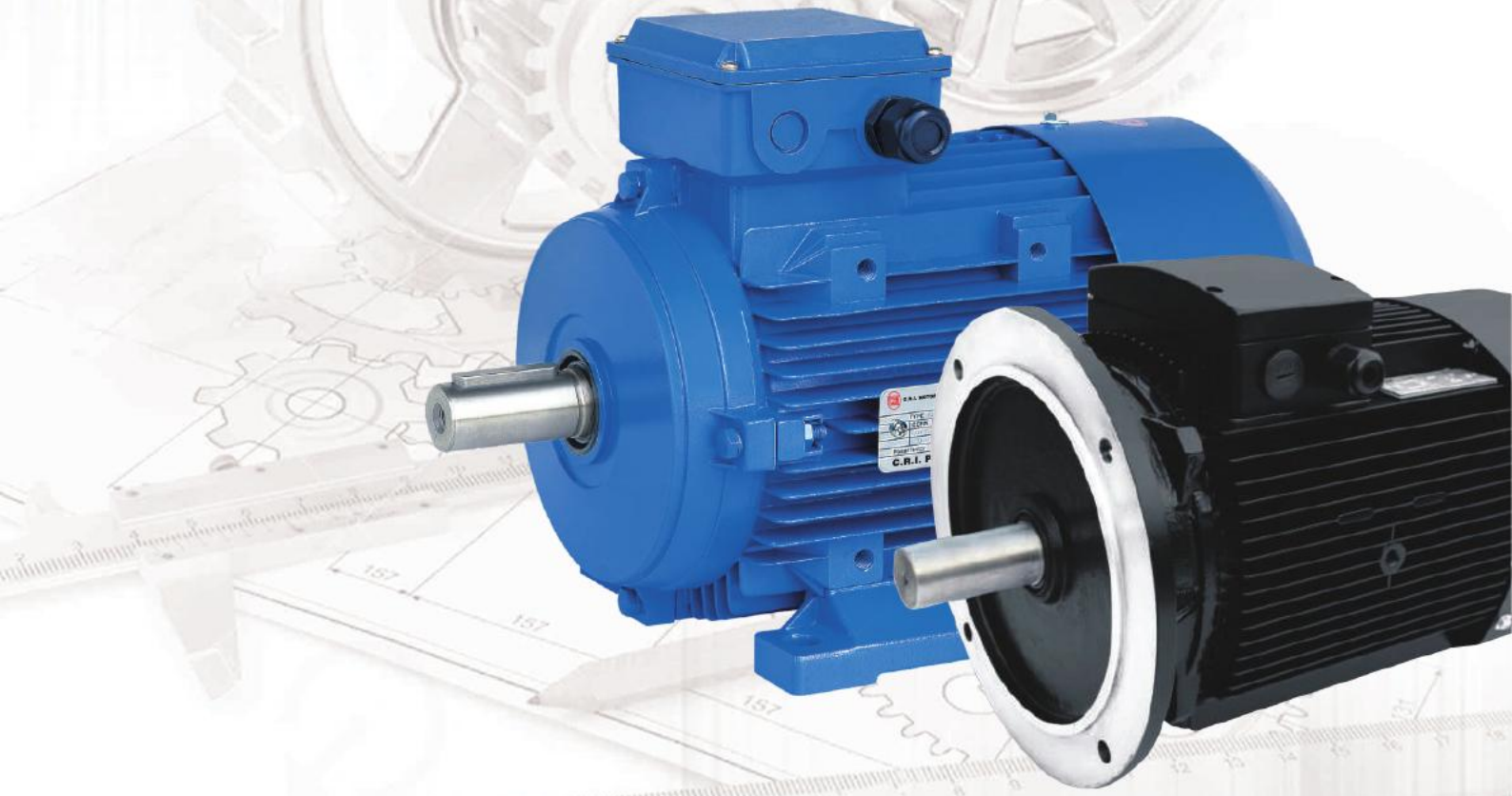
SAVE FOR FUTURE

C.R.I. MOTORS
Pumping trust. Worldwide.

Sheer POWER



A.C. Induction Motors - 50Hz

An ISO 9001 & 14001 Company

CE*

* For Specific models only.

C.R.I. PUMPS
Pumping trust. Worldwide.

THE BEGINNING

of C.R.I., way back in 1961, was a resolute attempt to produce a few irrigation equipments using the limited facilities of an in-house foundry. Eventually the founder's dream was coming true as the small production unit he started kept growing rapidly. Now, after more than five eventful decades, it is an enormous, widely reputed organization, which produces more than 1500 varieties of perfectly engineered pumps and motors and sells its products in numerous countries spread across 6 continents.

C.R.I. IS ONE AMONG

the few pioneers in the world to produce 100% stainless steel submersible pumps. Having achieved a record production capacity of over 1.5 million pumps per annum, today C.R.I. is rubbing its shoulders with the best brands in the world, with advanced technology and safety standards as its hallmarks.

THE INFRASTRUCTURE

of C.R.I. is pretty comprehensive with state-of-the-art machineries and high potential in-house R&D recognised by the ministry of science and technology, Govt. of India - all within its own covered area of 200,000 square metres. The production environment is accredited with ISO 9001 & 14001 certifications and the products are CE, UR/UL, TSE & ISI certified. The R&D team always stays in tune with the changing scenario and seldom fails in coming up with outstanding solutions every time.

NEEDLESS TO SAY,

behind this legendary growth lies the untiring, innovative, enthusiastic and dedicated team work. and, of course, a flawlessly maintained value system too. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation".

CONTENTS

A.C. INDUCTION MOTORS - 50Hz

DESCRIPTION

C.R.I. offers a comprehensive range of A.C. Induction motors in standard and premium efficiency designs for wide range of applications. These motors are synchronous type with constant speed suitable for continuous duty operations. Stator is made of low watt loss steel laminations to deliver high efficiency. Dynamically balanced rotor and high quality bearings ensure vibration and noise free operations. The varnish impregnated windings are made of high-grade enameled copper wire.

Shaft is made of high quality steel, precision ground of ample size for transmitting the rated horsepower. Construction of motor frames and usage of quality materials result in high performance and low temperature rise, thereby increasing the life cycle of the motor. High-grade cast iron / Die-cast Aluminum components machined with close tolerance and high quality, heavy duty bearings are used to ensure better efficiency and longer life. All single and three phase motors require adequate control systems with necessary protections.

Motors are available with IE-3(Premium Efficiency) IE2(EFF-1), IE1(EFF-2) versions with B3, B14 & B5 mounting dimensions to cater various applications.

Applications : Machine Tools, Blowers and Fans, Air-Conditioners, Compressors, Material Handling Equipments, Cranes and Hoist, Textile Machinery, Cement Plant, Pharmaceutical Machinery, Packaging Machinery, Construction Equipments, Agriculture, Food processing Machinery, Water treatment plants and General Engineering.

MATERIALS OF CONSTRUCTION

Motor Parts	Frame Size	Material
Stator frame	56 - 132	Aluminum alloy
	160 - 355	Cast iron
Endshield	56 - 90	Aluminum alloy
	100 - 355	Cast iron
Flanged endshield	56 - 132	Aluminum alloy
	160 - 355	Cast iron
Fan cover	71 - 355	Mild steel
Fan	71 - 355	Industrial nylon grade
Terminal box (1Ph)	71 - 90	Industrial nylon grade
Terminal box (3Ph)	71 - 132	Aluminum alloy
	160 - 355	Sheet steel / Cast iron

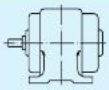
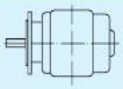
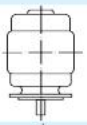
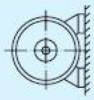
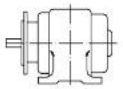
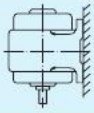
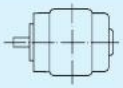
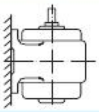
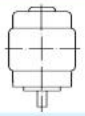
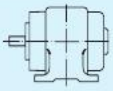
PERMISSIBLE NO. OF COLD STARTS PER HOUR

The permissible number of starts per hour can be taken as given in the table below, provided the following conditions are met : Additional moment of inertia moment of inertia of the rotor: load torque rising with the square of the speed up to nominal torque ; starts at even intervals.

Frame size	2 Pole	4 Pole
56 - 71	100	250
80 - 100	60	140
112 - 132	30	60
160 - 180	15	30
200 - 225	8	15
250 - 355	4	8

MOUNTING ARRANGEMENTS

Mounting arrangements for rotating electrical machines are designated according to IS 2253 / IEC 60034-7. Our motors are available with the mounting arrangements listed below, depending on design and frame size.

Foot mounting	Flange mounting
 B3 - Horizontal foot mounted	 B5 - Flange type 'D'
 B6 - Horizontal wall mounted (LHS)	 V1 - Vertical down wards flange type 'D'
 B7 - Horizontal wall mounted (RHS)	 V3 - Vertical up wards flange type 'D'
 B8 - Horizontal ceiling mounted	 B35 - Horizontal base flange type 'D'
 V5 - Wall mounted shaft down wards	 B14 - Horizontal face flange type 'C'
 V6 - Wall mounted shaft up wards	 V18 - Vertical face down wards flange type 'C'
 B34 - Horizontal base flange type 'C'	 V19 - Vertical face up wards flange type 'C'

It is essential to state the desired mounting arrangement when ordering, as the constructive design depends partly on the mounting arrangement.

MODEL IDENTIFICATION CODE

INDUCTION ELECTRIC MOTOR - 50 / 60 Hz

I X X X - XXX X - XXX (X) - (X) (X)

A.C. Induction Electric Motor

Pole
2 = 2 Pole, **4** = 4 Pole, **6** = 5 Pole

Type of Mounting
B = Foot Mounted (B3)
F = Flange Mounted (B5)
C = Face Mounted (B14)
D = Foot & Face Mounted (B34)
E = Foot & Face Mounted (B35)

Voltage Design
A=110, P=115, B=180, C=200, D=220,
E=230, F=240, G=300, H=350, I=380,
J=400, K=415, L=440, M=460, N=525

Motor Power
50 Hz (In kW) : 03 = 0.37, 11 = 1.1, 110 = 11,
60 Hz (In HP) : 05 = 0.5, 10 = 1.0, 75 = 7.5,
100 = 10, 125 = 12.5, 500 = 50, A00 = 100

Special characteristic
F - Flame proof, E-Explosion proof (applicable Only for flame & explosion proof motors)

Motor Eff. (applicable only for higher Eff. motors)
2 for IE2 & 3 for IE3 motor efficiency.

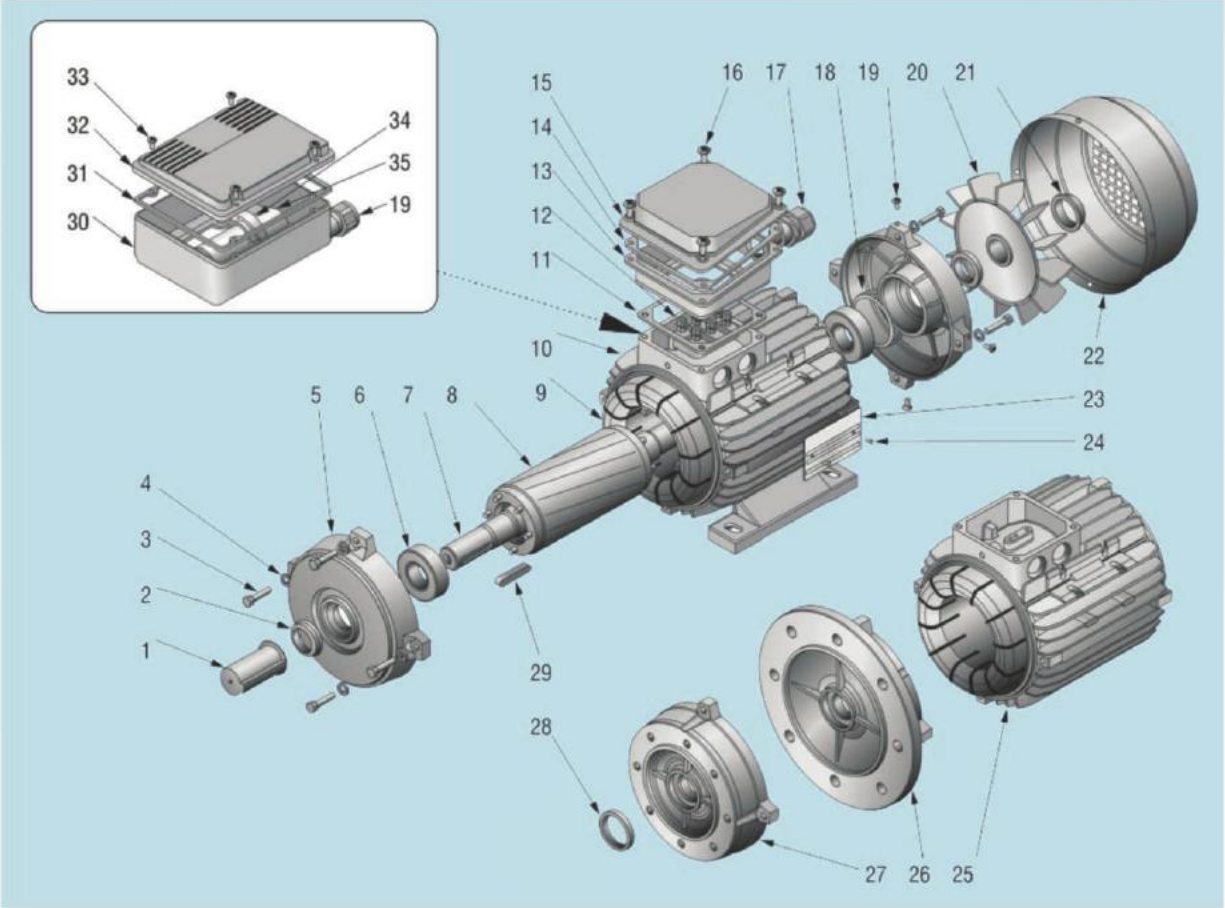
Frame Size Extension
L - Large, **S** - Small, **M** - Medium
(applicable only from 90 Frame size onwards)

Frame Size
63-63, 71-71, 80-80, 90-90, 100-100,
112-112, 132-132, 160-160, 180-180, 200-200,
225-225, 250-250, 280-280, 315-315, 355-355

Phase / Connection / Frequency

M = 1P / D.O.L PSC / 50	**1** = 1P / D.O.L PSC / 60
S = 1P / D.O.L CSCR / 50	**2** = 1P / D.O.L CSCR / 60
T = 3P / D.O.L / 50	**3** = 3P / D.O.L / 60
D = 3P / S.D / 50	**6** = 3P / S.D / 60

Description : Foot / Face Mounted Type
Single Phase : I2BE–11M-80, 1.1 kW, 50 Hz, 230 V, 1 Ph, Foot Mounted A.C.Induction Electric Motor.
Three Phase : I2CI–150T-90, 15 kW, 50 Hz, 380 V, 3 Ph, DOL, Face Mounted A.C.Induction Electric Motor.
Flange Mounted Type
Single Phase: I4FE–11M-80-2, 1.1 kW, 50 Hz, 230 V, 1 Ph, IE2, Flange Mounted A.C.Induction Electric Motor.



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Shaft Cover	13	Terminal Box	25	Motor Frame - B5
2	Dust Shield	14	Gasket - Terminal Box Cover	26	Flange - B5
3	Fixing Bolt - End shield	15	Terminal Box Cover	27	Flange - B14
4	Spring Washer	16	Screws - Terminal Box	28	Dust Shield
5	End shield	17	Cable Gland	29	Shaft Key
6	Bearing	18	Pre-load Washer	30	Terminal Box - 1 Phase
7	Motor Shaft	19	Screw Fan Cover	31	Gasket Terminal Box Cover (1Ph)
8	Rotor	20	Cooling Fan	32	Terminal Box Cover (1Ph)
9	Wound Stator	21	Bush - Cooling Fan	33	Screw - Terminal Box (1Ph)
10	Motor Frame - B3	22	Fan Cover	34	Capacitor Clamp
11	Gasket - Terminal Box	23	Nameplate	35	Capacitor
12	Terminal Block	24	Nameplate Screw		

SPECIFICATIONS

Type	: Squirrel Cage Induction Motor
Power Range	: 0.37 - 2.2 kW, 1Ph, 230V, 50Hz, 0.37 - 315 kW, 3Ph, 380-415V, 50Hz
Pole	: 2 Pole / 4 Pole (6 Pole on request)
Speed	: 2900 / 1450 rpm
Version	: 1Ph, above 0.75kW - Capacitor Start Capacitor Run (CSCR), 3Ph - DOL / SD
Insulation Class	: "F"
Protection	: IP 44 / IP 55
Duty	: Continuous S1
Ambient Temp.	: 40°C
Enclosure	: TEFC
Mounting	: Foot / Face / Flange
Direction of Rotation	: Bi-Direction

2 POLE, IE1 (EFF2) - MOTOR (230V SINGLE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)	Efficiency (η%)	Power Factor (CosØ)	Starting Current (A)	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Weight (kg)
	kW	HP								
I2BE-03M-71*	0.37	0.5	2800	2.73	67	0.92	16	1.8	1.8	8
I2BE-05M-71*	0.55	0.75	2800	3.88	70	0.92	21	1.8	1.8	9
I2BE-07S-80	0.75	1	2800	5.15	72	0.92	29	1.8	1.8	11
I2BE-11S-80	1.1	1.5	2800	7.02	75	0.95	40	1.8	1.8	12
I2BE-15S-90S	1.5	2	2800	9.44	76	0.95	55	1.7	1.8	15
I2BE-22S-90L	2.2	3	2820	13.7	77	0.95	80	1.7	1.8	17

* PSC Type.

2 POLE, IE1 (EFF2) - MOTOR (380V THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)	Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Weight (kg)
	kW	HP								
I2BI-03T-71	0.37	0.5	2840	1.0	70	0.81	6.0	2.2	2.2	14
I2BI-05T-71	0.55	0.75	2880	1.4	73	0.82	6.0	2.2	2.2	15
I2BI-07T-80	0.75	1	2890	1.8	75	0.83	6.0	2.2	2.2	16
I2BI-11T-80	1.1	1.5	2900	2.6	77	0.84	7.0	2.2	2.2	17
I2BI-15T-90S	1.5	2	2900	3.4	79	0.84	7.0	2.2	2.2	22
I2BI-22T-90L	2.2	3	2930	4.8	81	0.85	7.0	2.2	2.2	25
I2BI-30T-100L	3	4	2930	6.3	83	0.87	7.0	2.2	2.2	34
I2BI-40T-112M	4	5.5	2930	8.1	85	0.88	8.0	2.2	2.2	45
I2BI-55T-132S	5.5	7.5	2940	11	86	0.88	8.0	2.2	2.2	67
I2BI-75T-132S	7.5	10	2950	15	87	0.88	8.0	2.2	2.2	71
I2BI-110T-160M	11	15	2950	21.3	88	0.88	8.0	2.0	2.2	107
I2BI-150T-160M	15	20	2970	28.7	89	0.89	8.0	2.0	2.2	107
I2BI-185T-160L	18.5	25	2970	34.6	90	0.9	8.0	2.0	2.2	134
I2BI-220T-180M	22	30	2970	40.9	90.5	0.9	8.0	2.0	2.2	169
I2BI-300T-200L	30	40	2970	55.4	91.2	0.9	8.0	2.0	2.2	220
I2BI-370T-200L	37	50	2980	67.7	92	0.9	8.0	2.0	2.2	239
I2BI-450T-225M	45	60	2980	82.3	92.3	0.9	8.0	1.8	2.2	297
I2BI-550T-250M	55	75	2980	101	92.5	0.9	7.0	1.8	2.2	377
I2BI-750T-280S	75	100	2980	134	93	0.9	7.0	1.8	2.2	510
I2BI-900T-280M	90	125	2980	160	93.8	0.91	7.0	1.8	2.2	577
I2BI-A10T-315S	110	150	2980	195	94	0.91	6.8	1.8	2.2	920
I2BI-A32-315M	132	180	2980	233	94.5	0.91	6.8	1.8	2.2	970
I2BI-A60-315L	160	215	2980	279	94.6	0.92	6.8	1.8	2.2	1080
I2BI-B00-315L	200	270	2980	348	94.8	0.92	6.8	1.8	2.2	1130
I2BI-B50-355M	250	335	2980	433	94.8	0.92	7.0	1.6	2.2	1850
I2BI-C15-355L	315	420	2980	544	94.8	0.92	7.0	1.6	2.2	1900

4 POLE, IE1 (EFF2) MOTOR (SINGLE PHASE)

Model	Power		Speed	Rated Current (A)	Efficiency η%	Power Factor CosØ	Starting Current (A)	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Weight (kg)
	kW	HP								
I4BE-03M-71*	0.37	0.5	1400	2.81	65	0.92	16	1.8	1.8	9
14BE-05M-71*	0.55	0.75	1400	4.0	68	0.92	21	1.8	1.8	11
14BE-07S-80	0.75	1	1400	5.22	71	0.92	30	1.8	1.8	12
14BE-11S-90S	1.1	1.5	1400	7.2	73	0.95	40	1.7	1.8	13
14BE-15S-90L	1.5	2	1400	9.57	75	0.95	55	1.7	1.8	17
14BE-22S-100L	2.2	3	1400	13.9	76	0.95	80	1.7	1.8	26
14BE-30S-100L	3	4	1400	18.6	77	0.95	110	1.7	1.8	28

* PSC Type.

4 Pole, IE1 (EFF2) MOTOR (THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)	Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Weight (kg)
	kW	HP								
I4BI-03T-71	0.37	0.5	1400	1.12	67	0.75	5.5	2.2	2.2	16
I4BI-05T-80	0.55	0.75	1400	1.6	71	0.75	5.5	2.2	2.2	17
I4BI-07T-80	0.75	1	1400	2.0	73	0.77	6.0	2.2	2.2	18
I4BI-11T-90S	1.1	1.5	1400	2.9	75	0.77	6.0	2.2	2.2	23
I4BI-15T-90L	1.5	2	1400	3.7	78	0.79	6.0	2.2	2.2	27
I4BI-22T-100L	2.2	3	1420	5.1	80	0.81	7.0	2.2	2.2	35
I4BI-30T-100L	3	4	1420	6.8	82	0.82	7.0	2.2	2.2	38
I4BI-40T-112M	4	5.5	1440	8.8	84	0.82	7.0	2.2	2.2	49
I4BI-55T-132S	5.5	7.5	1440	11.8	85	0.83	7.0	2.2	2.2	67
I4BI-75T-132M	7.5	10	1440	15.5	87	0.84	7.0	2.0	2.0	80
I4BI-110T-160M	11	15	1460	22.3	88	0.85	7.0	2.0	2.2	124
I4BI-150T-160L	15	20	1460	30.1	89	0.85	7.0	2.0	2.2	147
I4BI-185T-180M	18.5	25	1470	36.4	90.5	0.85	7.5	2.2	2.2	169
I4BI-220T-180L	22	30	1470	43.1	91	0.85	7.5	2.2	2.2	184
I4BI-300T-200L	30	40	1470	57.4	92	0.86	7.5	2.2	2.2	241
I4BI-370T-225S	37	50	1480	69.9	92.5	0.87	7.5	2.2	2.2	300
I4BI-450T-225M	45	60	1480	84.7	92.8	0.87	7.5	2.2	2.2	322
I4BI-550T-250M	55	75	1480	103	93	0.89	7.0	2.2	2.2	400
I4BI-750T-280S	75	100	1480	140	93.8	0.86	7.0	2.2	2.2	546
I4BI-900T-280M	90	125	1490	167	94	0.86	7.0	2.2	2.2	620
I4BI-A10T-315S	110	150	1490	201	94.2	0.87	6.9	2.1	2.2	921
I4BI-A32T-315M	132	180	1490	240	94.5	0.87	6.9	2.1	2.2	1002
I4BI-A60T-315L	160	215	1490	287	94.8	0.88	6.9	2.1	2.2	1070
I4BI-B00T-315L	200	270	1490	359	94.9	0.88	6.9	2.3	2.2	1170
I4BI-B50T-355M	250	335	1485	443	94.9	0.88	6.9	2.3	2.2	1580
I4BI-C15T-355L	315	420	1485	556	94.9	0.89	6.9	2.2	2.2	1700

SPECIFICATIONS

Type	:	Squirrel Cage Induction Motor
Power Range	:	0.75 - 315 kW, 3Ph, 380-415V, 50Hz
Pole	:	2 Pole / 4 Pole (6 Pole on request)
Speed	:	2900 / 1450 rpm
Version	:	3Ph - DOL / SD
Insulation Class	:	"F"
Protection	:	IP 55
Duty	:	Continuous S1
Ambient Temp.	:	40°C
Enclosure	:	TEFC
Mounting	:	Foot / Face / Flange
Direction of Rotation	:	Bi-Direction

2 POLE, IE2 (EFF1) MOTOR (380-415V THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)			Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Rated Torque Nm	Weight (kg)
	kW	HP		380	400	415							
I2BI-07T-80-2	0.75	1	2875	1.77	1.69	1.62	77.4	0.83	5.30	2.5	3	2.49	16
I2BI-11T-80-2	1.1	1.5	2875	2.53	2.4	2.32	79.6	0.83	7.00	3.2	3.8	3.65	17
I2BI-15T-90S-2	1.5	2	2890	3.34	3.17	3.06	81.3	0.84	7.10	2.7	3.5	4.96	22.5
I2BI-22T-90L-2	2.2	3	2890	4.73	4.49	4.32	83.2	0.85	6.90	2.4	3	7.27	25
I2BI-30T-100L-2	3	4	2891	6.19	5.88	5.67	84.6	0.87	8.00	3.2	4	9.91	34.5
I2BI-40T-112M-2	4	5.5	2914	8.05	7.65	7.37	85.8	0.88	7.50	2.5	3	13.11	45
I2BI-55T-132S-2	5.5	7.5	2937	10.9	10.4	10.0	87.0	0.88	7.50	2.7	3.5	17.88	72
I2BI-75T-132S-2	7.5	10	2940	14.5	13.8	13.3	88.1	0.89	7.50	2.4	3.3	24.36	80
I2BI-110T-160M-2	11	15	2930	21.0	20	19.2	89.4	0.89	7.60	2.2	2.9	35.85	108
I2BI-150T-160M-2	15	20	2930	28.4	26.9	26.0	90.3	0.89	7.60	2.3	3	48.89	117
I2BI-185T-160L-2	18.5	25	2937	34.7	33	31.8	90.9	0.89	7.40	2.3	3.1	60.15	135
I2BI-220T-180M-2	22	30	2940	41.1	39.1	37.7	91.3	0.89	7.80	2.8	3.2	71.46	183
I2BI-300T-200L-2	30	40	2950	55.7	52.9	51.0	92.0	0.89	7.80	2.6	3	97.12	227
I2BI-370T-200L-2	37	50	2950	68.3	64.9	62.5	92.5	0.89	7.70	2.6	3	119.78	247
I2BI-450T-225M-2	45	60	2960	82.7	78.6	75.7	92.9	0.89	7.50	2.4	2.6	145.19	297
I2BI-550T-250M-2	55	75	2965	100.7	95.7	92.2	93.2	0.89	7.10	2.3	2.8	177.15	390
I2BI-750T-280S-2	75	100	2970	136.5	129.7	125	93.8	0.89	7.40	2.5	2.8	241.16	519
I2BI-900T-280M-2	90	125	2970	163.3	155.1	149.5	94.1	0.89	7.60	2.8	2.8	289.39	588
I2BI-A10T-315S-2	110	150	2975	196.9	187.1	180.3	94.3	0.90	6.9	2.4	2.8	353.11	948
I2BI-A32T-315M-2	132	180	2975	235.6	223.8	215.7	94.6	0.90	7.1	2.6	2.9	423.73	1009
I2BI-A60T-315L-2	160	215	2975	281.8	267.7	258	94.8	0.91	7.1	2.5	2.9	513.61	1111
I2BI-B00T-315L-2	200	270	2975	351.5	333.9	321.9	95	0.91	6.9	2.5	2.8	642.02	1140
I2BI-B50T-355M-2	250	335	2980	439.4	417.4	402.3	95	0.91	7.0	2.5	2.8	801.17	1938
I2BI-C15T-355L-2	315	420	2980	553.6	525.9	506.9	95	0.91	7.0	2.5	2.9	1009.48	2342

4 POLE, IE2 (EFF1) MOTOR (380-415V THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)			Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Rated Torque Nm	Weight (kg)
	kW	HP		380	400	415							
I4BI-07T-80-2	0.75	1	1400	1.91	1.81	1.75	79.6	0.75	5	2.4	2.9	5.12	18
I4BI-11T-90S-2	1.1	1.5	1440	2.74	2.6	2.51	81.4	0.75	6	3	3.5	7.3	22
I4BI-15T-90L-2	1.5	2	1445	3.67	3.49	3.36	82.8	0.75	6.8	3.2	3.8	9.91	27
I4BI-22T-100L-2	2.2	3	1440	4.9	4.65	4.48	84.3	0.81	7	3	3.5	14.6	35
I4BI-30T-100L-2	3	4	1140	6.5	6.18	5.95	85.5	0.82	7	2.6	3.3	19.9	41.5
I4BI-40T-112M-2	4	5.5	1445	8.56	8.13	7.84	86.6	0.82	7.5	3.5	4	26.4	49
I4BI-55T-132S-2	5.5	7.5	1455	11.6	11	10.6	87.7	0.82	6.4	2.2	2.8	36.1	77
I4BI-75T-132M-2	7.5	10	1455	15.5	14.7	14.2	88.7	0.83	7	2.4	3	49.2	87
I4BI-110T-160M-2	11	15	1460	21.9	20.8	20	89.8	0.85	6.9	2.5	2.9	71.9	110
I4BI-150T-160L-2	15	20	1460	29.2	27.8	26.8	90.6	0.86	7.5	2.5	3	98.1	132
I4BI-185T-180M-2	18.5	25	1470	35.8	34	32.8	91.2	0.86	7.8	2.6	3.1	120.2	172
I4BI-220T-180L-2	22	30	1470	42.4	40.3	38.9	91.6	0.86	7.5	2.6	3.1	142.9	180
I4BI-300T-200L-2	30	40	1470	57.4	54.6	52.6	92.3	0.86	7.1	2.4	2.9	194.9	247
I4BI-370T-225S-2	37	50	1480	70.5	67	64.6	92.7	0.86	7.5	2.5	2.7	238.8	297
I4BI-450T-225M-2	45	60	1480	85.4	81.1	78.2	93.1	0.86	7.6	2.5	2.8	290.4	322
I4BI-550T-250M-2	55	75	1480	103.9	98.7	95.2	93.5	0.86	7.3	2.6	2.7	354.9	413
I4BI-750T-280S-2	75	100	1480	137.8	130.9	126.1	94.0	0.88	7.6	2.7	2.7	484	558
I4BI-900T-280M-2	90	125	1480	155	156.7	151	94.2	0.88	7.5	2.7	2.7	580.7	632
I4BI-A10T-315S-2	110	150	1485	201	190.9	184	94.5	0.88	7.1	2.7	2.9	707.4	950
I4BI-A32T-315M-2	132	180	1485	240.7	228.6	120.4	94.7	0.88	7.3	2.7	2.9	889	1035
I4BI-A60T-315L-2	160	215	1485	287.8	273.4	163.5	94.9	0.89	7.4	3	3.0	1029	1105
I4BI-B00T-315L-2	200	270	1485	359	341.1	328.7	95.1	0.89	7.6	3	3.0	1286	1225
I4BI-B50T-355M-2	250	335	1490	443.8	421.6	406.4	95.1	0.90	7.5	2.8	2.9	1602	1740
I4BI-C15T-355L-2	315	420	1490	559	531.2	512	95.1	0.90	7.4	2.6	2.8	2019	1900

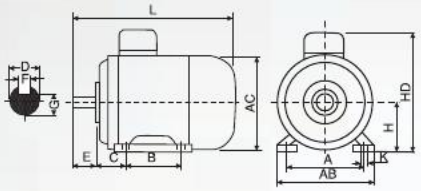
2 POLE, IE3 MOTOR (380-415V THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)			Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Rated Torque Nm	Weight (kg)
	kW	HP		380	400	415							
I2BI-07T-80-3	0.75	1	2880	1.7	1.61	1.56	80.7	0.83	5.5	1.8	3.5	2.49	20
I2BI-11T-80-3	1.1	1.5	2880	2.43	2.31	2.22	82.7	0.83	7.5	2.6	3.5	3.65	21
I2BI-15T-90S-3	1.5	2	2895	3.25	3.09	2.98	84.2	0.83	7.1	2.6	3.5	4.95	26
I2BI-22T-90L-3	2.2	3	2895	4.57	4.34	4.19	85.9	0.85	7	2	3	7.26	29
I2BI-30T-100L-3	3	4	2895	5.94	5.64	5.44	87.1	0.88	8.6	2	3.2	9.9	43
I2BI-40T-112M-3	4	5.5	2905	7.83	7.44	7.17	88.1	0.88	8	1.8	2.9	13.1	51
I2BI-55T-132S-3	5.5	7.5	2930	10.6	10.1	9.75	89.2	0.88	7.5	2.1	2.5	17.9	76
I2BI-75T-132S-3	7.5	10	2930	14.4	13.7	13.2	90.1	0.88	7.3	2	3.5	24.4	84
I2BI-110T-160M-3	11	15	2945	20.4	19.3	18.6	91.2	0.90	7.3	2.3	2.6	35.7	128
I2BI-150T-160M-3	15	20	2945	27.2	25.9	24.9	91.9	0.91	7	1.9	2.3	48.6	140
I2BI-185T-160L-3	18.5	25	2940	34.1	32.4	31.3	92.4	0.89	7	1.6	2.5	60.1	155
I2BI-220T-180M-3	22	30	2955	40.1	38.1	36.7	92.7	0.90	7	1.6	2.5	71.1	192
I2BI-300T-200L-3	30	40	2960	54.8	52.1	50.2	93.3	0.89	7	1.5	2.5	96.8	246
I2BI-370T-200L-3	37	50	2960	65.9	62.6	60.3	93.7	0.91	7.3	1.5	2.5	119	267
I2BI-450T-225M-3	45	60	2965	82.5	78.4	75.5	94.0	0.88	6.8	1.6	2.5	145	353
I2BI-550T-250M-3	55	75	2970	99.6	94.6	91.2	94.3	0.89	7.2	1.6	2.6	176.9	408
I2BI-750T-280S-3	75	100	2975	134	127	122	94.7	0.91	7.2	1.2	2	240.8	548
I2BI-900T-280M-3	90	125	2975	162	153	148	95.0	0.89	7.4	1.2	2	288.9	596
I2BI-A10T-315S-3	110	150	2978	195	185	179	95.2	0.90	7.3	1.2	2	352.8	956
I2BI-A32T-315M-3	132	175	2978	233	222	214	95.4	0.90	7.3	1.3	2.1	432.3	1017
I2BI-A60T-315L-3	160	215	2980	283	268	259	95.6	0.90	6.8	1.2	2	512.8	1119
I2BI-B00T-315L-3	200	270	2980	349	331	319	95.8	0.91	7.8	1.1	2	640.9	1150
I2BI-B50T-355M-3	250	335	2982	431	409	394	95.8	0.92	7.9	1.1	2	800.6	1948
I2BI-C15T-355L-3	315	425	2982	543	519	497	95.8	0.92	7.9	1.1	2	1009	2356

4 POLE, IE3 MOTOR (380-415V THREE PHASE)

Model	Power		Speed (rpm)	Rated Current (A)			Efficiency (η%)	Power Factor (CosØ)	Starting Current Ratio I_A / I_N	Starting Torque Ratio (T_A / T_N)	Tmax Ratio (T_M / T_N)	Rated Torque Nm	Weight (kg)
	kW	HP		380	400	415							
I4BI-07T-80-3	0.75	1	1420	1.86	1.77	1.7	82.5	0.74	6	2.9	3.6	5.04	22
I4BI-11T-90S-3	1.1	1.5	1445	2.68	2.55	2.46	84.1	0.74	6.5	2.7	3.8	7.27	27
I4BI-15T-90L-3	1.5	2	1445	3.61	3.43	3.3	85.3	0.74	6.8	3	3.6	9.91	32
I4BI-22T-100L-3	2.2	3	1435	4.93	4.68	4.52	86.7	0.78	7.2	2.5	3.5	14.6	44
I4BI-30T-100L-3	3	4	1435	6.66	6.32	6.09	87.7	0.78	7.2	2.6	3.5	20	49
I4BI-40T-112M-3	4	5.5	1440	8.56	8.14	7.84	88.6	0.80	7	2.3	3.2	26.5	56
I4BI-55T-132S-3	5.5	7.5	1460	11.6	11.1	10.7	89.6	0.80	7.1	2.7	3.5	36	81
I4BI-75T-132M-3	7.5	10	1460	15.3	14.6	14	90.4	0.82	7.2	2.7	3.8	49.1	91
I4BI-110T-160M-3	11	15	1465	22.3	21.2	20.4	91.4	0.82	6.8	1.9	2.3	71.7	141
I4BI-150T-160L-3	15	20	1465	30.1	28.6	27.6	92.1	0.82	6.8	1.8	2.4	97.8	151
I4BI-185T-180M-3	18.5	25	1470	36.1	34.3	33.1	92.6	0.84	6.9	1.8	2.5	120.2	190
I4BI-220T-180L-3	22	30	1470	42.3	40.2	38.7	93.0	0.85	7	1.8	2.5	142.9	205
I4BI-300T-200L-3	30	40	1475	56.5	53.7	51.7	93.6	0.86	6.8	1.8	2.3	194.2	275
I4BI-370T-225S-3	37	50	1485	69.5	66.1	63.7	93.9	0.86	7.1	1.7	2.3	237.9	315
I4BI-450T-225M-3	45	60	1485	83.2	79.1	76.2	94.2	0.87	7.1	1.8	2.4	289.4	345
I4BI-550T-250M-3	55	75	1485	101	96.2	92.7	94.6	0.87	7	1.8	2.4	353.7	421
I4BI-750T-280S-3	75	100	1486	138	131	126	95.0	0.87	6.9	1.8	2.2	482	538
I4BI-900T-280M-3	90	125	1486	165	157	151	95.2	0.87	7.2	1.6	2.1	578.4	638
I4BI-A10T-315S-3	110	150	1488	199	189	182	95.4	0.88	7.2	1.6	2.1	706	958
I4BI-A32T-315M-3	132	175	1488	238	226	218	95.6	0.88	7.2	1.5	2.0	847	1045
I4BI-A60T-315L-3	160	215	1488	288	274	264	95.8	0.88	6.8	1.5	2.0	1027	1115
I4BI-B00T-315L-3	200	270	1490	360	342	329	96	0.88	7.2	1.6	2.1	1282	1233
I4BI-B50T-355M-3	250	335	1490	449	427	411	96	0.88	7.3	1.4	2.1	1603	1744
I4BI-C15T-355L-3	315	425	1490	567	538	519	96	0.88	7.4	1.4	2.0	2019	1950

IMB3



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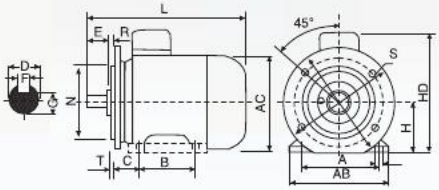
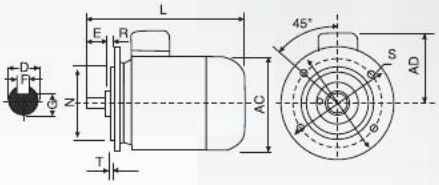
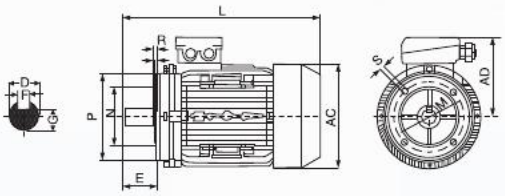


IMB5



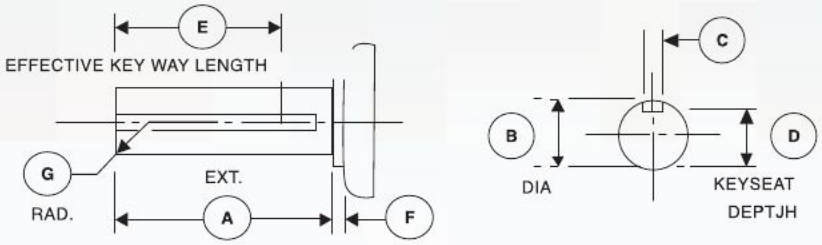
Frame Size	Mounting Dimensions (mm)																		Frame Dimensions (mm)					
	A	B	C	D		E		F		G		H	K	M	N	P	R	S	T	AB	AC	AD	HD	L	
				2 Pole	4 Pole	2 Pole	4 Pole	2 Pole	4 Pole	2 Pole	4 Pole													2 Pole	4 Pole
71	112	90	45	14	14	30	30	5	5	11	11	71	7	130	110	160	0	10	3	150	145	80	195	255	255
80	125	100	50	19	19	40	40	6	6	15.5	15.5	80	10	165	130	200	0	12	3.5	165	175	145	220	295	295
90S	140	100	56	24	24	50	50	8	8	20	20	90	10	165	130	200	0	12	3.5	180	195	155	250	320	320
90L	140	125	56	24	24	50	50	8	8	20	20	90	10	165	130	200	0	12	3.5	180	195	155	250	345	345
100L	160	140	63	28	28	60	60	8	8	24	24	100	12	215	180	250	0	15	4	205	215	180	270	385	385
112M	190	140	70	28	28	60	60	8	8	24	24	112	12	215	180	250	0	15	4	230	240	190	300	400	400
132S	216	140	89	38	38	80	80	10	10	33	33	132	12	265	230	300	0	15	4	270	275	210	345	470	470
132M	216	178	89	38	38	80	80	10	10	33	33	132	12	265	230	300	0	15	4	270	275	210	345	510	510
160M	254	210	108	42	42	110	110	12	12	37	37	160	15	300	250	350	0	19	5	315	330	255	400	605	605
160L	254	254	108	42	42	110	110	12	12	37	37	160	15	300	250	350	0	19	5	315	330	255	400	660	660
180M	279	241	121	48	48	110	110	14	14	42.5	42.5	180	15	300	250	350	0	19	5	355	380	280	440	690	690
180L	279	279	121	48	48	110	110	14	14	42.5	42.5	180	15	300	250	350	0	19	5	355	380	280	440	725	725
200L	318	305	133	55	55	110	110	16	16	49	49	200	19	350	300	400	0	19	5	410	420	305	500	765	765
225S	356	286	149	-	60	-	140	-	18	-	53	225	19	400	350	450	0	19	5	445	470	335	555	-	810
225M	356	311	149	55	60	110	140	16	18	49	53	225	19	400	350	450	0	19	5	445	470	335	550	805	835
250M	406	349	168	60	65	140	140	18	18	53	58	250	24	500	450	550	0	19	5	485	510	370	615	910	910
280S	457	368	190	65	75	140	140	18	20	58	67.5	280	24	500	450	550	0	19	5	550	580	410	660	980	980
280M	457	419	190	65	75	140	140	18	20	58	67.5	280	24	500	450	550	0	19	5	550	580	410	660	1030	1030
315S	508	406	216	65	80	140	170	18	22	58	71	315	28	600	550	660	0	24	6	630	645	630	825	1180	1275
315M	508	457	216	65	80	140	170	18	22	58	71	315	28	600	550	660	0	24	6	630	645	630	830	1290	1320
315L	508	508	216	65	80	140	170	18	22	58	71	315	28	600	550	660	0	24	6	630	645	630	830	1290	1320
355M	610	560	254	75	95	140	170	20	25	67.5	86	355	28	740	680	800	0	24	6	705	710	655	1010	1510	1540
355L	610	630	254	75	95	140	170	20	25	67.5	86	355	28	740	680	800	0	24	6	705	710	655	1010	1510	1540

IMB14



Frame Size	Mounting Dimensions (mm)									Frame Dimensions (mm)		
	E	F	D	G	M	N	P	R	S	AC	AD	L
71	30	5	14	11	85	70	105	0	M6	150	110	246
80	40	6	19	15.5	100	80	120	0	M6	170	135	285
90S	50	8	24	20	115	95	140	0	M8	185	137	335
90L	50	8	24	20	115	95	140	0	M8	185	137	335
100L	60	8	28	24	130	110	160	0	M8	206	150	376
112M	80	8	28	24	130	110	160	0	M8	228	170	400
132S	80	10	38	33	165	130	200	0	M10	267	190	460
132M	110	10	38	33	165	130	200	0	M10	267	190	500
160M	110	12	42	37	215	180	250	0	M12	330	255	615
160L	110	12	42	37	215	180	250	0	M12	330	255	675
180M	110	14	48	42.5	265	230	300	0	M15	380	280	700
180L	110	14	48	42.5	265	230	300	0	M15	380	280	740

SHAFT DIMENSIONS



Frame	A		B		C	D	E		F	G
	2 Pole	4 Pole	2 Pole	4 Pole	2 Pole	4 Pole	2 Pole	4 Pole	2 Pole	4 Pole
D.71	30	-	14	-	5 x 5	-	11	-	14	-
D.80	40	-	19	-	6 x 6	-	15.5	-	25	-
D.90	50	-	24	-	8 x 7	-	20	-	32	-
D.100	60	-	28	-	8 x 7	-	23.9	-	40	-
D.112	60	-	28	-	8 x 7	-	23.9	-	40	-
D.132	80	-	38	-	10 x 8	-	33	-	56	-
D.160	110	-	42	-	12 x 8	-	37	-	80	-
D.180	110	-	48	-	14 x 9	-	42.5	-	80	-
D.200	110	-	55	-	16 x 10	-	48.8	-	80	-
D.225	110	140	55	60	16 x 10	18 x 11	48.8	53	80	110
D.250	140	140	60	70	18 x 11	20 x 12	53	62.5	110	110
D.280	140	170	65	80	18 x 11	20 x 12	58	71	110	140
D.315S-M	140	170	65	85	18 x 11	22 x 14	58	76	110	140
D.315L		170		90		25 x14		81		140

Connection Types

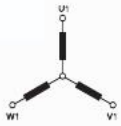
Windings of standard three-phase motors can be connected either in star or delta connection.

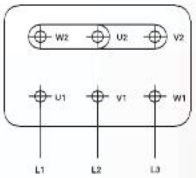
Star connection

A star connection is obtained by connecting W2, U2, V2 terminals to each other and the U1, V1, W1 terminals to the mains. The phase current and voltage are :

Iph = In ; Uph = Un / √3

where In is the line current and Vn the line voltage referred to the star connection.



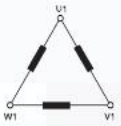


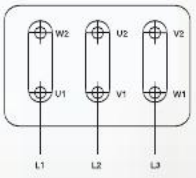
Delta connection

A delta connection is obtained by connecting the end of a phase to the beginning of the next phase.

The phase current Iph and the phase voltage Uph are : Iph = In / √3 ; Uph = Un

where In and Un are referred to the delta connection.





Star-delta starting

Star-delta starting allows a peak current reduction, ensuring however that the peak torque obtained is bigger than the resistant torque. Actually, it should be noted that the torque of an induction squirrel-cage motor is directly proportional to the square of the voltage. Motors whose rated voltage with delta connection corresponds to the mains voltage, can be started with the star-delta method.

All motors can be supplied with windings designed for star-delta starting (for example : 415V ⅄ / 690 Volts Y).

STARTING METHODS FOR AC MOTORS

Reducing Electrical and Mechanical Stress at Start-up

The starting current of an AC motor can vary from 3 to 7 times the nominal current. This is because a large amount of energy is required to magnetise the motor enough to overcome the inertia the system has at standstill. The high current drawn from the network can cause problems such as voltage drop, high transients and in some cases, uncontrolled shutdown. High starting current also causes great mechanical stress on the motor's rotor bars and windings and can affect the driven equipment and the foundations. Several starting methods exist, all aiming to reduce these stresses. The load, the motor and the supply network determine the most appropriate starting method. When selecting and dimensioning the starting equipment and any protective devices, the following factors must be taken into account :

- The voltage drop in the supply network when starting the motor
- The required load torque duringstart
- The required starting time

Direct-on-line (DOL) Start :

Direct on line starting is suitable for stable supplies and mechanically stiff and well dimensioned systems. It is the simplest, cheapest and most common starting method. Starting equipment for small motors that do not start and stop frequently is simple, often consisting of a hand operated motor protection circuit breaker. Larger motors and motors that start and stop frequently, or have some kind of control system, normally use a direct-on-line starter which can consist of a contactor plus overload protection, such as a thermal relay.

Star-Delta (Y/D) Starting :

Most low voltage motors can be connected to run at either 400V with delta connection or at 690V with star connection. This flexibility can also be used to start the motor with a lower voltage. Star/delta connection gives a low starting current of only about one third of that during direct-online starting, although this also reduces the starting torque to about 25%. The motor is started with Y-connection and accelerated as far as possible, then switched to D-connection. This method can only be used with induction motors delta connected for the supply voltage.

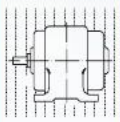
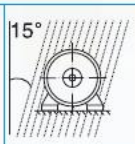
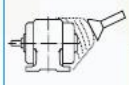
Soft Starters

Soft starters are based on semiconductors, which, via a power circuit and a control circuit, initially reduce the motor voltage, resulting in lower motor torque. During the starting process, the soft starter progressively increases the motor voltage so that the motor becomes strong enough to accelerate the load to rated speed without causing torque or current peaks. Soft starters can also be used to control the stopping of a process. Soft starters are less costly than frequency converters but like frequency converters, they may inject harmonic currents into the grid, disrupting other processes.

Frequency Converter Start

Although a frequency converter is designed for continuous feeding of motors, can also be used exclusively for start-up only. The frequency converter enables low starting current because the motor can produce rated torque at rated current from zero to full speed. As the price of frequency converters continues to drop, they are increasingly replacing soft starters. However in most cases they are still more expensive than soft starters, and like these, they inject harmonic currents into the network.

Degrees of protection for mechanical machines are designated in accordance with IS 4691 / IEC 60034-5 by the letters IP and two characteristic numerals.

								
First numeral : Protection against contact and ingress of foreign bodies ↓		No. special protection	Protection against vertically falling water drops	Protection against dropping water when inclined by up to 15 degrees	Protection against water spray when inclined by up to 60 degrees from vertical	Protection against water splashed from any direction	Protection against water projected bynoozle from any direction	Protection against heavy seas
Second Numeral : Protection against ingress of water →		0	1	2	3	4	5	6
0	No special protection							
1	Protection against solid foreign bodies > 50 mm (Example: inadvertent contact with hand)							
2	Protection against solid foreign bodies > 12 mm (Example: inadvertent contact with the fingers)		IP 21	IP 22	IP 23			
3	Protection against solid foreign bodies > 2.5 mm (Example: Inadvertent contact with wire & tools)							
4	Protection against solid foreign bodies > 1 mm (Example: Inadvertent contact with wire, bands)					IP 44		
5	Protection against dust (Harmful deposits of dust)					IP 54	IP 55	IP 56

Rated Voltage

Motors are suitable for variation of ± 10% of the rated voltage. Therefore the motors are designed for the following rated voltage ranges (exceptions are shown in the data tables):

Rated voltage
230 V ±10%
415 V ±10%
690 V ±10%

Within the rated motor voltage range, the permissible maximum temperature is not exceeded. When the motors are operated at the limits of the voltage tolerance, the permissible over temperature of the stator winding may be exceeded by 10°C.

For motors in 500 V, 50 Hz design, as well as all abnormal voltages, no voltage range is marked. The voltage tolerances to IS 325 / IEC 60034-1 apply.

Rated Frequency

Motors are suitable for 50 Hz with a variation 5%. 50 Hz motors can also be operated on 60 Hz mains, provided the mains voltage increases proportionally to the frequency. The relative values for starting and breakaway torque remain nearly unchanged and slightly increase for the starting current. The rated speed increases by the factor 1.2 and output by factor 1.15. Should a motor designed for 50 Hz be operated at 60 Hz without the voltage being increased, the rated output of the motor cannot be increased. Under these operating conditions, rated speed increases by factor 1.2. The relative values for starting and breakaway torque are reduced by factor 0.82 and for starting current by factor 0.9 Frame.

Rated Current I_N

The rated currents listed in the data tables apply to an operating voltage of 415V. The conversion to other operating voltages, with output and frequency remaining unchanged, is to be made as follows:

Nominal voltage (V)	230	380	415	440	500	660	690
Conversion factor x I_N	1.74	1.05	1.0	0.91	0.80	0.61	0.58

Rated Torque

$$\text{Rated torque in Nm} = 9550 \times \frac{\text{Rated power in kW}}{\text{Rated speed in rpm}}$$

Output

The outputs stated in this catalogue are for constant load in continuous running duty S1 according to IS 325 / IEC 60034-1, based on an ambient temperature of 50°C and installation at altitudes up to 1000 m above sea level.

For severe operating conditions, e.g. high switching rate, long run-up time or electric braking, a thermal reserve is necessary, which could call for higher thermal class or the use of a motor with a higher rating. In these cases we recommend to enquire with detailed information on the operating conditions.

Number of Poles

Number of poles of the motor determine the basic speed (synchronous speed) of the motor. Standard motors are available in the configuration of 2,4,6 and 8-poles.

Power

Rated power is the shaft power of the motor with an ambient temperature not exceeding 45°C/50°C and an altitude not exceeding 1000m above mean sea level.

Rated Speed, Slip

Rated speed corresponds to the operating speed of the motor at the rated power when it is being fed at rated voltage and frequency.

The synchronous speed of an induction motor depends on the supply frequency and the number of poles of the stator winding. Thus,

ηs = f/p x 120(rpm)
where η= synchronous speed (rpm) s
f = frequency (Hz)
P = number of poles
note 2p = number of poles
The rated speed given in the list is for motors operating at rated power under normal voltage and frequency.
The difference between synchronous speed, ηand rotor speed, η; referred to the synchronous speed, is called slip.
This slip, s, is expressed as a percentage;
s = η s - η /η s x 100 (%)
When the motor is partly loaded the slip varies almost linearly with the load.

Starting Current

Usually, given as a percentage or as a multiple of rated current, it is the value of the current drawn by the motor during starting.
The value of the starting current is generally between 500-700% (5-7 per unit) of the rated current.

Torque characteristics

Typical torque/speed characteristics of the motor is shown in figures on page no. 15 along with different relevant parameters.

The nominal torque of the motor T_N is the torque developed by the motor at rated speed, n while delivering rated power
P. The relationship between the torque T_N the power P, and $_N$'
the speed n is
T_N = 9550 x 415.I/ Ux [Nm]
Where P = power (kW)
T_N = motor speed (rpm)
alternatively, torque T, in kgm can be given as
T_N = 974 x P/n [kgm]
Starting torque of the motor T_s is the torque developed by the motor at zero speed when it is directly switched on.
Value of starting torque is usually given as a percentage or as a multiple of nominal motor torque T_N

Pull out torque of the motor T_{MAX} is the maximum torque that the motor can develop when it is operated directly on line.
Value of pull out torque is usually given as a percentage or as a multiple of nominal motor torque T_N

Moment of Inertia

The moment of inertia J is given in Kgm². The moment of inertia is numerically equal to ¼ GD². The moment of inertia J L of the driven machine at n L rpm when referred to motor speed n rpm is given by J = J L [nL/n]².

Overloads

In accordance with IS:325 motors are rated to withstand an overload, an excess torque of 60% of their rated torque at rated voltage and frequency for 15 seconds.

W I N N I N G W A Y S

When you have a good thing going it is quite in the fitting of things that recognitions come our way. Several prestigious awards, which decorate our shelf, say it all. These rewards not only acknowledge our position as a leader in the water pump industry but also serve as reminders about what the customer expects from a winner. And we, as ever, have our ears perfectly tuned to customer expectations.

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