOTOR**



**FLP FOOT CUM
FLANGE MOTOR**



SHOP FLOOR



AUTO WINDING LINE



AUTO WINDING LINE



AUTO WINDING LINE



INSPECTION OF WINDING



MULTI HOLE DRILLING



CNC TURNING CENTER



COWL DRILLING-TAPPING MACHINE



LOAD TEST DYNAMOMETER



INDUCTION HEATER FOR ROTOR PRESSING



DYNAMIC BALANCING MACHINE



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