Global warming is a reality and world over people are working towards reduction in carbon foot print. Electric motor applications, in Indian industry, consume about seventy percent of the generated electrical energy in India. Improving efficiency of the motor is therefore a major concern in energy-efficiency efforts. Electric motors with improved efficiency, in combination with frequency converters can save about 7% of the total worldwide electrical energy. Roughly one quarter to one third of these savings come from the improved efficiency of the motor. A need was felt amongst users, consultants and manufacturers in India to revise existing BIS standard IS 12615:2004 to harmonize with the international standards. This will lead us to be in line with international code of standards and practices. This will also result in having uniform test procedures to facilitate the end user to compare the performance and energy efficiency of motors manufactured by different manufacturers .

Motors from 0.37kW to 375kW make up the vast majority (approximately 90%) of installed motor population and are covered by the standard IS12615:2011. This fulfils the need of the manufacturers to design motor for a global market. This standard defines three efficiency classes and corresponding efficiency values for motors operating at 50Hz frequency.

Salient features of BIS standard IS 12615:2011 (second revision)

This standard is primarily based on IEC 60034-30:2008 issued by the International Electrotechnical Commission except that additional performance parameters other than efficiency values have also been included such as starting current, starting torque and full load speed.

The efficiency levels in IS 12615:2011 are based on test methods specified in IS 15999 (Part 2/sec 1): 2011 /IEC 60034-2-1:2007. The standard specifies methods used to determine losses and efficiency, with the objective to calculate efficiency values more accurately.

The standard specifies rated voltage as 415V, and rated frequency as 50Hz. Also the permissible variations in voltage and frequency are as below

- Voltage: ±10%
- Frequency: ±5%
- Combined variation: ±10%

The standard specifies output kW rating and frame relationship up to 160kW for 2P & 4P ratings and up to 132kW for 6P ratings. Above these ratings, the frame selection is left to the manufacturer.

New IE Efficiency Classes are as given below

Efficiency Class	Description	
IE1	Standard efficiency	Comparable to eff2
IE2	High efficiency	Comparable to eff1
IE3	Premium	Premium

The standard covers low voltage, AC three phase squirrel cage, single speed induction motors for

- Rated voltage $\leq$ 1000V
- Rated frequency 50Hz
- Rated output between 0.37kW to 375kW
- 2, 4 & 6 Pole motors
- Rated on the basis of continuous duty (S1) or intermittent periodic duty (S3) with 80% or higher cyclic duration factor
- Capable of operating direct on line
- Rated for ambient temperature of 40^{0}C & altitude not exceeding 1000m
- Degree of protection IP44 or superior
- Method of cooling IC 411
- Fixing dimensions as per IS 1231 & IS 2223
- Determination of total losses with stray load loss determination from residual losses

This standard does not cover

- 8P & higher polarity motors
- Pole changing motors (multispeed motors)
- Motors made exclusively for converter duty application
- Motors completely integrated into the machine. (for example, pumps, compressors that cannot be tested separately from the machine)
- Crane & hoist duty motors

Highlight

- Efficiency values of different manufacturers are comparable only if they are measured by the same method as per IS 15999 (Part 2/sec 1):2011 / IEC 60034-2-1:2007.
- IE Class efficiencies are subject to tolerance as per IS/IEC 60034-1.
- For conditions of limitations on grid supply (e.g. limiting starting current, high tolerances of voltage and/or frequency), it may not be possible to achieve the same IE efficiency class.
- Energy efficient cage-induction motors are typically built with more active material to achieve higher efficiency and hence the starting performance of these motors differ somewha

from motors with a lower efficiency. The locked rotor current increases approximately by 10 to 15 percent for increase in each level of efficiency for the same output power. For replacing existing motors, this should be checked by the user with manufacturer for proper sizing of the protective devices.

Old efficiency levels were eff2 and eff1 (as per CEMEP). For calculation of these efficiencies, fixed stray load losses (0.5% of motor input) were assumed and not measured. Hence efficiency values were with high uncertainty. Now IS : 12615:2011 refers to IS : 15999 (Part 2/sec 1):2011 / IEC 60034-2-1:2007 for calculation of efficiency. This calculation is based on the new methods of stray load loss measurement specified in the standard. The effect is in reduction of efficiency value than the earlier values.

Bharat Bijlee's IE2 Motors Product Range

Type	Frame Size	kW Range
IE2 High efficiency-2H	71 TO 355L	0.37 TO 355

Bharat Bijlee IE2 motors are readily suitable for inverter duty -

Features:

- All motors with dual coat winding wires
- Special Impregnation to suit inverter duty
- 6 terminals in the terminal box for all motors

Stray Load Loss Measurement and Efficiency Determination of IE2 Motor

The most significant difference in the efficiency determination method of standard motors (as per old IS 12615:2004) and IE2 motors (as per IS 12615-2011).

Effect of additional stray load losses for efficiency determination as per IS : 12615-2011.

The new standard follows IS : 15999 / IEC 60034-2-1 for arriving at the stray load losses. These losses can vary from 2.5% in small motors to 0.5% in higher ratings up to 10MW. (reference - graph. In figure 11 of standard IS : 15999).

The earlier standard IS : 12615-2004 used for eff1 motors assumed stray load losses as 0.5% of output. Hence the efficiency values tested by the earlier standard would be 0% to 2.0% higher than the new standard for the same motor.

Example is given below

Rating 4 Pole	eff1 specified in IS : 12615-2004 (%)	IE2 specified in IS : 12615-2011 (%)	Reduction in efficiency from eff1 due to additional stray load losses (%)
0.75kW	82.5	79.6	2.9
55kW	94.2	93.5	0.7

When comparing eff1/eff2 motor & IE2 motor, it is necessary to note the difference in testing methods. The standard has reduced the efficiency value to take care of this. At first glance, a customer would feel that an IE2 motor is inferior to an eff1 motor though both might be identical.

Hence for any comparison, it is necessary to use the same method of loss calculation.

The worked out example shown below gives the energy savings per year (for 8000 hours running) of a BBL IE2 motor (normalized for 0.5% stray load loss) over a BBL standard motor. Stray load losses are taken from figure 11 of IS : 15999.

Efficiency comparison and energy saving of standard motor and IE2 motor

Rating (kW)	11		55	
Efficienct Standared	Standard	IE2	Standard	IE2
Purchase Cost (Rs.)	25676	30340	132236	149944
Catalogue Efficiency %	89.0	89.8	93.8	93.5
Input Power (kW) for IE2 motor as per catalogue		11.0/0.898 =12.249		55.0/0.935 =58.824
Additional Stray load losses (kW) over Standard motor		(0.2424-0.0550) = 0.187		(0.959-0.275) =0.684
Normalized IE2 Efficiency % with 0.5% Stray losses assumed		11.0 / (12.249 -0.187) =91.2		55.0/ (58.824-0.684) =94.6
Motor losses(kW)	(11.0/0.89) - 11.0 =1.36	(11.0/0.912) - 11.0 =1.062	(55.0/0.938) -55.0 =3.636	(55.0/0.95) -55.0 =2.894
Saving (kW)	1.36-1.062=0.298		3.636-2.894=0.742	
Saving in energy (kWH) @8000 Hrs running per year	2384		5936	
Average Energy Cost (Rs.)	7			
Annual Saving (Rs.)	16688		41552	
Payback period for additional purchase cost for IE2	3.35 month		5.11 month	
Saving (Rs.) in 20 years	333760		831040	

For Standard motor, stray load loss is 0.5% of output
Stray load loss for 11kW motor is 0.055 kW
Stray load loss for 55kW motor is 0.275 kW

For IE2 motor, as per nomogram
(figure 11 of IS 15999)
Stray load loss for 11kW motor is 0.2424 kW
Stray load loss for 55kW motor is 0.959 kW

Table shown below gives the Energy Savings Per Year (for 8000 hours running) of a BBL IE2 Motor (normalized for 0.5% stray load loss) over a standard eff2 motor as per IS 12615-2004

	2 Pole				4 Pole				6 Pole			
Rating kW	Standard eff2 Motor (ŋ%)	BBL IE2 Motor (ŋ%)	Normalized IE2 ŋ with 0.5% Stray load losses	Saving in kWh/Year @8000 Hrs running	Standard eff2 Motor (ŋ%)	BBL IE2 Motor(ŋ%)	Normalized IE2 ŋ with 0.5% Stray load losses	Saving in kWh/Year @8000 Hrs running	Standard eff2 Motor (ŋ%)	BBL IE2 Motor(ŋ %)	Normalized IE2 ŋ with 0.5% Stray load losses	Saving in kWh/Year @8000 Hrs running
0.37	66.0	72.2	73.78	472.8	66.0	70.1	71.64	353.1	65.0	69	70.52	356.4
0.55	70.0	74.8	76.42	528.4	70.0	75.1	76.73	551.3	68.0	72.9	74.49	563.8
0.75	73.0	77.4	79.07	631.0	73.0	79.6	81.31	839.9	71.0	75.9	77.54	713.2
1.1	76.2	79.6	81.29	723.4	76.2	81.4	83.12	961.8	74.0	78.1	79.77	859.6
1.5	78.5	81.3	82.96	822.5	78.5	82.8	84.49	1083.4	76.0	79.8	81.44	1054.6
2.2	81.0	83.2	84.82	979.2	81.0	84.3	85.94	1248.8	79.0	81.8	83.40	1175.6
3.7	84.0	85.5	87.06	1237.4	84.0	86.3	87.87	1551.2	82.5	84.3	85.84	1396.2
5.5	85.7	87.0	88.50	1624.3	85.7	87.7	89.21	2018.2	84.5	86	87.49	1777.9
7.5	87.0	88.1	89.55	1965.7	87.0	88.7	90.16	2416.9	86.0	87.2	88.64	2079.2
9.3	87.7	88.8	90.22	2367.8	87.7	89.3	90.72	2827.4	87.0	88	89.41	2304.0
11	88.4	89.4	90.79	2621.8	88.4	89.8	91.20	3051.6	87.5	88.7	90.08	2884.3
15	89.4	90.3	91.64	3278.6	89.4	90.6	91.94	3710.2	88.5	89.7	91.03	3771.8
18.5	90.0	90.9	92.20	3927.0	90.0	91.2	92.50	4452.6	89.5	90.4	91.70	3961.9
22	90.5	91.3	92.57	4349.4	90.5	91.6	92.87	4969.2	90.0	90.9	92.17	4597.1
30	91.4	92.0	93.21	5107.6	91.4	92.3	93.52	5940.5	91.0	91.7	92.91	5423.3
37	92.0	92.5	93.67	5750.0	92.0	92.7	93.88	6428.6	91.5	92.2	93.37	6484.8
45	92.5	92.9	94.04	6360.4	92.5	93.1	94.24	7178.9	92.0	92.7	93.84	7653.4
55	93.0	93.2	94.30	6509.7	93.0	93.5	94.60	7999.8	92.5	93.1	94.20	8568.3
75	93.6	93.8	94.84	8361.3	93.6	94	95.04	9701.0	93.0	93.7	94.74	11824.9
90	93.9	94.1	95.10	9681.9	93.9	94.2	95.20	10481.8	93.3	94.0	95.00	13811.3
110	94.0	94.3	95.26	12383.0	94.4	94.5	95.46	10362.0	93.5	94.3	95.26	17389.3
125	94.5	94.5	95.43	10360.3	94.7	94.6	95.53	9227.8	93.6	94.4	95.33	19430.6
132	94.5	94.6	95.52	11972.5	94.7	94.7	95.62	10774.2	93.8	94.6	95.52	20311.7
150	94.6	94.7	95.60	13231.2	94.8	94.7	95.60	10555.0				
160	94.8	94.8	95.68	12475.1	95.0	94.9	95.78	11035.5				

TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 71 to 355L

Applicable standard for testing & efficiency determination: IS 15999

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

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

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

IE2

Rated Output		Frame size	Type Ref.	Operating Characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD² kgm²	Net Weight B3 Constn. Kg
				Rated Speed	Rated Current	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	B3 Construction	RPM	Amps.	Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	71	2H0712A3	2800	0.96	0.13	0.74	0.68	0.60	72.2	72.2	66.0	5.0	2.6	3.0	0.0019	7
0.55	0.75	71	2H071233	2805	1.29	0.19	0.79	0.72	0.58	74.8	74.0	70.0	5.0	2.7	3.0	0.0019	7
0.75	1.0	80	2H080213	2830	1.64	0.26	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	2H080233	2830	2.34	0.38	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	2H09S243	2840	3.13	0.51	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	2H09L273	2840	4.49	0.75	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	2H10L233	2890	6.84	1.25	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	2H13S2G3	2935	9.77	1.83	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	2H13S2N3	2935	13.2	2.49	0.90	0.87	0.82	88.1	87.5	85.0	6.5	2.6	3.0	0.0980	67
9.3	12.5	160M	2H16M233	2935	16.4	3.09	0.89	0.86	0.82	88.8	88.6	85.0	6.5	2.0	2.5	0.1500	105
11	15.0	160M	2H16M253	2935	19.2	3.65	0.89	0.84	0.76	89.4	89.4	87.0	6.5	2.3	3.0	0.171	112
15	20.0	160M	2H16M263	2930	26.0	4.99	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	2H16L293	2930	31.5	6.15	0.90	0.89	0.86	90.9	90.7	89.0	6.5	2.0	2.5	0.268	137
22	30.0	180M	2H18M233	2935	37.7	7.30	0.89	0.87	0.82	91.3	91.0	88.8	7.0	2.4	2.7	0.34	177
30	40.0	200L	2H20L2A3	2955	51.0	9.89	0.89	0.86	0.80	92.0	92.0	90.0	7.0	2.6	3.0	0.61	274
37	50.0	200L	2H20L273	2955	64.0	12.2	0.87	0.84	0.76	92.5	92.5	91.0	7.0	2.2	2.5	0.64	275
45	60.0	225M	2H22M253	2965	76.6	14.8	0.88	0.85	0.78	92.9	92.7	91.0	7.0	2.5	2.5	1.13	353
55	75.0	250M	2H25M233	2965	90.2	18.1	0.91	0.89	0.86	93.2	92.7	90.0	7.0	2.3	2.7	2.60	550
75	100	280S	2H28S233	2970	122	24.6	0.91	0.89	0.86	93.8	93.6	92.0	6.5	2.0	2.8	3.01	669
90	120	280M	2H28M253	2970	146	29.5	0.91	0.89	0.86	94.1	93.9	90.9	6.5	2.0	2.8	3.42	750
110	150	315S	2H31S233	2982	180	35.9	0.90	0.86	0.80	94.3	94.1	91.5	7.0	2.2	2.5	5.0	898
125	170	315M	2H31M2A3	2982	207	40.8	0.89	0.85	0.78	94.5	93.5	91.5	7.0	2.2	2.6	5.0	940
132	180	315M	2H31M233	2982	216	43.1	0.90	0.86	0.80	94.6	93.6	91.3	7.0	2.0	2.5	5.0	940
150	200	315L	2H31L2A3	2982	248	49.0	0.89	0.84	0.78	94.7	93.7	92.2	7.0	2.0	2.5	6.2	1100
160	215	315L	2H31L253	2985	261	52.2	0.90	0.86	0.80	94.8	94.1	93.0	7.0	2.4	2.5	6.2	1100
180	240	315L	2H31L2B3	2982	300	58.8	0.88	0.82	0.75	94.9	94.1	93.0	7.0	2.0	2.5	7.7	1390
200	270	355L	2H35L2A3	2985	325	65.3	0.90	0.87	0.82	95.0	94.2	92.2	7.0	1.6	2.4	12.0	1680
*250	335	355L	2H35L213	2985	407	81.6	0.90	0.88	0.84	95.0	94.5	92.8	7.0	1.6	2.4	12.0	1680
*315	425	355L	2H35L233	2985	513	103	0.90	0.88	0.84	95.0	94.5	93.0	7.0	1.6	2.4	14.7	1870

Note : Efficiency class 'IE2' will be punched on the nameplates as per IS : 12615-2011 for ratings from 0.37kw to 375kw.
All performance values are subject to tolerance as per IS/IEC 60034-1
Efficiency measurements are without seals.

*- These ratings are suitable for ambient temperature 45°C

TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 71 to 355L

Applicable standard for testing & efficiency determination: IS 15999

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

Ambient : 50° C
Duty : S1 (Continuous)
1500 rpm (4-Pole)

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

IE2

Rated Output		Frame size	Type Ref.	Operating Characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD² kgm²	Net Weight B3 Constn. Kg
				Rated Speed RPM	Rated Current Amps.	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	B3 Construction			Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	71	2H071433	1380	1.03	0.26	0.71	0.62	0.50	70.1	70.1	65.0	3.4	2.3	2.5	0.0033	7
0.55	0.75	80	2H080433	1420	1.38	0.38	0.74	0.64	0.50	75.1	75.1	68.0	5.0	2.8	3.0	0.0072	11
0.75	1.0	80	2H080453	1410	1.75	0.52	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	2H09S423	1430	2.44	0.75	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	2H09L473	1435	3.23	1.02	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	2H10L473	1435	4.48	1.49	0.81	0.74	0.60	84.3	84.3	82.0	6.0	2.6	3.0	0.028	26
3.7	5.0	112M	2H11M473	1450	7.46	2.49	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	2H13S4K3	1450	10.3	3.69	0.85	0.82	0.74	87.7	87.7	86.0	6.5	2.2	2.8	0.126	64
7.5	10	132M	2H13M4T3	1450	13.8	5.04	0.85	0.82	0.74	88.7	88.7	87.0	6.5	2.2	2.8	0.163	74
9.3	12.5	160M	2H16M4C3	1460	17.6	6.20	0.82	0.76	0.68	89.4	89.4	87.0	6.5	2.5	2.8	0.177	105
11	15.0	160M	2H16M4K3	1465	20.3	7.31	0.84	0.80	0.70	89.8	89.8	88.0	6.5	2.5	2.8	0.229	115
15	20.0	160L	2H16L4T3	1465	27.1	9.97	0.85	0.82	0.72	90.7	90.7	89.5	6.5	2.5	2.7	0.300	128
18.5	25.0	180M	2H18M473	1465	33.2	12.3	0.85	0.82	0.76	91.2	91.2	89.5	6.5	2.7	2.9	0.540	188
22	30	180L	2H18L483	1470	39.8	14.6	0.84	0.78	0.70	91.6	91.6	89.8	6.5	2.8	3.0	0.61	200
30	40	200L	2H20L453	1470	52.6	19.9	0.86	0.82	0.72	92.3	92.0	90.0	7.0	2.6	2.6	0.93	275
37	50	225S	2H22S433	1470	63.8	24.5	0.87	0.85	0.77	92.7	92.5	90.5	7.0	2.6	2.6	1.60	362
45	60	225M	2H22M453	1470	77.3	29.8	0.87	0.85	0.77	93.1	92.8	91.0	7.0	2.6	2.6	1.85	377
55	75	250M	2H25M433	1480	95.2	36.2	0.86	0.84	0.76	93.5	93.0	91.0	7.0	2.5	2.6	3.06	500
75	100	280S	2H28S423	1485	131	49.2	0.85	0.82	0.74	94.0	94.0	93.0	6.7	2.6	2.8	5.53	670
90	120	280M	2H28M453	1485	156	59.0	0.85	0.82	0.74	94.2	94.2	93.2	6.5	2.3	2.8	6.36	735
110	150	315S	2H31S413	1485	188	72.1	0.86	0.83	0.76	94.5	94.3	92.3	6.5	2.5	3.0	9.97	862
125	170	315M	2H31M4A3	1486	216	81.9	0.85	0.81	0.74	94.6	94.3	92.7	6.5	2.5	3.0	11.7	965
132	180	315M	2H31M433	1487	225	86.5	0.86	0.83	0.76	94.7	94.5	93.0	6.5	2.5	3.0	11.7	965
150	200	315L	2H31L4A3	1488	262	98.2	0.84	0.80	0.72	94.7	94.4	92.8	6.5	2.5	3.0	14.0	1145
160	215	315L	2H31L453	1487	270	105	0.87	0.84	0.78	94.9	94.6	93.1	6.5	2.4	3.0	14.0	1145
180	240	315L	2H31L463	1487	307	118	0.86	0.83	0.76	95.0	94.7	93.2	6.5	2.5	3.0	15.6	1225
200	270	315L	2H31L473	1489	340	131	0.86	0.83	0.76	95.1	94.8	93.3	7.0	2.5	3.0	17.8	1290
250	335	355L	2H35L413	1488	416	164	0.88	0.85	0.75	95.1	94.9	93.5	6.5	2.2	2.5	23.3	1680
315	422	355L	2H35L433	1488	524	206	0.88	0.85	0.75	95.1	94.8	93.5	6.5	2.2	2.5	32.7	1855
*355	475	355L	2H35L453	1488	590	232	0.88	0.85	0.75	95.1	94.9	93.5	6.5	2.2	2.5	37.9	2025

Note : Efficiency class 'IE2' will be punched on the nameplates as per IS : 12615-2011 for ratings from 0.37kw to 375kw.
All performance values are subject to tolerance as per IS/IEC 60034-1
Ratings above 400 kW up to 1000kW are available in 355, 400 & 450 frames with Dual Circuit Cooling Arrangement (DCCA).
Efficiency measurements are without seals.
*-These ratings are suitable for class F temperature rise

TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 80 to 355L

Applicable standard for testing & efficiency determination: IS 15999

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

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

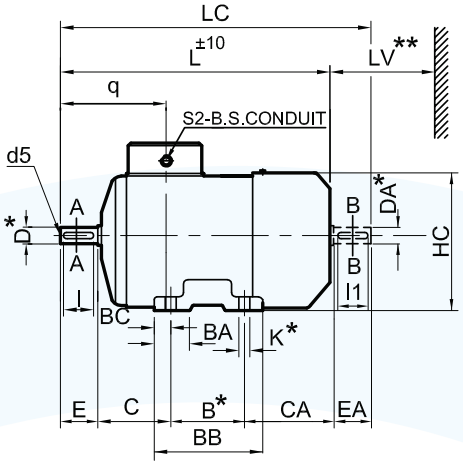
Ins. Class : F
Temp. Rise : B
Protection : IP55

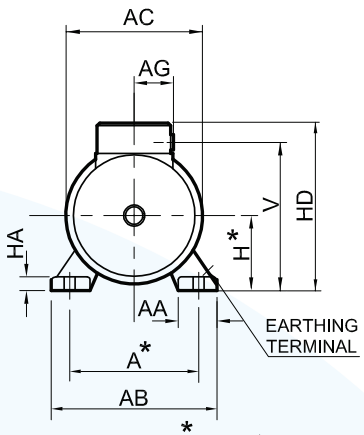
IE2

Rated Output		Frame size	Type Ref.	Operating Characteristics at Rated output									With DOL Starting		Pullout Torque to Rated Torque Ratio	Rotor GD² kgm²	Net Weight B3 Constn. Kg
				Rated Speed RPM	Rated Current Amps.	Rated Torque	Power Factor			% Efficiency			Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio			
kW	HP	IEC	B3 Construction			Kg.m	FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.55	80	2H080613	910	1.07	0.40	0.70	0.60	0.48	69.0	69.0	67.0	3.0	2.1	2.3	0.0060	10
0.55	0.75	80	2H080633	915	1.48	0.59	0.71	0.62	0.48	72.9	72.9	68.5	4.0	2.2	2.5	0.0084	11
0.75	1.0	90S	2H09S633	925	1.91	0.79	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	2H09L653	930	2.72	1.15	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	2H10L633	935	3.63	1.56	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	2H11M653	940	4.99	2.28	0.75	0.65	0.58	81.8	81.8	79.8	5.0	2.1	2.5	0.065	33
3.7	5.0	132S	2H13S6G3	960	8.25	3.75	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	2H13M6T3	960	12.0	5.58	0.74	0.70	0.60	86.0	84.5	82.0	6.0	2.0	2.5	0.193	75
7.5	10	160M	2H16M633	960	15.0	7.61	0.80	0.74	0.64	87.2	87.2	85.2	5.5	2.0	2.5	0.276	103
9.3	12.5	160L	2H16L663	960	18.4	9.44	0.80	0.74	0.64	88.0	88.0	86.7	5.5	2.1	2.5	0.34	113
11	15	160L	2H16L673	965	21.6	11.1	0.80	0.77	0.66	88.7	88.7	87.0	6.0	2.0	2.5	0.40	123
15	20	180L	2H18L633	965	29.1	15.1	0.80	0.75	0.62	89.7	89.7	87.2	5.5	2.6	2.3	0.82	200
18.5	25	200L	2H20L633	975	34.7	18.5	0.82	0.77	0.69	90.4	90.4	88.3	5.5	2.6	2.3	1.20	254
22	30	200L	2H20L653	975	41.1	22.0	0.82	0.77	0.69	90.9	90.9	88.8	6.0	2.6	2.3	1.37	270
30	40	225M	2H22M643	975	52.9	30.0	0.86	0.84	0.76	91.7	91.2	88.7	7.0	2.5	2.2	2.41	358
37	50	250M	2H25M633	980	63.4	36.8	0.88	0.85	0.82	92.2	92.2	91.0	6.0	2.5	2.3	3.72	528
45	60	280S	2H28S613	984	80.4	44.5	0.84	0.80	0.72	92.7	92.7	91.2	6.0	2.5	2.4	5.11	573
55	75	280M	2H28M633	984	95.6	54.4	0.86	0.83	0.76	93.1	93.1	91.0	6.0	2.4	2.4	6.16	620
75	100	315S	2H31S613	988	133	73.9	0.84	0.82	0.75	93.7	93.7	92.5	6.0	2.4	2.5	10.7	830
90	120	315M	2H31M633	989	159	88.6	0.84	0.80	0.74	94.0	94.0	92.9	6.0	2.2	2.5	12.4	912
110	150	315M	2H31M653	989	193	108	0.84	0.81	0.74	94.3	94.3	93.3	6.0	2.3	2.5	15.5	1010
125	170	315L	2H31L6A3	990	222	123	0.83	0.80	0.72	94.4	94.2	93.0	6.0	2.3	2.5	18.0	1175
132	180	315L	2H31L673	990	231	130	0.84	0.81	0.74	94.6	94.6	93.8	6.0	2.3	2.5	18.0	1175
150	200	315L	2H31L6B3	990	269	148	0.82	0.79	0.70	94.7	94.3	92.8	6.0	2.0	2.5	21.5	1231
160	215	315L	2H31L693	990	280	157	0.84	0.81	0.71	94.8	94.5	93.0	6.0	2.0	2.5	21.5	1231
180	240	355L	2H35L6A3	990	322	177	0.82	0.77	0.65	94.9	94.6	93.3	6.0	2.0	2.5	28.7	1670
200	270	355L	2H35L613	990	349	197	0.84	0.80	0.70	95.0	94.7	93.5	6.0	2.0	2.5	28.7	1670
250	335	355L	2H35L633	990	436	246	0.84	0.80	0.70	95.0	94.7	93.4	6.0	2.0	2.5	35.5	1780

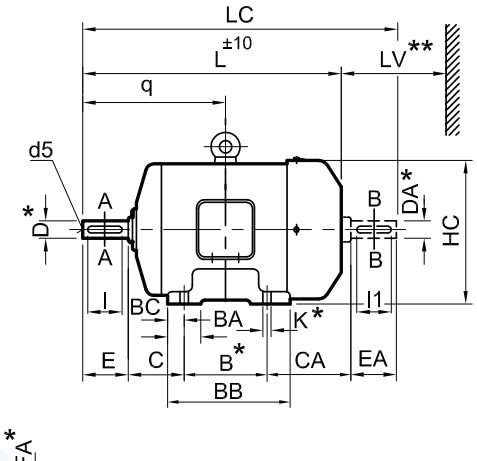
Note : Efficiency class 'IE2' will be punched on the nameplates as per IS : 12615-2011 for ratings from 0.37kw to 375kw.
All performance values are subject to tolerance as per IS/IEC 60034-1
Ratings above 315kW up to 800kW are available in 355, 400 & 450 frames with Dual Circuit Cooling Arrangement (DCCA).
Efficiency measurements are without seals.

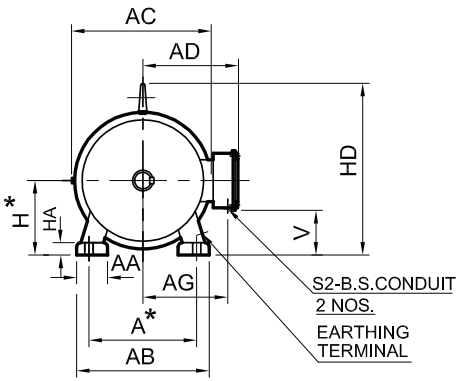
Dimensional Drawing: Industrial Motors Type 2H Foot Mounted (B3) TEFC IE2 series Frame 63-355L



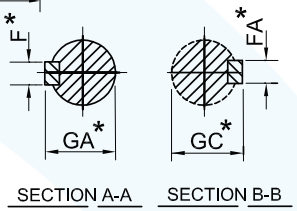


FRAME SIZE 63 TO 80

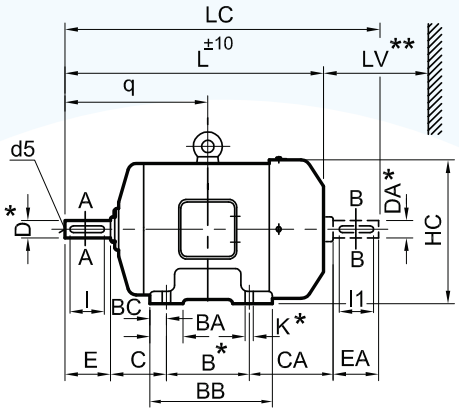


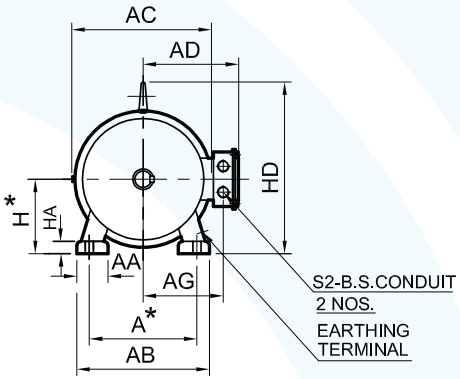


FRAME SIZE 160M TO 180L

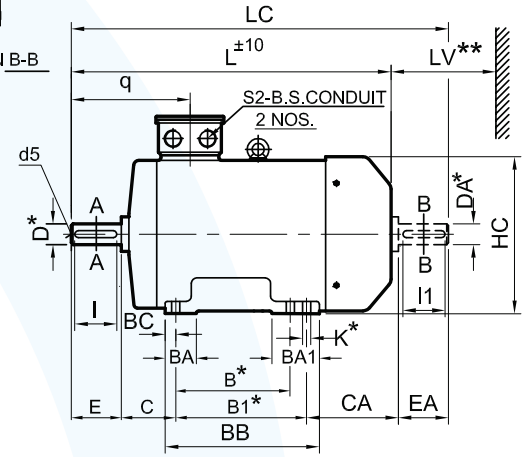


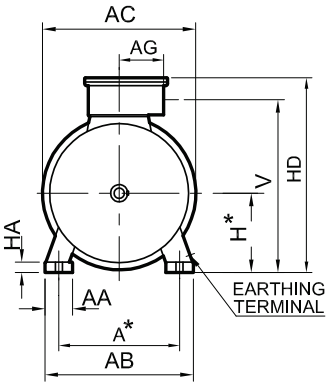
SECTION A-A SECTION B-B





FRAME SIZE 200L TO 225M





FRAME SIZE 90S TO 132M
FRAME SIZE 250M TO 355L

* Refer TABLE A for tolerances

CAT-C-6335-3-1

Dimensional Details: Industrial Motors Type 2H Foot Mounted (B3) TEFC IE2 series Frame 63-355L

		FIXING						GENERAL														TERMINAL BOX				SHAFT						
IEC Fr. size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	BC	HA	HC	HD	AD	L	LC	CA	AC	LV**	V	q	AG	S2 B.S.C.	D,DA*	E EA	F* FA*	GA* GC*	I I1	d5
63	2 & 4	100	80	—	40	63	7	126	100	28	30	—	13	7	125	179	—	206	241	75	124	30	149	104	40	3/4"	11	23	4	12.5	18	M4
71	2,4 & 6	112	90	—	45	71	7	135	110	31	30	—	13	7	141	195	—	234	278	83	140	30	166	102	40	3/4"	14	30	5	16	25	M5
80	2,4 & 6	125	100	—	50	80	10	150	124	31	35	—	15	9	159	214	—	267	324	94	157	30	185	112	40	3/4"	19	40	6	21.5	35	M6
90S	6 & 8	140	100	—	56	90	10	168	125	34	31.5	—	18	12	177	230	-	302	374	118	174	35	199	139	52	3/4"	24	50	8	27	45	M8
90L	6 & 8		125						150									327	399					153								
100L	6 & 8	160	140	—	63	100	12	190	174	43.5	36	—	21	12	198	257	-	366	448	125	192	40	225	152	56	1"	28	60	8	31	55	M10
112M	6 & 8	190	140	—	70	112	12	220	174	47	36	—	21	12	222	282	-	388	471	141	220	45	249	157	56	1"	28	60	8	31	55	M10
132S	6 & 8	216	140	—	89	132	12	256	180	64	50	—	23	17	262	338	-	459	552	172	260	50	299	196	63	1"	38	80	10	41	70	M12
132M	6		178						218		54							497	590	172				215								
160M	2 & 4	254	210	—	108	160	15	310	250	58	70	—	23	20	318	366	226	605	741	203	316	60	98	323	186	1"	42	110	12	45	105	M16
	6 & 8																	585	721	183												
160L	6 & 8		254						294									629	765	183				345								
180M	2,6 & 8	279	241	—	121	180	15	344	281	65	70	—	23	26	357	412	265	679	799	217	354	70	83	352	216	1 1/2"	48	110	14	51.5	100	M16
180L	6 & 8		279						319									717	838	218				371								
200L	2	318	305	—	133	200	19	398	355	85	85	—	28	32	397	462	319	795	920	262	394	80	—	396	249	2"	55	110	16	59	100	M20
	6 & 8																	772	897	239												
225S	4	356	286	—	149	225	19	436	336	85	85	—	28	34	450	509	344	852	1001	281	450	90	—	432.5	273	2"	60	140	18	64	130	M20
225M	2		311						361									837	956	276				415			55	110	16	59	100	
	6 & 8																	852	1001	231				445			60	140	18	64	130	
250M	2	406	349	—	168	250	24	506	425	100	115	—	49	42	495	665	—	993	1134	337	489	100	578	352	243	2"	60	140	18	64	130	M20
	4,6 & 8																	914	1065	268							65	140	18	69	130	
280S/M	2	457	368	419	190	280	24	540	490	100	110	149	40	42	552	725	—	1010	1160	271	544	115	638	360	243	2"	65	140	18	69	130	M20
	4,6 & 8																										75	140	20	79.5	130	
315S/M	2	508	406	457	216	315	28	625	540	120	120	155	46	45	600	830	—	1137	1293	340	600	130	728	386	278	2"	65	140	18	69	130	M20
	4,6 & 8																	1167	1353					416			80	170	22	85	160	
315L	2		508	—					593	120	120	—	46					1302	1458	454				386		2 1/2"	65	140	18	69	130	
	4,6 & 8																	1332	1518					416			80	170	22	85	160	
355L	2	610	630	—	254	355	28	710	770	110	170	—	73	45	693	939	—	1461	1622	458	685	145	850	434	403	3"	75	140	20	79.5	130	M20
	4,6 & 8																	1491	1682					464			95	170	25	100	160	M24

TABLE B

Pole	L	LC	CA
—	—	—	—
—	—	—	—
—	—	—	—
2 & 4	336	408	152
2 & 4	361	433	152
2 & 4	387	469	146
4	419	502	172
2 & 4	518	617	228
—	—	—	—
4	556	659	232
—	—	—	—
2 & 4	635	771	233
—	—	—	—
2 & 4	679	815	233
4	698	802	220
4	737	841	221
—	—	—	—
4	795	920	262
—	—	—	—
—	—	—	—
4	877	1026	281
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

TABLE A

Dimension	Tolerance		Specification
A,B	±0.75		
H	-0.5	UPTO 280	IS : 1231
	-1	OVER 280	
K	+0.360	7,10Ø	
	+0.430	12,15Ø	
	+0.520	19,24,28Ø	

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

*Refer TABLE A for tolerances

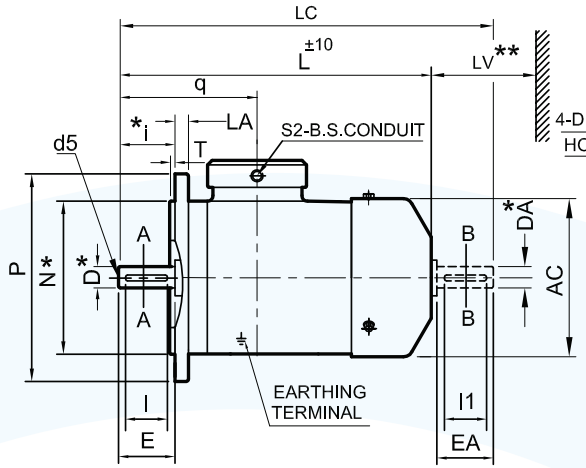
Special Remarks

15kW/2P & 11kW/4P in 160M will have dimensions "L","LC" & "CA" as Indicated in table "B"

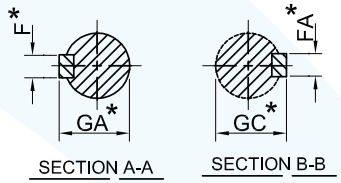
- Double shaft extension can be provided with shaft dimension identical to DE shaft.
- Also suitable for B6,B7,B8,V5 & V6 mounting as per IS 2253.
- ** Minimum distance for efficient cooling of motor to be maintained by user
- (1) Without Eye bolt
- Key / key way fit : h9 / N9

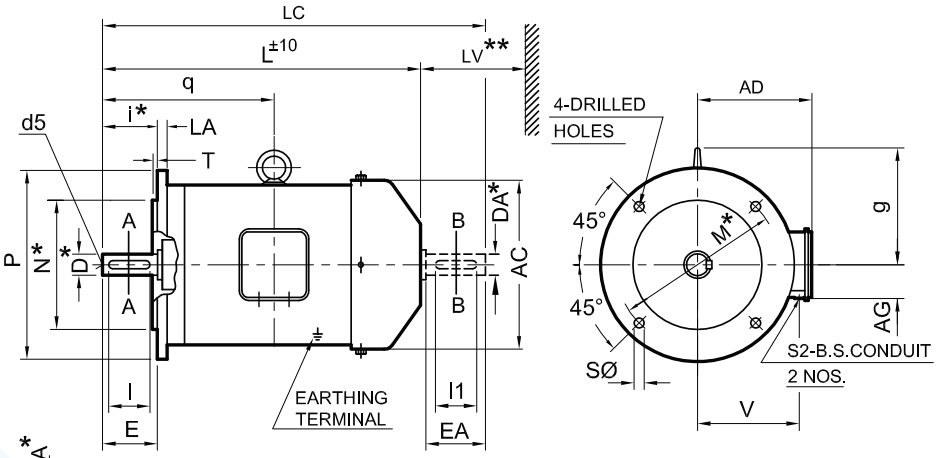
All Dimensions are in mm unless otherwise specified.

Dimensional Drawing: Industrial Motors Type 2H Flange Mounted (B5) TEFC IE2 series Frame 63-355L

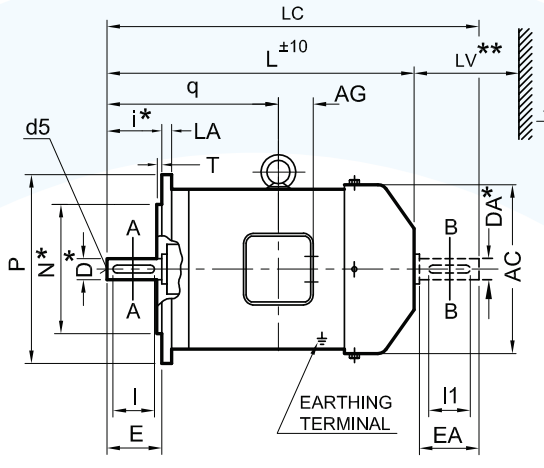


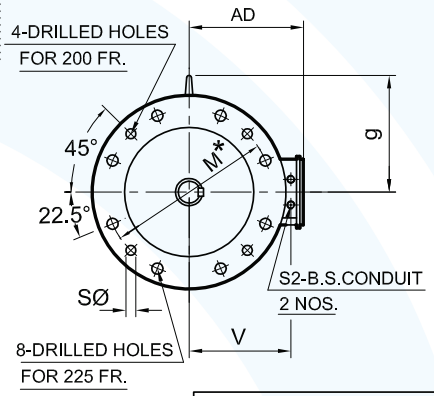
FRAME SIZE 63 TO 80





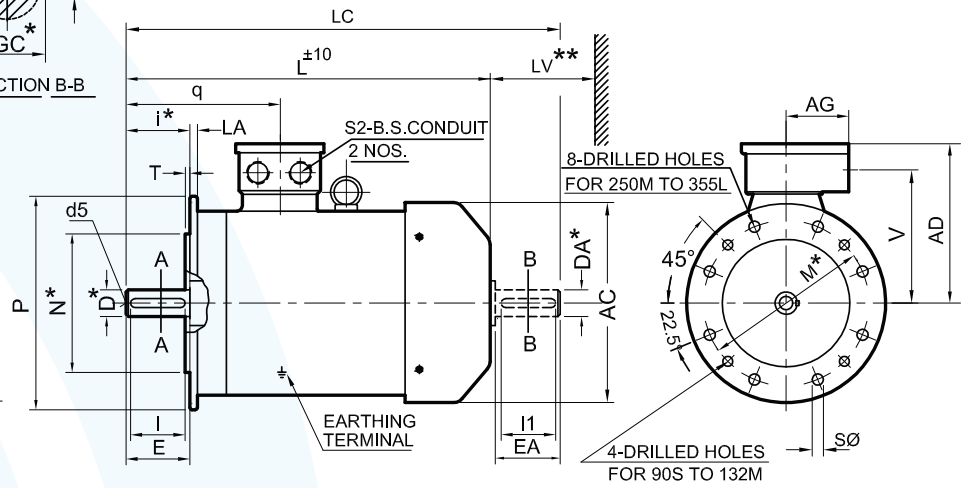
FRAME SIZE 160M TO 180L





FRAME SIZE 200L TO 225M

* Refer TABLE A for tolerances



FRAME SIZE 90S TO 132M
FRAME SIZE 250M TO 355L

CAT-C-6335-5-1

Dimensional Details: Industrial Motors Type 2H Flange Mounted (B5) TEFC (IE2) series Frame 63-355L

		FIXING					GENERAL								TERMINAL BOX				SHAFT					
IEC Fr. size	Pole	P	N*	M*	i*	S	T	LA	AD	AC	L	LC	LV**	g	V	q	AG	S2 B.S.C.	* * D,DA	E EA	F* FA*	GA* GC*	I I1	d5
63	2 & 4	140	95	115	23	10	3	9	116	124	225	260	30	—	86	109	40	3/4"	11	23	4	12.5	18	M4
71	2,4 & 6	160	110	130	30	10	3.5	9	124	140	261	305	30	—	95	127	40	3/4"	14	30	5	16	25	M5
80	2,4 & 6	200	130	165	40	12	3.5	10	134	157	267	324	30	—	105	112	40	3/4"	19	40	6	21.5	35	M6
90S	6 & 8	200	130	165	50	12	3.5	10	140	174	302	374	35	①	109	139	52	3/4"	24	50	8	27	45	M8
90L	6 & 8										327	399				153								
100L	6 & 8	250	180	215	60	15	4	11	157	195	366	448	40	-	125	152	56	1"	28	60	8	31	55	M10
112M	6 & 8	250	180	215	60	15	4	11	170	220	388	471	45	-	137	157	56	1"	28	60	8	31	55	M10
132S	6 & 8	300	230	265	80	15	4	12	206	260	459	552	50	-	167	196	63	1"	38	80	10	41	70	M12
132M	6										497	590				215								
160M	2 & 4	350	250	300	110	19	5	13	226	316	605	741	60	206	186	323	63	1"	42	110	12	45	105	M16
	6 & 8										585	721												
160L	6 & 8										629	765				345								
180M	2,6 & 8	350	250	300	110	19	5	13	265	354	679	799	70	232	216	352	97	1 1/2"	48	110	14	51.5	100	M16
180L	6 & 8										717	838				371								
200L	2	400	300	350	110	19	5	15	319	394	795	920	80	262	249	396	172	2"	55	110	16	59	100	M20
	6 & 8										772	897												
225S	4	450	350	400	140	19	5	16	344	450	852	1001	90	284	273	432.5	172	2"	60	140	18	64	130	M20
225M	2				110						837	956				415			55	110	16	59	100	
	6 & 8				140						852	1001				445			60	140	18	64	130	
250M	2	550	450	500	140	19	5	18	415	489	993	1134	100	—	328	352	243	2"	60	140	18	64	130	M20
	4,6 & 8										914	1065							65	140	18	69	130	
280S/M	2	550	450	500	140	19	5	18	445	544	1010	1160	115	—	358	360	243	2"	65	140	18	69	130	M20
	4,6 & 8																		75	140	20	79.5	130	
315S/M	2	660	550	600	140	24	6	22	515	600	1137	1293	130	—	413	386	278	2"	65	140	18	69	130	M20
	4,6 & 8				170						1167	1353				416			80	170	22	85	160	
315L	2				140						1302	1458				386		2 1/2"	65	140	18	69	130	
	4,6 & 8				170						1332	1518				416			80	170	22	85	160	
355L	2	800	680	740	140	24	6	25	584	690	1461	1622	145	—	495	434	403	3"	75	140	20	79.5	130	M20
	4,6 & 8				170						1491	1682				464			95	170	25	100	160	M24

TABLE B

Pole	L	LC
—	—	—
—	—	—
—	—	—
2 & 4	336	408
2 & 4	361	433
2 & 4	387	469
4	419	502
2 & 4	518	617
—	—	—
4	556	659
—	—	—
2 & 4	635	771
—	—	—
2 & 4	679	815
4	698	802
4	737	841
—	—	—
4	795	920
—	—	—
—	—	—
4	877	1026
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

TABLE A

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

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

*Refer TABLE A for tolerances

① Without Eye bolt

** Minimum distance for efficient cooling of motor to be maintained by user

Note: For B3/B5 mounting motor in frame 63 & 71 refer to Sales office

Special Remarks

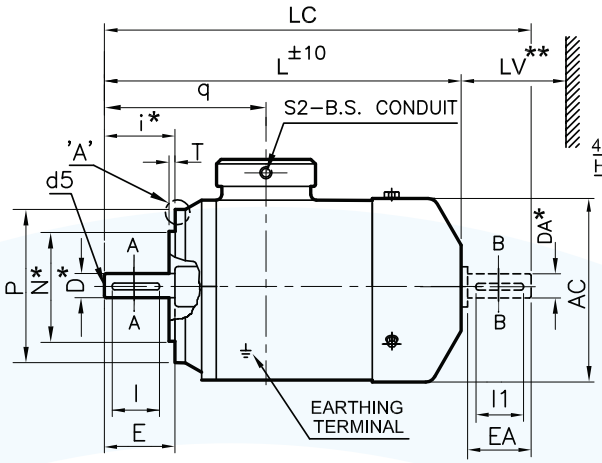
15kW/2P & 11kW/4P in 160M will have dimensions "L" & "LC" as Indicated in table "B"

- Double shaft extension can be provided with shaft dimension identical to D.E.shaft
- Also suitable for V1 & V3 mounting as per IS 2253
- Key / key way fit : h9 / N9
- 8 Nos. Fixing Holes from 225S/M frame onwards

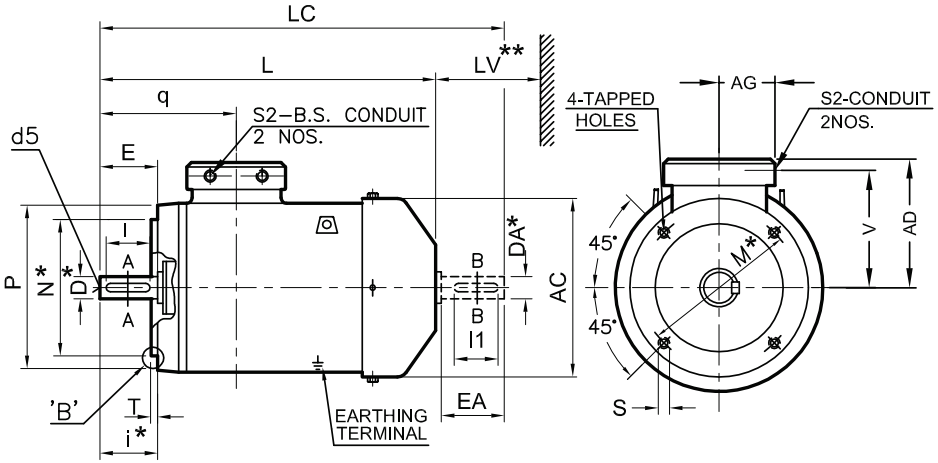
All Dimensions are in mm unless otherwise specified.

CAT-A-6335-5-2

Dimensional Details: Industrial Motors Type 2H Face Mounted (B14) TEFC (IE2) series Frame 63-132M



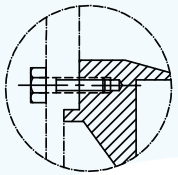
FRAME SIZE 63 TO 80



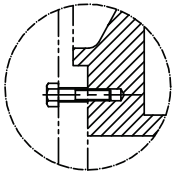
FRAME SIZE 90S TO 132M

		FIXING					GENERAL						TERMINAL BOX				SHAFT					
IEC Fr. size	Pole	P	N*	M*	i*	S	T	AD	AC	L	LC	LV**	g	V	q	AG	S2 B.S.C.	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5
63	2 & 4	90	60	75	23	M5X10	2.5	116	124	206	241	30	—	86	104	40	3/4"	11	23	4	12.5	18	M4
71	2,4 & 6	105	70	85	30	M6X10	2.5	124	140	234	278	30	—	95	102	40	3/4"	14	30	5	16	25	M5
80	2,4 & 6	120	80	100	40	M6X13	3	134	157	267	324	30	—	105	112	40	3/4"	19	40	6	21.5	35	M6
90S	6 & 8	140	95	115	50	M8X12	3	140	174	302	374	35	①	109	139	52	3/4"	24	50	8	27	45	M8
90L	6 & 8									327	399				153								
100L	6 & 8	160	110	130	60	M8X12	3.5	157	195	366	448	40	-	125	152	56	1"	28	60	8	31	55	M10
112M	6 & 8	160	110	130	60	M8X12	3.5	170	220	388	471	45	-	137	157	56	1"	28	60	8	31	55	M10
132S	6 & 8	250	180	215	80	M12X20	4	206	260	459	552	50	-	167	196	63	1"	38	80	10	41	70	M12
132M	6									497	590				215								

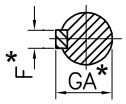
TABLE B		
Pole	L	LC
—	—	—
—	—	—
—	—	—
2 & 4	336	408
2 & 4	361	433
2 & 4	387	469
4	419	502
2&4	518	617
—	—	—
4	556	659



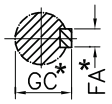
ENLARGEMENT OF CIRCLE 'A'



ENLARGEMENT OF CIRCLE 'B'



SECTION A–A



SECTION B–B

TABLE A

Dimension	Tolerance	Specification
N	j6	IS : 2223
M	±0.3	
i	±1	

Dimension	Tolerance		Specification
D,DA	j6	11,14,19,24,28Ø	IS : 1231
	k6	38Ø	
GA,GC,F,FA			IS : 2048
d5(centering)			IS : 2540

*Refer TABLE A for tolerances

① Without Eye bolt

- Also suitable for V19 & V18 mounting as per IS 2253
- Key / key way fit : h9 / N9
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft

** Minimum distance for efficient cooling of motor to be maintained by user

All Dimensions are in mm unless otherwise specified.

Standard TEFC 3 Phase Squirrel Cage Induction Motors - Frame size 90s to 355L

Applicable standard for testing: IS 4029
Applicable standard for efficiency determination: IS 4889

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

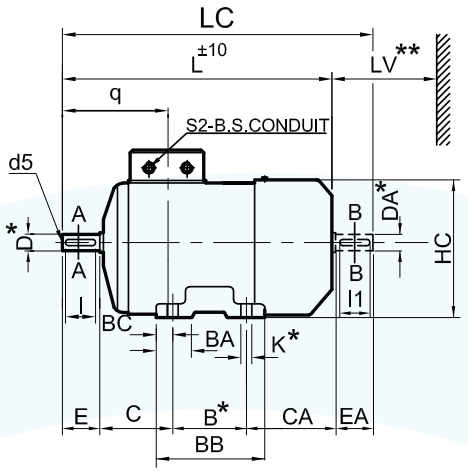
Ambient : 50° C
Duty : S1(Continuous)
750 rpm (8-Pole)

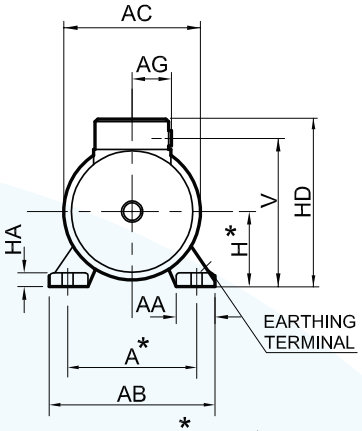
Ins. Class : F
Temp. Rise : B
Protection : IP55

Rated Output		Frame size	Type ref	Rated Speed RPM	Rated Current Amps	Rated Torque Kg.m	Operating Characteristics at Rated output						With DOL Starting			Rotor GD² kgm²	Net Weight Kg
								Power Factor			% Efficiency		Starting Current to Rated Current Ratio	Starting Torque to Rated Torque Ratio	Pullout Torque to Rated Torque Ratio		
kW	HP						FL	3/4L	1/2L	FL	3/4L	1/2L					
0.37	0.50	90S	MH09S813	700	1.22	0.51	0.63	0.52	0.41	66.8	60.0	52.0	2.7	1.8	2.1	0.0110	11
0.55	0.75	90L	MH09L853	690	1.71	0.78	0.63	0.53	0.43	71.1	67.0	62.0	2.9	2.0	2.4	0.0140	14
0.75	1.0	100L	MH10L813	685	1.94	1.07	0.73	0.63	0.50	73.8	73.8	67.0	3.0	1.7	2.0	0.0230	18
1.1	1.5	100L	MH10L833	690	2.83	1.55	0.71	0.62	0.48	76.2	76.2	73.0	3.3	1.9	2.3	0.0270	21
1.5	2.0	112M	MH11M813	705	3.83	2.07	0.70	0.62	0.50	77.9	77.9	75.0	3.8	1.7	2.2	0.0510	25
2.2	3.0	132S	MH13S8B3	705	4.87	3.04	0.78	0.74	0.64	80.5	80.0	76.0	3.5	1.8	2.3	0.0990	57
3.7	5.0	160M	MH16M813	720	7.95	5.01	0.78	0.74	0.65	83.0	83.0	78.0	4.4	1.8	2.0	0.217	88
5.5	7.5	160M	MH16M833	720	11.5	7.44	0.78	0.74	0.65	85.1	85.1	82.0	4.8	1.9	2.2	0.299	101
7.5	10	160L	MH16L873	715	15.5	10.2	0.78	0.74	0.65	86.4	86.4	84.0	5.5	2.1	2.2	0.400	119
9.3	12.5	180M	MH18M813	720	18.8	12.6	0.79	0.74	0.64	87.3	87.3	85.0	5.0	2.1	2.2	0.620	177
11	15	180L	MH18L833	720	22.0	14.9	0.79	0.74	0.64	88.1	88.1	87.0	5.0	2.1	2.2	0.720	182
15	20	200L	MH20L833	720	28.6	20.3	0.82	0.79	0.71	89.0	89.0	88.0	6.0	2.5	2.3	1.32	282
18.5	25	225S	MH22S823	725	36.3	24.9	0.79	0.77	0.69	89.8	89.8	88.0	5.5	2.1	2.2	2.10	329
22	30	225M	MH22M833	725	43.0	29.6	0.79	0.77	0.69	90.2	90.2	88.0	5.5	2.1	2.2	2.41	369
30	40	250M	MH25M813	730	55.6	40.0	0.82	0.78	0.68	91.5	91.5	89.0	6.0	2.5	2.2	3.72	472
37	50	280S	MH28S823	730	70.8	49.4	0.79	0.75	0.65	92.0	92.0	90.0	5.5	2.2	2.2	5.83	615
45	60	280M	MH28M853	730	85.8	60.0	0.79	0.75	0.65	92.4	92.4	90.0	5.5	2.2	2.2	6.86	665
55	75	315S	MH31S813	740	105	72.4	0.78	0.73	0.64	93.0	92.5	90.5	5.5	2.1	2.4	10.7	912
75	100	315M	MH31M833	740	143	98.7	0.78	0.73	0.64	93.5	93.5	92.0	5.5	2.1	2.4	12.4	912
90	120	315M	MH31M853	740	171	118	0.78	0.73	0.65	94.0	94.0	93.0	5.5	2.1	2.4	15.5	1010
110	150	315L	MH31L873	740	208	145	0.78	0.73	0.64	94.3	94.0	93.0	5.5	2.1	2.4	18.0	1170
125	170	315L	MH31L8A3	740	236	165	0.78	0.73	0.64	94.6	94.4	93.6	5.5	2.1	2.4	21.5	1340
132	180	315L	MH31L893	740	248	174	0.78	0.73	0.64	94.8	94.7	94.0	5.5	2.1	2.4	21.5	1340
150	200	355L	MH35L8A3	740	282	197	0.78	0.70	0.60	95.0	95.0	93.0	5.5	1.8	2.2	28.7	1670
160	215	355L	MH35L813	740	300	211	0.78	0.70	0.60	95.0	95.0	93.0	5.5	1.8	2.2	28.7	1670
180	240	355L	MH35L8B3	740	337	237	0.78	0.70	0.60	95.2	95.2	93.2	5.5	1.8	2.2	35.5	1780
200	270	355L	MH35L833	740	374	263	0.78	0.70	0.60	95.3	95.3	93.3	5.5	1.8	2.2	35.5	1780

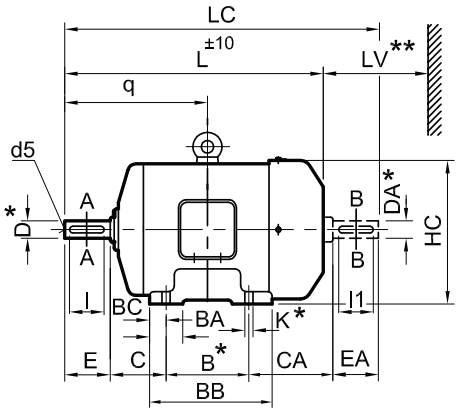
Note :
All performance values are subject to tolerance as per IS/IEC 60034-1
Efficiency measurements are without seals.
Ratings above 200kW/8P upto 630kW/8P are available in Frame 400 & 450. For details contact our sales office.

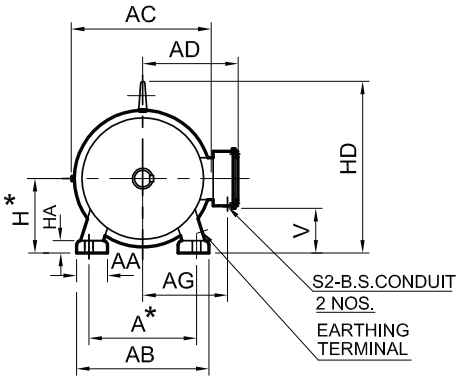
Dimensional Drawing: Industrial Motors Type MH Foot Mounted (B3) TEFC series Frame 90S-355L



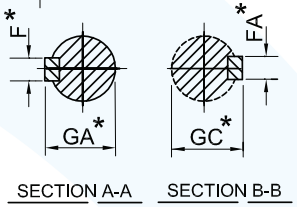


FRAME SIZE 90S TO 132S

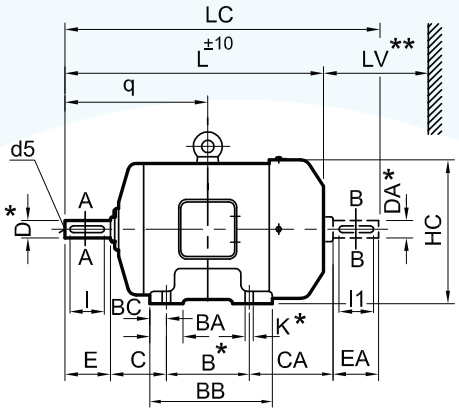


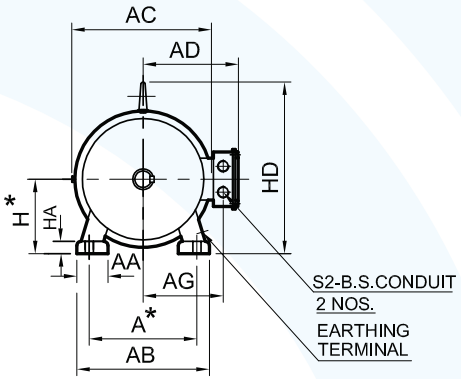


FRAME SIZE 160M TO 180L

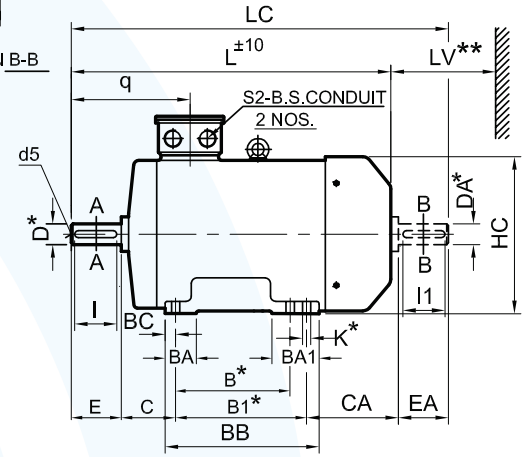


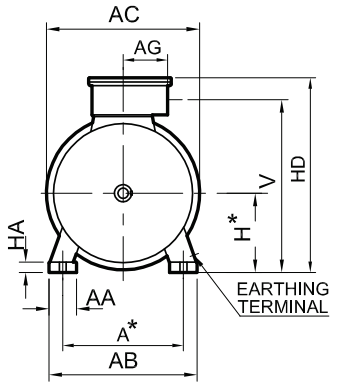
SECTION A-A SECTION B-B





FRAME SIZE 200L TO 225M





FRAME SIZE 250M TO 355L

* Refer TABLE A for tolerances

CAT-C-9035-3-1

Dimensional Details: Industrial Motors Type MH Foot Mounted (B3) TEFC series Frame 90S-355L

		FIXING						GENERAL														TERMINAL BOX				SHAFT						
IEC Fr. size	Pole	A*	B*	B1*	C	H*	K*	AB	BB	AA	BA	BA1	BC	HA	HC	HD	AD	L	LC	CA	AC	LV**	V	q	AG	S2 B.S.C.	D,DA* *	E EA	F* FA*	GA* GC*	I I1	d5
90S	8	140	100	—	56	90	10	168	125	34	31.5	—	18	12	177	230	-	302	374	118	174	35	199	139	52	3/4"	24	50	8	27	45	M8
90L	8		125						150									327	399					153								
100L	8	160	140	—	63	100	12	190	174	43.5	36	—	21	12	198	257	-	366	448	125	192	40	225	152	56	1"	28	60	8	31	55	M10
112M	8	190	140	—	70	112	12	220	174	47	36	—	21	12	222	282	-	388	471	141	220	45	249	157	56	1"	28	60	8	31	55	M10
132S	8	216	140	—	89	132	12	256	180	64	50	—	23	17	262	338	-	459	561	172	260	50	299	196	63	1"	38	80	10	41	70	M12
160M	8	254	254	—	108	160	15	310	294	58	70	—	23	20	318	366	226	585	721	183	316	60	98	323	186	1"	42	110	12	45	105	M16
160L	8																	629	765	183				345								
180M	8	279	241	—	121	180	15	344	281	65	70	—	23	26	357	412	265	679	799	217	354	70	83	352	216	1 1/2"	48	110	14	51.5	100	M16
180L	8		279						319									717	838	218				371								
200L	8	318	305	—	133	200	19	398	355	85	85	—	28	32	397	462	319	772	897	239	394	80	—	396	249	2"	55	110	16	59	100	M20
225M	8	356	311	—	149	225	19	436	361	85	85	—	28	34	450	509	344	827	976	231	450	90	—	445	273	2"	60	140	18	64	130	M20
250M	8	406	349	—	168	250	24	506	425	100	115	—	49	42	495	665	—	914	1065	268	489	100	578	352	243	2"	65	140	18	69	130	M20
280S/M	8	457	368	419	190	280	24	540	490	100	110	149	40	42	552	725	—	1010	1160	271	544	115	638	360	243	2"	75	140	20	79.5	130	M20
315S/M	8	508	406	457	216	315	28	625	540	120	120	155	46	45	600	830	—	1167	1353	340	600	130	728	416	278	2"	80	170	22	85	160	M20
315L	8		508	—					593	120	120	—	46					1332	1518	454				416		2 1/2"	80	170	22	85	160	
355L	8	610	630	—	254	355	28	710	770	110	170	—	73	45	693	939	—	1491	1682	458	685	145	850	464	403	3"	95	170	25	100	160	M24

TABLE A

Dimension	Tolerance		Specification
A,B	±0.75		
H	-0.5	UPTO 280	IS : 1231
	-1	OVER 280	
K	+0.360	10Ø	
	+0.430	12,15Ø	
	+0.520	19,24,28Ø	

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

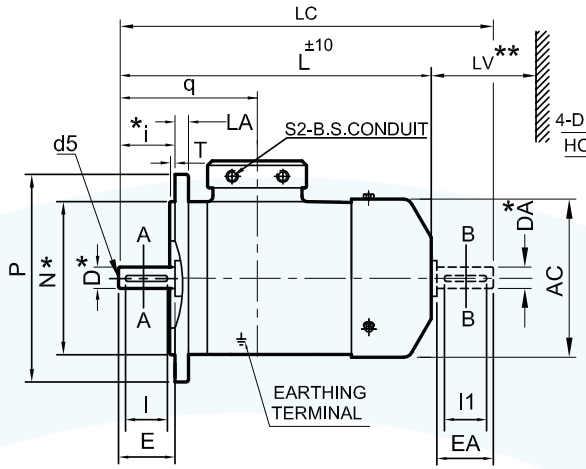
- Double shaft extension can be provided with shaft dimension identical to DE shaft.
- Also suitable for B6,B7,B8,V5 & V6 mounting as per IS 2253.
- ** Minimum distance for efficient cooling of motor to be maintained by user
- (1) Without Eye bolt
- Key / key way fit : h9 / N9

*Refer TABLE A for tolerances

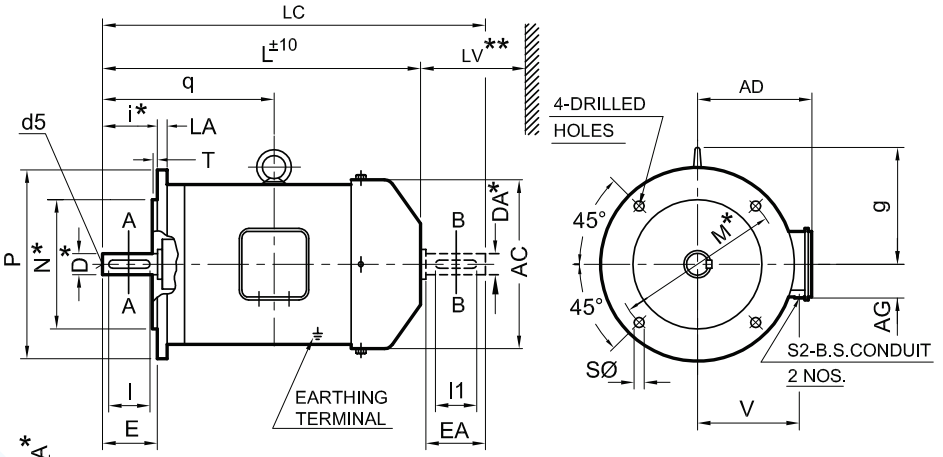
All Dimensions are in mm unless otherwise specified.

CAT-A-9035-3-2

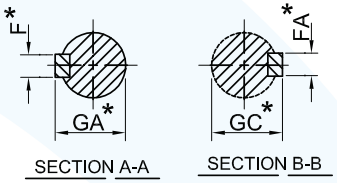
Dimensional Drawing: Industrial Motors Type MH Flange Mounted (B5) TEFC series Frame 90S-355L

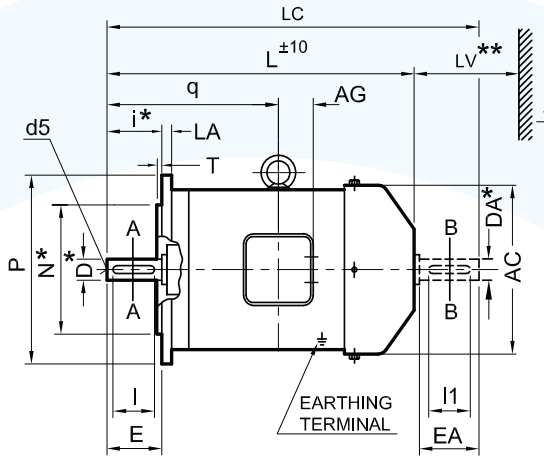


FRAME SIZE 90S TO 132S



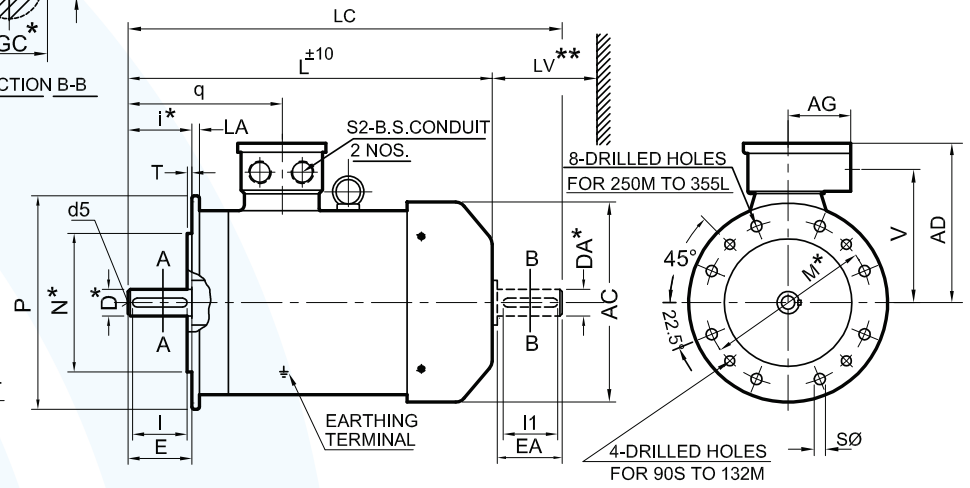
FRAME SIZE 160M TO 180L





FRAME SIZE 200L TO 225M

* Refer TABLE A for tolerances



FRAME SIZE 250M TO 355L

CAT-C-9035-5-1

Dimensional Details: Industrial Motors Type MH Flange Mounted (B5) TEFC series Frame 90S-355L

		FIXING					GENERAL								TERMINAL BOX				SHAFT					
IEC Fr. size	Pole	P	N*	M*	i*	S	T	LA	AD	AC	L	LC	LV**	g	V	q	AG	S2 B.S.C.	D,DA**	E EA	F* FA*	GA* GC*	I I1	d5
90S	8	200	130	165	50	12	3.5	10	140	174	302	374	35	①	109	139	52	3/4"	24	50	8	27	45	M8
90L	8										327	399				153								
100L	8	250	180	215	60	15	4	11	157	195	366	448	40	-	125	152	56	1"	28	60	8	31	55	M10
112M	8	250	180	215	60	15	4	11	170	220	388	471	45	-	137	157	56	1"	28	60	8	31	55	M10
132S	8	300	230	265	80	15	4	12	206	260	459	561	50	-	167	196	63	1"	38	80	10	41	70	M12
160M	8	350	250	300	110	19	5	13	226	316	585	721	60	206	186	323	63	1"	42	110	12	45	105	M16
160L	8										629	765				345								
180M	8	350	250	300	110	19	5	13	265	354	679	799	70	232	216	352	97	1 1/2"	48	110	14	51.5	100	M16
180L	8										717	838				371								
200L	8	400	300	350	110	19	5	15	319	394	772	897	80	262	249	396	172	2"	55	110	16	59	100	M20
225M	8	450	350	400	140	19	5	16	344	450	827	976	90	284	273	445	172	2"	60	140	18	64	130	M20
250M	8	550	450	500	140	19	5	18	415	489	914	1065	100	—	328	352	243	2"	65	140	18	69	130	M20
280S/M	8	550	450	500	140	19	5	18	445	544	1010	1160	115	—	358	360	243	2"	75	140	20	79.5	130	M20
315S/M	8	660	550	600	170	24	6	22	515	600	1167	1353	130	—	413	416	278	2"	80	170	22	85	160	M20
315L	8				170						1332	1518				416		2 1/2"	80	170	22	85	160	
355L	8	800	680	740	170	24	6	25	584	690	1491	1682	145	—	495	464	403	3"	95	170	25	100	160	M24

TABLE A

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

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

*Refer TABLE A for tolerances

① Without Eye bolt

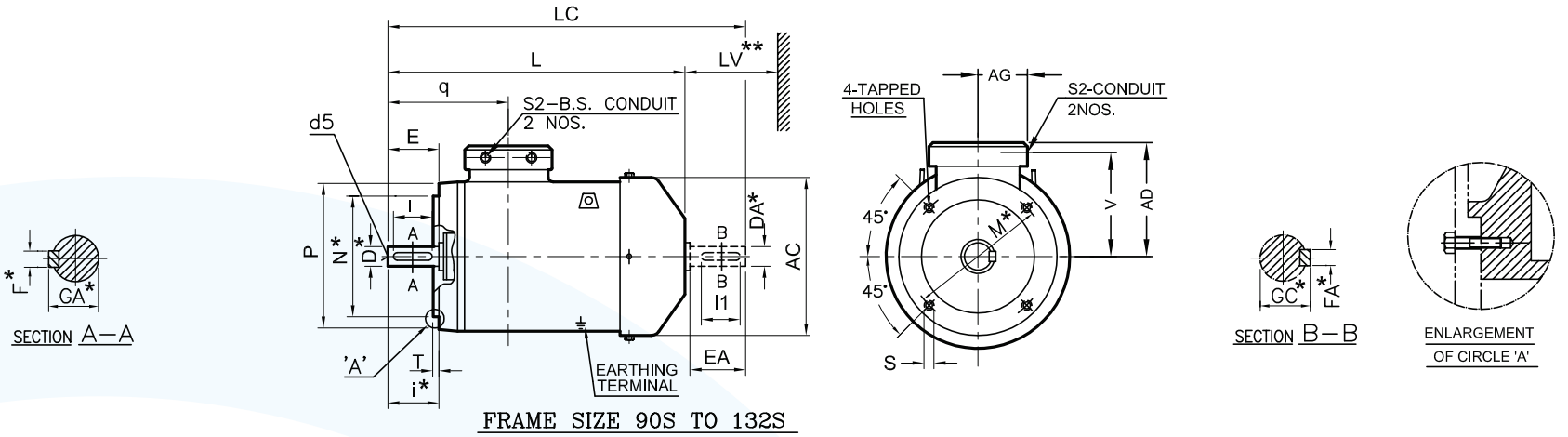
** Minimum distance for efficient cooling of motor to be maintained by user

- Double shaft extension can be provided with shaft dimension identical to D.E.shaft
- Also suitable for V1 & V3 mounting as per IS 2253
- Key / key way fit : h9 / N9
- 8 Nos. Fixing Holes from 225S/M frame onwards

All Dimensions are in mm unless otherwise specified.

CAT-A-9035-5-2

Dimensional Details: Industrial Motors Type MH Face Mounted (B14) TEFC series Frame 90S-132S



FRAME SIZE 90S TO 132S

		FIXING					GENERAL							TERMINAL BOX				SHAFT					
IEC Fr. size	Pole	P	N*	M*	i*	S	T	AD	AC	L	LC	LV**	g	V	q	AG	S2 B.S.C.	D* DA*	E EA	F* FA*	GA* GC*	I I1	d5
90S	8	140	95	115	50	M8X12	3	140	174	302	374	35	①	109	139	52	3/4"	24	50	8	27	45	M8
90L	8									327	399				153								
100L	8	160	110	130	60	M8X12	3.5	157	195	366	448	40	-	125	152	56	1"	28	60	8	31	55	M10
112M	8	160	110	130	60	M8X12	3.5	170	220	388	471	45	-	137	157	56	1"	28	60	8	31	55	M10
132S	8	250	180	215	80	M12X20	4	206	260	459	561	50	-	167	196	63	1"	38	80	10	41	70	M12

TABLE A

Dimension	Tolerance	Specification
N	j6	IS : 2223
M	±0.3	
i	±1	

Dimension	Tolerance		Specification
D,DA	j6	24,28Ø	IS : 1231
	k6	38Ø	
GA,GC,F,FA			IS : 2048
d5(centering)			IS : 2540

*Refer TABLE A for tolerances

① Without Eye bolt
- Also suitable for V19 & V18 mounting as per IS 2253
- Key / key way fit : h9 / N9
- Double shaft extension can be provided with shaft dimension identical to D.E. shaft

** Minimum distance for efficient cooling of motor to be maintained by user

All Dimensions are in mm unless otherwise specified.