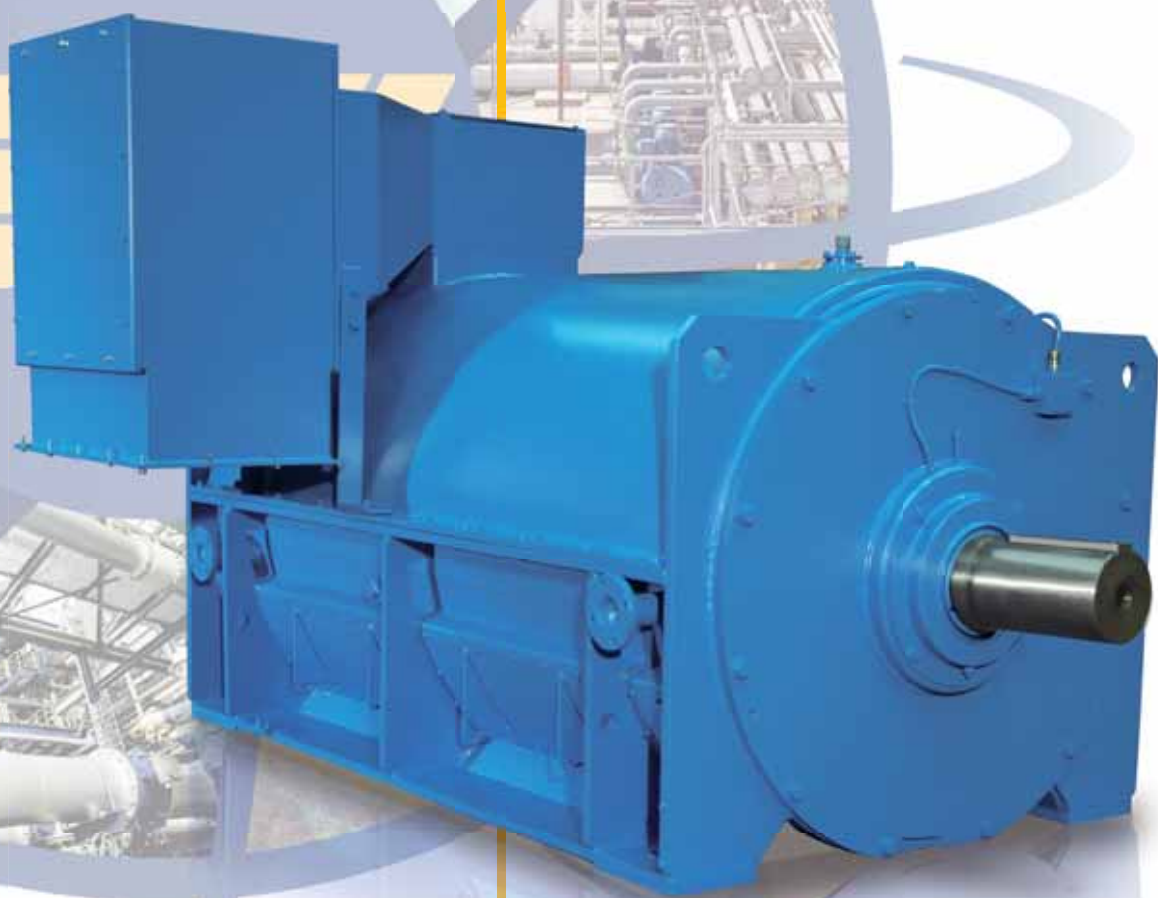


# Water Jacket Three Phase Squirrel Cage Induction Motors

B4J - B5J SERIES  
355 - 560 FRAME SIZES

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 **MarelliMotori®**

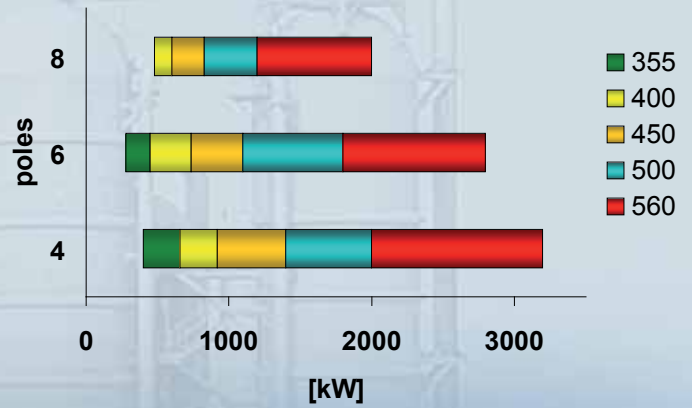
## WATER COOLED ASYNCHRONOUS MOTORS 355, 400, 450, 500 AND 560 FRAME SIZES

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





## 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 register 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



## 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.

### ENVIRONMENTAL 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.

 <b>MarelliMotori</b> <small>ARZIGNANO (VI) ITALY</small>	
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
450	6326-C3	6326-C3	6326-C3	7322
				6326 7326
500	6328-C3	6328-C3	6328-C3	6328 7328
				6234 2 x 7328
560	NU328-EC-C3 6328M-C3	6238M-C3	NU234-EC-C3	

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.



**TECHNICAL DATA / LOW VOLTAGE 690V**

Rated output		Motor type	Rated speed		Performances at rated outputs				DOL starting		Breakdown torque	Sound pressure level Lpa dB(A)	Moment of inertia	Approx. Weight
					Torque	Current	Efficiency	Power factor	Current	Torque				
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.		J kg m <sup>2</sup>	kg
<b>4 poles</b>														
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

<b>6 poles</b>														
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

<b>8 poles</b>														
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

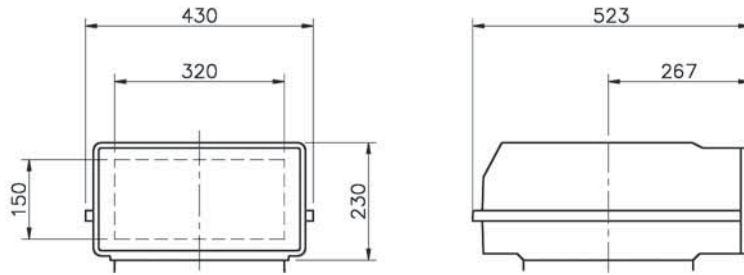
## STANDARD CONFIGURATION AND OPTIONS

Description		Frame Size				
		355	400	450	500	560
<b>Degree of Protection</b>						
-	IP 55	S	S	S	S	S
125	IP 56	0	0	0	0	NA
<b>Insulation</b>						
100	Class H	0	0	0	0	0
<b>Painting</b>						
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
<b>Vibration Grade</b>						
-	Grade A	S	S	S	S	S
133	Grade B	0	0	0	0	0
<b>Bearings</b>						
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
<b>Drain Holes</b>						
-	Drain holes	S	S	S	S	S
<b>Shaft</b>						
127	Second shaft extension	0	0	0	0	0
<b>Heating elements</b>						
109	Space heaters with terminals placed in auxiliary box	0	0	0	0	0
<b>Windings Protections</b>						
-	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
<b>Inverter Supply</b>						
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

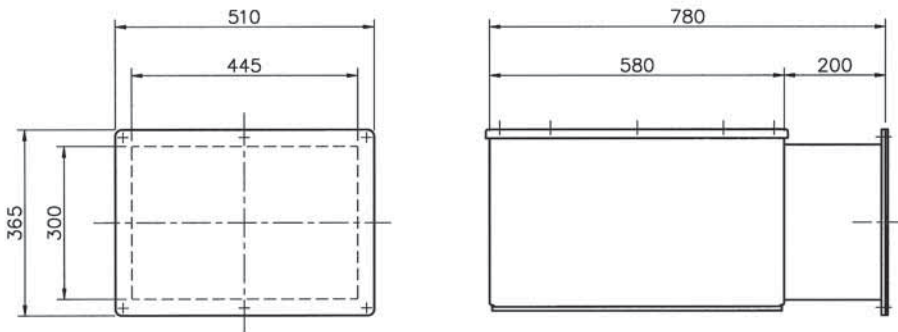
S: Standard configuration  
 0: Option  
 NA: Not Applicable  
 \*: Contact MarelliMotori

## TERMINAL BOX DIMENSIONS

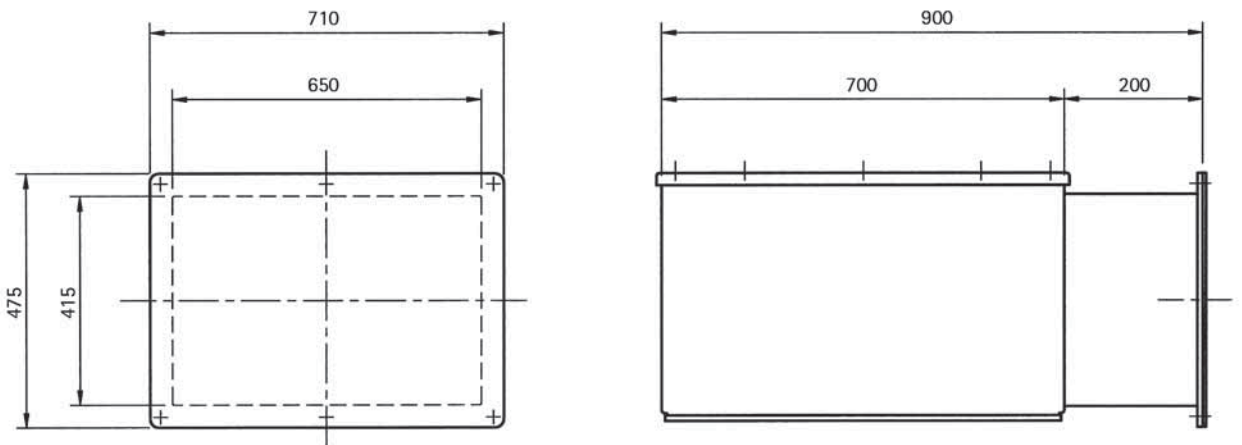
355-400LB



400LC-500



560

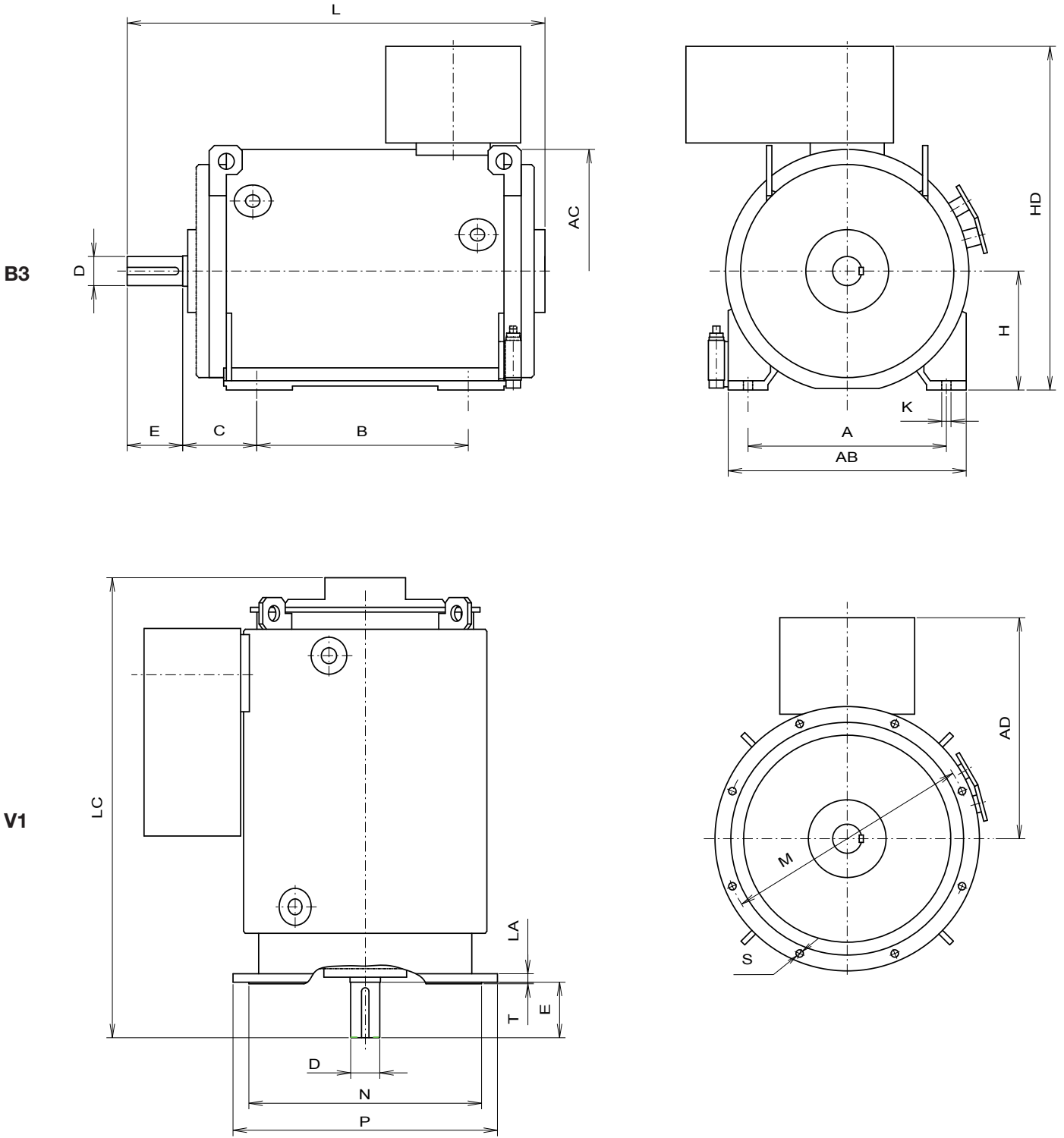


Dimensions in mm

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



## DIMENSIONS



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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