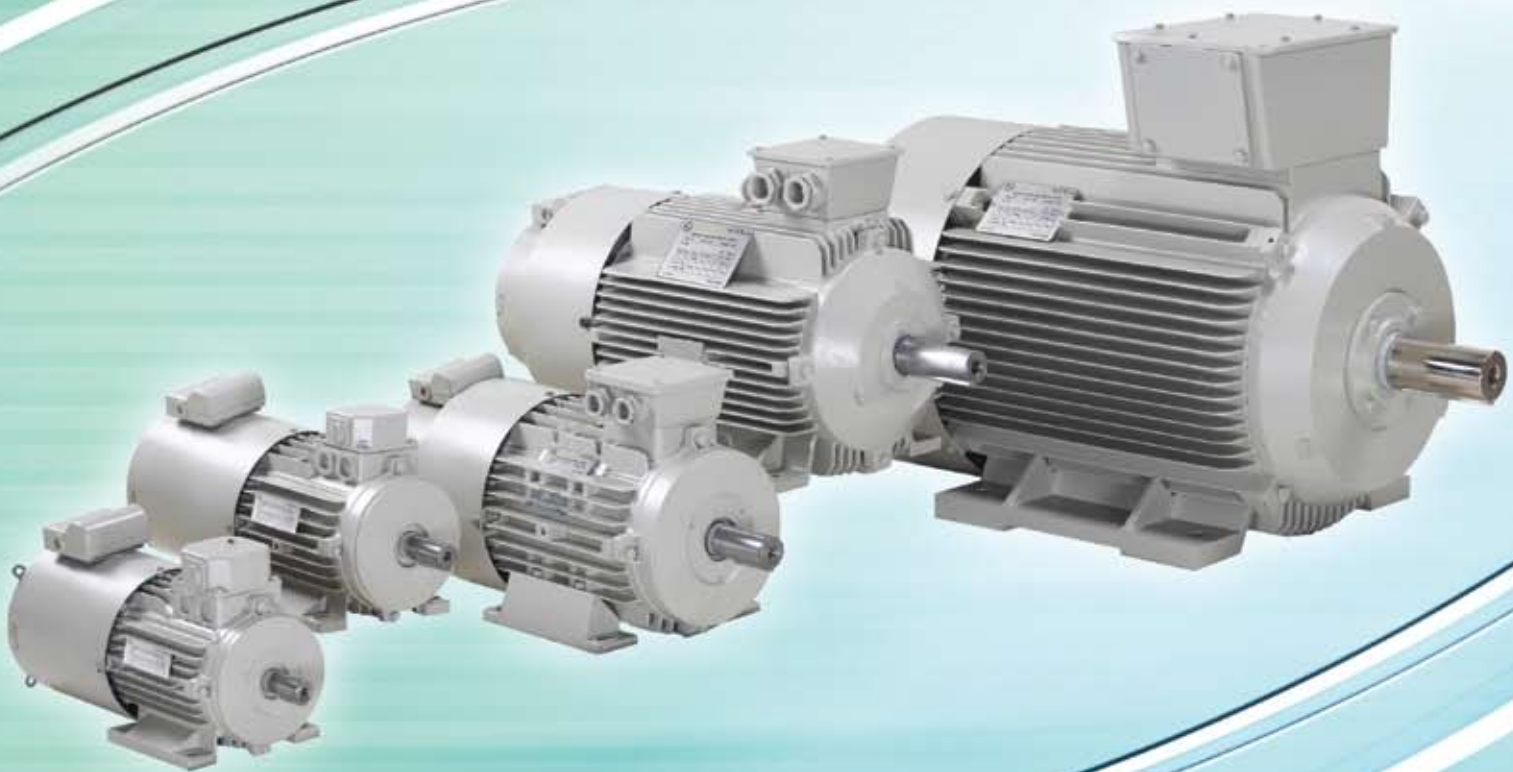


SUPERNOVA™

LTI SERIES

3 PHASE INVERTER DUTY MOTORS





3 PHASE INVERTER DUTY MOTORS

About Larsen & Toubro

Larsen & Toubro is a technology-driven USD 7 billion company that infuses engineering with imagination. The Company offers a wide range of advanced solutions in the field of Engineering, Construction, Electrical & Electronics, Machinery and Information Technology.

L&T Electrical Standard Products, which form a part of the Electrical & Electronics business, is India's largest manufacturer of low voltage switchgear and has the scale sophistication and range to meet global benchmarks.

L&T Electricals have found acceptance not only in India but also over 40 countries across the globe.

Environment & Community

The Company has a comprehensive Quality, Environment and Safety system. The manufacturing facilities conform to ISO 14001 (Environment Management System) & OSHAS 18001 by BVQI.

Switchgear Design and Development Center

SDDC is the primary constituent supporting the Electrical and Electronics division's leadership, through its proven excellence in product design.

Distribution

L&T's Electrical Standard Products Division is one of the largest distribution networks in the industry. These products are available through a network of more than 700 authorised stockists.

Training & After-Sales Service

L&T's Electrical & Electronics training centers at Pune, Lucknow and Coonoor have state-of-the-art training facilities with well equipped workshops and testing systems. Over 75,000 participants have benefited from these programmes.

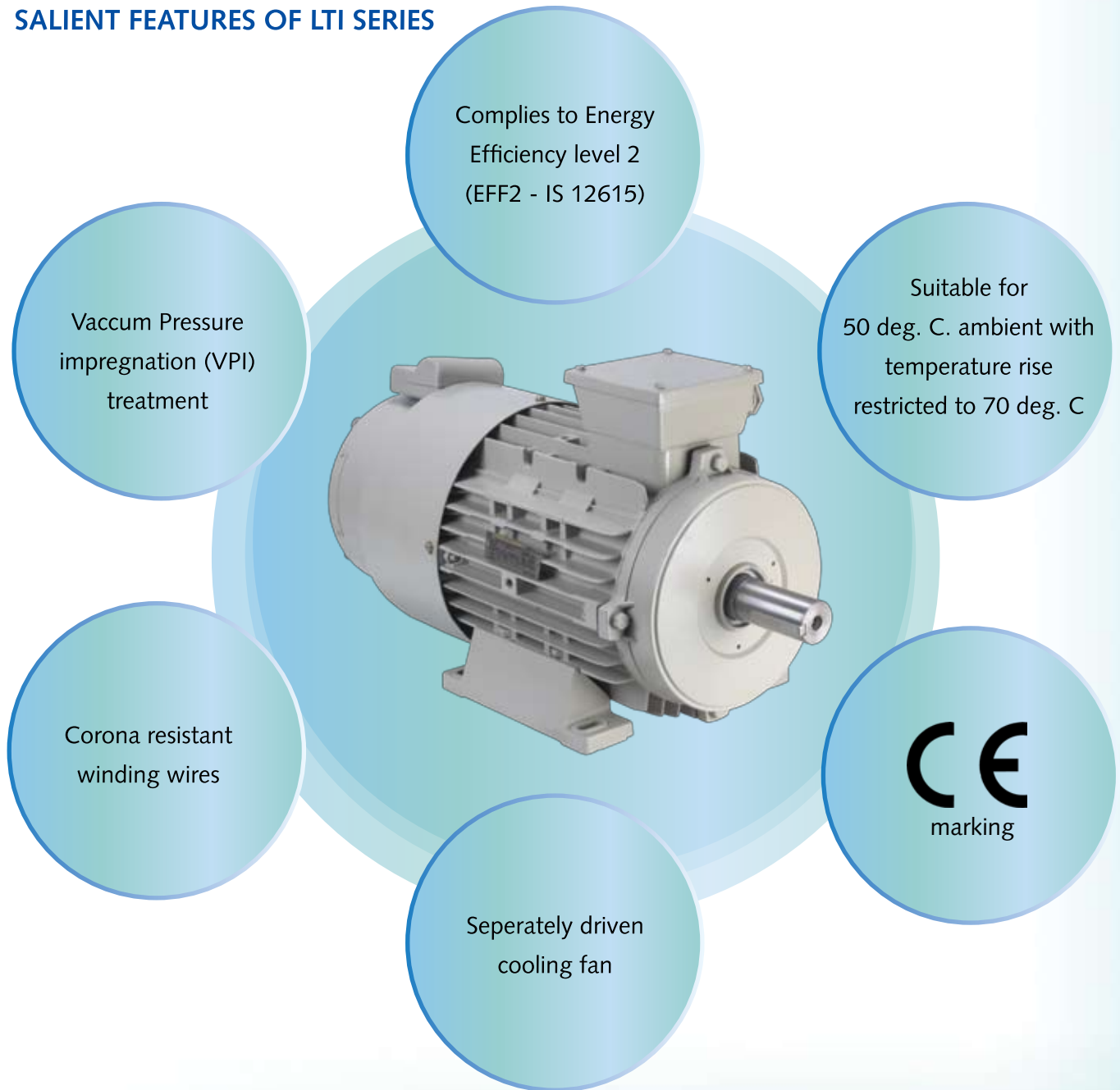
The Company has over 40 branch offices across the country and a network of over 100 service centres to deliver after-sales service to the customers.

For us it's "Imagineering"

Reliability is always a need. The need provokes **imagination** of the human mind to deliver strength and elegance. Powered with strong **engineering** and streamlined design, L&T introduces complete range of low tension AC motors suitable for various market segments namely Industry, OEM, Energy & Infrastructure, Buildings and Agriculture. These power packed motors with innovative manufacturing techniques enable high performance, energy efficiency and sustainability.

LTI SERIES OF 3 PHASE INVERTER DUTY MOTORS

SALIENT FEATURES OF LTI SERIES



LTI UNIQUE OFFERINGS

- LTI motors can operate from its rated speed to 10% of rated speed without any reduction in torque.
- LTI motors are suitable for lower speed or lower frequency operation
 - a. By "Constant V/f" for constant torque applications like extruders, lifts etc.
 - b. By "Variable V/f" for variable torque applications like Fans etc.
- LTI motors can be offered for constant power application in field weakening mode.
Application : Winder - Rewinder
- LTI series offers specially designed motors which will operate at desirable base speed, reducing the associated cost.



3 PHASE INVERTER DUTY MOTORS

BASIC FEATURES

“LTI” Motors Range

LTI series motors are 3 phase, TEFC Squirrel Cage Induction, Inverter Duty motors. These motors are available from frame size LTI 90 to LTI 315 having output ranging from 0.37KW to 200KW with 2,4,6,8 poles. Please refer back to us for higher pole requirements.

Voltage & Frequency

LTI motors are suitable for operation on 3 phase at $415V \pm 10\%$ and $50Hz \pm 5\%$ supply and combined variation of $\pm 10\%$. Please refer to us for motors with different voltage and frequency combinations.

Stator & Rotor Construction

Motors are available in Aluminium housing from frame 90 to 132.

Motors are available in Cast Iron housing from frame from 112 to 315. All motors in cast iron housing are with integral feet.

The complete range of motors are with high pressure aluminum die cast rotors.

Paint

Motors are provided with paint shade RAL 7032 that is suitable for tropical conditions. Special paints are available on request.

Enclosure

All motors shall have IP55 degree of protection which gives complete protection from dust & jets of water sprayed from all sides.

External Conditions: Ambient, Altitude & Humidity

All Motors are designed for an ambient of 50°C and maximum operational altitude of 1000 meters above mean sea level. The motors are designed for a relative humidity of upto 85%.

Insulation System & Temperature Rise

All motors are provided with class F insulation and temperature rise restricted to class B.

The winding temperature rise based on resistance method for various classes of insulation at 50° ambient temperature is as under (as per IS 12802)

Class B	-	70°C	(Add 10°C for Hot spot)
Class F	-	95°C	(Add 10°C for Hot spot)
Class H	-	115°C	(Add 15°C for Hot spot)



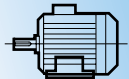
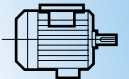
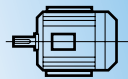
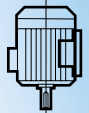
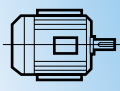
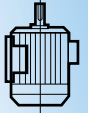
Mounting Arrangement

The standard inverter duty motors are foot mounted (B3). Motors can also be offered in the following mountings with various configurations as under:

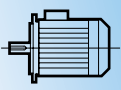
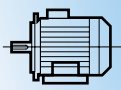
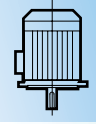
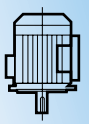
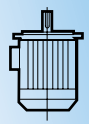
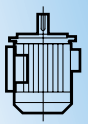
Foot : B3, B6, B7, B8, V5, V6
 Flange (D) : B5, V1, V3, B35, V15 & V36
 Face(C) : B14, B34

MOUNTING ARRANGEMENTS

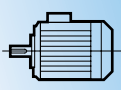
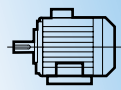
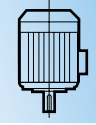
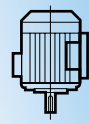
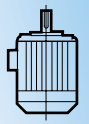
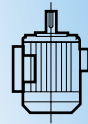
Foot mounted motors all frame sizes

IM 1001 (IM B3) - Horizontal shaft - Feet on floor		IM 1071 (IM B8) - Horizontal shaft - Feet on top		IM 1051 (IM B6) - Horizontal shaft - Wall mounted with feet on left hand side when viewed from drive end	
IM 1011 (IM V5) - Vertical shaft facing down - Feet on wall		IM 1061 (IM B7) - Horizontal shaft - Wall mounted with feet on right hand side when viewed from drive end		IM 1031 (IM V6) - Vertical shaft facing up - Feet on wall	

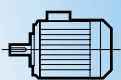
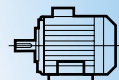
(FF) flange mounted motors all frame sizes (except IM 3001 limited to frame size 225)

IM 3001 (IM B5) - Horizontal shaft		IM 2001 (IM B35) - Horizontal shaft - Feet on floor		IM 3011 (IM V1) - Vertical shaft facing down	
IM 2011 (IM V15) - Vertical shaft facing down - Feet on wall		IM 3031 (IM V3) - Vertical shaft facing up		IM 2031 (IM V36) - Vertical shaft facing up - Feet on wall	

(FT) face mounted motors all frame sizes ≤ 132 mm

IM 3601 (IM B14) - Horizontal shaft		IM 2101 (IM B34) - Horizontal shaft - Feet on floor		IM 3611 (IM V18) - Vertical shaft facing down	
IM 2111 (IM V58) - Vertical shaft facing down - Feet on wall		IM 3631 (IM V19) - Vertical shaft facing up		IM 2131 (IM V69) - Vertical shaft facing up - Feet on wall	

Motor without drive end shield is important: the protection(IP) specified on the IM B9 & IM B15 motor plates is provided to the customer when the motor is assembled.

IM 9101 (IM B9) - Threaded tie rods - Horizontal shaft		IM 1201 (IM B15) - Feet and threaded tie rods - Horizontal shaft	
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3 PHASE INVERTER DUTY MOTORS

Winding & Impregnation System

Vacuum Pressure impregnation (VPI) is used for all motors with a polyesterimide Class H resin for the best electro-mechanical protection of the windings.

Motors are provided with **corona resistance** (Thermex 200 CR) winding wires suitable for high temperature withstanding capability.



VPI



Cooling & Forced Ventilation

All "LTI series" are provided with separately driven axial cooling fan units running at constant speed.

The frame wise ratings of the motors are as shown in the table:

Frame	Ratings (Watts)
90	90
100	90
112	90
132	90
160	135
180	135
200	155
225	155
250	155
280	180
315	180

BEARING DATA

Frame	Poles	DE Bearing	NDE bearing
90	2,4,6	6205 C3 ZZ	6205 C3 ZZ
100	2,4,6	6206 C3 ZZ	6206 C3 ZZ
112	2,4,6	6306 C3 ZZ	6306 C3 ZZ
132	2,4,6	6208 C3 ZZ	6208 C3 ZZ
160	2,4,6	6209 C3 ZZ	6209 C3 ZZ
180	2,4,6	6210 C3 ZZ	6210 C3 ZZ
200	2,4,6	6212 C3 ZZ	6212 C3 ZZ
225	2,4,6	6213 C3 ZZ	6213 C3 ZZ
250	2,4,6	6215 C3 ZZ	6215 C3 ZZ
280	2	6315 C3	6315 C3
280	4,6	6317 C3	6317 C3
315	2	6315 C3	6315 C3
315	4,6	6318 C3	6318 C3

Bearings & Lubrication

All motors upto 250 frames have pre-lubricated bearing as a standard feature.

Frame 280 and above are equipped with re-greasable bearings and all motors are lubricated with requisite amounts of lithium base grease.



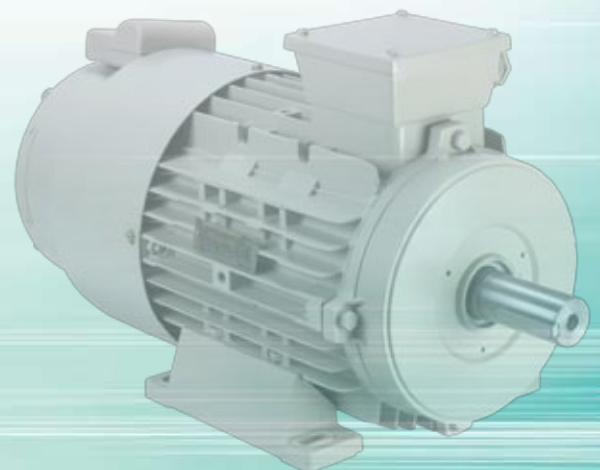
GOVERNING STANDARDS

INDIAN STANDARDS

- IS 325 : Three phase Induction motors.
- IS 1231: Dimensions of three phase foot mounted AC Induction motors.
- IS 2223: Dimensions of Flange mounted AC Induction motors.
- IS 2253: Designation for type of construction and mounting arrangements of rotating machines.
- IS 4029: Guide for testing three phase Induction motors.
- IS 4691: Degree of protection of electrical rotating machines.
- IS 4722: Rotating electric machines.
- IS 4889: Methods of determination of efficiency of rotating electrical machines.
- IS 6362: Designation of methods for cooling of rotating electrical machines.
- IS 8789: Values of performance characteristics for three phase Induction motors.
- IS 12065: Permissible limits of noise levels for rotating electrical machines.
- IS 12075: Mechanical vibration of rotating electrical machines.
- IS 12615: Energy efficient Induction motors – Three phase squirrel cage.

INTERNATIONAL STANDARDS

- IEC 34-1: Recommendation for rotating electrical machines.
- IEC 72-1: Recommendation, Dimensions & output rating of electrical machines for foot mounting.
- IEC 72-2: Recommendation of the dimensions and output rating of electrical motors for flange mounting.



Terminal Arrangements

All motors are provided with a spacious terminal box made of Aluminium. The terminal boxes provided on top are standard. They can be rotated in steps of 90 degree for all frames. They have IP55 protection. Motors of frame 90 are provided with 3 leads in the terminal box and motor is with star connection. All motors above frame 100 are provided with 6 leads in the terminal box for flexibility of star/delta starting.

Fig. 1: 90 frame, 3 terminals, Aluminium terminal box

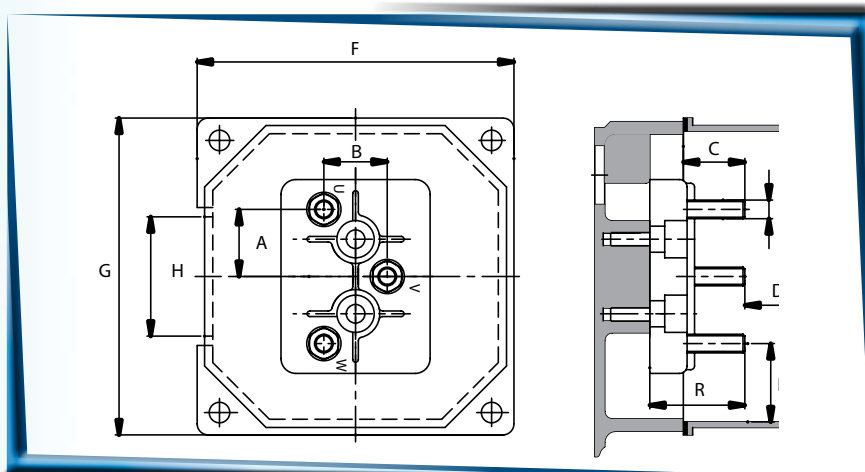


Fig . 2: 100-112 frames, 6 terminals, Aluminium terminal box

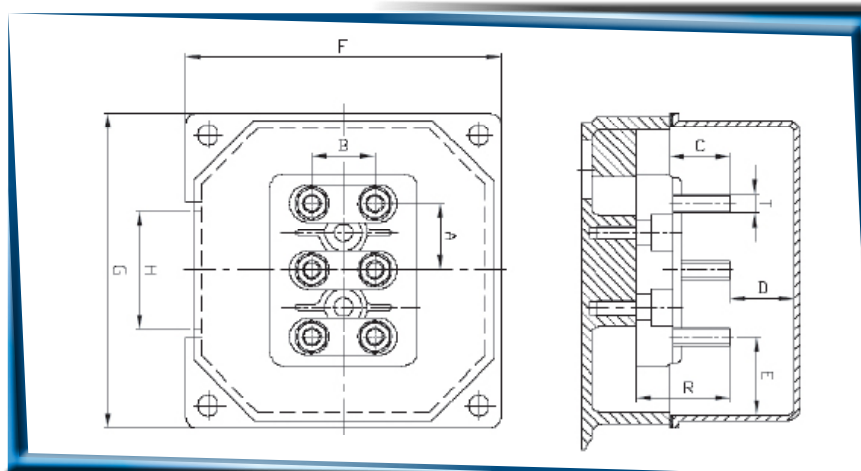


Fig. 3: 132-160 frames, 6 terminals, Aluminium terminal box

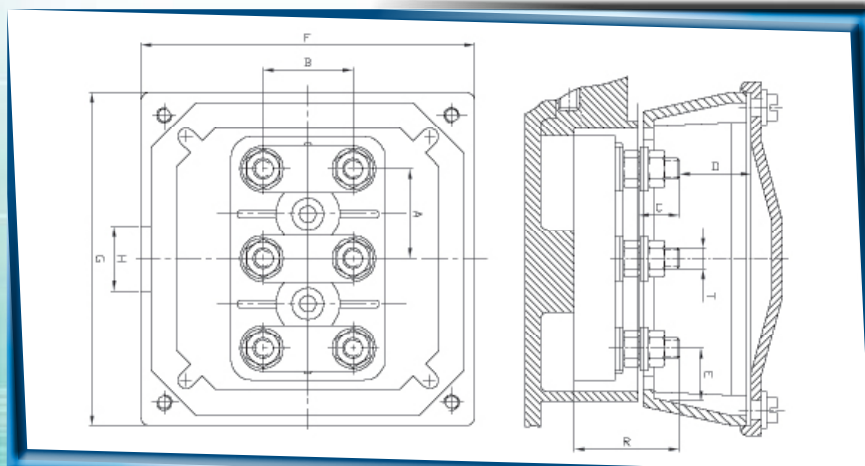


Fig 4: 180-200 frames, 6 terminals, Cast Iron terminal box

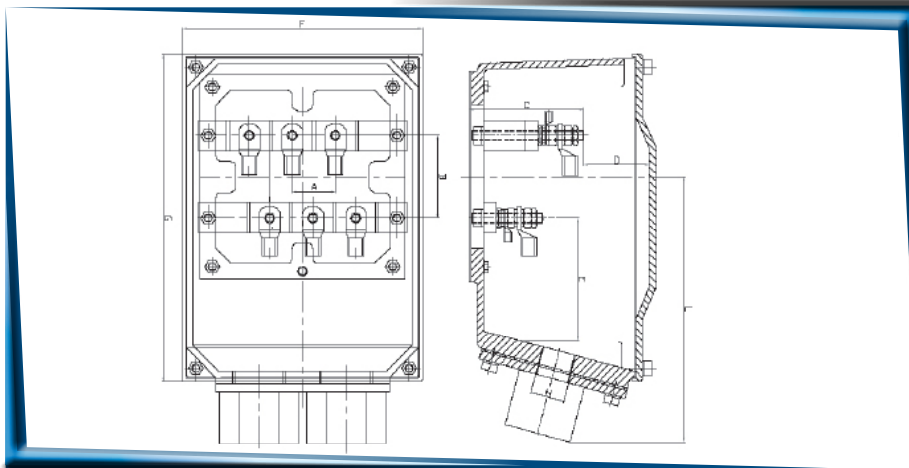
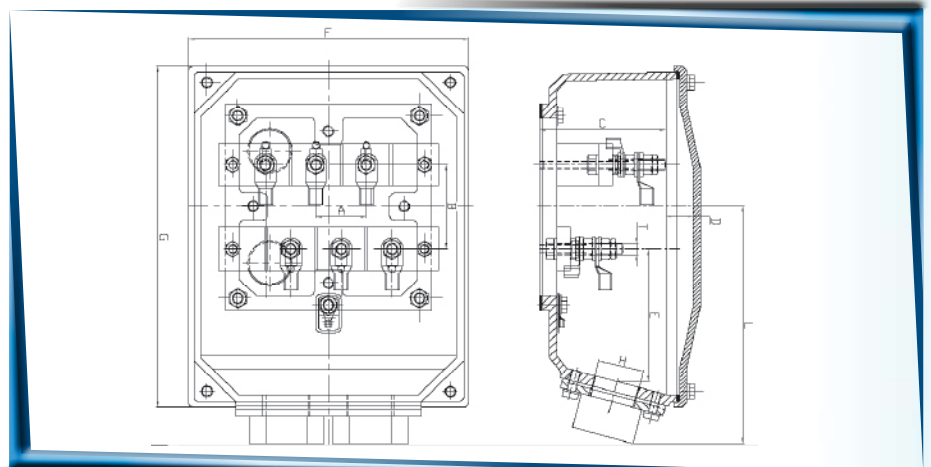


Fig 5: 225-315 frames, 6 Terminal Fabricated Terminal Box



TERMINAL BOX DIMENSIONS

Frame	T	A	B	C	D	E	F	G	H	L	R
IE 90	M5	17	17	16	18	19	85	85	M20	---	25
IE 100	M5	17	17	16	23	15	85	85	M25	---	27
IE 112	M5	17	17	16	23	15	85	85	M25	---	27
IE 132	M6	25	25	24	27	15	116	116	M25	---	30
IE 160	M8	35	35	16	28	23	130	130	M32	---	41
IE 180	M8	36	60	90	20	95	240	194	M32	180	48
IE 200	M8	36	60	90	20	95	240	194	M32	180	48
IE 225	M10	42	80	112	64	121	312	226	M32	250	62
IE 250	M10	42	80	112	64	121	312	226	M32	250	62
IE 280	M12	58	104	105	60	179	313	335	M32	260	85
IE 315	M12	58	104	105	60	179	313	335	M32	260	85

For connection diagrams and the terminal connections, refer page no. 14.



3 PHASE INVERTER DUTY MOTORS

SELECTION & ORDERING DATA

PERFORMANCE FIGURES OF INVERTER DUTY AC MOTORS

415Volts, 50Hz, IP55, IC416, 50Deg.Amb, Ins. Cl 'F', Temp. Rise Cl. B & Alt 1000mts.

2 POLE=3000 RPM

Frame	kW	hp	EFF [%]	Current [A]	Cos ϕ [pu]	Speed [rpm]	TORQUE			Starting current [pu]	Gd ² kgm ²
							Rated [Kg m]	Starting [pu]	Pullout [pu]		
90S	1.50	2.00	78.5	3.0	0.89	2850	0.51	1.9	2.6	5.6	0.006
90L	2.20	3.00	81.0	4.3	0.89	2855	0.75	1.9	2.7	5.8	0.007
100L	3.70	5.00	84.0	7.0	0.88	2860	1.26	1.9	3.1	6.0	0.015
132S	5.50	7.50	85.7	10.4	0.86	2880	1.86	2.0	2.8	6.0	0.041
132S	7.50	10.0	87.0	13.5	0.88	2890	2.53	2.0	3.0	6.0	0.054
160M	9.30	12.5	87.7	16.2	0.90	2930	3.09	2.1	2.8	6.0	0.130
160M	11.0	15.0	88.4	19.1	0.90	2930	3.65	2.2	2.9	6.0	0.133
160M	15.0	20.0	89.4	25.5	0.90	2930	4.98	2.0	2.7	6.0	0.184
160L	18.5	25.0	90.0	31.5	0.90	2930	6.14	2.0	2.7	6.0	0.220
180M	22.0	30.0	90.5	37.0	0.90	2900	7.38	2.1	2.9	6.0	0.297
200L	30.0	40.0	91.4	50.0	0.90	2935	9.95	2.0	2.5	6.0	0.510
200L	37.0	50.0	92.0	60.9	0.90	2940	12.25	2.0	2.5	6.0	0.640
225M	45.0	60.0	92.5	74.0	0.90	2955	14.82	2.0	2.7	6.0	1.070
250M	55.0	75.0	93.0	89.5	0.90	2960	18.08	1.9	2.2	6.0	1.440
280S	75.0	100.0	93.6	124.0	0.90	2970	24.57	2.0	2.3	6.0	2.480
280M	90.0	120.0	93.9	148.0	0.90	2970	29.48	2.0	2.2	6.0	2.960
315S	110.0	150.0	94.0	181.0	0.90	2980	35.92	1.7	2.5	7.0	5.800
315M	132.0	180.0	94.5	216.0	0.90	2980	43.10	1.7	2.5	7.0	6.980
315L	160.0	215.0	94.8	261.0	0.90	2980	52.24	1.7	2.5	7.0	8.460
250M	55.0	75.0	93.0	89.5	0.90	2960	18.08	1.9	2.2	6.0	1.440
280S	75.0	100.0	93.6	124.0	0.90	2970	24.57	2.0	2.3	6.0	2.480
280M	90.0	120.0	93.9	148.0	0.90	2970	29.48	2.0	2.2	6.0	2.960
315S	110.0	150.0	94.0	181.0	0.9	2980	35.92	1.7	2.5	7.0	5.80
315M	132.0	180.0	94.5	216.0	0.9	2980	43.10	1.7	2.5	7.0	6.98
315L	160.0	215.0	94.8	261.0	0.9	2980	52.24	1.7	2.5	7.0	8.46

PERFORMANCE FIGURES OF INVERTER DUTY AC MOTORS

415Volts, 50Hz, IP55, IC416, 50Deg.Amb, Ins. Cl 'F', Temp. Rise Cl. B & Alt 1000mts.

4 POLE=1500 RPM

Frame	kW	hp	EFF [%]	Current [A]	Cos ϕ [pu]	Speed [rpm]	TORQUE			Starting current [pu]	Gd ² kgm ²
							Rated [Kg m]	Starting [pu]	Pullout [pu]		
90S	1.10	1.50	76.5	2.7	0.75	1400	0.76	1.9	2.6	4.6	0.0090
90L	1.50	2.00	78.5	3.7	0.74	1405	1.04	2.0	2.8	4.9	0.0130
100L	2.20	3.00	81.0	4.8	0.80	1410	1.52	1.8	2.7	5.0	0.0240
112M	3.70	5.00	84.0	7.6	0.83	1435	2.51	2.0	2.5	5.6	0.0490
132S	5.50	7.50	86.0	11.0	0.82	1440	3.72	2.0	3.0	5.7	0.094
132M	7.50	10.0	87.0	14.7	0.83	1450	5.03	2.0	3.1	5.8	0.128
160M	9.30	12.5	88.0	17.5	0.84	1450	6.24	1.8	2.9	5.7	0.248
160M	11.0	15.0	89.0	20.5	0.84	1455	7.36	1.9	2.9	5.8	0.250
160L	15.0	20.0	90.0	28.0	0.83	1465	9.96	1.9	3.0	5.9	0.336
180M	18.5	25.0	90.0	36.0	0.80	1470	12.25	1.8	2.7	5.8	0.515
180L	22.0	30.0	91.0	41.5	0.81	1474	14.52	1.8	2.7	6.0	0.618
200L	30.0	40.0	92.0	52.0	0.87	1472	19.83	2.1	2.9	6.0	1.110
225S	37.0	50.0	92.0	65.0	0.86	1472	24.46	2.1	2.5	6.0	1.440
225M	45.0	60.0	92.5	79.5	0.87	1472	29.75	2.2	2.6	6.0	1.740
250M	55.0	75.0	93.0	93.5	0.88	1480	36.16	1.9	2.7	6.0	3.070
280S	75.0	100.0	93.7	128.0	0.87	1485	49.14	2.0	2.5	6.0	4.79
280M	90.0	120.0	93.9	153.0	0.87	1485	58.97	1.9	2.4	6.0	5.75
315S	110.0	150.0	94.4	183.0	0.89	1485	72.07	1.8	2.6	6.0	10.00
315M	132.0	180.0	94.7	218.0	0.89	1485	86.49	1.8	2.6	6.0	10.70
315L	160.0	215.0	95.0	264.0	0.89	1485	104.84	1.8	2.6	6.0	15.80
315L	200.0	270.0	95.0	329.0	0.89	1485	131.04	1.7	2.6	6.0	17.50





3 PHASE INVERTER DUTY MOTORS

PERFORMANCE FIGURES OF INVERTER DUTY AC MOTORS

415Volts, 50Hz, IP55, IC416, 50Deg.Amb, Ins. Cl 'F', Temp. Rise Cl. B & Alt 1000mts.

6 POLE=1000 RPM

Frame	kW	hp	EFF [%]	Current [A]	Cos ϕ [pu]	Speed [rpm]	TORQUE			Starting current [pu]	Gd ² kgm ²
							Rated [Kg m]	Starting [pu]	Pullout [pu]		
90S	0.75	1.00	71.0	2.10	0.70	935	0.78	1.9	2.1	3.5	0.015
90L	1.10	1.50	74.0	3.00	0.70	940	1.14	1.9	2.3	3.6	0.020
100L	1.50	2.00	76.0	3.95	0.70	938	1.56	2.2	2.2	3.9	0.042
112M	2.20	3.00	79.0	5.00	0.77	950	2.25	1.8	2.3	4.3	0.075
132S	3.70	5.00	82.5	8.00	0.78	960	3.75	1.8	2.3	4.2	0.154
132M	5.50	7.50	84.5	11.5	0.80	955	5.60	1.8	2.0	3.7	0.184
160M	7.50	10.0	86.0	15.0	0.80	970	7.52	1.8	2.8	5.3	0.377
160L	11.0	15.0	87.5	22.0	0.80	970	11.03	1.8	2.8	5.3	0.514
180M	15.0	20.0	88.5	31.1	0.76	980	14.89	1.8	3.4	6.0	0.867
200L	18.5	25.0	89.5	36.5	0.80	980	18.37	1.8	2.8	6.0	1.38
200L	22.0	30.0	90.0	42.5	0.80	980	21.84	1.8	2.9	6.0	1.59
225M	30.0	40.0	91.0	56.6	0.81	985	29.63	1.9	2.0	6.0	3.07
250M	37.0	50.0	91.5	67.0	0.81	985	36.55	1.8	2.1	6.0	5.68
280S	45.0	60.0	92.0	84.0	0.81	990	44.23	1.9	2.2	6.0	5.88
280M	55.0	75.0	92.5	102.0	0.81	990	54.06	1.9	2.2	6.0	7.10
315S	75.0	100.0	93.0	132	0.85	990	73.71	1.8	2.6	6.0	17.90
315M	90.0	120.0	93.5	158	0.85	990	88.45	1.8	2.6	6.0	22.00
315M	110.0	50.0	93.5	193	0.85	990	108.11	1.8	2.6	6.0	26.85
315L	132.0	180.0	94.0	228	0.86	990	129.73	1.8	2.6	6.0	27.85

PERFORMANCE FIGURES FOR EFFICIENCY-II MOTORS

415Volts, 50Hz, IP55, IC416, 50Deg.Amb, Ins. Cl 'F', Temp. Rise Cl. B & Alt 1000mts.

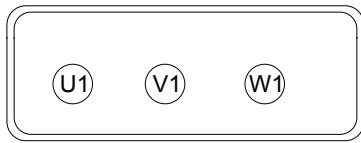
8 POLE=750 RPM

Frame	kW	hp	EFF [%]	Current [A]	Cos ϕ [pu]	Speed [rpm]	TORQUE			Starting current [pu]	Gd ² kgm ²
							Rated [Kg m]	Starting [pu]	Pullout [pu]		
90S	0.37	0.50	62.0	1.35	0.61	700	0.51	1.9	2.0	3.0	0.0152
90L	0.55	0.75	67.0	1.90	0.61	700	0.77	1.9	2.0	3.0	0.0202
100L	0.75	1.00	70.0	2.45	0.60	700	1.0	1.9	2.4	3.4	0.0312
100L	1.10	1.50	72.0	3.30	0.65	700	1.5	1.8	2.1	3.2	0.0416
112M	1.50	2.00	74.0	4.35	0.65	710	2.1	1.8	2.3	3.5	0.0755
132S	2.20	3.00	77.0	5.8	0.69	715	3.0	1.8	2.0	3.3	0.102
160M	3.70	5.0	80.0	8.7	0.74	722	5.0	1.8	2.5	4.2	0.322
160M	5.5	7.5	82.5	12.4	0.75	722	7.4	1.8	2.5	4.2	0.425
160L	7.5	10.0	84.0	16.3	0.76	722	10.1	1.8	2.5	4.3	0.579
180L	11.0	15.0	86.0	23.7	0.75	730	14.7	1.7	2.6	5.0	1.07
200L	15.0	20.0	87.0	30.8	0.78	730	20.0	1.7	2.2	5.0	1.59
225S	18.5	25.0	88.0	37.5	0.78	735	24.5	1.7	2.3	5.0	2.54
225M	22.0	30.0	88.5	44.5	0.78	735	29.2	1.7	2.3	5.0	3.07
250M	30.0	40.0	90.0	59.5	0.78	740	39.5	1.6	2.3	5.0	5.68
280S	37.0	50.0	90.5	71.0	0.80	739	48.8	1.9	2.5	6.0	7.80
280M	45.0	60.0	91.0	86.0	0.80	740	59.2	1.9	2.5	6.0	9.20
315S	55	75	91.5	106	0.79	740	72.4	1.9	2.3	6.0	17.9
315M	75	100	92.5	143	0.79	740	98.7	1.8	2.3	6.0	22.0
315L	90	120	93.0	171	0.79	740	119	1.8	2.3	6.0	26.85
315L	110	150	93.5	208	0.79	740	145	1.8	2.3	6.0	32.8
315L	90	120	93.0	171	0.79	740	119	1.8	2.3	6.0	26.85
315L	110	150	93.5	208	0.79	740	145	1.8	2.3	6.0	32.8



TERMINAL BOX CONNECTIONS

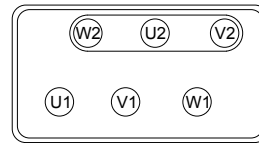
Y Connection



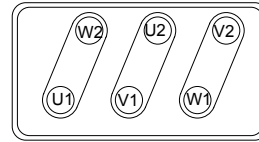
3 terminal, Frame 90 is star connected

TERMINAL CONNECTIONS

Y Connection



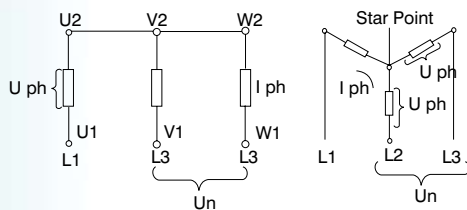
D Connection



6 terminal, Frame 100 - 315

CONNECTING DIAGRAMS

Y or Star connection



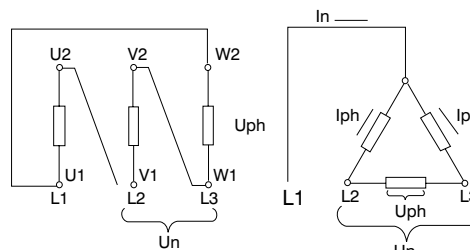
Connecting together the W2, U2, V2 terminals (star point) and connecting to the mains the U1, V1, W1 terminals a star connection is obtained.

The phase current I_{ph} and phase voltage U_{ph} are as follows :

$$I_{ph} = I_n$$

$$U_{ph} = U_n / \sqrt{3}$$

Δ or Delta connection



Connecting the end of each winding to the beginning of the next winding a delta connection is obtained. The phase current I_{ph} and the phase voltage U_{ph} are as follows:

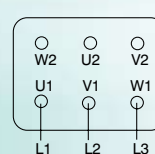
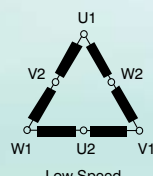
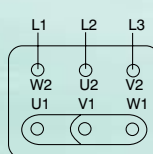
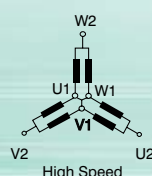
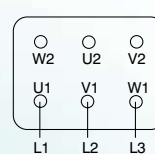
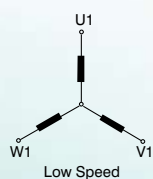
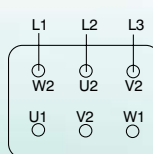
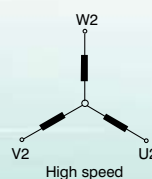
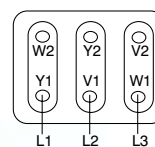
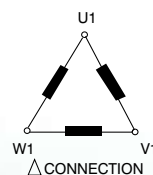
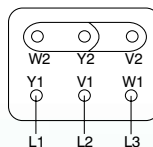
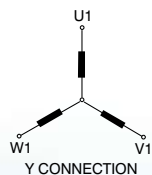
$$I_{ph} = I_n / \sqrt{3}$$

$$U_{ph} = U_n$$

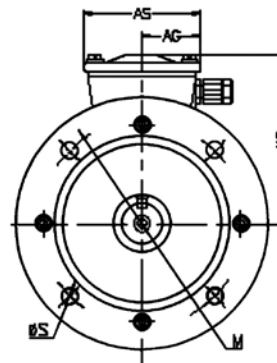
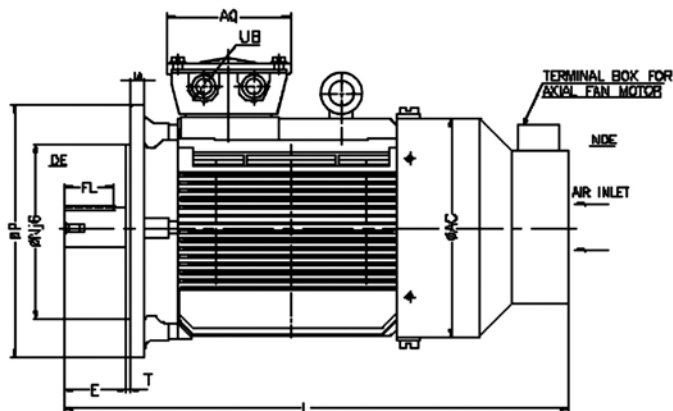
Where : I_n : the line current
 U_n : the line voltage

Star-Delta starting

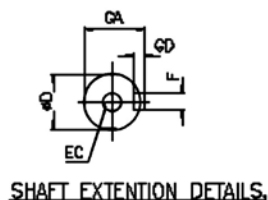
The star delta starting is an easy way to reduce the starting current but the starting torque also gets reduced. Motors can be started with the star delta method only when the supply voltage corresponds to the rated voltage of the motors in the delta connection.



Dimensions: Flange Mounted (B5) Motors



B5-'B' TYPE FLANGE MOUNTED INVERTER-DUTY



SHAFT EXTENSION DETAILS

1) TOLERANCES

ØD=Ø11 TO Ø28-ISO j8

ØD=Ø38 TO Ø48-ISO k6

ØD=Ø55 TO Ø65-ISO m6

F-ISO h9

h- +0.0/-0.5

ALL DIMENSIONS ARE IN mm.
PROTECTION-: IP 55
COOLING -: IC 416

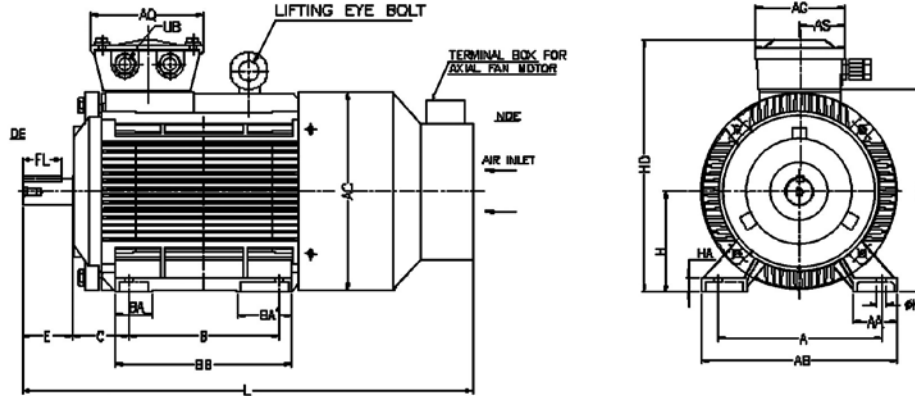
B5-"B" TYPE FLANGE MOUNTED INVERTER-DUTY

Frame	AC	AQ	AS	AG	ØD1	E	FL	F1	GD	GA	HB	M	ØN1	ØP	ØS	T	LA	EC	UB
90S	177	95	95	48	24	50	40	8	7	27	137	165	130	200	12	3.5	9	M6	1XPc11
90L	177	95	95	48	24	50	40	8	7	27	137	165	130	200	12	3.5	9	M6	1XPc11
100L	200	95	95	48	28	60	50	8	7	31	147	215	180	250	15	4	12	M8	1XPc11
112M	224	117	117	59	28	60	50	8	7	31	176	215	180	250	15	4	12	M8	2x25
132S	264	117	117	59	38	80	60	10	8	41	196	265	230	300	15	4	12	M8	2x25
132M	264	117	117	59	38	80	60	10	8	41	196	265	230	300	15	4	12	M8	2x25
160M	320	140	140	70	42	110	100	12	8	45	220	300	250	350	19	5	13	M16	2x32
160L	320	140	140	70	42	110	100	12	8	45	220	300	250	350	19	5	13	M16	2x32
180M	355	204	250	145	48	110	103	14	9	51.5	295	300	250	350	19	5	13	M16	2x32
180L	355	204	250	145	48	110	103	14	9	51.5	295	300	250	350	19	5	13	M16	2x32
200L	400	204	250	145	55	110	105	16	10	59	320	350	300	400	19	5	15	M20	2x32
225M (2P)	450	234	320	205	55	110	105	16	10	59	404	400	350	450	19	5	16	M20	2x32
225S (4P&8P)	450	234	320	205	60	140	135	18	11	64	404	400	350	450	19	5	16	M20	2x32
225M (4,6,8P)	450	234	320	205	60	140	135	18	11	64	404	400	350	450	19	5	16	M20	2x32
250M (2P)	500	234	320	205	60	140	135	18	11	64	429	500	450	550	19	5	18	M20	2x32
250M (4,6,8P)	500	234	320	205	65	140	135	18	11	69	429	500	450	550	19	5	18	M20	2x32
280S (4,6,8P)	546	314	336	202	75	140	130	22	14	80	435	500	450	550	19	5	22	M20	2x36
280M (4,6,8P)	546	314	336	202	75	140	130	22	14	80	435	500	450	550	19	5	22	M20	2x36
280S (2P)	546	314	336	202	65	140	130	18	11	69	435	500	450	550	19	5	22	M20	2x36
280M (2P)	546	314	336	202	65	140	130	18	11	69	435	500	450	550	19	5	22	M20	2x36
315S (4,6,8P)	645	314	336	202	80	170	150	22	14	85	555	600	550	660	24	6	22	M24	2x36
315M (4,6,8P)	645	314	336	202	80	170	150	22	14	85	555	600	550	660	24	6	22	M24	2x36
315L (4,6,8P)	645	314	336	202	80	170	150	22	14	85	555	600	550	660	24	6	22	M24	2x36
315S (2P)	645	314	336	202	65	140	130	18	11	69	555	600	550	660	24	6	22	M20	2x36
315M (2P)	645	314	336	202	65	140	130	18	11	69	555	600	550	660	24	6	22	M20	2x36
315L (2P)	645	314	336	202	65	140	130	18	11	69	555	600	550	660	24	6	22	M20	2x36

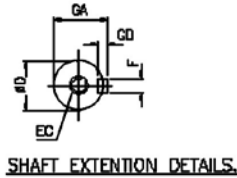
ALL DIMENSIONS ARE IN "MM"

DIMENSIONAL DRAWINGS

Dimensions: Foot Mounted (B3) Motors



B3-FOOT MOUNTED INVERTER-DUTY



1) TOLERANCES

$\phi D = \phi 11$ TO $\phi 28$ - ISO j6
 $\phi D = \phi 38$ TO $\phi 48$ - ISO k6
 $\phi D = \phi 55$ TO $\phi 65$ - ISO m6
 F - ISO h9
 h - $+0.0/-0.5$

ALL DIMENSIONS ARE IN mm.
 PROTECTION -: IP 55
 COOLING -: IC 416

B3-FOOT MOUNTED INVERTER-DUTY

Frame	A	AA	AB	AC	AQ	AS	AG	B	BB	BA	BA'	C	$\phi D1$	E	FL	FI	GD	GA	H1	HA	HC	HD	K	L	EC	UB
90S	140	35	170	177	95	95	48	100	155	30	55	56	24	50	40	8	7	27	90	10	180	227	10	430	M6	1XPc11
90L	140	35	170	177	95	95	48	125	155	30	55	56	24	50	40	8	7	27	90	10	180	227	10	430	M6	1XPc11
100L	160	40	196	200	95	95	48	140	176	36	36	63	28	60	50	8	7	31	100	10	200	247	12	480	M8	1XPc11
112M	190	47	226	224	117	117	59	140	176	36	36	70	28	60	50	8	7	31	112	12	224	288	12	504	M8	2x25
132S	216	55	260	264	117	117	59	140	214	36	74	89	38	80	60	10	8	41	132	12	266	328	12	600	M8	2x25
132M	216	55	260	264	117	117	59	178	214	36	74	89	38	80	60	10	8	41	132	12	266	328	12	600	M8	2x25
160M	254	56	307	320	140	140	70	210	300	45	90	108	42	110	100	12	8	45	160	16	324	380	15	764	M16	2x32
160L	254	56	307	320	140	140	70	254	300	45	90	108	42	110	100	12	8	45	160	16	324	380	15	764	M16	2x32
180M	279	66	330	355	204	250	145	241	330	63	105	121	48	110	103	14	9	51.5	180	22	359	475	15	800	M16	2x32
180L	279	66	330	355	204	250	145	279	330	63	105	121	48	110	103	14	9	51.5	180	22	359	475	15	800	M16	2x32
200L	318	80	398	400	204	250	145	305	355	85	85	133	55	110	105	16	10	59	200	25	399	520	19	870	M20	2x32
225M (2P)	356	80	436	450	234	320	205	311	366	100	100	149	55	110	105	16	10	59	225	25	448	629	19	925	M20	2x32
225S (4P&8P)	356	80	436	450	234	320	205	286	366	100	100	149	60	140	135	18	11	64	225	25	448	629	19	955	M20	2x32
225M (4,6,8P)	356	80	436	450	234	320	205	311	366	100	100	149	60	140	135	18	11	64	225	25	448	629	19	955	M20	2x32
250M (2P)	406	100	506	500	234	320	205	349	425	115	115	168	60	140	135	18	11	64	250	32	498	679	24	1040	M20	2x32
250M (4,6,8P)	406	100	506	500	234	320	205	349	425	115	115	168	65	140	135	18	11	69	250	32	498	679	24	1040	M20	2x32
280S (4,6,8P)	457	124	548	546	314	336	202	368	439	100	151	190	75	140	130	22	14	80	280	40	535	740	24	1173	M20	2x36
280M (4,6,8P)	457	124	548	546	314	336	202	419	490	100	151	190	75	140	130	22	14	80	280	40	535	740	24	1210	M20	2x36
280S (2P)	457	124	548	546	314	336	202	368	439	100	151	190	65	140	130	18	11	69	280	40	535	740	24	1173	M20	2x36
280M (2P)	457	124	548	546	314	336	202	419	490	100	151	190	65	140	130	18	11	69	280	40	535	740	24	1210	M20	2x36
315S (4,6,8P)	508	131	618	645	314	336	202	406	527	125	176	216	80	170	150	22	14	85	315	50	690	890	28	1450	M24	2x36
315M (4,6,8P)	508	131	618	645	314	336	202	457	578	125	176	216	80	170	150	22	14	85	315	50	690	890	28	1500	M24	2x36
315L (4,6,8P)	508	131	618	645	314	336	202	508	578	125	176	216	80	170	150	22	14	85	315	50	690	890	28	1530	M24	2x36
315S (2P)	508	131	618	645	314	336	202	406	527	125	176	216	65	140	130	18	11	69	315	50	690	890	28	1450	M20	2x36
315M (2P)	508	131	618	645	314	336	202	457	578	125	176	216	65	140	130	18	11	69	315	50	690	890	28	1500	M20	2x36
315L (2P)	508	131	618	645	314	336	202	508	578	125	176	216	65	140	130	18	11	69	315	50	690	890	28	1530	M20	2x36

ALL DIMENSIONS ARE IN "MM"

PACKING - WEIGHT & DIMENSIONS

All LTI motors are provided with **Corrugated carton packing for frames till 132. Beyond 132 size frame, motors are provided in robust wooden packing.** The packing weight & dimensions are as indicated in the table below:

Frame	Length in mm	Width in mm	Height in mm	Net Wt.(Kg)	Gross Wt.(Kg)
90S	360	220	260	15	16
90L	360	220	260	18	19
100L	432	305	330	25	26
112M	457	330	356	35	36
132S	559	356	406	58	57
132M	559	356	406	59	63
160M	711	381	432	141	160
160L	711	381	432	153	170
180	810	455	575	220	250
200	890	500	620	300	340
225	975	550	730	375	420
250	1065	600	780	510	560
280S	1123	650	790	685	725
280M	1174	650	790	700	760
315S	1220	718	910	916	980
315M	1300	718	910	978	1040
315L	1330	718	910	1020	1100

NAME PLATE

 LARSEN & TOUBRO																	
3-phase Inverter Duty Motor																	
Sno: XXXXXXXX		KW :	EFF% :	FRAME:													
Amb. 50°C	IP55	Ins.Class: F	<table border="1"> <tr> <td>DE</td> <td></td> </tr> <tr> <td>NDE</td> <td></td> </tr> </table>	DE		NDE											
DE																	
NDE																	
<table border="1"> <tr> <td>V</td> <td>Hz</td> <td>RPM</td> <td>A</td> <td>PF</td> <td>DUTY</td> <td>Wt.(kg)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	V	Hz	RPM	A	PF	DUTY	Wt.(kg)										
V	Hz	RPM	A	PF	DUTY	Wt.(kg)											
Connection:		Ref: IS.325,IS.12615,IEC.34-1		MADE IN INDIA													

OPTIONAL FEATURES

The following special features/accessories can be provided for motors on request:

- Non standard voltage &/or frequency
- RTD PT 100
- Epoxy coatings on winding overhangs
- Epoxy based paint
- Standard double shaft extension
- Terminal box on RHS/LHS (seen from Driving side)
- PTC thermistors
- Space Heaters
- Non standard payment shade
- Non standard shaft extension
- Insulated bearings
- Construction in IM B35

NOTES

NOTES

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Product improvement is a continuous process. For the latest information and special applications, please contact any of our offices listed here.



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