Water Jacket Three Phase Squirrel Cage Induction Motors

B4J - B5J SERIES
355 - 560 FRAME SIZES

MarelliMotori®

ASI.CT.036.1 GB

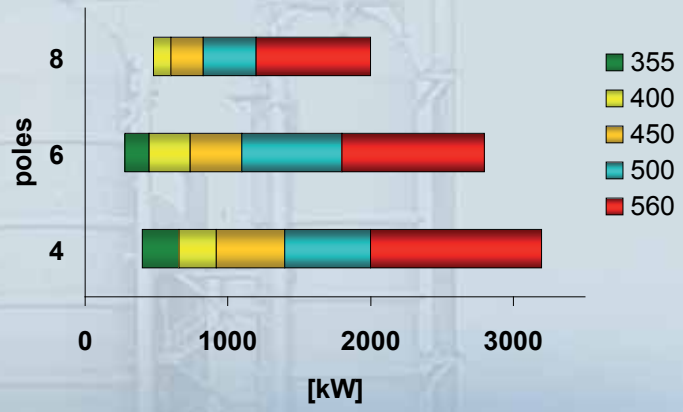
WATER COOLED ASYNCHRONOUS MOTORS 355, 400, 450, 500 AND 560 FRAME SIZES

This series of water cooled motors was designed by **MarelliMotori** for heavy duty applications where space and natural ventilation is limited.

The integral water jacket coolers provide an excellent power output for the compact motor size as compared to traditional heat exchanger designs. These motors, originally designed for tight shipboard applications as main propulsion drives and auxiliary bow thrusters, now find themselves in heavy industry for compressors, pumps, rollers and other rotating equipment.

MarelliMotori has a tradition dating back to 1891 when Ercole Marelli founded the company. With over 100 years of manufacturing excellence and experience, MarelliMotori is recognised as a leading supplier to Industrial, Petrochemical and Marine Industries offering a complete range of **Low**, **Medium** and **High** Voltage Motors and Generators. These quality products are backed up by an organisation of skilled people providing sales, service and technical support to the high standards demanded by customers.

AVAILABLE OUTPUTS - Duty S1 - 50Hz



APPLICATIONS

Marine: main propulsion and thrusters, pumps, etc.

Cement: vibrating equipment, kilns, mills, conveyor belts, fans, etc.

Mining: mills, conveyor belts, compressors, fans, pumps, crushers, etc.

Paper industry: chippers, mixers, debarkers, refineries, etc.

Petrochemical: pumps, compressors

Water: pumps

Process industry: cranes, fans, exhausters, laminators, pumps, etc.

Sugar and alcohol industry: chippers, debarkers, mills, etc.

Hydropower application

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Member of CISQ Federation RINA ISO 9001:2008 Certified Quality System

Member of CISQ Federation RINA ISO 14001:2004 Certified Environmental System

RINA BS OHSAS 18001:2007 Certified Health & Safety System

GENERAL FEATURES

Robust construction designed for heavy, arduous and continuous duty in confined spaces.

Standards

IEC 60034, IEC 60072

Approvals

The motors are designed and built in accordance with marine regester rules specifications and comply with: ABS, BV, CCS, DNV, GL, KR, LR, NK, RINA, RS.

Mountings

Vertical or horizontal
Feet and/or flange mountings

Construction

Steel frame
Cast iron or steel terminal boxes and shields
Protection degree IP55
Windings impregnated with VPI system (Vacuum Pressure Impregnation)
Insulation class F
Anti-corrosion and rust frame treatment
Stainless steel nameplate
Simple earthing
Drainage hole
PTCs in windings with terminals in auxiliary terminal box

Supply

Low or Medium Voltage
(for marine application only low voltage allowed)
Inverter

Cooling

Fresh water

Sound Pressure

Low noise level

Bearings

Rolling bearings
Regreasing system
Arrangement for SPM sensor

Safety

Water leakage sensor

Advantages of Water Jacket Design

No heating dissipation in the installed area
Compact dimensions
No dust circulation

Recommended Uses

When limited space is required
When driven machine is already water cooled
When low noise is required
When switchboard is already water cooled

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TECHNICAL FEATURES

DUTY TYPE

The power outputs given in this catalogue refer to S1 duty type. The table below shows the correction factors to calculate the outputs for S2 duty.

S2 – 30'			S2 – 60'	
4 poles	6-8 poles	Frame size	4 poles	6-8 poles
1,30	1,30	355	1,10	1,10
1,30	1,25	400	1,10	1,05
1,25	1,20	450	1,05	1,05
1,15	1,15	500	1,05	1,05
1,15	1,15	560	1,05	1,05

DEGREE OF PROTECTION

Motors are normally provided with IP55 enclosure. A higher degree of protection is available on request.

ENVIROMENTAL CONDITIONS

Electrical tables refer to a cooling water of +38°C.

Please contact MarelliMotori for different environmental conditions and where cooling water temperature is less than 10°C.

INSULATION

All motors have class F insulation which allows a maximum winding temperature rise of 100°C with cooling fluid temperature of 38°C.
On request class H insulation is also available.

TEMPERATURE RISE

The outputs shown in this catalogue refer to temperature rise Class F.

PROTECTIVE TREATMENTS

External Surfaces

Standard finish is a heavy duty epoxy-vinyl paint. Colour is RAL5010.

Special paint finishes can be provided to protect against: acids, alkalis, salt air, anhydrous gases and sea water.

Internal Surfaces

Special tropicalised treatment of internal surfaces and electrical windings and inner cooling channels are coated with rust protector.

MATERIALS

Durability and reliability determine the choice of materials. Fabricated steel frames and cast iron shields are designed for reduced weight.

Terminal boxes for frame sizes up to 400LB are in cast iron and from 400LC to 560 frame size in fabricated steel.

Please contact MarelliMotori for different materials.

Special steel shafts are available for high load applications.

BALANCING AND VIBRATION GRADE

The motors are dynamically balanced with a half key applied to the shaft extension in accordance with standard IEC 60034-14 to vibration grade reduced (A). On request vibration grade special (B) is also available.

COOLING SYSTEM

IC 7 A1 W7 (Self-circulating primary coolant with integral heat exchanger using remote fresh water). Reduces the noise level and it is ideal for constant torque, low speed, inverter applications.

The cooling fluid must be clean water.

Do not use:

- sea water,
- water with more than 120 mg/l of chloride.
- water with solid content over 10 mg/l.

Two flanged connections are provided for inlet and outlet of cooling water.

On the appropriate name plate heat exchanger characteristics are indicated: flow rate, inlet/outlet temperature, min/max pressure.

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ARZIGNANO (VI) ITALY

SCAMBIATORE DI CALORE - HEAT EXCHANGER

Fluido di raffreddamento Cooling fluid	Acqua dolce Fresh water	
Portata Flow rate	(*)	l/min.
Temperatura ingresso Inlet temperature	38	° C
Temperatura uscita Outlet temperature	48	° C
Pressione max Max. pressure	6	bar
Pressione minima Min. pressure	1	bar

Frame size mm	Flow rate l/min (*)	Inlet Temp. °C	Outlet Temp. °C	Max Pressure bar	Min Pressure bar
355	50	38	45	6	1
400	65	38	45	6	1
450	70	38	48	6	1
500	75	38	48	6	1
560	120	38	48	6	1

SOUND LEVELS

The electric tables show the sound pressure levels (Lp(A)) measured at no load conditions at one metre distance from the machine according to standard ISO R 1680 with tolerances of 3dB(A). The values do not depend on the supply frequency.

BEARINGS

Frame size	D-end		N-end	
	B3	V1	B3	V1
355	6322-C3	6322-C3	6322-C3	6322-C3
400	6322-C3	6322-C3	6322-C3	6322-C3
	6322-C3	6322-C3	6322-C3	7322
450	6326-C3	6326-C3	6326-C3	6326 7326
500	6328-C3	6328-C3	6328-C3	6328 7328
560	NU328-EC-C3 6328M-C3	6238M-C3	NU234-EC-C3	6234 2 x 7328

On request high load configurations are also available: roller or sleeve bearings.

DERATING FOR INVERTER SUPPLY

The B4J and B5J series have been designed to satisfy the requirements of speed control by frequency converter supply. MarelliMotori therefore provides various solutions to obtain the best performances.

To select the best solution please contact MarelliMotori supplying the following information:

1. Load characteristics (quadratic torque, constant torque or torque curve for all other cases) of the driven equipment;
2. Electric supply and speed range;
3. Converter supply characteristics (peak voltage values at the motor terminals, rise time, etc.);
4. Maximum inverter overload (time and current value).

Inverter fed motors will be supplied with enhanced winding insulation and N-end insulated bearing.

SAFETY

The whole series is supplied with PT100 in windings and internal water leakage sensor as standard.

APPROVALS

In addition to meeting the electrical motor specifications, the B4J and B5J series also match the requirements of marine register rules for pressure vessels.

In particular our motors comply with: ABS, BV, CCS, DNV, GL, KR, LR, NK, RINA, RS.

KR KOREAN REGISTER · Lloyd's Register · ClassNK · RINA 1861 · PRS

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TECHNICAL DATA / LOW VOLTAGE 690V

Rated output		Motor type	Rated speed		Performances at rated outputs				DOL starting		Breakdown torque	Sound pressure level	Moment of inertia	Approx. Weight
					50 Hz									
					Torque	Current	Efficiency	Power factor	Current	Torque		Lpa		
50 Hz kW	60 Hz kW		50 Hz rpm	60 Hz rpm	Tn N m	In A	h %	cos -	Is/In p.u.	Ts/Tn p.u.	Tmax/Tn p.u.	dB(A)	J kg m²	kg
4 poles														
330	**400**	**B4J 355 LA4**	1484	1784	2121	327	96,0	0,88	5,6	2,1	2,5	69	6,2	1600
400	**480**	**B4J 355 LB4**	1486	1786	2568	395	96,3	0,88	5,6	2,1	2,5	69	7,4	1770
450	**540**	**B4J 355 LC4**	1486	1786	2889	444	96,4	0,88	5,6	2,0	2,4	69	8,4	1950
500	**600**	**B4J 355 LD4**	1486	1786	3210	487	96,6	0,89	5,6	2,0	2,5	69	9,5	2100
550	**660**	**B4J 355 LF4**	1487	1787	3529	535	96,7	0,89	5,6	2,0	2,4	69	10,6	2200
600	**720**	**B4J 400 LA4**	1486	1786	3852	604	96,7	0,86	5,3	0,8	2,1	71	14	2700
700	**830**	**B4J 400 LB4**	1486	1786	4494	696	96,8	0,87	5,4	0,9	2,2	71	17	2950
770	**920**	**B4J 400 LC4**	1486	1786	4943	774	96,9	0,86	5,5	0,9	2,1	71	19	3150
980	**1150**	**B5J 450 LA4**	1491	1791	6270	958	97,4	0,88	5,7	0,7	2,4	72	30	4040
1050	**1250**	**B5J 450 LB4**	1492	1792	6714	1015	97,4	0,89	6,0	0,8	2,5	72	33	4325
1180	**1400**	**B5J 450 LC4**	1492	1792	7545	1138	97,6	0,89	6,1	0,8	2,5	72	37	4680
1400	**1600**	**B5J 500 LA4**	1493	1793	8946	1364	97,7	0,88	5,3	0,6	2,1	78	49	5730
1560	**1800**	**B5J 500 LB4**	1493	1793	9968	1518	97,8	0,88	5,3	0,6	2,1	78	55	6180
1750	**2000**	**B5J 500 LC4**	1494	1794	11175	1683	97,9	0,89	5,8	0,6	2,3	78	62	6700
2000	**2300**	**B5J 560 LA4**	1494	1794	12771	1996	97,6	0,86	5,2	0,5	2,0	80	111	8220
2400	**2800**	**B5J 560 LB4**	1495	1795	15315	2365	97,7	0,87	5,8	0,6	2,1	80	139	9297
2700	**3200**	**B5J 560 LC4**	1496	1796	17218	2724	97,7	0,85	7,2	0,8	2,5	80	162	10355
6 poles														
230	**280**	**B4J 355 LA6**	990	1190	2216	243	95,4	0,83	5,4	2,2	2,2	66	11	1600
300	**350**	**B4J 355 LB6**	991	1191	2888	316	95,7	0,83	5,4	2,2	2,2	66	14	1820
380	**450**	**B4J 355 LC6**	992	1192	3654	394	96,1	0,84	5,7	2,5	2,4	66	18	2150
450	**530**	**B4J 400 LA6**	994	1194	4319	477	96,3	0,82	5,8	0,9	2,4	68	21	2670
530	**630**	**B4J 400 LB6**	994	1194	5087	547	96,7	0,84	5,8	0,9	2,4	68	27	3150
610	**735**	**B4J 400 LC6**	994	1194	5855	628	96,8	0,84	5,6	0,8	2,2	68	29	3250
760	**900**	**B5J 450 LA6**	994	1194	7294	772	97,0	0,85	5,5	0,8	2,3	70	41	4000
850	**1000**	**B5J 450 LB6**	994	1194	8158	863	97,1	0,85	5,3	0,8	2,2	70	46	4300
930	**1100**	**B5J 450 LC6**	994	1194	8926	943	97,2	0,85	5,2	0,8	2,2	70	52	4650
1130	**1300**	**B5J 500 LA6**	995	1195	10834	1145	97,3	0,85	5,7	0,7	2,3	73	71	5620
1300	**1500**	**B5J 500 LB6**	995	1195	12464	1299	97,5	0,86	5,3	0,7	2,1	73	82	6230
1570	**1800**	**B5J 500 LC6**	995	1195	15053	1569	97,5	0,86	5,6	0,7	2,2	73	97	6850
1800	**2100**	**B5J 560 LA6**	995	1195	17258	1780	97,4	0,87	5,3	0,6	2,3	75	206	8600
2100	**2400**	**B5J 560 LB6**	995	1195	20135	2074	97,5	0,87	5,4	0,6	2,3	75	237	9350
2400	**2800**	**B5J 560 LC6**	996	1196	22988	2370	97,5	0,87	5,8	0,6	2,5	75	268	10000
8 poles														
400	**480**	**B4J 400 LA8**	743	893	5136	430	95,0	0,82	5,5	1,2	2,1	68	26	2670
440	**530**	**B4J 400 LB8**	743	893	5650	470	95,7	0,82	5,6	1,2	2,1	68	30	3150
500	**600**	**B4J 400 LC8**	743	893	6420	533	95,8	0,82	5,4	1,2	2,1	68	33	3250
550	**650**	**B5J 450 LA8**	745	895	7043	568	96,5	0,84	4,8	1,0	2,1	69	55	4000
610	**740**	**B5J 450 LB8**	745	895	7811	622	96,6	0,85	4,7	1,0	2,1	69	61	4300
700	**830**	**B5J 450 LC8**	745	895	8964	713	96,7	0,85	4,7	1,0	2,1	69	69	4650
780	**930**	**B5J 500 LA8**	745	895	9988	794	96,8	0,85	4,7	0,7	2,3	71	95	5620
880	**1050**	**B5J 500 LB8**	745	895	11269	885	96,9	0,86	4,7	0,7	2,3	71	110	6230
1000	**1200**	**B5J 500 LC8**	746	896	12788	1004	97,0	0,86	5,0	0,9	2,3	71	122	6850
1250	**1450**	**B5J 560 LA8**	746	896	15985	1315	97,1	0,82	5,6	0,7	2,4	74	219	8450
1450	**1650**	**B5J 560 LB8**	746	896	18543	1526	97,1	0,82	5,6	0,7	2,4	74	252	9320
1700	**2000**	**B5J 560 LC8**	746	896	21740	1787	97,2	0,82	5,2	0,7	2,3	74	285	10100

STANDARD CONFIGURATION AND OPTIONS

	Description	Frame Size				
		355	400	450	500	560
Degree of Protection						
-	IP 55	S	S	S	S	S
125	IP 56	0	0	0	0	NA
Insulation						
100	Class H	0	0	0	0	0
Painting						
919	Non standard RAL colour	0	0	0	0	0
930	Epoxy-vinyl + polyacrylic	0	0	0	0	0
-	Tropicalisation	S	S	S	S	S
Vibration Grade						
-	Grade A	S	S	S	S	S
133	Grade B	0	0	0	0	0
Bearings						
128	D-end roller bearing	0	0	0	0	0
-*	Sleeve bearings	0	0	0	0	0
-	Regreasing device	S	S	S	S	S
-	Arrangement for SPM	S	S	S	S	S
122	PT100 in bearings	0	0	0	0	0
Drain Holes						
-	Drain holes	S	S	S	S	S
Shaft						
127	Second shaft extension	0	0	0	0	0
Heating elements						
109	Space heaters with terminals placed in auxiliary box	0	0	0	0	0
Windings Protections						
-	PTC (one series of 3 PTC in windings)	S	S	S	S	S
114	PTC (two series of 3 PTC in windings)	0	0	0	0	0
115	PT100 (one series of 3 PT100 in windings)	0	0	0	0	0
115	PT100 (two series of 3 PT100 in windings)	0	0	0	0	0
Inverter Supply						
175	Insulated bearing	0	0	0	0	0
178	Enhanced insulation for use with filter	0	0	0	0	0
178	Enhanced insulation for use without filter	0	0	0	0	0
161	Encoder	0	0	0	0	0

S: Standard configuration
O: Option
NA: Not Applicable
*: Contact MarelliMotori

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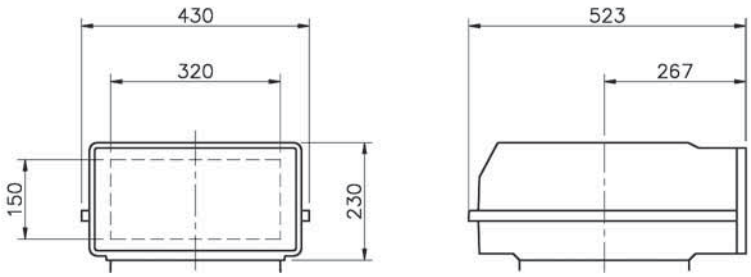
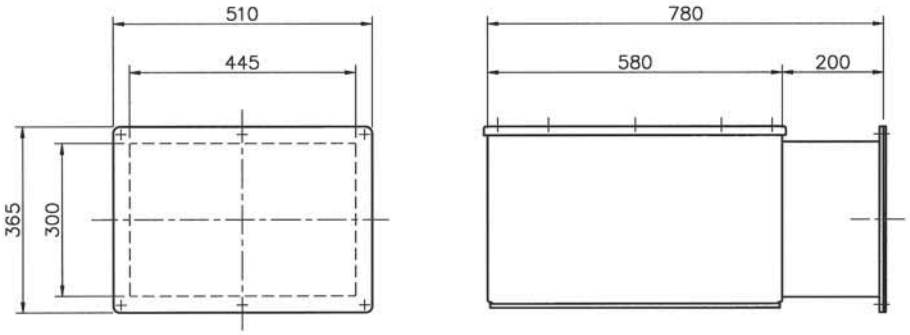
TERMINAL BOX DIMENSIONS

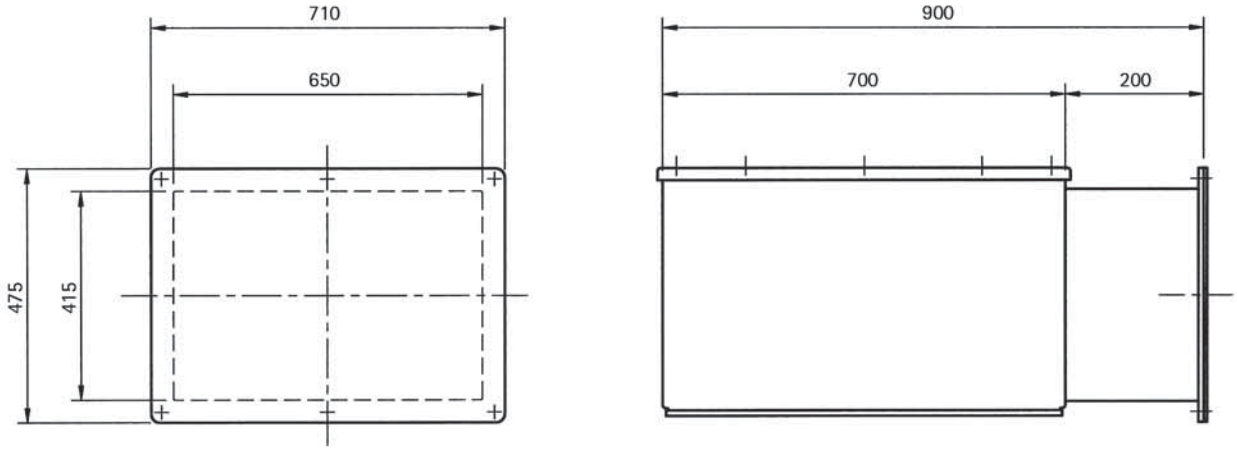
355-400LB



400LC-500



560

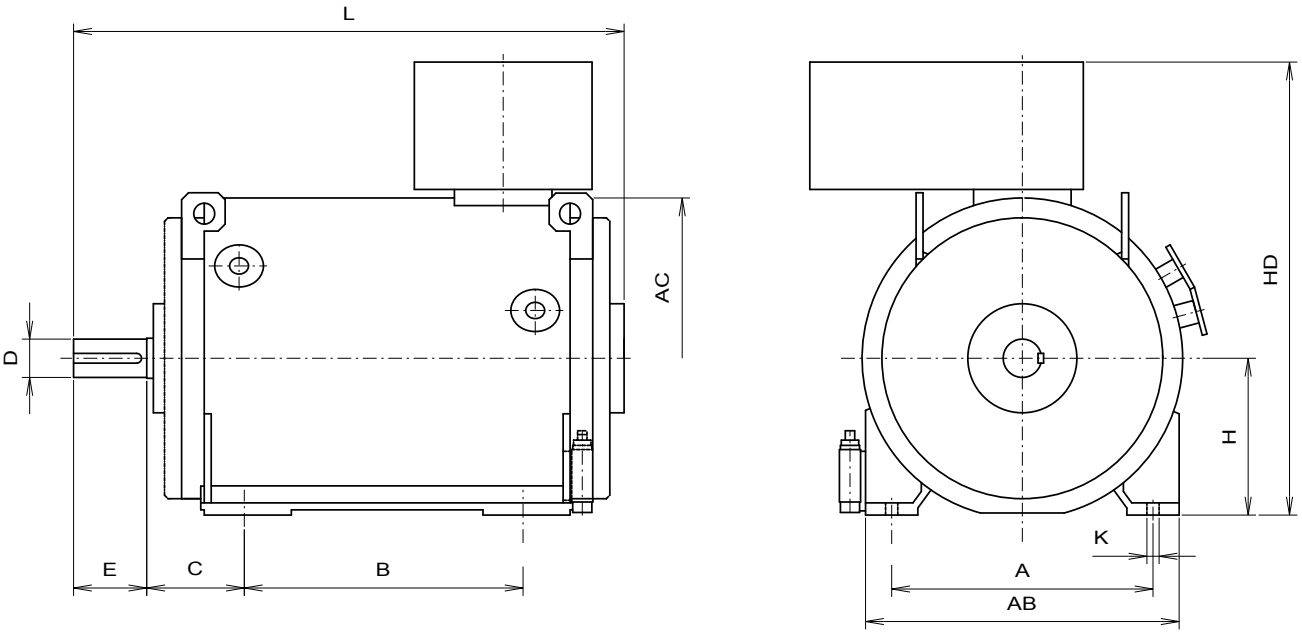


Dimensions in mm

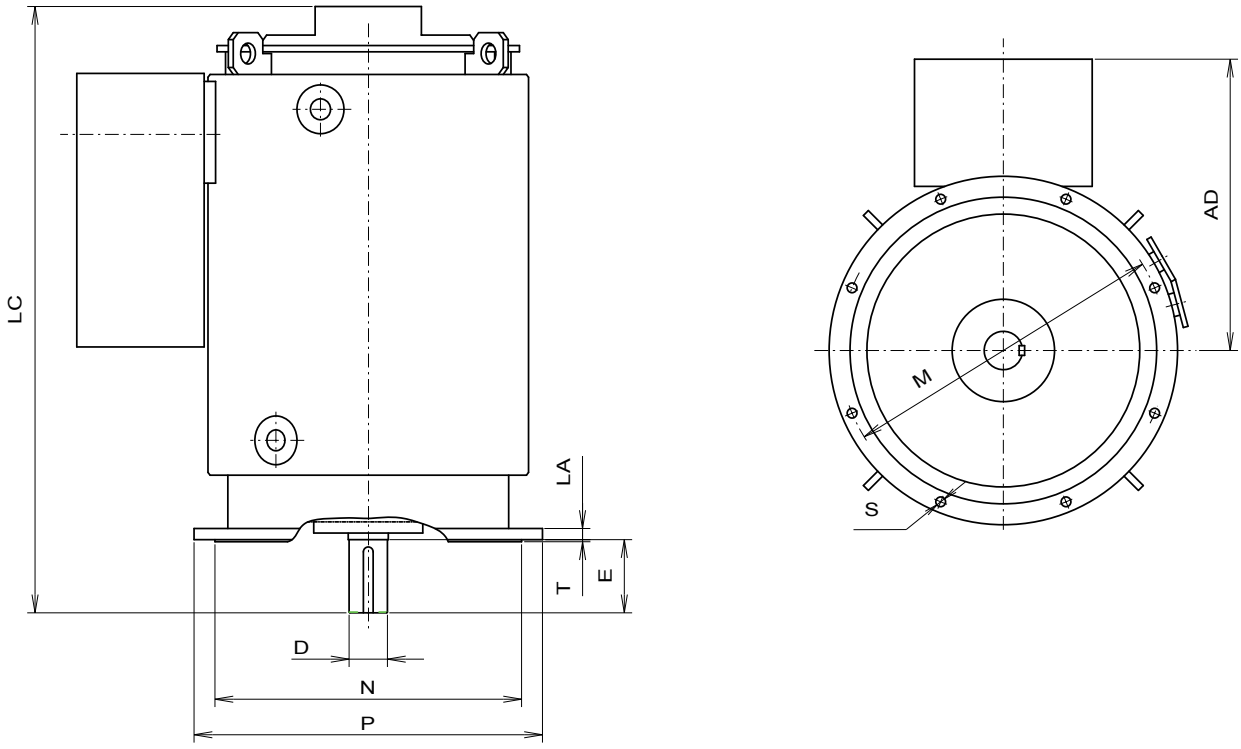
Frame size	Terminal Block	Terminals	Maximum conductor cross section	Cable entrance
355 ÷ 400 LB	Flat coppers bars	Hole for M12 bolt	2 x 300 mm²	Undrilled gland plate
400 LC ÷ 500	Flat coppers bars	Hole for M12 bolt	4 x 300 mm²	Undrilled gland plate
560	Flat coppers bars	Hole for M16 bolt	8 x 300 mm²	Undrilled gland plate

DIMENSIONS

B3



V1



Dimensions in mm

Frame Size	Frame Length	Poles	A	AD	B	C	H	AD	HD	K	L	LC	D	E	LA	M	N	P	S	T
B4J 355	LA - LB	4-8	610	267	630	254	355	610	965	28	1405	1405	100	210	25	740	680	800	24	6
	LC - LF	4-8	610	267	630	254	355	610	965	28	1585	1585	100	210	25	740	680	800	24	6
B4J 400	LA - LB	4-8	686	267	710	280	400	657	1057	35	1785	1785	100	210	28	940	880	1000	28	6
	LC - LD	4-8	686	610	710	280	400	800	1200	35	1785	1785	100	210	28	940	880	1000	28	6
B5J 450	LA - LC	4-8	750	610	1120	280	450	865	1315	35	2000	2000	120	210	30	1080	1000	1150	28	6
B5J 500	LA - LC	4-8	900	610	1250	280	500	950	1450	42	2305	2380	130	250	30	1080	1000	1150	28	6
B5J 560	LA - LC	4-8	1120	610	1800	315	560	1160	1720	42	2690	3000	180	300	30	1320	1250	1400	28	8

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Ed. 02-10 - MCI - Grafiche Marcolin Schio 0310