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IS 1231 (1974): Dimensions of Three-phase Foot-mounted Induction Motors [ETD 15: Rotating Machinery]



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IS : 1231 - 1974

Indian Standard
DIMENSIONS OF THREE-PHASE
FOOT-MOUNTED INDUCTION MOTORS
(*Third Revision*)

Fourth Reprint OCTOBER 1989

(Incorporating Amendments No. 1, 2 and 3)

UDC 621.313.333/334.025.3:389.63

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

DIMENSIONS OF THREE-PHASE FOOT-MOUNTED INDUCTION MOTORS

(Third Revision)

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Indian Standard
DIMENSIONS OF THREE-PHASE
FOOT-MOUNTED INDUCTION MOTORS
(*Third Revision*)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 23 July 1974, after the draft finalized by the Rotating Machinery Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was first published in 1958 taking into consideration the agreement reached at the IEC level and the manufacturing practices in our country. At that time the standard was limited to the dimensions for foot-mounted three-phase 50 Hz ac squirrel-cage motors of axle heights ranging from 112 to 280 mm for general purpose applications and having enclosures for type of protection IP 21 or IP 22 (screen-protected or drip-proof construction) or both with Class A insulation.

0.3 The first revision was taken up in 1962 to extend the scope of this standard to cover motors of axle heights ranging from 100 to 280 mm, motors having enclosures for type of protection IP 44 or superior (totally enclosed construction) and motors with Class E insulation.

0.4 In the second revision brought out in 1967, the important modification introduced was the assigning of higher outputs to the original frame sizes on the basis of experience gained in the country. In addition, dimensions for squirrel-cage motors having enclosures for type of protection IP 21 and IP 22 (screen-protected, drip-proof and drip-proof screen-protected enclosures) with Class E insulation were also covered. Also fixing dimensions, details of bearing bore diameters, shaft extension dimensions with related maximum torque values, keyway dimensions and shaft run out values were included.

0.5 The present standard (third revision) has been undertaken to incorporate the frame assignments for ac slip-ring (wound rotor) induction motors. The opportunity has also been utilized to modify the values of tolerances for shaft extension, keys and keyways and values of related maximum torque for continuous duty to bring them in line with latest IEC recommendations. In this revision, type of protection afforded by the enclosures and method of

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cooling have been designated in accordance with IS : 4691-1968* and IS : 6362-1971† respectively.

0.6 In the case of squirrel-cage motors having enclosures for type of protection IP 44 or superior (totally enclosed) and IP 21 and IP 22 (drip-proof), the outputs and shaft extension dimensions are different for the same frame sizes. This naturally results in different bearing sizes. Another notable point to be emphasized is that for the same type of enclosure for frame sizes where two outputs are specified, the higher shaft size is adopted thereby eliminating the necessity for having two shaft sizes for the same frame size.

0.7 The present trend in the manufacture of squirrel-cage motors is towards greater use of Class E insulation. However, dimensions of squirrel-cage motors with Class A insulation are given in the standard for guidance in the interim period, anticipating a fall in the manufacture of motors with Class A insulation, particularly in view of the economic advantages resulting in the use of Class E insulation.

0.8 The use of aluminium windings of electric motors is being adopted in a large measure in this country. Sufficient experience on the dimensions of such motors is not, however, available and it has been considered premature to include dimensions of motors with aluminium windings. This standard, therefore, covers only motors wound with copper conductors.

0.9 Dimensions of foot-mounted single-phase motors are covered in IS : 996-1964‡. Dimensions of flange mounted ac induction motors are covered in IS : 2223-1971§.

0.10 Performance requirements of motors covered by this standard shall be in accordance with IS : 325-1970||.

0.11 In the preparation of this standard, assistance has been derived from the following:

IEC Pub 72 (1971) Dimensions and output ratings for rotating electrical machines — Frame numbers 56 to 400 and flange numbers F 55 to F 1080. International Electrotechnical Commission.

BS 3979 : 1966 Dimensions of electric motors (metric series). British Standards Institution.

0.12 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960¶. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡Specification for single-phase small ac and universal electric motors (*revised*).

§Dimensions of flange mounted ac induction motors (*first revision*).

||Specification for three-phase induction motors (*third revision*).

¶Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard specifies the dimensions for foot-mounted 3-phase 50 Hz ac induction motors, of axle height ranging from 56 to 315 mm, intended for general purpose applications. This standard also specifies the standard nominal output for squirrel-cage induction motors having enclosures for type of protection IP 21, IP 22 and IP 44 or superior (*see IS : 4691-1968**) for different frame sizes on the basis of Class 'A', Class 'E' and Class 'B' insulation (*see IS : 1271-1958†*) and continuous rating in accordance with IS : 325-1970‡. It also covers the standard outputs and corresponding sizes of frame and shaft for slip ring (wound rotors) continuous rated motors, of axle height ranging from 160 to 315 mm, for a class of insulation not lower than Class 'E' (*see IS : 1271-1958†*) and having enclosures for type of protection IP 21, IP 22 and IP 44 or superior (*see IS : 4691-1968**) for supply voltage not exceeding 650 volts.

2. LETTER SYMBOLS

2.0 For the purpose of this standard, the following letter symbols shall apply (*see Fig. 1*).

2.1 Letter Symbols for Dimension Sketches

- A* — Distance between centre-lines of mounting holes (end view)
- AA* — Width of end of foot (end view)
- AB* — Overall dimension across feet (end view)
- AC* — Diameter of machine
- AD* — Distance from centre-line of machine to extreme outside of terminal box or other most salient object mounted on side of machine
- B* — Distance between centre-line of fixing holes (side view)
- BA* — Length of foot (side view)
- BB* — Overall dimension across feet (side view)
- C* — Distance from shoulder on shaft to centre-line of mounting holes in the nearest feet
- CA* — Distance from shoulder on second shaft to centre-line of mounting holes in the nearest feet
- D* — Diameter of shaft extension
- DA* — Diameter of the second shaft extension
- E* — Length of shaft extension from the shoulder
- EA* — Length of the second shaft extension from the shoulder

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service.

‡Specification for three-phase induction motors (*third revision*).

- F* — Width of keyway
- FA* — Width of keyway of the second shaft extension
- G* — Distance from the bottom of keyway to the opposite surface of the shaft extension
- GA* — Distance from the top of the key to the opposite surface of the shaft extension
- GB* — Distance from the bottom of the keyway to the opposite surface of the second shaft extension
- GC* — Distance from the top of the key to the opposite surface of the second extension
- GD* — Thickness of key
- GE* — Depth of the keyway at the crown of the shaft
- GF* — Thickness of key of the second shaft extension
- GH* — Depth of keyway at the crown of the second shaft extension
- H* — Distance from centre-line of shaft to bottom of feet (basic dimension)
- HA* — Thickness of feet
- HC* — Top of horizontal machine to bottom of feet
- HD* — Top of eye-bolt, terminal box or other most salient object mounted on top of the machine to bottom of feet
- K* — Diameter of holes for width of slots in the feet of the machine
- L* — Overall length of machine with single shaft extension
- LC* — Overall length of the machine when there is a second shaft extension

3. DESIGNATION OF MACHINE

3.1 Foot-mounted machines may be designated by the frame number followed immediately by the diameter of the shaft extension. Where the frame number does not end with a letter, frame number and shaft diameter should be separated by a dash.

Example :

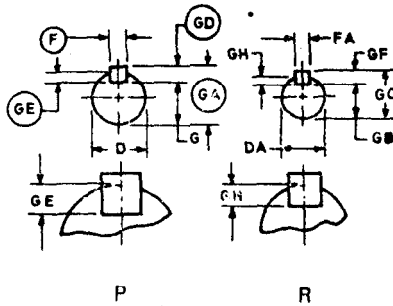
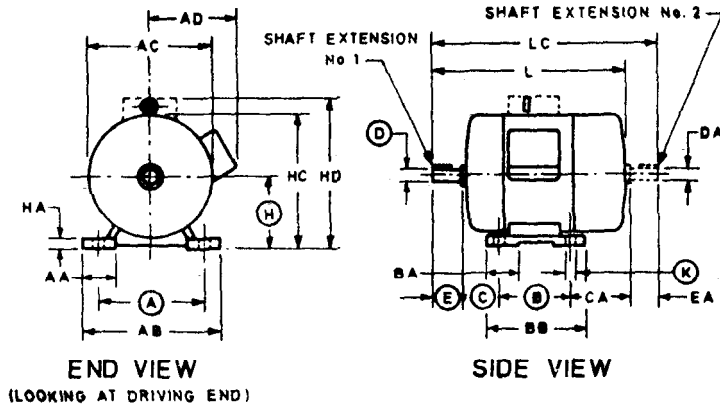
112 M 28

80-19

4. STANDARD FRAME SIZES AND DIMENSIONS

4.1 The basic dimensions for the frame sizes covered by this standard shall be as given in Table 1 read with Fig. 1.

4.2 As a basic information for the guidance of motor manufacturers, the maximum torque values at continuous rating for different shaft diameters are given in Table 2. This table also gives the key and keyway dimensions.



P = End view of shaft extension No. 1
 R = End view of shaft extension No. 2

NOTE — Ringed symbols refer to dimensions which are specified in the standard. Unringed symbols are themselves standardized to facilitate reference when ordering motors to this specification.

FIG. 1 STANDARDIZED AND OTHER DIMENSIONS FOR FOOT-MOUNTED MOTORS

5. POSITION OF TERMINAL BOX

5.1 The terminal box on a motor should be situated with its centre-line within a sector ranging from the top to 10 degrees below the horizontal centre-line of the motor on the right-hand side, when looking at the driving end of the motor.

5.2 It is recommended that unless the terminal box is on the top, the motors shall be so constructed that the terminal box may be located on the left-

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hand side by the manufacturer, if requested by the user at the time the motor is ordered.

NOTE — Provision should preferably be made so as to enable cable entry to the terminal box in any one of four directions at right angles.

6. STANDARD OUTPUTS

6.1 The frame number and shaft extension diameter for the standard nominal output ratings for ac three-phase 50 Hz squirrel-cage motors with continuous ratings at voltages of 650 V or less shall be as given in Tables 3 to 6.

6.2 The frame number and shaft extension diameter for the standard nominal output ratings for ac three-phase 50 Hz slip ring (wound rotor) with continuous ratings at voltages of 650 V or less shall be as given in Tables 7 and 8.

6.3 These outputs are on the basis of continuous duty as defined in IS : 325-1970*.

6.4 For output ratings other than continuous duty, the choice of frame size shall be a matter of agreement between the manufacturer and the purchaser.

6.5 For site conditions other than those specified in **3.3** of IS : 325-1970*, the choice of frame size shall be a matter of agreement between the manufacturer and the purchaser.

7. FRAME NUMBER

7.1 The frame numbers consist of two parts, the first part giving values corresponding to the actual shaft heights and the second part giving letters indicating the frame lengths, the letter 'S' being for short motor, 'M' for medium motor and 'L' for long motor.

*Specification for three-phase induction motors (*third revision*).

TABLE 1 BASIC DIMENSION OF FRAME SIZES

(Clause 4.1)

FRAME NUMBER*	H		A	B	C	K†		BOLT OR SCREW	
	Nominal Maximum Deviation					Nominal	Tolerance‡		
	mm	mm					mm		µm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
56	56	-0.5	90	71	36	5.8	+300	0	M5
63	63	-0.5	100	80	40	7	+360	0	M6
71	71	-0.5	112	90	45	7	+360	0	M6
80	80	-0.5	125	100	50	10	+360	0	M8
90 S	90	-0.5	140	100	56	10	+360	0	M8
90 L	90	-0.5	140	125	56	10	+360	0	M8
100 S	100	-0.5	160	112	63	12	+430	0	M10
100 L	100	-0.5	160	140	63	12	+430	0	M10
112 S	112	-0.5	190	114	70	12	+430	0	M10
112 M	112	-0.5	190	140	70	12	+430	0	M10
(112 L)	112	-0.5	190	159	70	12	+430	0	M10
132 S	132	-0.5	216	140	89	12	+430	0	M10
132 M	132	-0.5	216	178	89	12	+430	0	M10
(132 L)	132	-0.5	216	203	89	12	+430	0	M10
(160 S)	160	-0.5	254	178	108	15	+430	0	M12
160 M	160	-0.5	254	210	108	15	+430	0	M12
160 L	160	-0.5	254	254	108	15	+430	0	M12
(180 S)	180	-0.5	279	203	121	15	+430	0	M12
180 M	180	-0.5	279	241	121	15	+430	0	M12
180 L	180	-0.5	279	279	121	15	+430	0	M12
(200 S)	200	-0.5	318	228	133	19	+520	0	M16
200 M	200	-0.5	318	267	133	19	+520	0	M16
200 L	200	-0.5	318	305	133	19	+520	0	M16
225 S	225	-0.5	356	286	149	19	+520	0	M16
225 M	225	-0.5	356	311	149	19	+520	0	M16
(225 L)	225	-0.5	356	356	149	19	+520	0	M16
250 S	250	-0.5	406	311	168	24	+520	0	M20
250 M	250	-0.5	406	349	168	24	+520	0	M20
(250 L)	250	-0.5	406	406	168	24	+520	0	M20
280 S	280	-1	457	368	190	24	+520	0	M20
280 M	280	-1	457	419	190	24	+520	0	M20
(280 L)	280	-1	457	457	190	24	+520	0	M20
315 S	315	-1	508	406	216	28	+520	0	M24
315 M	315	-1	508	457	216	28	+520	0	M24
(315 L)	315	-1	508	508	216	28	+520	0	M24

*Frame numbers within brackets have not been utilized for assigning the standard outputs in Tables 3 to 8 and shall be regarded as non-preferred for ac induction machines. These are given for information only.

†Open-ended slots are not permitted. In case of small frames, oblong holes may be used, making it convenient for sliding the motor.

‡These tolerances are those given in coarse series H14 according to IS : 1821-1967 'Dimensions for clearance holes for metric bolts (first revision)'.

TABLE 2 SHAFT EXTENSION DIMENSIONS, KEYS AND KEYWAYS

(Clause 4.2)

SHAFT				KEY					KEYWAY					GA NOMI- NAL§	MAXIMUM TORQUE FOR CONTINUOUS DUTY ON ac MOTORS
D*			E†	F		GD			F			GE			
Nomi- nal	Tolerance			mm	Nomi- nal	Toler- ance	Nomi- nal	Tolerance		Nomi- nal	Toler- ance	Toler- ance	Nomi- nal	Tolerance	mm
(1)	Desig- nation	µm	(5)		h9	(7)	Desig- nation	µm	(10)	N9‡	P9‡	(13)	(14)		
mm	(2)	(3)	(4)	mm	µm	mm	(8)	(9)	mm	µm	µm	mm	µm	mm	(16)
7	j6	+ 7 - 2	16	2	0 -25	2	h9	0 -25	2	- 4 -29	- 6 -31	1.2	+100 0	7.8	0.25
9	j6	+ 7 - 2	20	3	0 -25	3	h9	0 -25	3	- 4 -29	- 6 -31	1.8	+100 0	10.2	0.63
11	j6	+ 8 - 3	23	4	0 -30	4	h9	0 -30	4	0 -30	-12 -42	2.5	+100 0	12.5	1.25
14	j6	+ 8 - 3	30	5	0 -30	5	h9	0 -30	5	0 -30	-12 -42	3	+100 0	16	2.8
16	j6	+ 8 - 3	40	5	0 -30	5	h9	0 -30	5	0 -30	-12 -42	3	+100 0	18	4.5
18	j6	+ 8 - 3	40	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	20.5	7.1
19	j6	+ 9 - 4	40	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	21.5	8.25
22	j6	+ 9 - 4	50	6	0 -30	6	h9	0 -30	6	0 -30	-12 -42	3.5	+100 0	24.5	14
24	j6	+ 9 - 4	50	8	0 -36	7	h11	0 -90	8	0 -36	-15 -51	4	+200 0	27	18
28	j6	+ 9 - 4	60	8	0 -36	7	h11	0 -90	8	0 -36	-15 -51	4	+200 0	31	31.5
32	k6	+18 + 2	80	10	0 -36	8	h11	0 -90	10	0 -36	-15 -51	5	+200 0	35	50
38	L6	+18 + 2	80	10	0 -36	8	h11	0 -90	10	0 -36	-15 -51	5	+200 0	41	90

42	k6	+18 + 2	110	12	0 -43	8	h11	0 -90	12	0 -43	-18 -61	5	+200 0	45	125
48	k6	+18 + 2	110	14	0 -43	9	h11	0 -90	14	0 -43	-18 -61	5.5	+200 0	51.5	200
55	m6	+30 +11	110	16	0 -43	10	h11	0 -90	16	0 -43	-18 -61	6	+200 0	59	355
60	m6	+30 +11	140	18	0 -43	11	h11	0 -110	18	0 -43	-18 -61	7	+200 0	64	450
65	m6	+30 +11	140	18	0 -43	11	h11	0 -110	18	0 -43	-18 -61	7	+200 0	69	630
70	m6	+30 +11	140	20	0 -52	12	h11	0 -110	20	0 -52	-22 -74	7.5	+200 0	74.5	800
75	m6	+30 +11	140	20	0 -52	12	h11	0 -110	20	0 -52	-22 -74	7.5	+200 0	79.5	1 000
80	m6	+30 +11	170	22	0 -52	14	h11	0 -110	22	0 -52	-22 -74	9	+200 0	85	1 250
85	m6	+35 +13	170	22	0 -52	14	h11	0 -110	22	0 -52	-22 -74	9	+200 0	90	1 600
90	m6	+35 +13	170	25	0 -52	14	h11	0 -110	25	0 -52	-22 -74	9	+200 0	95	1 900
95	m6	+35 +13	170	25	0 -52	14	h11	0 -110	25	0 -52	-22 -74	9	+200 0	100	2 360

*For diameters up to 25 mm, a shoulder of 0.5 mm is considered sufficient.

†In cases where the service conditions are well defined, shaft extensions might also be selected in accordance with existing Indian Standards.

‡The keyway tolerance N9 applies for normal keys and P9 for fitted keys.

§Tolerances for GA may be calculated from values of the other dimensions given in the table.

||The torque values are chosen from series R 40. In cases where the service conditions are well defined, torque values might also be selected in accordance with existing Indian Standards.

TABLE 3 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 44 OR SUPERIOR (see IS : 4691-1968*) AND METHOD OF COOLING, IC 41 (see IS : 6362-1971†) WITH CLASS 'E' AND CLASS 'B' INSULATIONS

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATING IN kW FOR SYNCHRONOUS SPEED (rev/min)			FRAME NUMBER‡	SHAFT EXTENSION DIAMETER§ FOR SYNCHRONOUS SPEED (rev/min)			
3 000 & 1 500	1 000	750		3 000		1 500 and Below	
(1)	(2)	(3)		Size	Tolerance	Size	Tolerance
0.06 and 0.09	—	—	56	9	j6	9	j6
0.12 and 0.18	—	—	63	11	j6	11	j6
0.25 and 0.37	—	—	71	14	j6	14	j6
0.55 and 0.75	0.37 and 0.55	—	80	19	j6	19	j6
1.1	0.75	0.37	90 S	24	j6	24	j6
1.5	1.1	0.55	90 L	24	j6	24	j6
2.2	1.5	0.75 and 1.1	100 L	28	j6	28	j6
3.7	2.2	1.5	112 M	28	j6	28	j6
5.5	—	2.2	132 S	38	k6	38	k6
7.5	3.7 and 5.5	—	132 M	38	k6	38	k6
11	7.5	3.7 and 5.5	160 M	42	k6	42	k6
15	11	7.5	160 L	42	k6	42	k6
18.5	—	—	180 M	48	k6	48	k6
22	15	11	180 L	48	k6	48	k6
30	18.5 and 22	15	200 L	55	m6	55	m6
37	—	18.5	225 S	55	m6	60	m6
45	30	22	225 M	55	m6	60	m6
55	37	30	250 M	60	m6	65	m6
75	45	37	280 S	65	m6	75	m6
90	55	45	280 M	65	m6	75	m6
110	75	55	315 S	65	m6	80	m6
125	90	75	315 M	65	m6	80	m6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

TABLE 4 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 21 AND IP 22 (see IS : 4691-1968*) AND METHOD OF COOLING, IC 01 (see IS : 6362-1971†) WITH CLASS 'E' AND CLASS 'B' INSULATIONS

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATINGS IN kW FOR SYNCHRONOUS SPEED (rev/min)			FRAME NUMBER‡	SHAFT EXTENSION DIAMETER§ FOR SYNCHRONOUS SPEED (rev/min)			
3 000 & 1 500	1 000	750		3 000		1 500 and Below	
(1)	(2)	(3)	(4)	Size	Tolerance	Size	Tolerance
0.06 and 0.09	—	—	56	9	j6	9	j6
0.12 and 0.18	—	—	63	11	j6	11	j6
0.25 and 0.37	—	—	71	14	j6	14	j6
0.55 and 0.75	0.37 and 0.55	—	80	19	j6	19	j6
1.1	0.75	0.37	90 S	24	j6	24	j6
1.5	1.1	0.55	90 L	24	j6	24	j6
2.2	1.5	0.75 and 1.1	100 L	28	j6	28	j6
3.7	2.2	1.5	112 M	28	j6	28	j6
5.5	—	2.2	132 S	38	k6	38	k6
7.5	3.7 and 5.5	—	132 M	38	k6	38	k6
11	7.5	3.7 and 5.5	160 M	48	k6	48	k6
15 and 18.5	11	7.5	160 L	48	k6	48	k6
22	15	11	180 M	55	m6	55	m6
30	18.5	15	180 L	55	m6	55	m6
37	22	18.5	200 M	60	m6	60	m6
45	30	22	200 L	60	m6	60	m6
55	37	30	225 M	60	m6	65	m6
75	45	37	250 S	65	m6	75	m6
90	55	45	250 M	65	m6	75	m6
110	75	55	280 S	65	m6	80	m6
125	90	75	280 M	65	m6	80	m6
160	110	90	315 S	70	m6	90	m6
180 and 200	125	110	315 M	70	m6	90	m6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

**TABLE 5 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR
SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES
FOR TYPE OF PROTECTION IP 21 AND IP 22 (see IS : 4691-1968*) AND
METHOD OF COOLING, IC 01 (see IS : 6362-1971†) WITH CLASS
'A' INSULATION**

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATINGS IN kW FOR SYNCHRONOUS SPEED (rev/min)				FRAME NUMBER‡	SHAFT EXTENSION DIAMETER D§	
3 000	1 500	1 000	750		Size	Tolerance
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.1	0.75	0.55	0.37	112 S	22	j6
1.5 and 2.2	1.1 and 1.5	0.75 and 1.1	0.55	112 M	22	j6
3.7	2.2	1.5	0.75 and 1.1	132 S	28	j6
5.5	3.7	2.2	1.5	132 M	28	j6
7.5	5.5	3.7	2.2	160 M	38	k6
11	7.5	5.5	3.7	160 L	38	k6
15	11	7.5	5.5	180 M	42	k6
18.5	15	—	7.5	180 L	42	k6
22	18.5	11	—	200 M	48	k6
30	22	15	11	200 L	48	k6
37	30	18.5	15	225 S	55	m6
45	37	22	18.5	225 M	55	m6
55	45	30	22	250 S	65	m6
—	55	37	30	250 M	65	m6
75	75	45	37	280 S	75	m6
90	90	55	45	280 M	75	m6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

TABLE 6 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 44 OR SUPERIOR (see IS : 4691-1968*) AND METHOD OF COOLING, IC 41 (see IS : 6362-1971†) WITH CLASS 'A' INSULATION

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATINGS IN kW FOR SYNCHRONOUS SPEED (rev/min)				FRAME NUMBER‡	SHAFT EXTENSION DIAMETER D§	
3 000	1 500	1 000	750		Size	Tolerance
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.1	0.75	0.55	0.37	112 S	22	j6
1.5 and 2.2	1.1 and 1.5	0.75 and 1.1	0.55	112 M	22	j6
3.7	2.2	1.5	0.75 and 1.1	132 S	28	j6
5.5	3.7	2.2	1.5	132 M	28	j6
7.5	5.5	3.7	2.2	160 M	38	k6
11	7.5	5.5	3.7	160 L	38	k6
15	11	7.5	5.5	180 M	42	k6
18.5	15	—	7.5	180 L	42	k6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

TABLE 7 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SLIP-RING (WOUND ROTOR) CONTINUOUS RATED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 44 OR SUPERIOR (see IS : 4691-1968*), METHOD OF COOLING, IC 41 (see IS : 6362-1971†) AND CLASS OF INSULATION NOT LOWER THAN CLASS 'E'

(Clause 6.2)

All dimensions in millimetres.

OUTPUT RATINGS IN kW FOR SYNCHRONOUS SPEED (rev/min)			FRAME NUMBER ‡	DIAMETER OF SHAFT EXTENSION §
1 500	1 000	750		
(1)	(2)	(3)	(4)	(5)
7.5	5.5	—	160 M	42
11	7.5	5.5	160 L	42
15	11	7.5	180 L	48
18.5 and 22	15	11	200 L	55
30	18.5 and 22	15 and 18.5	225 M	60
37 and 45	30	22	250 M	65
55	37	30	280 S	75
75	45	37	280 M	75
90	55	45	315 S	80
110	75	55	315 M	80

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

TABLE 8 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SLIP-RING (WOUND ROTOR) CONTINUOUS RATED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION, IP 21 AND IP 22 (see IS : 4691-1968*), METHOD OF COOLING, IC 01 (see IS : 6362-1971†) AND CLASS OF INSULATION NOT LOWER THAN CLASS 'E'

(Clause 6.2)

All dimensions in millimetres.

OUTPUT RATING IN kW FOR SYNCHRONOUS SPEED (rev/min)			FRAME NUMBER ‡	DIAMETER OF SHAFT EXTENSION §
1 500	1 000	750		
(1)	(2)	(3)	(4)	(5)
7.5	5.5	3.7	160 M	48
11 and 15	7.5	5.5	160 L	48
18.5	11	7.5	180 M	55
22	15	11	180 L	55
30	18.5	15	200 M	60
37	22	18.5	200 L	60
45 and 55	30 and 37	22 and 30	225 M	65
75	45	37	250 S	75
90	55	45	250 M	75
110	75	55	280 S	80
125	90	75	280 M	80
160	110	90	315 S	90
200	125	110	315 M	90

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

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(Continued from page 2)

<i>Members</i>	<i>Representing</i>
SHRI H. G. KAMATH	Voltas Limited, Bombay
SHRI J. C. PATEL (<i>Alternate</i>)	
SHRI D. V. KAPUR	Bharat Heavy Electricals Ltd, Hardwar
SHRI K. S. CHATTERJEE (<i>Alternate</i>)	
SHRI J. R. MAHAJAN	Indian Electrical Manufacturers Association, Bombay
SHRI P. V. MEHTA	All India Electric Motor Manufacturers' Association, Bombay
SHRI M. J. NAIK (<i>Alternate</i>)	
SHRI T. R. MOHAN	Siemens India Ltd, Bombay
SHRI B. MUKHOPADHYAYA	National Test House, Calcutta
SHRI D. N. UPADHYAYA (<i>Alternate</i>)	
SHRI J. P. MUKHERJI	Walchandnagar Industries Ltd, Walchandnagar
SHRI C. S. BIJLANI (<i>Alternate</i>)	
SHRI A. K. NAGARKATTI	Kirloskar Electric Co Ltd, Bangalore
SHRI S. K. RAJAMANE (<i>Alternate</i>)	
SHRI E. N. NARAYANASWAMY	Directorate of Industries & Commerce, Madras
SHRI N. C. NAYAK	Hindustan Steel Ltd, Ranchi
SHRI A. K. GHOSH (<i>Alternate</i>)	
SHRI K. G. PARIKH	Millowners Association, Bombay
SHRI N. RAMAJAYAM	Indian Machine Tool Manufacturers Association, Bombay
SHRI M. RANGASHAI	Hindustan Machine Tools Ltd, Bangalore
MISS NIRMALA NAIK (<i>Alternate</i>)	
SHRI A. N. SRIVATHSA	NGEF Limited, Bangalore
SHRI S. A. WAJID (<i>Alternate</i>)	

AMENDMENT NO. 4 MAY 1984

TO

IS : 1231-1974 DIMENSIONS OF THREE-PHASE FOOT-MOUNTED INDUCTION MOTORS

(*Third Revision*)

Alterations

(*Page 6, clause 2.1, letter symbol K*) — Substitute 'or' for 'for'.

(*Page 9, Table 1, foot-notes*) - Substitute the following for the existing foot-notes:

*Frame numbers within brackets have not been utilized for assigning the standard outputs in Tables 3 to 8 and shall be regarded as non-preferred for ac induction machines. These are given for information only.

†Open ended slots are not permitted. In case of smaller frame numbers up to 160 L, oblong holes may be provided for convenience in sliding the motor. The minimum length of oblong holes shall not be less than dimensions 'K' for circular holes. The tolerances on dimensions of oblong holes are not applied.

‡These tolerances are those given in coarse series H14 according to IS : 1821-1967 Dimensions for clearance holes for metric bolts (*first revision*).

NOTE — The tolerance on dimension A, B and C shall be applied in accordance with course class tolerances specified in IS : 2102-1969 Allowable deviations for dimensions without specified tolerances (*first revision*).

(Page 12, Table 3) — Substitute the following for the existing table:

TABLE 3 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 44 OR SUPERIOR (see IS: 4691-1968*) AND METHOD OF COOLING IC 41 (see IS: 6362-1971†) WITH CLASS 'E' AND CLASS 'B' INSULATIONS

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATING IN kW FOR SYNCHRONOUS SPEED (rev/min)				FRAME‡ NUMBER	SHAFT EXTENSION DIAMETER§ FOR SYNCHRONOUS SPEED (rev/min)			
3 000	1 500	1 000	750		3 000		1 500 and Below	
(1)	(2)	(3)	(4)	(5)	Size	Tolerance	Size	Tolerance
0.09 and 0.12	0.06 and 0.09	—	—	56	9	j6	9	j6
0.18 and 0.25	0.12 and 0.18	—	—	63	11	j6	11	j6
0.37 and 0.55	0.25 and 0.37	—	—	71	14	j6	14	j6
0.75 and 1.1	0.55 and 0.75	0.37 and 0.55	—	80	19	j6	19	j6
1.5	1.1	0.75	0.37	90S	24	j6	24	j6
2.2	1.5	1.1	0.55	90L	24	j6	24	j6
3.7	2.2	1.5	0.75 and 1.1	100L	28	j6	28	j6
—	3.7	2.2	1.5	112M	28	j6	28	j6
5.5 and 7.5	5.5	3.7	2.2	132S	38	k6	38	k6
—	7.5	5.5	—	132M	38	k6	38	k6
11 and 15	11	7.5	3.7 and 5.5	160M	42	k6	42	k6
18.5	15	11	7.5	160L	42	k6	42	k6
22	18.5	—	—	180M	48	k6	48	k6
—	22	15	11	180L	48	k6	48	k6
30 and 37	30	18.5 and 22	15	200L	55	m6	55	m6
—	37	—	18.5	225S	55	m6	60	m6
45	45	30	22	225M	55	m6	60	m6
55	55	37	30	250M	60	m6	65	m6
75	75	45	37	280S	65	m6	75	m6
90	90	55	45	280M	65	m6	75	m6
110	110	75	55	315S	65	m6	80	m6
125	125	90	75	315M	65	m6	80	m6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.

TABLE 4 FRAME NUMBER AND SHAFT EXTENSION DIAMETER FOR SQUIRREL-CAGE FOOT-MOUNTED MOTORS HAVING ENCLOSURES FOR TYPE OF PROTECTION IP 21 AND IP 22 (see IS : 4691-1968*) AND METHOD OF COOLING IC 01 (see IS : 6363-1971†) WITH CLASS 'E' AND CLASS 'B' INSULATIONS

(Clause 6.1)

All dimensions in millimetres.

OUTPUT RATINGS IN kW FOR SYNCHRONOUS SPEED (rev/min)				FRAME‡ NUMBER	SHAFT EXTENSION DIAMETERS§ FOR SYNCHRONOUS SPEED (rev/min)			
3 000	1 500	1 000	750		3 000		1 500 and Below	
(1)	(2)	(3)	(4)	(5)	Size	Tolerance	Size	Tolerance
0.09 and 0.12	0.06 and 0.09	—	—	56	9	j6	9	j6
0.18 and 0.25	0.12 and 0.18	—	—	63	11	j6	11	j6
0.37 and 0.55	0.25 and 0.37	—	—	71	14	j6	14	j6
0.75 and 1.1	0.55 and 0.75	0.37 and 0.55	—	80	19	j6	19	j6
1.5	1.1	0.75	0.37	90S	24	j6	24	j6
2.2	1.5	1.1	0.55	90L	24	j6	24	j6
—	2.2	1.5	0.75 and 1.1	100L	28	j6	28	j6
3.7	3.7	2.2	1.5	112M	28	j6	28	j6
5.5 and 7.5	5.5	—	2.2	132S	38	k6	38	k6
—	7.5	3.7 and 5.5	—	132M	38	k6	38	k6
11 and 15	11	7.5	3.7 and 5.5	160M	48	k6	48	k6
18.5 and 22	15 and 18.5	11	7.5	160L	48	k6	48	k6
30	22	15	11	180M	55	m6	55	m6
37	30	18.5	15	180L	55	m6	55	m6
45	37	22	18.5	200M	60	m6	60	m6
55	45	30	22	200L	60	m6	60	m6
75	55	37	30	225M	60	m6	65	m6
90	75	45	37	250S	65	m6	75	m6
110	90	55	45	250M	65	m6	75	m6
—	110	75	55	280S	65	m6	80	m6
125	125	90	75	280M	65	m6	80	m6
160	160	110	90	315S	70	m6	90	m6
180 and 200	180 and 200	132	110	315M	70	m6	90	m6

*Degrees of protection provided by enclosures for rotating electrical machinery.

†Designation of methods of cooling for rotating electrical machines.

‡For basic dimensions of frame, reference shall be made to Table 1.

§For other data on shaft extension, see Table 2.