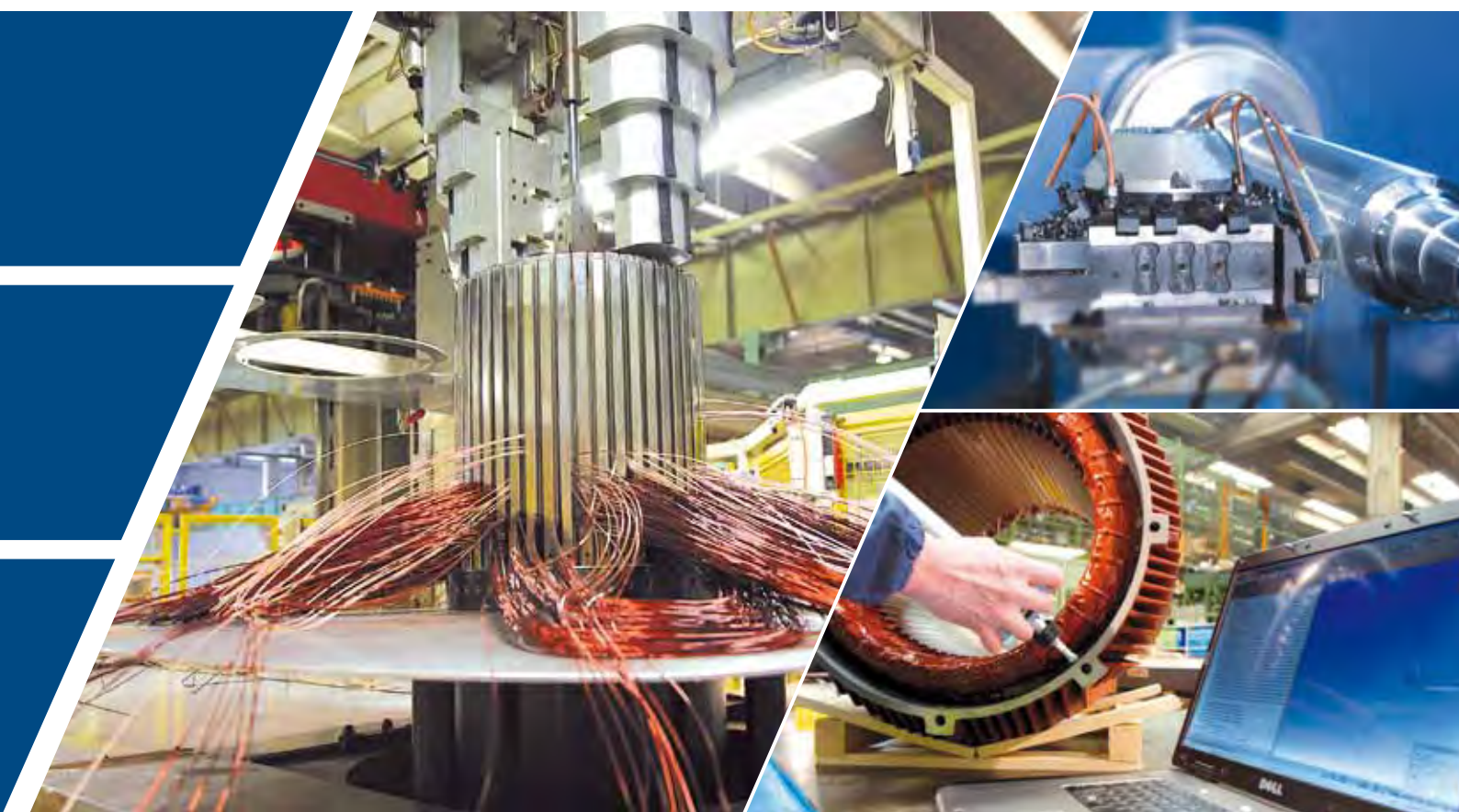


Three Phase Squirrel Cage Induction Motors

A5 - B5 SERIES
160 - 500 SIZES
LOW AND HIGH VOLTAGE
INDUSTRIAL APPLICATIONS



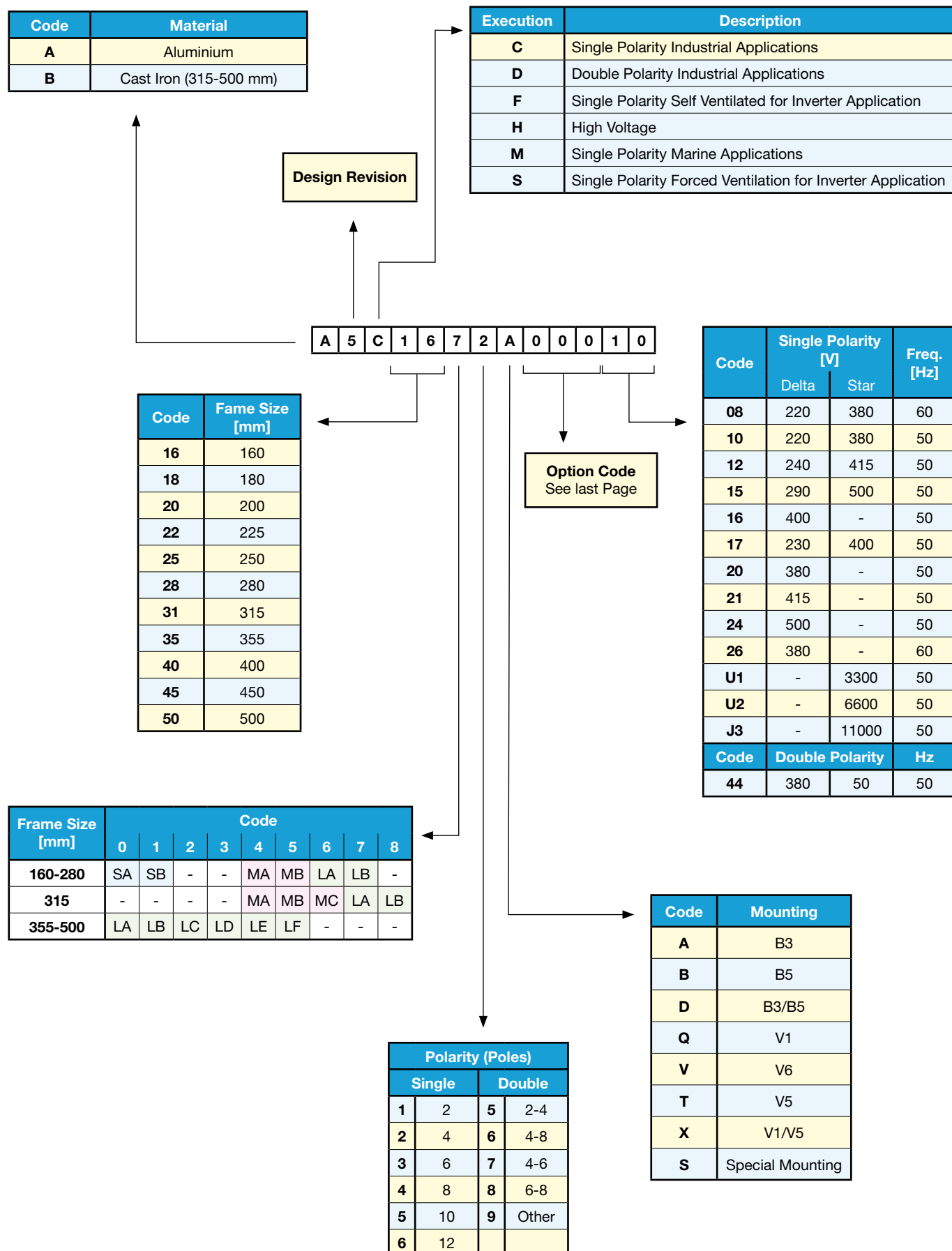
 **MarelliMotori®** your partner in power technology



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PRODUCT CODE STRUCTURE

MarelliMotori products are identified by a 13-digit code shown on the nameplate. The code is constructed as follows.



RATING PLATES

All identification plates are laser engraved with data as shown in the following standard typologies.

Motors subject to the efficiency classification in accordance to IEC 60034-30 and the commission regulation (EC) No 640/2009, have the correspondent efficiency level and the nominal efficiency at full, 3/4 and 2/4 rated load.

From 160 to 315 frame size:

High efficiency motors IE2

		MarelliMotori		IE2					
MADE IN ITALY - ARZIGNANO (VI)				IEC 60034-1					
MOT.3~		A5C 280 M4 B3		COD.		A5C2842A00016			
N° Y013264		04-11		I.Cl. F/B		IP 55			
S 1						kg 472			
+		NU 2217-EC-C3				6314-Z-C3		+	
		1400 h		22 g		MOBILUX EP3			
Δ	V	λ	Hz	Δ	A	λ	kW	min ⁻¹	cos.φ
400	690		50	154,5	89,5		90	1480	0,89
LOAD - η		4/4 - 94,5%		3/4 - 95,9%		2/4 - 94,8%			
AD OGNI ASSIEM. RIPRIST. IL GRASSO SUI GIUNTI - APPLY GREASE ON THE MATING SURFACES BEFORE REASSEMBLING									

Motors not IE2

		MarelliMotori		EN 60034-1 IEC 60034-1															
ARZIGNANO (VI) ITALY																			
MOT.3~ A5C 280 M8 B3 COD.				A5C2844A00016															
N° Y015827 04-11 I.Cl. F/B				IP 55															
S1				kg 402															
+		NU 2217-EC-C3				6314-Z-C3		+											
		3400 h		22 g		MOBILUX EP3													
Δ		V		λ		Hz		Δ		A		λ		kW		min ⁻¹		cos.φ	
400		690				50		89		51,5				45		735		0,79	
AD OGNI ASSIEM. RIPRIST. IL GRASSO SUI GIUNTI - APPLY GREASE ON THE MATING SURFACES BEFORE REASSEMBLING																			

From 355 frame size and above:

Low voltage:

High efficiency motors IE2

		MarelliMotori MADE IN ITALY - ARZIGNANO (VI)		IE2 IEC 60034-1		CE			
MOT.3~ B5C 355 LA4 B3 COD. B5C3502A00016A									
N°X019895 05-11 I.Cl.F/B				IP 55					
S1				kg 1690					
Δ	V	λ	Hz	Δ	A	λ	kW	min⁻¹	cos.φ
400	690		50	438.5	254		250	1490	0,86
LOAD - η			4/4 - 95,7%		3/4 - 95,5%		2/4 - 94,4%		
6322-C3				6322-C3					
2800h		15 g				MOBILUX EP3			
AD OGNI ASSIEMAGGIO RIPRISTINARE IL GRASSO SUI GIUNTI APPLY GREASE ON THE MATING SURFACES BEFORE REASSEMBLING									

Motors not IE2

+				MarelliMotori		EN 60034-1 IEC 60034-1				+			
MADE IN ITALY - ARZIGNANO (VI)													
MOT.3~B5C 400 LA2 B3 COD. B5C4001A00016													
N°X020726 05/11 I.Cl.F/B						IP 55							
S1						kg 2790							
Δ		V		λ		Hz		Δ		A			
λ								λ					
400		690		50		841		488		500			
										kW			
										min ⁻¹			
										cos.φ			
										0,89			
6317-C3						6317-C3							
2000h								MOBILUX EP3					
AD OGNI ASSIEMAGGIO RIPRISTINARE IL GRASSO SUI GIUNTI													
APPLY GREASE ON THE MATING SURFACES BEFORE REASSEMBLING													
+												+	

High voltage:

+



MarelliMotori

MADE IN ITALY - ARZIGNANO (VI)

EN 60034-1

IEC 60034-1

+

MOT.3~ B5H 400 LC4 B3 COD. B5H4022A000P5

N°Y019562 05-11 I.Cl. F/B

IP 55

S1

kg 3190

V	Hz	A	kW	min ⁻¹	cos.φ
6000	50	54	450	1490	0,84

6322-C3



6322-C3

4500h

48 g

MOBILUX EP3

+

AD OGNI ASSIEMAGGIO RIPRISTINARE IL GRASSO SUI GIUNTI

APPLY GREASE ON THE MATING SURFACES BEFORE REASSEMBLING

+

STANDARDS

TITLE	International Standard
Rating and performance	IEC 60034 - 1
Standard methods for determining losses and efficiency from tests	IEC 60034 - 2 - 1
Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	IEC 60034 - 5
Methods of cooling (IC Code)	IEC 60034 - 6
Classification of types of construction, mounting arrangements and terminal box position (IM Code)	IEC 60034 - 7
Terminal markings and direction of rotation	IEC 60034 - 8
Noise limits	IEC 60034 - 9
Thermal protection	IEC 60034 - 11
Starting performance of single-speed three-phase cage induction motors	IEC 60034 - 12
Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	IEC 60034 - 14
Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)	IEC 60034 - 30
Standard voltages	IEC 60038
Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080	IEC 60072 - 1

CE MARK AND DECLARATION OF CONFORMITY

All low voltage products described in this catalogue are marked CE and are in conformity with the requirements of the applicable Directive. With reference to the Machinery Directive (89/392/EEC amended by 91/368/EEC, 93/44/EEC and 93/68/EEC), the above mentioned product is to be considered as a component.

ENERGY SAVING

The International Electrotechnical Commission (IEC), in order to harmonize the energy consumption regulations aimed to reduce the CO₂ emissions and the impact of industrial operations on the environment, has established the standard IEC 60034-30:2008 which defines energy efficiency classes for single-speed, three-phase, 50 Hz and 60 Hz induction motors.

To that regard, the European Community (EC) has recently passed the regulation EC N° 640/2009 which is essentially based on the IEC 60034-30 and requires all the EU countries to conform themselves to the new efficiency standards.

Electric motors account for about 70% of the electricity consumed by industry.

The potential cost saving of high efficiency systems is estimated 20% to 30% and one of the major factors in such cost-effective improvement is the use of energy efficient motors.

The IEC 60034-30 is part of an effort to unify motor testing standards, efficiency requirements and product labeling requirements to easily recognize worldwide high-efficiency products.

To show compliance with these new efficiency standards, motors must be tested in accordance with the new testing standard IEC 60034-2-1:2007.

The motor efficiency class and nominal motor efficiency must be stated on the motor nameplate and given in product documentation and motor catalogues.

Efficiency Classes

The new IEC 60034-30 defines worldwide the following efficiency classes of single-speed three-phase, cage-induction motors in the 0,75 kW - 375 kW power range.

IE1	Standard	Motors with a rated efficiency at full-load (rated output) equal to or exceeding the limits listed
IE2	High	Motors with a rated efficiency at full-load (rated output) equal to or exceeding the limits listed
IE3	Premium	Motors with a rated efficiency at full-load (rated output) equal to or exceeding the limits listed;
IE4	Super Premium	Under consideration*

* it is expected that technologies other than cage-induction motors will be required to meet ie4 levels.

Deadlines

16 June 2011

Motor efficiency less than IE2 level will not be allowed;

1 January 2015

Motor efficiency for output powers 7,5-375 kW less than IE3 level will not be allowed or if the IE2 efficiency level is met, motors will have to be equipped with variable speed drive;

1 January 2017

Motor efficiency for output powers 0,75-375 kW less than IE3 level will not be allowed or if the IE2 efficiency level is met, motors will have to be equipped with variable speed drive.

Efficiency values at 50 Hz

Power kW	IE1 - Standard			IE2 - High			IE3 - Premium		
	2 pole	4 pole	6 pole	2 pole	4 pole	6 pole	2 pole	4 pole	6 pole
0,75	72,1	72,1	70,0	77,4	79,6	75,9	80,7	82,5	78,9
1,1	75,0	75,0	72,9	79,6	81,4	78,1	82,7	84,1	81,0
1,5	77,2	77,2	75,2	81,3	82,8	79,8	84,2	85,3	82,5
2,2	79,7	79,7	77,7	83,2	84,3	81,8	85,9	86,7	84,3
3,0	81,5	81,5	79,7	84,6	85,5	83,3	87,1	87,7	85,6
4,0	83,1	83,1	81,4	85,8	86,6	84,6	88,1	88,6	86,8
5,5	84,7	84,7	83,1	87,0	87,7	86,0	89,2	89,6	88,0
7,5	86,0	86,0	84,7	88,1	88,7	87,2	90,1	90,4	89,1
11	87,6	87,6	86,4	89,4	89,8	88,7	91,2	91,4	90,3
15	88,7	88,7	87,7	90,3	90,6	89,7	91,9	92,1	91,2
19	89,3	89,3	88,6	90,9	91,2	90,4	92,4	92,6	91,7
22	89,9	89,9	89,2	91,3	91,6	90,9	92,7	93,0	92,2
30	90,7	90,7	90,2	92,0	92,3	91,7	93,3	93,6	92,9
37	91,2	91,2	90,8	92,5	92,7	92,2	93,7	93,9	93,3
45	91,7	91,7	91,4	92,9	93,1	92,7	94,0	94,2	93,7
55	92,1	92,1	91,9	93,2	93,5	93,1	94,3	94,6	94,1
75	92,7	92,7	92,6	93,8	94,0	93,7	94,7	95,0	94,6
90	93,0	93,0	92,9	94,1	94,2	94,0	95,0	95,2	94,9
110	93,3	93,3	93,3	94,3	94,5	94,3	95,2	95,4	95,1
132	93,5	93,5	93,5	94,6	94,7	94,6	95,4	95,6	95,4
160	93,8	93,8	93,8	94,8	94,9	94,8	95,6	95,8	95,6
200	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
250	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
315	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
355	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
375	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8

Scope

The efficiency classes specified in the IEC 60034-30 are relevant to single speed, three-phase, 50Hz and 60Hz induction motors with:

- 2, 4 or 6 pole
- rated output from 0,75 to 375kW;
- rated voltage UN up to 1000V;
- duty type S1 (continuous duty) or S3 (intermittent periodic duty) with a rated cyclic duration factor of 80% or higher;
- direct on-line starting.

The following motors are excluded from the IEC 60034-30:

- motors made solely for converter operation;
- motors completely integrated into a machine (for example, pump, fan or compressor) that cannot be tested separately from the machine.

The following motors are excluded from regulation EC No 640/2009:

- motors designed to operate wholly immersed in a liquid;
- motors completely integrated into a product (for example gear, pump, fan or compressor) of which the energy performance cannot be tested independently from the product;
- brake motors;
- water cooled motors with inlet temperature less than 5°C or exceeding 25°C;
- motors specifically designed to operate:
 - at altitudes exceeding 1000 m above sea-level;
 - where ambient air temperatures exceed 40°C;
 - in maximum operating temperature above 400°C;
 - where ambient air temperatures are less than -15°C for any type of motor or less than 0°C for a motor with air cooling;
 - in potentially explosive atmospheres as defined in Directive 94/9/EC

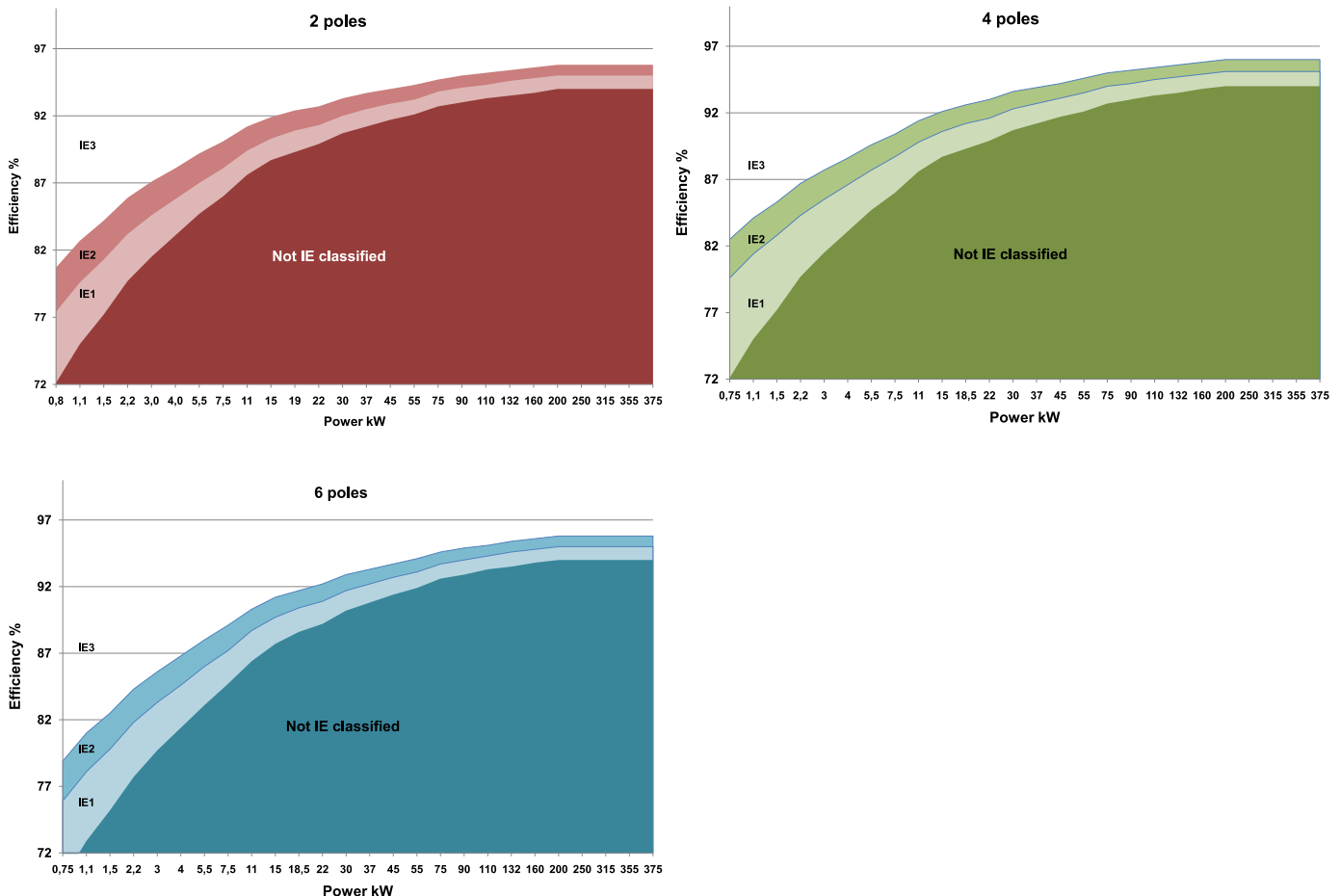
New method for determining the Efficiency (IEC 60034-2-1:2007)

The method for measuring the efficiency of low-voltage three-phase asynchronous motors was revised with the IEC 60034-2-1 standard which replaced the previous IEC 60034-2:1996. The actual losses are now measured under defined laboratory conditions and no longer added as a lump sum. This new standard significantly increases the efficiency level accuracy.

MarelliMotori IE solutions

MarelliMotori measures the efficiency of all motors strictly in accordance with the IEC 60034-2-1.

With his 100 years of experience MarelliMotori offers a complete range of high efficiency motors (IE2) in respect of the European Directive EN 640/2009.



TECHNICAL CHARACTERISTICS

Continuous duty S1:

The type of duty is indicated by the symbols S1...S9 as defined in standard IEC 60034-1. Duty type S1 refers to operation at a constant load maintained for sufficient time to allow the machine to reach thermal equilibrium.

Degree of Protection IP55

The motors in standard execution have **IP55** protection degree, where:

5 (first number in code):

Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the machine.

5 (second number in code):

Water projected against the machine from a nozzle from any direction has no harmful effect.



IP56 protection can be provided upon request.

Insulation class F:

Class F insulation systems are utilised in MarelliMotori motors. This is the most common requirement among the industry today. The class F insulation system allows a temperature rise of 105K, measured by the resistance variation method, and a maximum hot spot temperature value of 155°C. The materials and the impregnation systems used make these motors suitable for use in tropical environments, for applications with high vibrations and for applications with high thermal variations.



Insulation class H can be provided upon request.

Temperature rise compatible with class B:

Class B rise allows a maximum winding temperature rise of 80K under normal running conditions (rated voltage, frequency and load) with maximum ambient temperature of 40°C and altitude below 1000m a.s.l.

Installation ≤1000 m a.s.l.:

The performance of standard motors is considered at a maximum height of 1000m above sea level (a.s.l.) with motors running in continuous duty, at nominal voltage and frequency and a maximum ambient temperature of 40°C. The table displayed on page 39 gives the performance variations of the motors when utilised in other conditions.

PROTECTIVE TREATMENT

External surfaces

The **standard painting process** consists of epoxy vinylpolyurethane paint: of a thickness used to ensure an optimum environmental resistance. Standard finishing paint colour is RAL 5010.



A **special painting process**, consisting of epoxy vinyl paint followed by polyacrylic paint is available on request. This process is particularly recommended for:

- Environments where acids or basic liquids are present;
- Outdoor installations where salt is present;
- Marine applications,
- Environments where anhydric gases are present.



Other RAL and MUNSSELL colours are available on request.

Description	Process	Characteristics	Minimum Thickness
Base Painting	Standard F96833	Two component paint formulated with solid epoxy resins modified with vinyl polyamide catalysers	$\geq 50 \mu\text{m}$
	On request F96819	Typical Marine Application Base paint: epoxy vinyl paint Final Paint: polyacrilic paint	$\geq 200 \mu\text{m}$
	On request F96826	For aggressive atmosphere and environment classification C5I Base paint: epoxy vinyl paint + Final Paint: polyacrilic paint	
Finishing paint	Std	RAL 5010	-
	On request	RAL or MUNSELL colours	-

Internal surfaces

All internal surfaces of motors from 280 frame size are tropicalised with an insulating enamel to prevent motor corrosion due to humidity and aggressive substances.

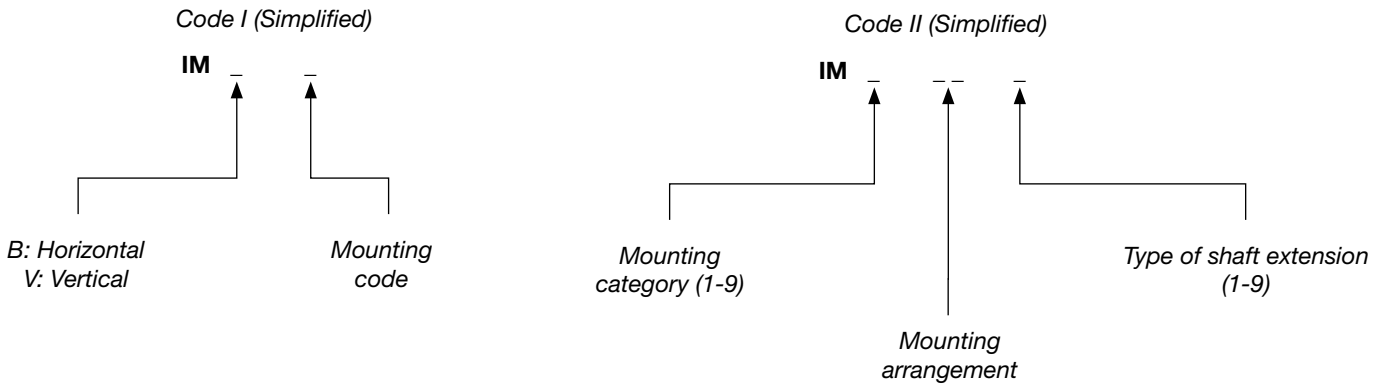


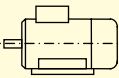
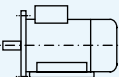
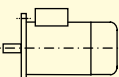
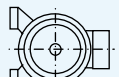
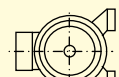
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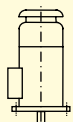
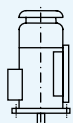
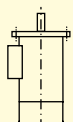
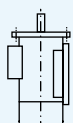
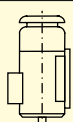
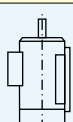
Tropicalisation can also be applied to motors from 160 to 250 frame size on request.

MOUNTINGS AND POSITIONS

Mountings and positions are defined by the following codes according to IEC 60034-7:



IEC 60034-7			Frame Size							
Code I	Code II	Mount	160 + 250	280	315 M	315 L	355	400	450	500
IM B3	IM 1001	 1)	•	•	•	•	•	•	•	•
IM B35	IM 2001	 1) 2)	•	•	•	•	•	•	•	•
IM B5	IM 3001	 2)	•	X	X	X	X	—	—	—
IM B6	IM 1051	 1)	•	X	X	X	X	—	—	—
IM B7	IM 1061	 1)	•	X	X	X	X	—	—	—
IM B8	IM 1071	 1)	•	X	X	X	X	—	—	—

IEC 60034-7			Frame Size							
Code I	Code II	Mount	160 + 250	280	315 M	315 L	355	400	450	500
IM V1	IM 3011	 2)	•	•	•	•	•	•	•	•
IM V15	IM 2011	 1) 2)	•	•	•	•	•	•	•	•
IM V3	IM 3031	 2)	•	X	X	X	X	—	—	—
IM V36	IM 2031	 1) 2)	•	X	X	X	X	—	—	—
IM V5	IM 1011	 1)	•	X	X	X	X	—	—	—
IM V6	IM 1031	 1)	•	X	X	X	X	—	—	—

- 1) Motors with feet
2) Flanged Motor: unthreaded through holes

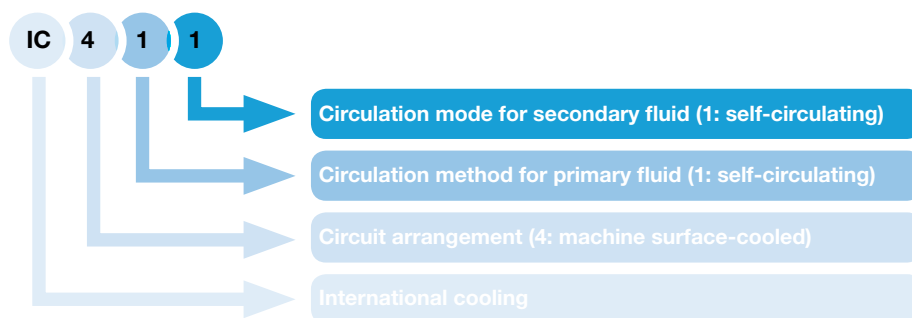
- Standard
— Not applicable
X Consult Marelli Motori

For other mounting arrangements refer to IEC 60034-7
The motors should be installed on a rigid foundation with negligible structural vibrations.

COOLING

The cooling method designation is given by IC (International Cooling) code, according to IEC 60034-6.

The designation system is made up as follows, using the example IC 411 for simplified designation:

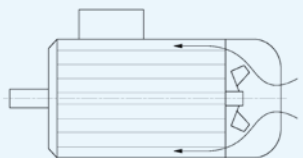
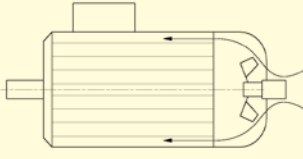


Motors in standard execution are supplied with IC 411 cooling system, cooling is achieved by a bi-directional fan mounted at the NDE of the motor, inside a fan cover which acts as a safety guard. The fan draws the air through the grille in the cover and sends it along the housing fins, giving an identical heat balance in either direction of rotation.

On request, all frame sizes can be supplied with cooling system IC 418 or IC 416.

 177: Option code for assisted ventilation, cooling system IC 416.

For motors with cooling system IC 418, please refer to MarelliMotori in order to verify which motor size to choose, according to the rated power.

Code	Description	Figure
IC 411	Self ventilated motor. Enclosed machine with finned casing. External shaft-mounted fan.	
IC 416	Motor with assisted ventilation. Enclosed machine with finned casing. Independent ventilation device mounted inside the fan cover.	
IC 418	Motor with external ventilation. Enclosed machine with finned casing. Ventilation provided by air flow coming from the driven system.	

MATERIALS

The table below, show the materials used on the mechanical components for standard motors.

Components		Frame size											
		160	180	200	225	250	280	315	355	400	450	500	
Frame		Alluminium						Cast iron					
Shield	D-end IMB3	Alluminium	Cast iron										
	D-end IMB5	Cast iron											
	N-end	Alluminium			Cast iron								
Fan cover		Steel						Fibreglass					
Fan	2 Poles	Polypropylene						Polyamide					
	≥4 poles	Polypropylene						Alluminium					
Terminal box		Steel						Cast iron					

BALANCING AND VIBRATION GRADES

The motors are subjected to dynamic balancing with a half key applied to the shaft extension in accordance with standard IEC 60034-14 to vibration grade A in standard execution.

The following table indicates the limits of vibration magnitude in displacement, velocity and acceleration (r.m.s.) for shaft height H.

Large vibrations may occur on motors installed on site, due to several factors such as unsuitable foundations or reactions caused by the driven application. In such cases checks should also be carried out on each element of the installation.



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Motors can be supplied also with grade B on request.

Vibration grade	Shaft height [mm] Mounting	160 ≤ H ≤ 280			H > 280		
		Displac. [μm]	Vel. [mm/s]	Acc. [m/s²]	Displac. [μm]	Vel. [mm/s]	Acc. [m/s²]
A	Free suspension	35	2,2	3,5	45	2,8	4,4
	Rigid mounting	29	1,8	2,8	37	2,3	3,6
B	Free suspension	18	1,1	1,7	29	1,8	2,8
	Rigid mounting	14	0,9	1,4	24	1,5	2,4

The instrumentation can have a measurement tolerance of ± 10%.

The free suspension condition is achieved by suspending the machine on a spring or by mounting on a elastic support (springs, rubber, etc)

COUPLING

The coupling realized by elastic or flexible couplings, have to be correctly carried out in order to avoid any axial and / or radial loads transmission to the motor shaft and bearings. The permissible radial load with regards to belt coupling are indicated in the table on page 17.

NOISE

Medium values of A-sound pressure level (LpA) and A-sound power level (LwA) are measured at a one metre distance according to standard ISO R 1680. Sound levels are measured at no-load and a tolerance of 3 dB(A) shall be applied. Values of sound pressure increase by approximately 4 dB (A) at 60 Hz.



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To reduce noise levels, a special fan can be fitted to motors on request, starting from 225 frame size. Ask Marelli Motori to check requested derating and admissible outputs.

BEARINGS

The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction motors, without external forces (radial and/or axial) is in excess of 50 000 hours.

The lifetime of bearings is determined by multiple factors and specifically by:

- the lifetime of the grease (mainly on double screen bearings),
- the environmental conditions and working temperature,
- the external loads and vibrations.

The motors from 160 to 250 frame size have single screen prelubricated ball bearings (without grease nipples).

The motors from 280 frame size and above have regreasable bearings (with grease nipples Tecalemit UNI type) and the relative exhausted grease drainage.

The correspondent grease life for motors with prelubricated ball bearings under normal operating conditions for a motor with horizontal shaft, maximum ambient temperature of 40°C is :

- 10 000 hours in continuous duty for 2-pole motors,
- 20 000 hours in continuous duty for ≥4-pole motors.

For initial charge of standard motor bearings a grease with mineral oil as basic oil and lithium soap as thickener, NLGI consistency grade 3, is used.

Motors for unfavourable operating conditions can be lubricated with special grease.

The name plate indicates the type of grease, the quantity and the relubrication intervals. For standard motors relubrication data applies for neutral ambient conditions, at the rated speed, with almost vibration-free running, without any additional axial or radial load.

Immediately after regreasing the bearing temperature rises (10-15 °C) for a while, and then drops to normal values after the grease has been uniformly distributed and the exceeding grease displaced from the bearing.

An excessive quantity of grease causes bearing self heating.

The relubrication intervals refers to an average temperature about 70°C. With higher temperatures the lubrication interval must be shortened.

For vertical mounting the values must be halved.

The lubrication intervals of motors without grease nipples and the relubrication intervals of motors with grease nipples are shown in the tables below.

Motors without grease nipples

Frame size	Lubrication intervals [hours]							
	3600 min ⁻¹	3000 min ⁻¹	1800 min ⁻¹	1500 min ⁻¹	1200 min ⁻¹	1000 min ⁻¹	900 min ⁻¹	750 min ⁻¹
160 – 180	14000	15000	24000	28000	28000	36000	36000	36000
200	11000	14000	22000	24000	24000	32000	32000	32000
225	11000	14000	20000	22000	22000	32000	32000	32000
250	10000	11000	19000	22000	22000	28000	28000	28000

Motors with grease nipples

Frame size	Relubrication intervals [hours]									
	3600 min ⁻¹	3000 min ⁻¹	1800 min ⁻¹	1500 min ⁻¹	1200 min ⁻¹	1000 min ⁻¹	900 min ⁻¹	750 min ⁻¹	600 min ⁻¹	500 min ⁻¹
280	2300	2600	1500	1800	2400	2800	2900	3400	-	-
315 M	2100	2400	1200	1500	2000	2400	2500	3000	-	-
315 L	2100	2400	2600	3000	4500	5000	-	-	-	-
355	1500	2500	4000	5500	7000	7500	8000	9000	9000	9000
400	1000	2000	3200	4500	6500	7000	7500	8000	8000	8000
450	1000	1500	2800	4000	5000	6000	7000	8000	8000	8000
500	1000	1500	2800	4000	5000	6000	7000	8000	8000	8000

Lubrication - Grease quantity

Frame size	160		180		200		225		250		280		315		355		400		450		500	
	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4	2	≥4
Grease quantity (g)	12	12	12	12	16	16	20	20	22	22	22	22	30	30	30	48	30	48	42	66	42	76

The bearings should be lubricated at least once a year independently from lubrication intervals.



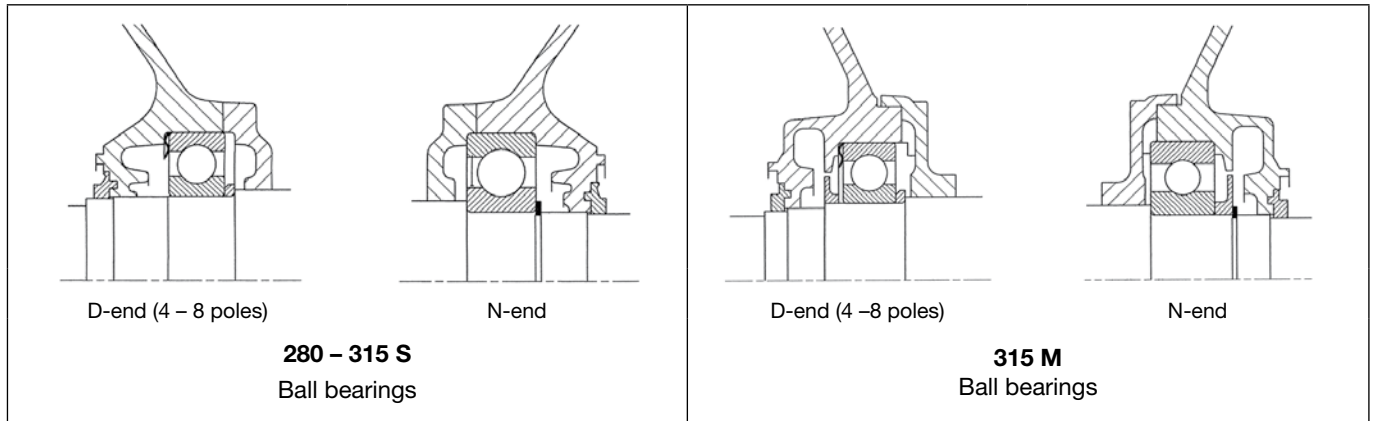
138

Motors 160 – 250 frame sizes can be supplied with grease nipples and the relative grease exhausts on request.

AXIAL ROTOR POSITION

Frame size	Poles	Horizontal arrangement	Vertical arrangement
160 – 250	-	Preload washer at N-end	
280	-	Fixed bearing at N-end	
315 M	2	Fixed bearing at D-end	Fixed bearing at N-end
315 S - M	≥4	Fixed bearing at N-end	
315 L	-	Fixed bearing at D-end	Fixed bearing at N-end
355 – 500	-	Fixed bearing at D-end	Fixed bearing at N-end

On request, for motors frame size 280 – 315 S and M ≥ 4 poles can be supplied with ball bearings on both sides. In these cases the bearings are axially preloaded, as shown in the following diagrams.

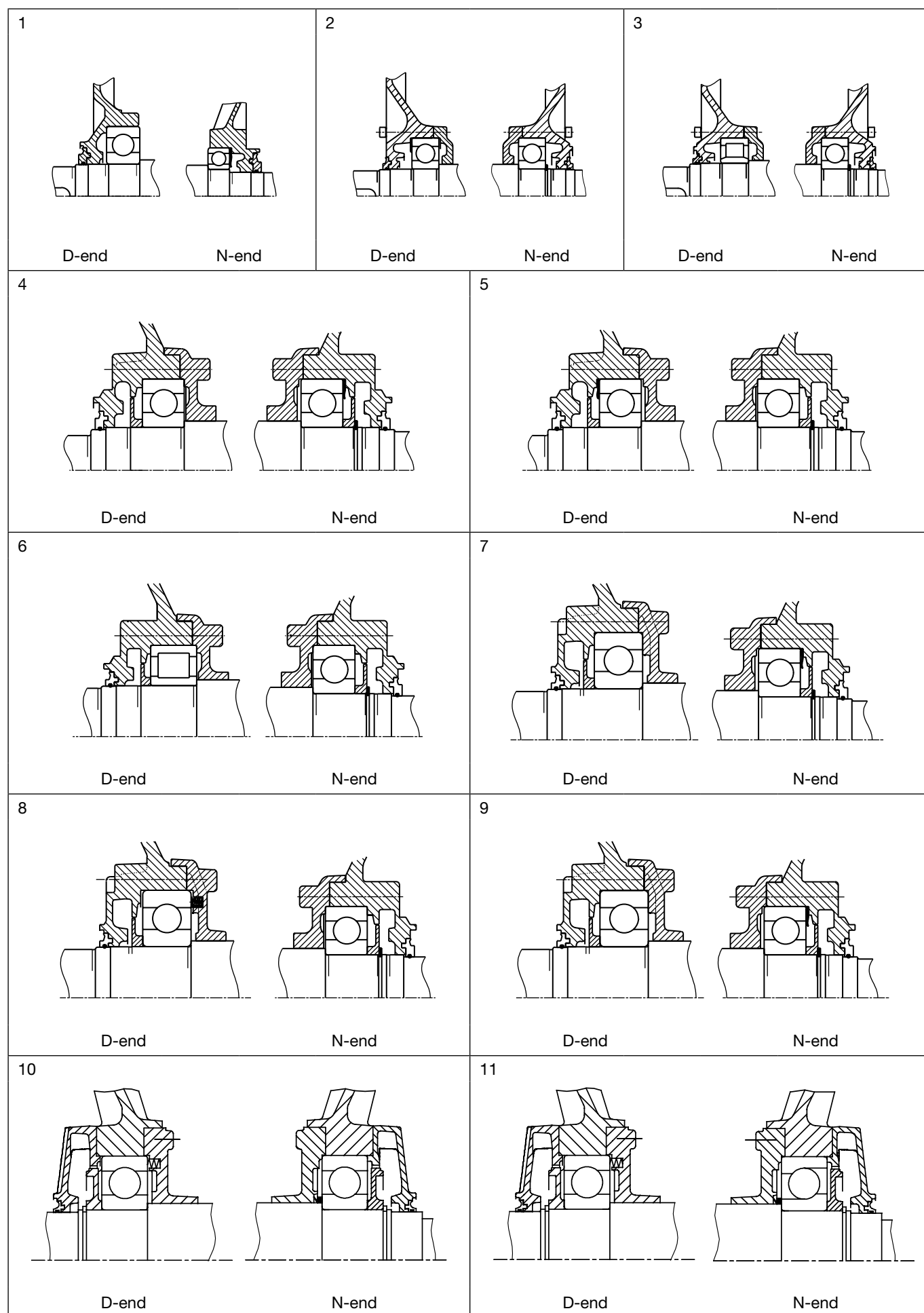


BEARINGS FOR STANDARD MOTORS

Type	Frame Size	Poles	Horizontal			Vertical		
			D-end	N-end	Bearing Assembly Diagrams ID	D-end	N-end	Bearing Assembly Diagrams ID
A5C	160	-	6310-Z-C3	6209-Z-C3	1	6310-Z-C3	6209-Z-C3	1
A5C	180 M	-	6310-Z-C3	6209-Z-C3	1	6310-Z-C3	6209-Z-C3	1
A5C	180 L	-	6310-Z-C3	6210-Z-C3	1	6310-Z-C3	6210-Z-C3	1
A5C	200	-	6312-Z-C3	6210-Z-C3	1	6312-Z-C3	6210-Z-C3	1
A5C	225	-	6313-Z-C3	6213-Z-C3	1	6313-Z-C3	6213-Z-C3	1
A5C	250	-	6314-Z-C3	6213-Z-C3	1	6314-Z-C3	6213-Z-C3	1
A5C	280	2	6314-Z-C3	6314-Z-C3	2	6314-Z-C3	6314-Z-C3	2
A5C	280	≥ 4	NU 2217-EC-C3	6314-Z-C3	3	NU 2217-EC-C3	6314-Z-C3	3
B5C	315 M-L	2	6316-Z-C3	6316-Z-C3	4	6316-Z-C3	6316-Z-C3	5
B5C	315 M	≥ 4	NU 2219-EC-C3	6316-Z-C3	6	NU 2219-EC-C3	6316-Z-C3	6
B5C	315 L	≥ 4	6319-C3	6316-Z-C3	7	6319-C3	6316-Z-C3	8
B5C	355	2	6317-C3	6317-C3	9	6317-C3	7317-BE	11
B5C	355	≥ 4	6322-C3	6322-C3	9	6322-C3	6322-C3	10
B5C	400	2	6317-C3	6317-C3	9	6317-C3	7317-BE	11
B5C	400 LA-LB	≥ 4	6322-C3	6322-C3	9	6322-C3	6322-C3	10
B5C	400 LC-LD	≥ 4	6322-C3	6322-C3	9	6322-C3	7322-BE	11
B5C	450 LA-LC	2	6320-C3	6320-C3	9	6320-C3	7320-BE	11
B5C	450 LA-LC	≥ 4	6326-C3	6326-C3	9	6326-C3	7326-BC	11
B5C	500	2	ON REQUEST					
B5C	500 LA-LC	≥ 4	6328-C3	6328-C3	9	6328-C3	7328-BC	11

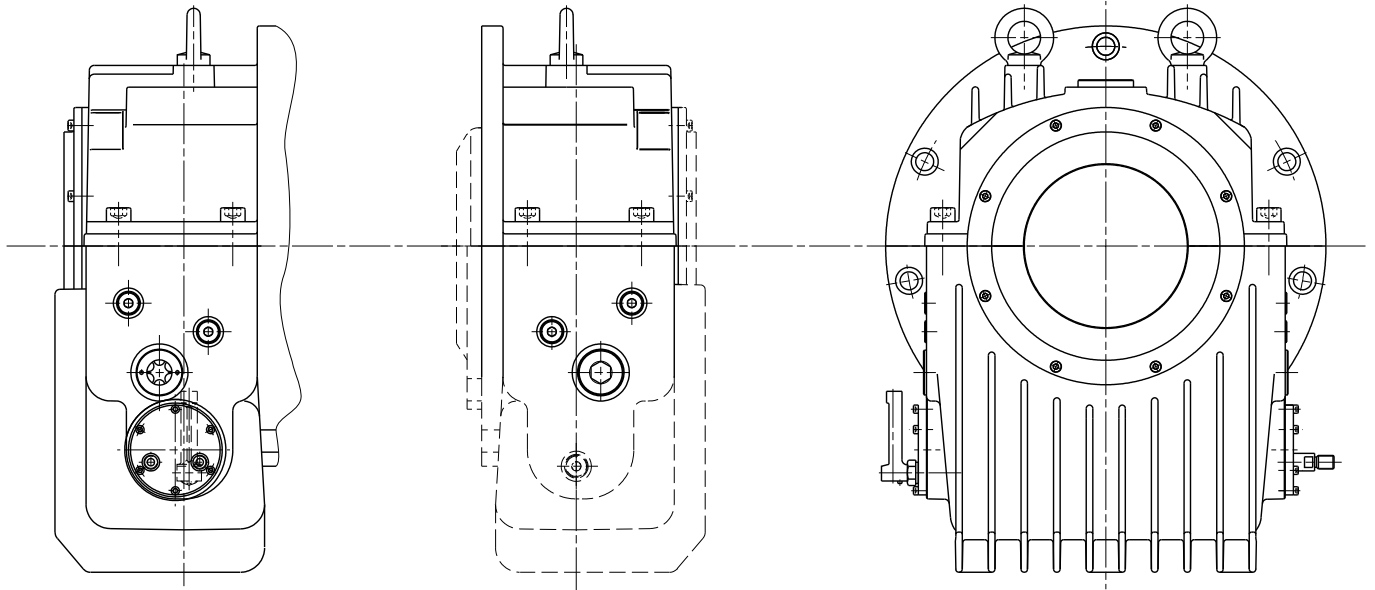
- All poles

DRAWINGS BEARINGS FOR STANDARD MOTORS



SLEEVE BEARINGS

For specific applications, motors from frame size 355 can be provided with sleeve bearings.



AXIAL FORCES – HORIZONTAL MOUNTING

The maximum allowable axial force at the shaft extension for motors having the following characteristics:

- standard construction;
- horizontal mounting (Mounting arrangement IM B3, IM B35 only;¹⁾)
- operating frequency 50Hz;
- bearing life of 20 000 hours (according to ISO 281:1990);
- bearing operating temperature between - 20 and + 70°C;
- no external radial forces;
- motor installed on a rigid foundation with negligible structural vibrations;

are shown in the following table.

Frame size	Mounting arrangement IM B3, IM B35 ¹⁾							
	Maximum allowed axial force [N]				Maximum allowed axial force [N]			
	2 poles	4 poles	6 poles	8 poles	2 poles	4 poles	6 poles	8 poles
160	1000	1200	1450	1650	2000	2500	2900	3300
180	950	1300	1500	1700	2000	2500	2900	3200
200	710	710	710	710	2650	3350	3850	4300
225	1750	2100	2500	2750	3000	3700	4300	4750
250	1700	2050	2000	2120	3400	4200	4800	5400
280	3250	4050	4700	5200	3250	4050	4700	5200
315 M	4000	4850	5600	6200	4000	4850	5600	6200
315 L	3240	3930	4530	- / -	3240	3930	4530	- / -
355 L	2000	6000	7000	8000	2000	6000	7000	8000
400 LA - LB	1850	6000	7100	- / 6900	1850	6000	7100	- / 6900
400 LC - LD	1000 / -	1630 / -	300	300	1000 / -	1630 / -	300	300
450 L	4200	7300	8300	4600	4200	7300	8300	4600
500 L	- / -	3400	300	300	- / -	3400	300	300

1) For other mounting arrangements consult Marelli Motori

The corresponding values for motors running at 60Hz can be obtained by reducing the indicated values by 7% (160-315) and by 10% (355-500). For double speed motors the higher speed should always be considered.

AXIAL FORCES – VERTICAL MOUNTING

The maximum allowable axial force at the shaft extension for motors having the following characteristics:

- standard construction;
- vertical mounting shaft extension downwards (Mounting arrangement IM V1, IM V15 only;¹⁾)
- operating frequency 50Hz;
- bearing life of 20 000 hours (according to ISO 281:1990);
- bearing operating temperature between - 20 and + 70°C;
- no external radial forces;
- motor installed on a rigid foundation with negligible structural vibrations;

are shown in the following table.

Frame size	Shaft extension downwards Mounting arrangement IM V1, IM V15 ¹⁾							
	Maximum allowable axial force in downwards direction [N]				Maximum allowable axial force in upwards direction [N]			
	2 poles	4 poles	6 poles	8 poles	2 poles	4 poles	6 poles	8 poles
160	1730	2040	2470	2930	1270	1660	1880	2020
180	1650	1990	2340	2680	1300	1820	2060	2230
200	2190	2750	3140	3660	1170	1310	1430	1350
225	2380	2760	3330	3820	2370	3040	3470	3680
250	2700	3160	3540	4250	2410	3090	3260	3270
280	2130	2430	3100	3640	4370	5670	6300	6760
315 M	2170	1950	2150	2820	5830	7750	9050	9580
315 L	1350	1270	490	- / -	5850	7470	9590	- / -
355 L	3690	1880	300	300	160	14100	15800	17100
400 LA-LB	1350	300	300	- / 300	2450	14400	16900	- / 6900
400 LC-LD	1000 / -	300 / -	300	300	1000 / -	1630 / -	300	300
450	300	300	300	300	100	714	11100	13900
500	- / -	3400	300	300	- / -	3400	300	300

1) For other mounting arrangements consult Marelli Motori

Corresponding values for motors running at 60Hz:

Frame sizes: 160 – 315:

The indicated values have to be reduced by 7%

Frame sizes: 355 – 500:

Maximum allowable axial force in downwards direction: The indicated values have to be reduced by 10%.

Maximum allowable axial force in upwards direction:

2 poles, frame sizes 400 e 500: The indicated values have to be reduced by 50%.

2 poles, frame sizes 355 e 450: Consult Marelli Motori

≥ 4 poles, frame sizes 355-500: The indicated values have to be reduced by 25%.

For double speed motors the higher speed should always be considered.

RADIAL FORCES

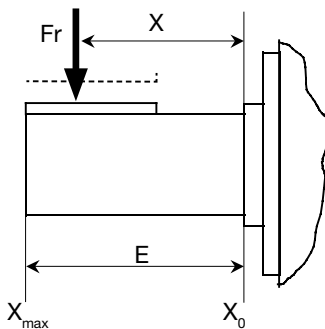
The maximum allowable radial forces at the shaft extension (X_{max}) and at the shaft collar (X_0) for motors having the following characteristics:
 standard construction;
 horizontal mounting (Mounting arrangement IM B3, IM B35 only¹⁾);
 operating frequency 50Hz;
 bearing life of 20 000 hours (according to ISO 281:1990);
 bearing operating temperature between - 20 and +70°C;
 no external axial forces;
 motor installed on a rigid foundation with negligible structural vibrations;
 are shown in the following table.

Mounting arrangement IM B3, IM B35 ¹⁾								
Frame Size	2 poles		4 poles		6 poles		8 poles	
	F _{x0} [N]	F _{xmax} [N]	F _{x0} [N]	F _{xmax} [N]	F _{x0} [N]	F _{xmax} [N]	F _{x0} [N]	F _{xmax} [N]
160	3000	2400	3600	2000	4300	2000	4500	2000
180	3000	2400	3650	2500	4300	2500	4900	2500
200	1390	950	1390	950	1390	950	1390	950
225	4550	3800	5400	3800	6300	3800	7000	3800
250	3260	2000	3260	2000	3260	2000	3260	2000
280	4600	3750	See construction for high radial loads					
315 M	6100	3530	See construction for high radial loads					
315 L	6330	4040	9530	5020	10120	5020	/	/
355 L	4300	2200	9000	6500	9800	3400	9800	3000
400 LA-LB	3600	2000	9000	7800	10500	4500	- / 2000	- / 1000
400 LC-LD	1000 / -	500 / -	2000 / -	1000 / -	300	300	300	300
450 L	3400	3100	5500	4800	5600	3000	2000	1000
500 L	/	/	3000	1500	300	300	300	300

1) For other mounting arrangements consult Marelli Motori

The external radial forces between the values $X_0=0$ and $X_{max}=E$ can be determined by following linear relationship.

$$Fr = F_{x0} - \frac{X}{E} * (F_{x0} - F_{xmax})$$



F_{x0} = maximum radial force on the shaft collar [N].

F_{xmax} = maximum radial force at the shaft extension [N].

E = shaft extension length [mm].

X = distance from radial force application point to the shaft collar [mm].

CONSTRUCTION FOR HIGH RADIAL LOADS

Maximum allowable external radial loads for motors 4 - 8 poles equipped with roller bearings and having the following characteristics:
 horizontal mounting (Mounting arrangement IM B3, IM B35 only;¹⁾)
 operating frequency of 50Hz;
 bearing life of 20 000 hours (in accordance with ISO 281:1990);
 bearing operating temperature between - 20 and +70C°
 no external axial forces;
 motor installed on a rigid foundation with negligible structural vibrations;

In the high radial loads option, for all frame sizes, the rotor is axially positioned by N-end bearing.



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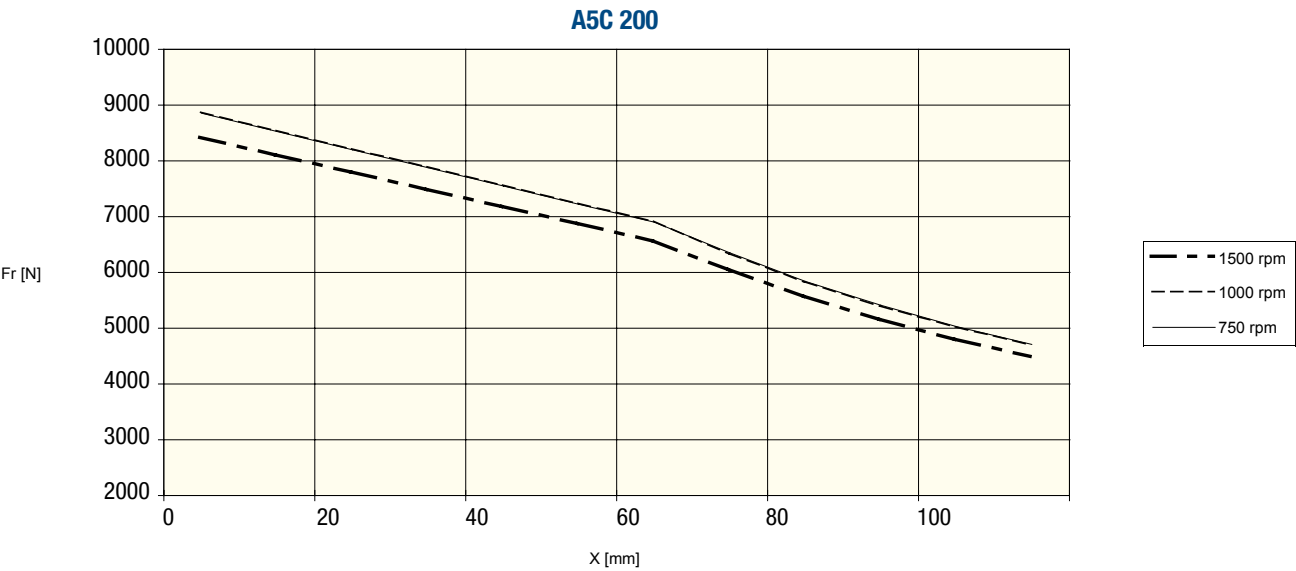
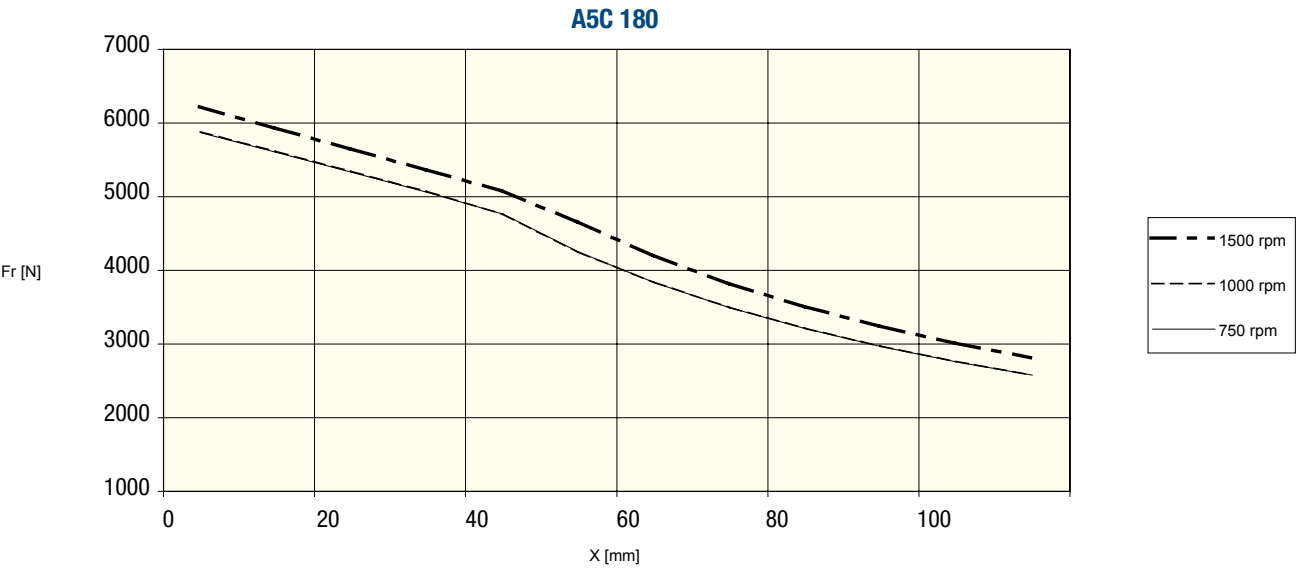
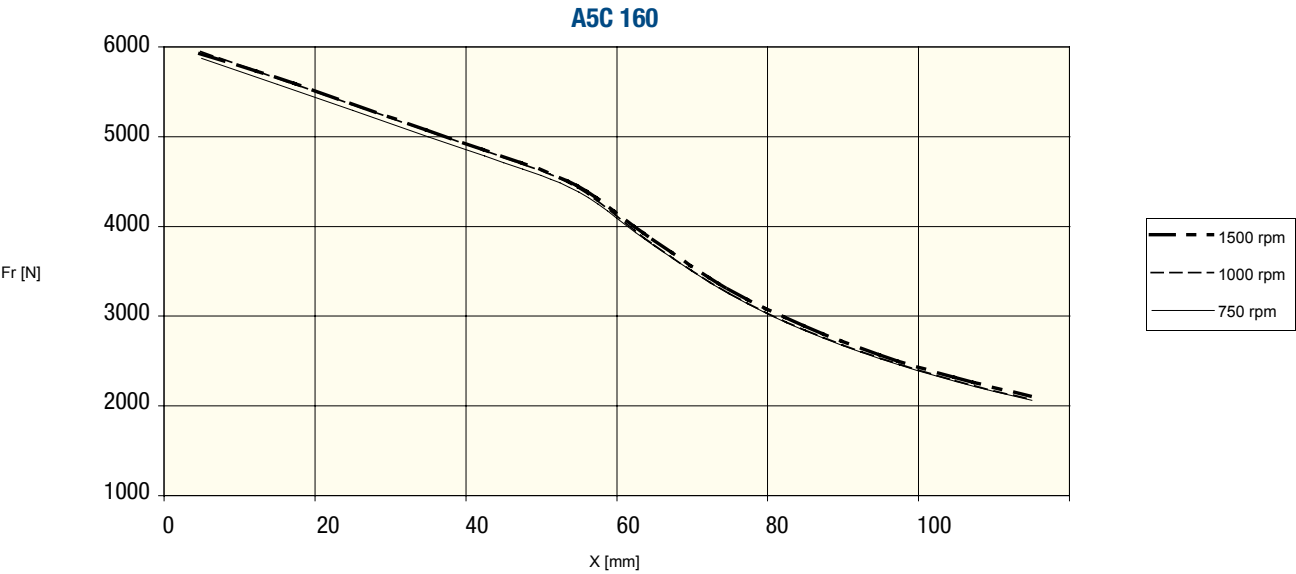
Motors for high radial loads - bearings (horizontal construction)

Frame Size	Mounting arrangement IM B3, IM B35 ¹⁾	
	4 poles – 6 poles – 8 poles	
	D-end	N-end
A5C 160	NU310	6209-Z-C3
A5C 180	NU310	6210-Z-C3
A5C 200	NU312	6210-Z-C3
A5C 225	NU313	6213-Z-C3
A5C 250	NU314	6213-Z-C3
A5C 280 ²⁾	NU2217-EC-C3	6314-Z-C3
B5C 315 M ²⁾	NU2219-EC-C3	6316-Z-C3
B5C 315 L	NU319-EC-C3	6316-Z-C3
B5C 355 L	NU322-C3	6322-C3
B5C 400 L	NU322-C3	6322-C3
B5C 450 L	NU326-C3	6326-C3
B5C 500 L	NU328-C3	6328-C3

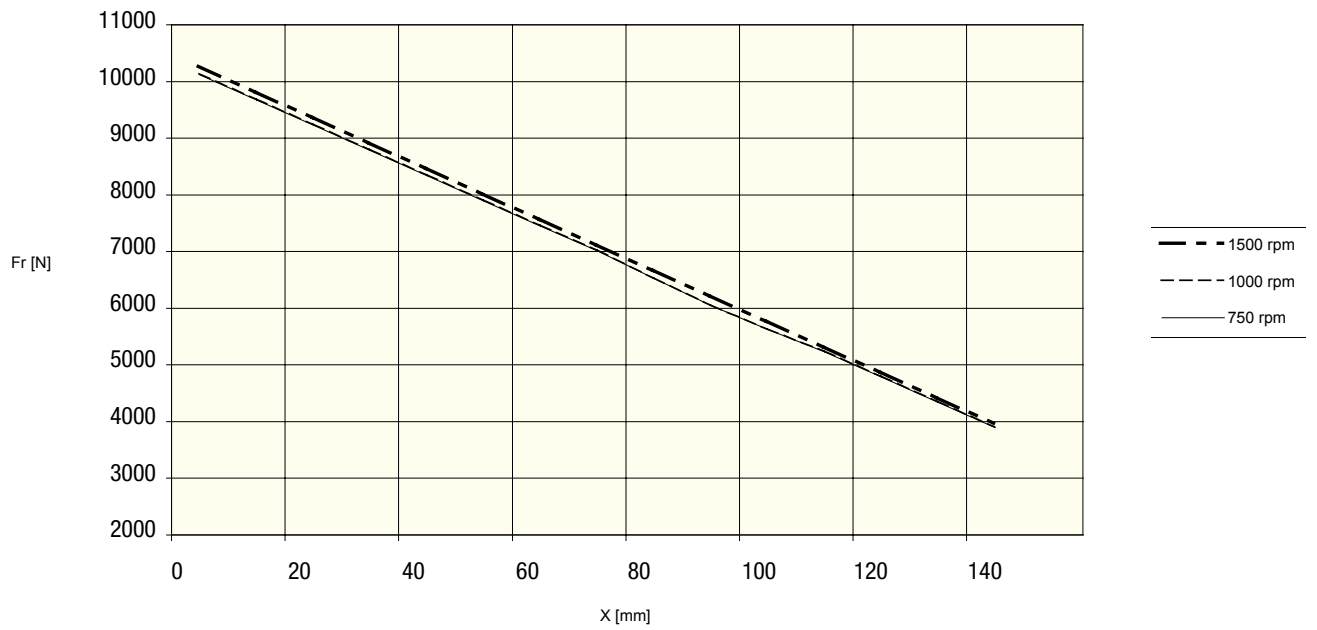
1) For other mounting arrangements consult Marelli Motori

2) Frame sizes 280, 315M are supplied with bearing construction for high loads as standard.

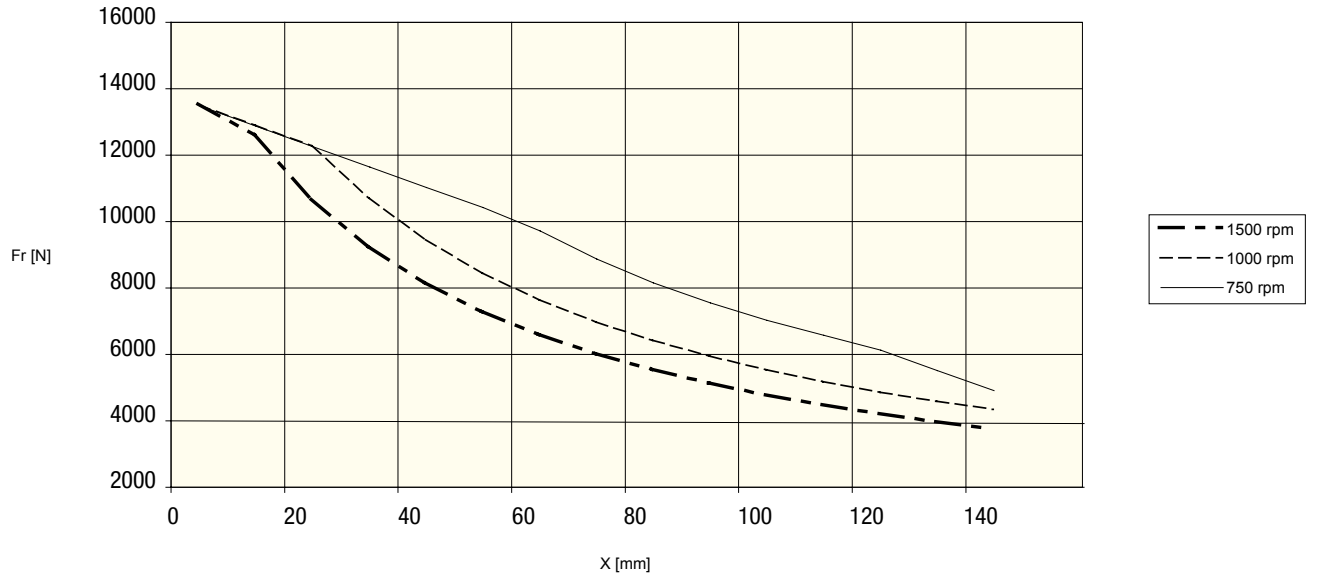
CONSTRUCTION FOR HIGH RADIAL LOADS



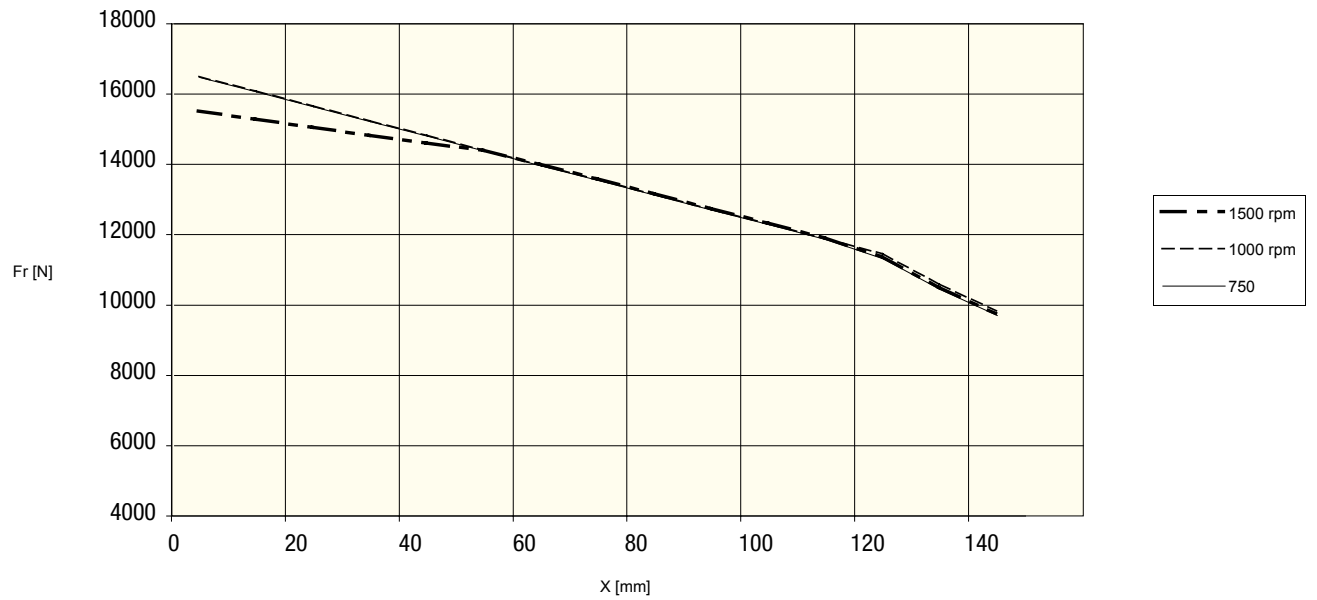
A5C 225



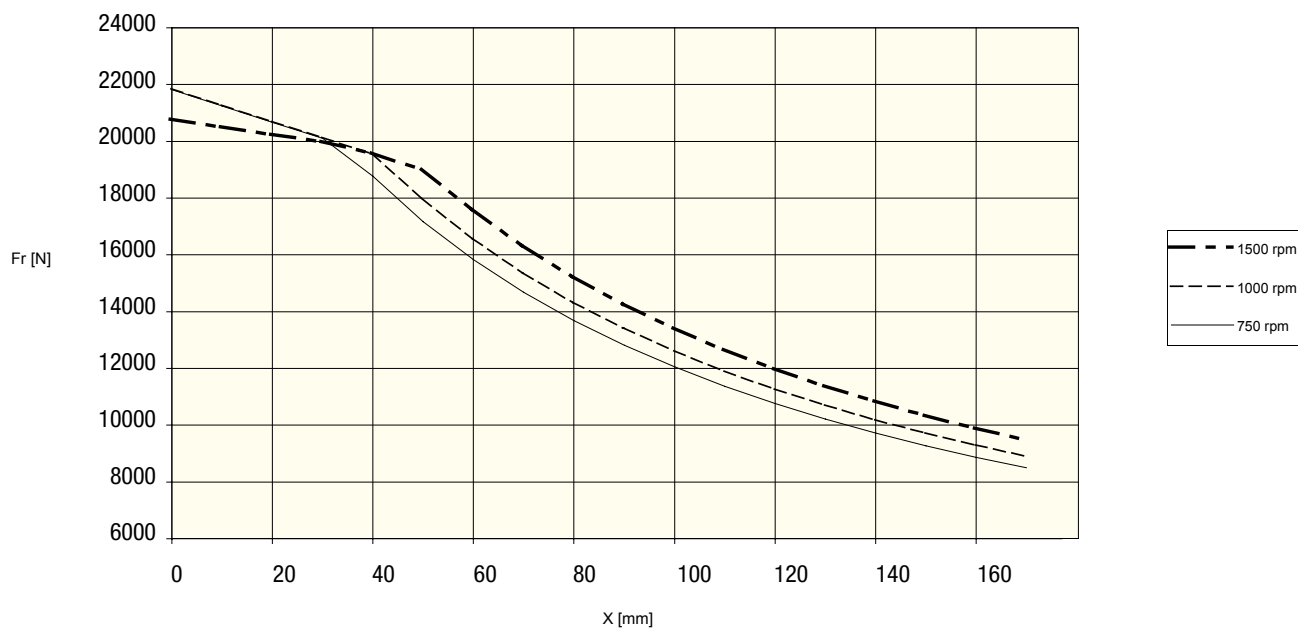
A5C 250



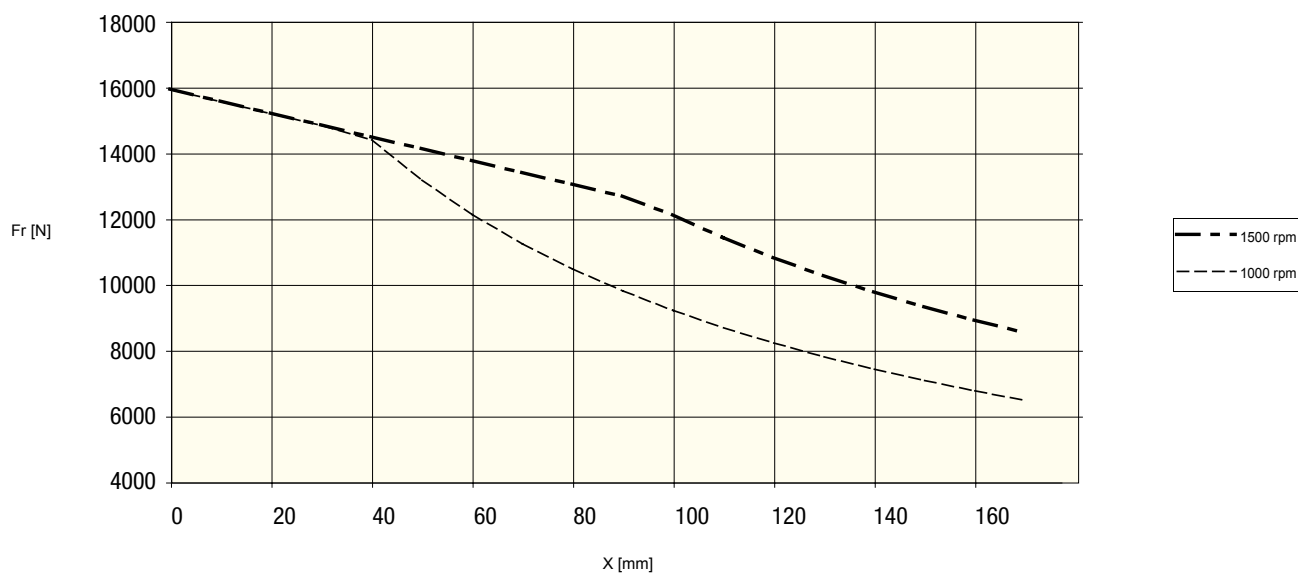
A5C 280



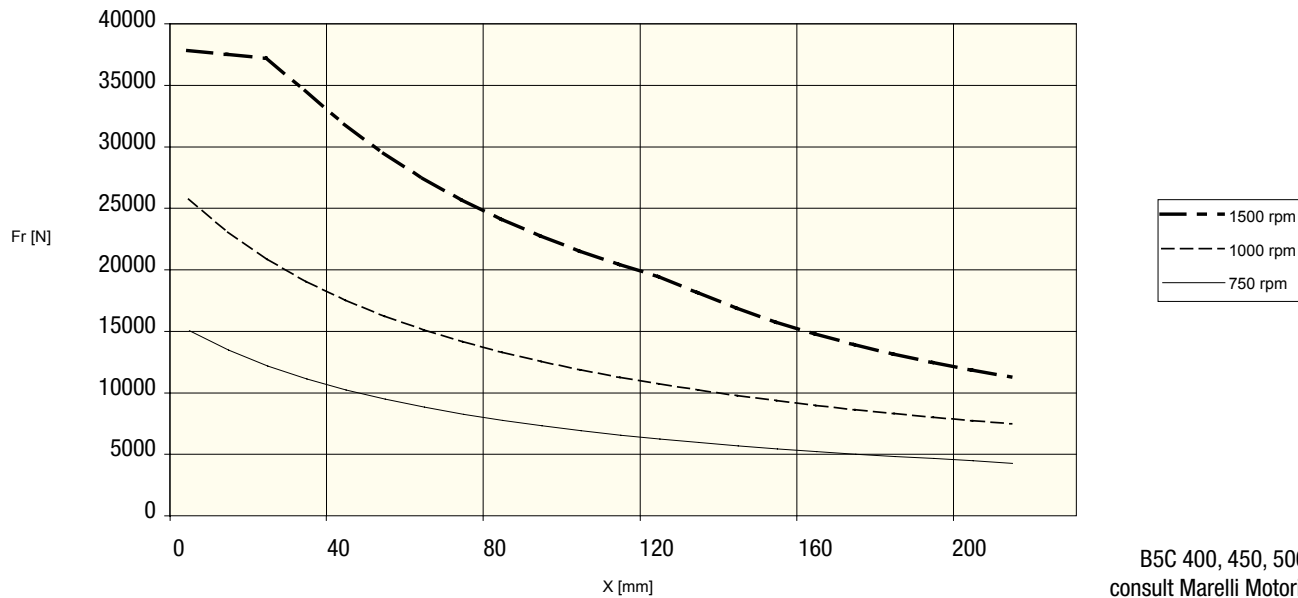
B5C 315 M



B5C 315 L



B5C 355 L



B5C 400, 450, 500
consult Marelli Motori.

TERMINAL BOX AND CABLE ENTRY

The main terminal box is placed on top and is normally equipped with 6 leads.

Frame size	Type of terminal	Terminal bolt size	Maximum conductor section [mm ²]	Maximum cable diameter [mm]	Clearance holes formetric cableglnds
160-250	Threaded Terminals	M8	35	38	M40 1) + M50 1)
280-315M	Threaded Terminals	M12	120	43	2 x M63 1)
315 L	Threaded Terminals	M12	120	43	2 x M63
355-400	Flat Copper Bars	M12	2 x 300	/	Undrilled gland plate
450-500	Flat Copper Bars	M12	6 x 300	/	Undrilled gland plate

1): Knockout opening

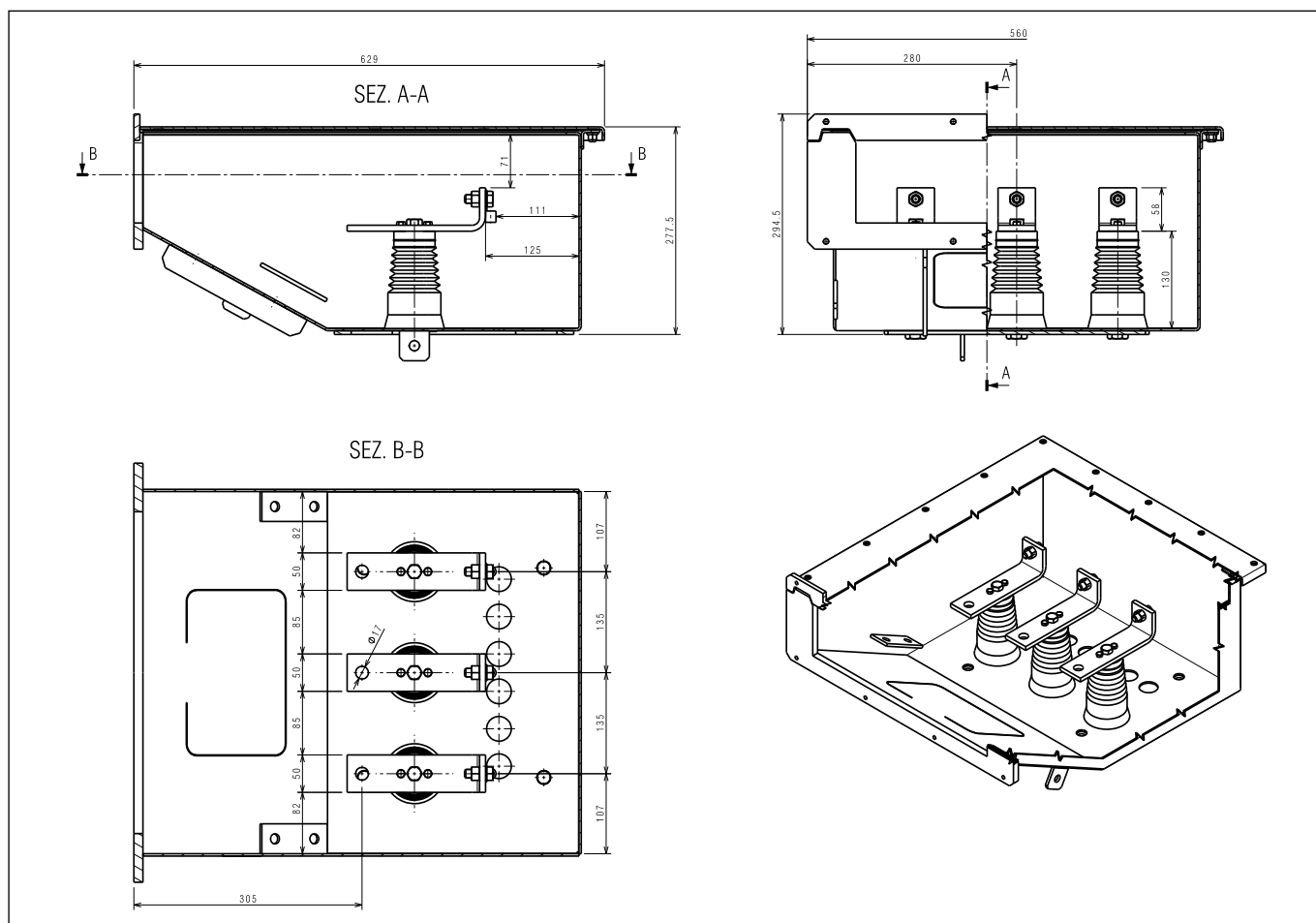
TERMINAL BOXES - DIMENSIONS

Motors in standard execution are supplied with main terminal box having the following dimensions:

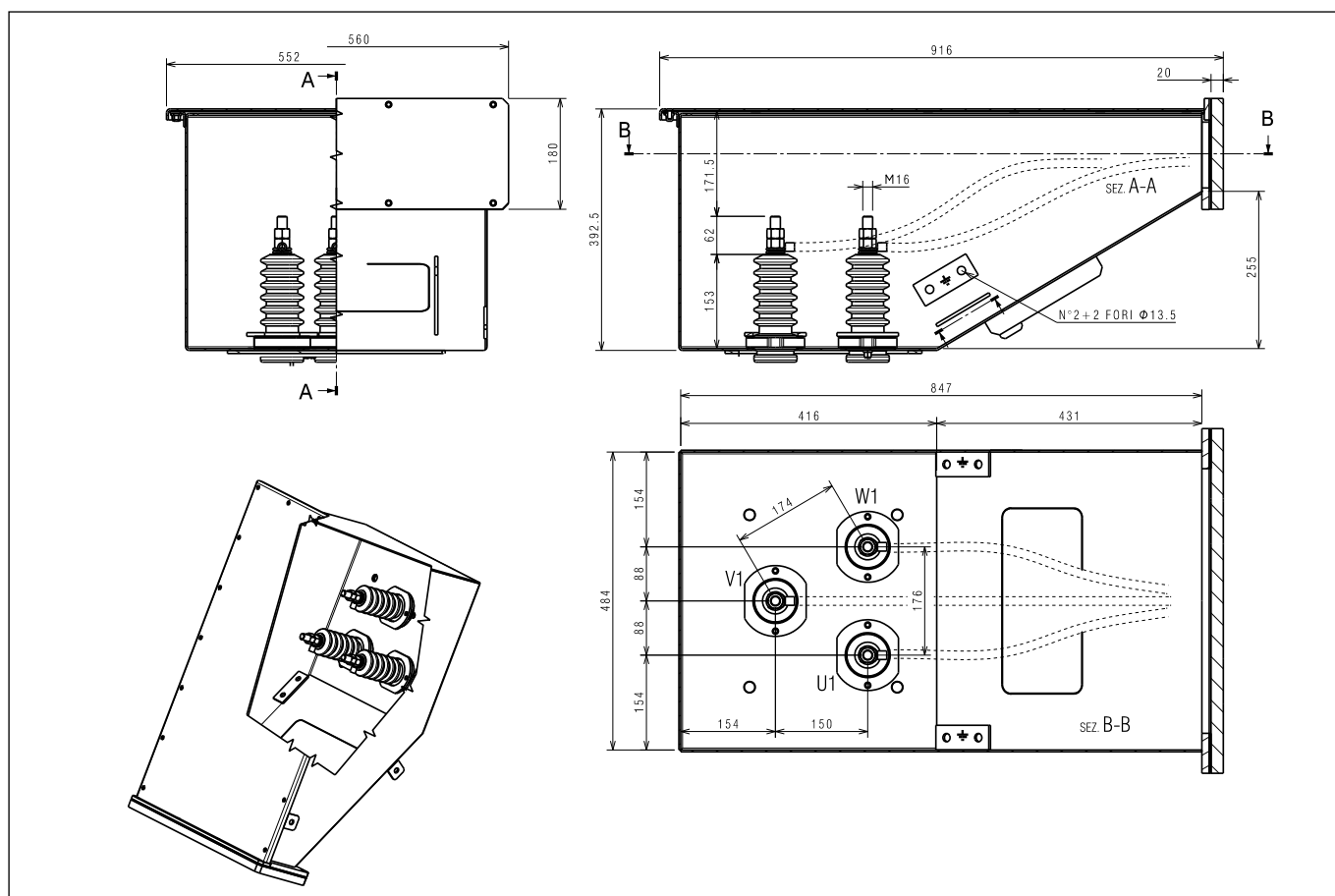
Delta connection Star connection	Delta connection Star connection
160 - 250	280 - 315 M
Delta connection Star connection	Delta connection Star connection
315 L	355 - 400
Delta connection Star connection	Connection
450 - 500 LV Low Voltage	355 - 500 MV Medium Voltage

Non-standard design of terminal boxes, eg size, degree of protection, are available on request as options.
Degree of protection of standard terminal box is IP 55.

The medium voltage terminal box up to 6.6 kV is shown below.



The high voltage terminal box up to 11 kV is shown below.



GROUNDING

Two terminals exist for grounding, one inside the terminal box and one outside.

CONDENSATION DRAINAGE

When installed outdoors or used for intermittent work in environments with high humidity levels, motors must be provided with holes for condensation drainage. In order to assure the correct positioning of the holes the operating position of the motors must be specified. Motors with frame sizes from 280 to 500 have holes for condensation drainage as standard.

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Motors can be supplied with drainage holes on request.

ANTICONDENSATION HEATERS

 108, 109

Motors subject to atmospheric condensation, either through standing idle in damp environments or because of wide ambient temperature variations, may be fitted with anticondensation heaters. They are of tape form. Anticondensation heaters are normally switched on automatically when the supply to the motor is interrupted, heating the motor to avoid water condensation. They are normally mounted on D-end winding heads.

Normal feeding voltage is 220//230/240V.

Motors can be supplied with anticondensation heaters with terminals in main terminal box (Opt. 108) or, with terminals in a separate terminal box (Opt. 109). The power values normally used are shown in the table below.

Frame size	Power (W)
160 - 180	50
200 - 250	65
280	100
315	200
355	300
400-450	400
500	600

THERMAL PROTECTIONS

 110, 111, 112, 113, 114, 115, 122

Standard magnetothermal circuit breakers are sufficient to suitably protect the motor from overloading. Anyway the motors can be supplied with additional thermal protections with the characteristics described in the following table.

Type	Operating principle	Active temperature [°C]
Bimetallic devices	Motoprotectors with contact normally closed. The disc opens when the winding temperature reaches limits dangerous to the insulation system of the motor.	150
Positive temperature coefficient thermistors PTC	At the active temperature this device quickly changes its resistance value.	155
Platinum resistance thermometer PT100	Variable linear resistance with the winding temperature, particularly suitable for a continuous winding temperature monitoring.	Set up in control panel

Motors from 315M frame size are supplied with N. 3 PTC with terminals in main terminal box, in standard execution. Frame size from 355 are supplied with terminals in separate terminal box, in standard execution.

 122

Motors from 280 frame size can be supplied with PT100 thermal detectors on the bearings on request.

CONNECTION DIAGRAMS

The table below, show the materials used on the mechanical components for standard motors.

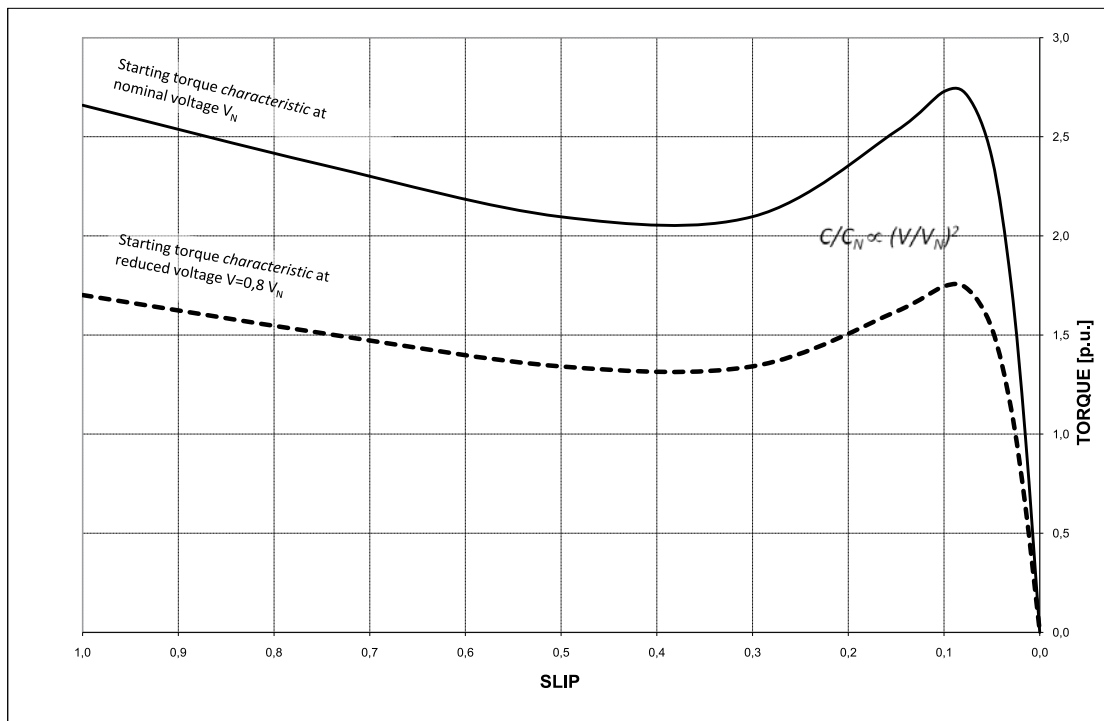
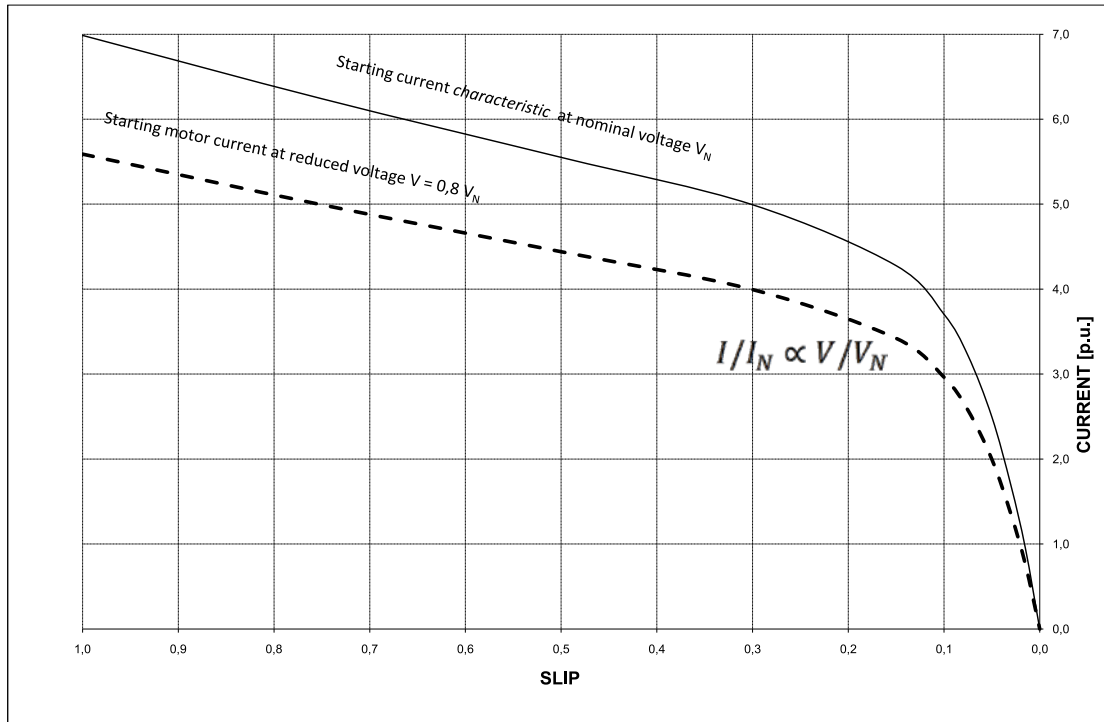
Voltages and connection	Internal connection diagrams	Outline diagrams	External connection diagrams
Single speed motors			
- Voltage: U - Connection Δ (at lower marked voltage) e.g. 230 V / Δ - Voltage: U - Connection Y (at lower marked voltage) e.g. 400 V / Y			
Double speed motors			
Two separat winding (Y internal)		Lower speed (LSP) Higher speed (HSP)	
Double speed motors			
Dahlander 6 Terminals (Δ internal) Δ - YY		Lower speed (LSP) Higher speed (HSP)	
Double speed motors			
Dahlander 6 Terminals (Y internal) Y - YY		Lower speed (LSP) Higher speed (HSP)	

STARTING

The performances of a motor in the starting phases are, in first approximation, related to the corresponding feeding voltage by the following relationships:

- The starting current is almost varying directly with the motor feeding voltage: $I/I_N \propto V/V_N$.
- The starting torque (C_s) and the maximum torque (C_M) of the motor is almost varying directly with the square of the feeding voltage: $C/C_N \propto (V/V_N)^2$.

Example of starting current and torque characteristics modification when voltage is varying from 100 % of V_N to 80 % of V_N



Starting response

The starting current values given in p.u. detailed in the present catalogue allow to obtain the starting current rms values, and so measured after some sinusoidal periods from insertion: in the first instant it is possible to have peak currents which can be up to 2.5 times the stable values. The amplitude of the peaks depends essentially on the instantaneous value of the sinusoidal supply voltage at the moment of insertion. These peaks are rapidly damped. The starting torque peaks, having an analogue behavior, come considerably attenuated by the inertia of the motor and the coupling load, with negligible resulting stress of the shaft and coupling.

Type of starting

Knowing the torque versus speed diagram of the load driven by the motor is the first fundamental point to evaluate which type of starting method can be used in the system: the motor coupled to the load can be started positively only when the accelerating motor torque is higher than the required load torque in all the speed range of the starting process (from zero to the nominal speed).

Torque load diagrams are mainly divided in the following categories:

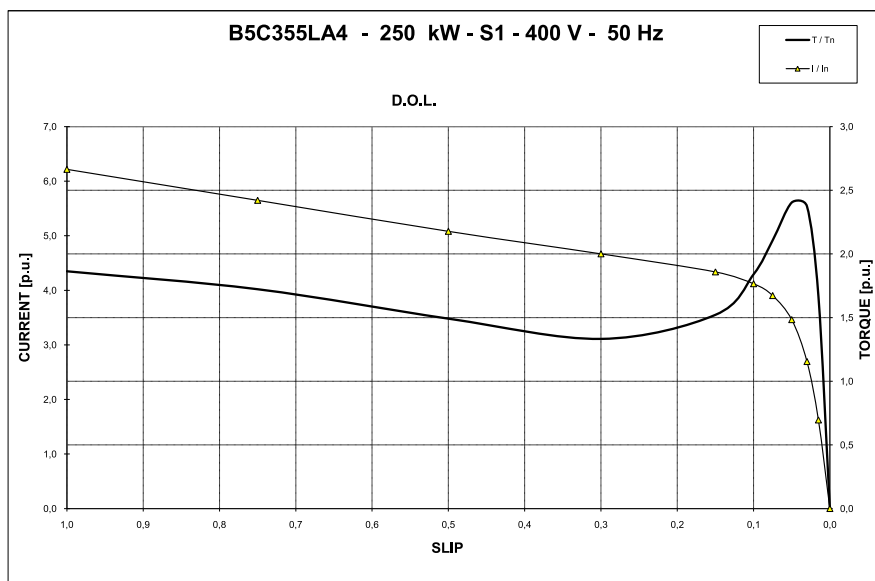
- **Machines with quadratic torque versus speed diagram:** typically these machines can be centrifugal pumps, ventilators, propellers or screw compressors
- **Machines with constant torque versus speed diagram:** typically these can be paper continuative machines, refrigeration piston compressor, or skiing cable car
- **Machines with proportional torque versus speed diagram:** typically are rolling mills or liquid ring pump.

During the starting a big attention is usually paid to the starting current that, for DOL starting can achieve very high values. Considering all these factors, an appropriate starting system can be chosen.

The most common starting methods are the following:

1. Direct-on-line starting (D.O.L.)

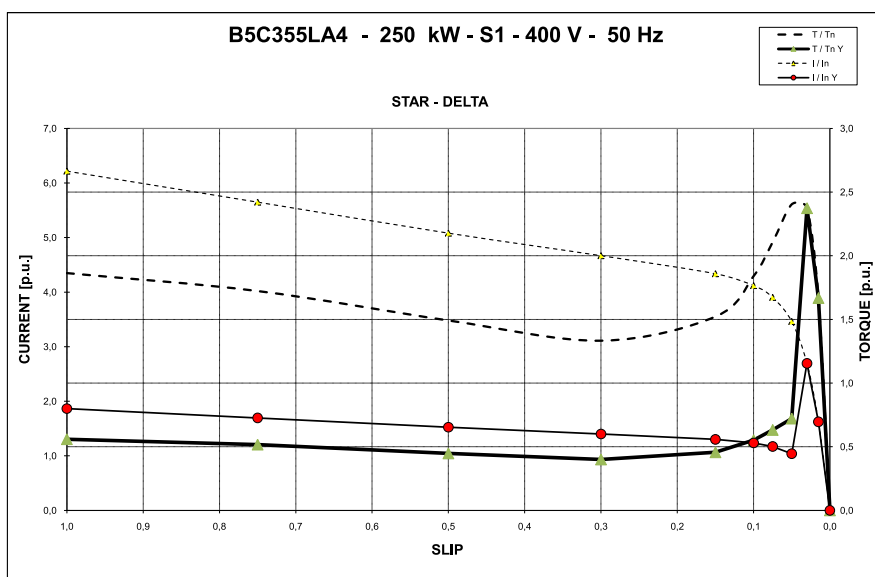
D.O.L. starting means the direct insertion of the motor at its nominal voltage and frequency values. In these conditions the starting torque and current are those given in the catalogue.



2. Star-Delta starting (Y / Δ)

With this method both the starting torque ($\blacktriangle$) and the current ($\bullet$), in the starting phase, will be reduced at a value of approx 30% of the correspondent value indicated for DOL starting (with a negligible transient at delta insertion). This starting method can be adopted in cases where the resistant torque is very low and low starting currents are also requested.

A motor that should be started with star – delta device should have all the six winding terminals in the main terminal box and the motor should be designed for delta connection when fed at nominal voltage / frequency.

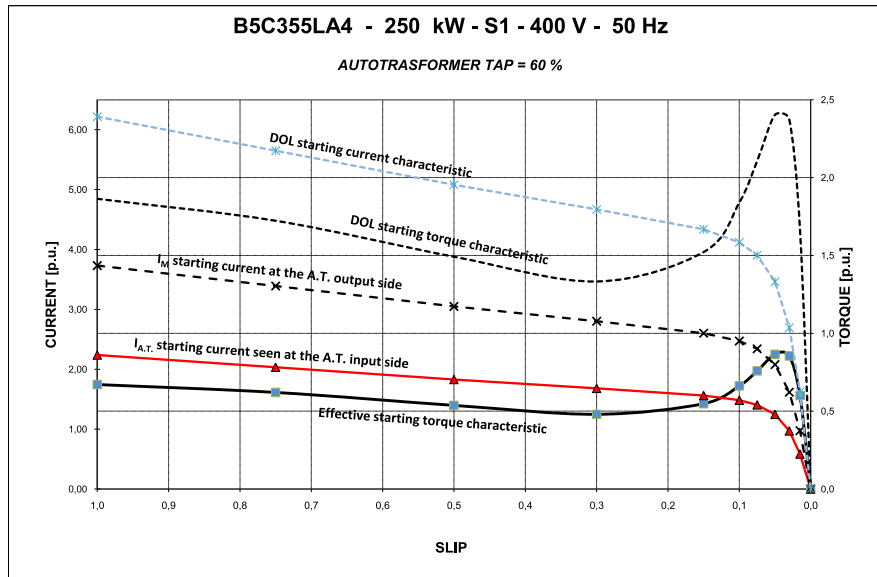


3. Autotransformer starting (A.T.)

When the starting is realized by the use of an autotransformer it should be considered the voltage ratio ($K=V_{AT}/V_N$) between the output and input of the transformer during the starting.

In this conditions the starting performances will be as in the following:

The use of an autotransformer allows a reduction of the starting current but also results in a lower motor torque characteristic. Functioning is given with the following relationships:



$$I_{A.T.} = I_N \cdot \left(\frac{V_{A.T.}}{V_N} \right)^2 = I_N \cdot K^2$$

$$I_M = I_N \cdot \frac{V_{A.T.}}{V_N} = I_N \cdot K$$

$$C_{A.T.} = C_{D.O.L.} \cdot \left(\frac{V_{A.T.}}{V_N} \right)^2 = C_{D.O.L.} \cdot K^2$$

V_N = motor nominal voltage [V]

$V_{A.T.}$ = reduced voltage at the exit of autotransformer [V]

I_N = motor nominal current [A]

I_M = motor starting current at voltage V_{AT} [A]

$I_{D.O.L.}$ = motor starting current at nominal voltage

$C_{D.O.L.}$ = starting torque at nominal voltage

$I_{A.T.}$ = reduced starting current seen by the main supply (input side of autotransformer [A])

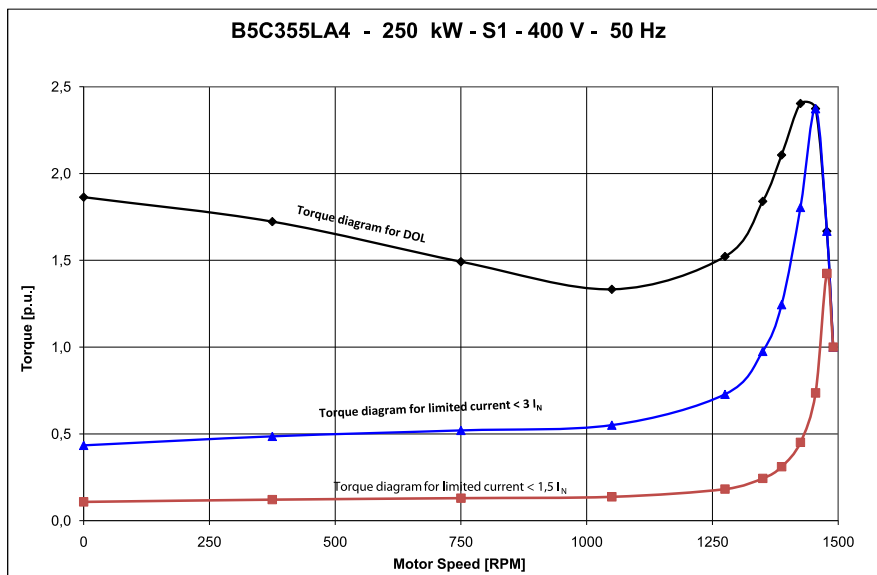
$C_{A.T.}$ = starting motor torque at reduced voltage $V_{A.T.}$

4. Soft starter starting

The soft starter can be seen as a device that, during the starting process, increase gradually the voltage, limiting the starting current at a fixed value (usually the limited current range is from 1,5 to 3 times the nominal current).

Being fixed the limited current during the starting, the torque diagram will be consequently reduced almost directly with the square ratio of the limited current and the correspondent D.O.L. current.

This method of starting is indicated for machines with very low torque profile at low speed.



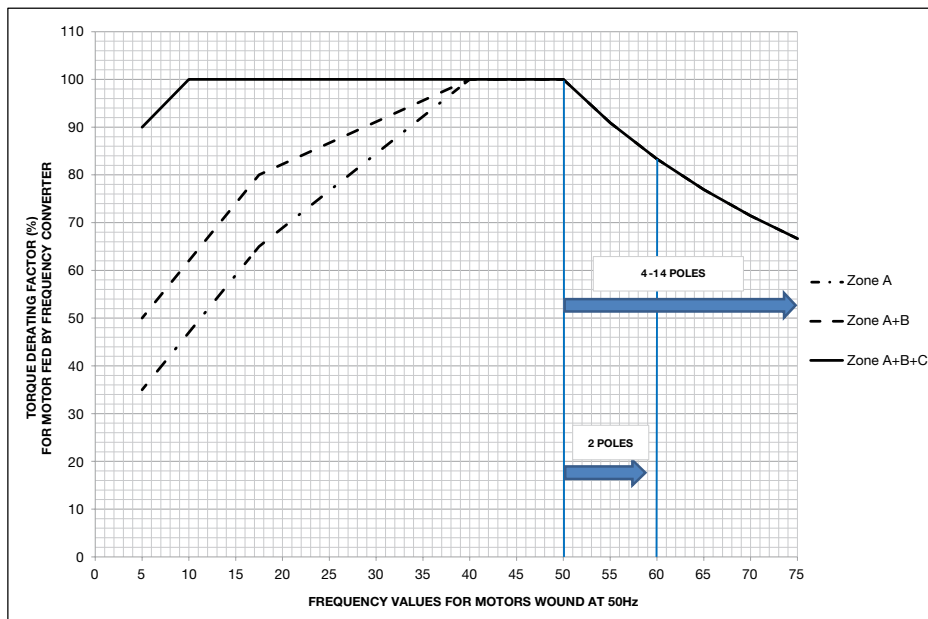
MOTORS FOR VARIABLE SPEED APPLICATIONS

A.C. motors designed for sinusoidal feeding voltage and constant feeding frequency can, under normal conditions, be used in variable speed applications by means of a frequency converter. Motors for variable speed applications are generally fed by the frequency converter by upholding the relationship U_n/f_n up to the speed correspondent to the nominal voltage and frequency and, for higher speeds, by increasing the frequency and keeping constant the nominal voltage value. The performances of a motor fed by frequency converter depend on the cooling type: self-ventilated motors are suitable for use at loads with quadratic torque/speed shapes (typical case for pumps and fans).

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When constant torque is required from low speeds, forced ventilation must be employed.

Generally the motor type can be chosen referring to the following diagram by considering: the torque diagram of the motor, the speed range, the cooling type.



In both cases the resistant torque of the driven machine must be lower than the leading torque of the motor for the total running speed range.

The speed range is set from a minimum frequency F_{MIN} (typically around 5-10 Hz depending on the converter), and a maximum frequency F_{MAX} given by the speed limits of the rotating system and/or the reduction in torque.

Cooling Method IC 411	Poles	Frame size
Zone A + B	2 – 14	≥ 355
Zone A	6 – 8	≤ 315
Zone A + B	2 – 4	≤ 315
Cooling Method IC 416	Poles	Frame size
Zone A + B + C	2 – 14	≤ 500

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The use of the frequency converter requires some precautions regarding the voltage peaks and wave-fronts. The values of the peaks depend on the supply voltage of the frequency converter and on the motor feeding cable length.

According to different voltage levels, peaks values and features of the insulation are based on the following table.

Frame Size	Vn $\leq$ 500 V		Vn $\leq$ 690 V	
	Peak Voltage Limits	Features	Peak Voltage Limits	Features
160 ÷ 250	Vpk $\leq$ 800 V Rise Time $\geq$ 1 μ s	Standard motor	Vpk $\leq$ 800 V Rise Time $\geq$ 1 μ s	Standard insulation + dU/dt-filter*
280 ÷ 315	Vpk $\leq$ 1000 V Rise Time $\geq$ 1 μ s	Enhanced insulation	Vpk $\leq$ 1000 V Rise Time $\geq$ 1 μ s	Enhanced insulation + dU/dt-filter*
355 ÷ 500	Vpk $\leq$ 1350 V Rise Time $\geq$ 1 μ s	Enhanced insulation	Vpk $\leq$ 2150 V Rise Time $\geq$ 0,5 μ s	Superior insulation
			Vpk $\leq$ 1900 V Rise Time $\geq$ 0,2 μ s	

*: The filter depends on the characteristics of the converter and therefore any inquiries should be directed to the converter manufacturer.

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Motors fed by frequency converter can be subject to voltages between the D-end and N-end bearing arrangements. This is due to the effects of the feeding system. The values of the aforementioned voltages depend on the characteristics of the frequency converter and on the dimensions of the motor itself. For motors from 315 frame size or those where the shaft peak voltage exceeds 500mV, MarelliMotori suggest to insulate one of the bearing arrangements of the motor. Normally this solution is applied to the N-end of the motor.

These guidelines, coupled with the correct grounding of the operating system, motor and coupled machine, guarantee the best results.

MOTORS FOR FORCED VENTILATION

The forced ventilation is available as an optional for specific application.

Motors for forced ventilation			Nominal data			
			400V - 50Hz		440V - 60Hz	
Frame Size	Approx. Δp [kg]	Approx. Δl [mm]	P [W]	In [A]	P [W]	In [A]
160-180M	5,3	215	0,25	0,82	0,26	0,75
180L-200	7,7	222	0,55	1,7	0,58	1,4
225-250	7,7	232	0,55	1,7	0,58	1,4
280	7,7	248	0,55	1,7	0,58	1,4
315	32	250	0,55	1,7	0,58	1,4
355	60	400	2,2	4,65	2,4	4,39
400	60	400	2,2	4,65	2,4	4,39
450	80	450	3	6,57	3,3	6,32
500	80	450	4	8,08	4,4	7,8

TOLERANCES FOR ELECTROMECHANICAL CHARACTERISTICS

Tolerances for electromechanical characteristics in accordance with standard IEC 60034-1.

Efficiency η	-15% of $(1 - \eta)$ for $P_{nom} \leq 150$ kW -10% of $(1 - \eta)$ for $P_{nom} > 150$ kW
Power factor	-1/6 $(1 - \cos \phi)$ Minimum absolute value 0.02 Maximum absolute value 0.07
Slip	$\pm 20\%$ for $P_{nom} \geq 1$ kW $\pm 30\%$ for $P_{nom} < 1$ kW
Locked rotor current	+20% of the current
Locked rotor torque	-15% +20% of rated torque
Run up torque	-10% of rated torque $> 1,5M_n$
Breakdown torque	-10% of the value
Moment of inertia	$\pm 10\%$
Noise	+3 dB (A)
Vibration	+10% of the guaranteed class

ROUTINE, TYPE AND SPECIAL TESTS

Marelli Motori has a state of the art test facility in Arzignano capable of testing motors and generators in their original mounting arrangement (vertical and horizontal).

Testing can be conducted at 50/60 Hz and variable speed as the facility is provided with a large power – high frequency AFE inverter (regenerative).

Testing is carried out in compliance with all major international standards (IEC, IEEE), customer specifications, marine/navy and ATEX rules.

Routine Test

- Winding insulation resistance test
- Stator winding resist. measurement at cold
- High voltage test
- No-load run test at nominal voltage
- No-load vibration test
- Phase rotation
- Short circuit test
- Auxiliary check
- Visual and dimensional check
- Name plate check

Type (or Complete) Test

Includes ROUTINE TEST plus the following:

- Locked rotor test
- Full load heat run test
- Load run test at nominal power, voltage and frequency, with measurement of current, power factor efficiency at 4/4 - 3/4 - 1/2

Special Tests

- Measurement of curve $C=f(n)$
- Measurement of noise level
- Overspeed
- Polarisation index

High Voltage Diagnosis & Analysing System

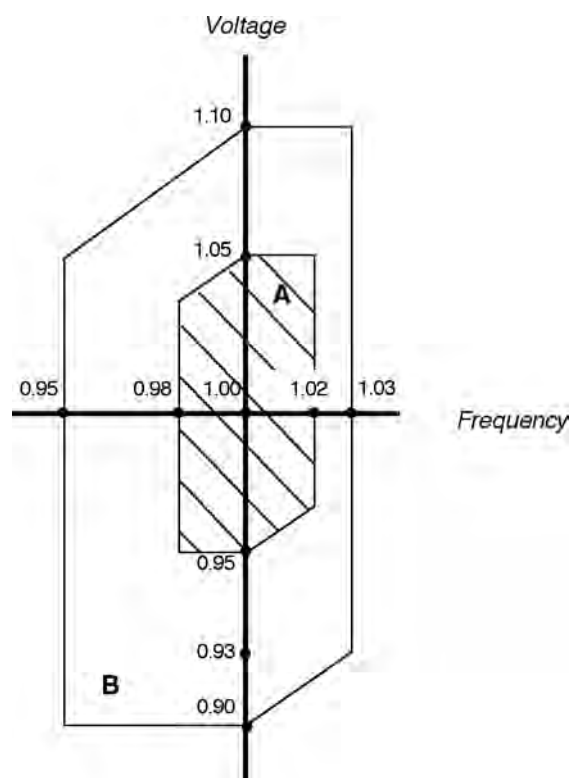
- Measurement of dissipation factor $\tan \delta$ up to 15 kV
- Surge test - 5 stations up to 5 kV and 1 to 40 kV
- High applied voltage 35 kV
- Partial discharge

VOLTAGE AND FREQUENCY

The motors described in this catalogue have nominal ratings and performances referred to the nominal voltage mentioned in the main nameplate, according to the Standard IEC 60034-1. This Standard classifies voltage and frequency variations in two different areas A and B as shown in the following figure.

Area A – The motor shall be capable of performing its primary function continuously, but need not comply fully with its performance at rated voltage and frequency and may exhibit some deviations.

Area B – In this area the motor shall be capable of performing its primary function, but may exhibit greater deviations from its performance at rated voltage and frequency than in zone A. Extended operation at the perimeter of zone B is not recommended.



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The motors can be wound for special voltage and frequency values, on request

DERATINGS

Should the environmental conditions be different from the conditions given by IEC 60034-1 §6 standards (continuous duty S1, at 50 Hz for rated voltage, 40° ambient temperature, and an altitude up to 1000 m a.s.l.), the output ratings are obtained by applying the factors as per the following table.

		Ambient temperature [°C]						
		30	35	40	45	50	55	60
Altitude [m] a.l.m.	1000	-	-	1,00	0,95	0,92	0,88	0,83
	1500	-	1,00	0,97	0,92	0,90	0,85	0,82
	2000	1,00	0,95	0,94	0,90	0,87	0,83	0,80
	2500	0,96	0,93	0,90	0,88	0,85	0,81	0,77
	3000	0,92	0,90	0,86	0,85	0,82	0,78	0,75
	3500	0,90	0,88	0,82	0,81	0,80	0,76	0,73
	4000	0,86	0,84	0,80	0,78	0,77	0,73	0,70
	4500	0,82	0,80	0,76	0,74	0,72	0,70	0,67
	5000	0,78	0,75	0,71	0,69	0,67	0,65	0,62

THREE PHASE SQUIRREL CAGE - LOW VOLTAGE

DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

IE2 EFFICIENCY ACCORDING TO IEC 60034-30

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS											SOUND PRESSURE LEVEL L _{pa} dB(A)	MOMENT OF INERTIA J kgm2	WEIGHT IM 1001 (IM B3) kg	WEIGHT IM 3011 (IM V1) kg
		RATED SPEED	EFFICIENCY η %			POWER FACTOR cos φ	CURRENT		TORQUE							
			FULL LOAD	3/4 LOAD	2/4 LOAD		In A	Is/In p.u.	Tn Nm	Ts/Tn p.u.	Tmax/Tn p.u.					
kW		rpm														
2 poles - 400V - 50Hz																
11	A5C	160 MA2	2925	89,5	90,3	89,0	0,86	20,6	6,6	36	2,2	3,4	72	0,035	95	105
15		160 MB2	2920	90,4	91,1	90,6	0,85	28,2	6,4	49	2,2	3,1	72	0,040	105	115
18,5		160 L2	2925	91,2	92,1	91,9	0,87	33,7	7,4	60	2,5	3,3	72	0,048	115	125
22		180 M2	2950	91,5	92,0	91,4	0,90	38,6	7,0	71	2,0	2,8	74	0,165	140	145
30		200 LA2	2950	92,4	93,0	92,2	0,89	52,7	6,4	97	2,2	3,1	74	0,180	179	183
37		200 LB2	2940	92,6	93,2	93,0	0,90	64,1	6,9	120	2,4	2,8	74	0,190	186	193
45		225 M2	2960	93,4	92,9	92,0	0,87	79,9	7,1	146	2,5	3,3	77	0,250	238	247
55		250 M2	2960	94,0	94,5	94,1	0,88	96,0	6,6	177	2,3	3,1	77	0,290	264	252
75		280 S2	2960	94,1	94,5	94,2	0,90	128	6,3	242	2,2	2,7	80	0,416	392	400
90		280 M2	2960	94,4	95,0	94,8	0,91	151	6,8	290	2,0	2,4	80	0,550	450	457
110	B5C	315 MA2	2975	94,6	94,4	93,7	0,88	191	6,8	353	2	2	83	0,950	740	745
132		315 MB2	2980	95,0	94,8	93,3	0,85	236	6,0	423	1,8	1,7	83	1,12	807	812
160		315 MC2	2980	95,3	95,7	94,8	0,86	282	6,5	513	2	1,9	83	1,13	855	885
200		315 LA2	2980	95,5	95,3	94,0	0,85	356	7,2	641	2,2	2,2	83	1,60	1000	1030
250		355 LA2	2980	95,5	95,3	94,5	0,89	425	7,0	801	2,3	2,3	82	3,7	1620	1660
315		355 LB2	2980	95,6	95,7	95,2	0,90	528	7,1	1009	2,2	2,2	82	4,5	1810	1850
355		355 LC2	2980	95,6	95,5	94,6	0,89	603	7,2	1138	2,1	2,2	82	5,2	2030	1980
400		355 LD2	2980	96,7	95,7	93,6	0,90	663	6,5	1282	2,2	2,2	82	5,9	2180	2130
450		355 LE2	2980	96,7	95,7	93,6	0,90	746	6,5	1442	2,4	2,3	82	6,5	2310	2260
500		400 LA2	2981	96,9	95,9	93,8	0,90	827	5,7	1602	1,9	2,1	82	8,2	2680	2650
560		400 LB2	2982	97,0	96,0	93,9	0,90	926	6,1	1793	1,8	2,1	82	9,1	2850	2820
630		400 LC2	2983	97,2	96,2	94,1	0,90	1039	7,0	2017	2,1	2,3	82	10	3030	3000
710 ¹⁾		450 LA2	2987	97,4	96,4	94,3	0,91	670 ²⁾	5,8	2270	0,5	2,9	84 ³⁾	22	4130	4095
800 ¹⁾		450 LB2	2988	97,5	96,5	94,4	0,92	746 ²⁾	6,3	2557	0,6	3,2	84 ³⁾	24	4450	4415
900 ¹⁾		450 LC2	2989	97,6	96,6	94,5	0,92	839 ²⁾	6,6	2876	0,6	3,2	84 ³⁾	27	4780	4745

4 poles - 400V - 50Hz

11	A5C 160 M4	1470	90,3	90,4	89,1	0,81	21,7	6,5	71	2,5	3,1	62	0,075	115	125
15		1470	90,6	90,8	90,5	0,82	29,1	6,6	97	2,5	2,7	62	0,090	127	137
18,5		1465	91,3	92,0	92,2	0,87	33,6	6,0	121	2,3	2,6	63	0,110	143	148
22	180 L4	1470	92,0	92,4	91,7	0,86	40,1	6,8	143	2,5	3,0	63	0,180	165	169
30	200 L4	1465	92,4	93,0	92,7	0,86	54,5	6,0	196	2,6	2,9	63	0,220	188	195
37	225 S4	1480	93,1	93,3	93,0	0,86	66,7	6,4	239	2,0	2,5	68	0,410	247	257
45		1475	93,2	93,7	93,6	0,88	79,2	6,2	291	2,0	2,4	68	0,520	277	287
55	250 M4	1480	93,7	93,9	92,2	0,87	97,4	7,2	355	2,8	2,9	68	0,580	307	325
75	280 S4	1480	94,3	94,8	94,6	0,90	128	7,2	484	2,6	2,3	75	1,060	448	456
90		1480	94,5	95,9	94,8	0,89	154	6,9	581	2,5	2,5	75	1,150	472	479
110	B5C 315 MA4	1485	94,7	94,8	94,3	0,85	197	6,0	707	1,9	2,0	78	2,1	740	750
132		1490	95,2	95,3	94,6	0,85	235	6,5	846	2,2	2,0	78	2,5	821	830
160		1490	95,6	95,6	94,8	0,85	284	6,4	1025	2,1	2,0	78	3,1	940	967
200		1490	95,8	95,8	95,5	0,85	354	6,5	1282	2,3	2,0	78	3,4	1010	1040
250	355 LA4	1490	95,7	95,5	94,4	0,86	438	6,2	1602	1,9	2,4	79	6,1	1690	1730
315	355 LB4	1490	95,7	95,4	94,2	0,86	552	6,2	2019	2,0	2,4	79	7,4	1880	1920
355	355 LC4	1490	95,8	95,6	94,7	0,86	622	6,2	2275	1,9	2,3	79	8,3	2100	2140
400	355 LD4	1490	96,0	95,0	92,9	0,86	699	5,6	2564	2,0	2,5	79	9,4	2250	2200
450	355 LE4	1490	96,3	95,3	93,2	0,87	775	5,6	2884	2,0	2,4	79	10,2	2360	2310
500	355 LF4	1490	96,4	95,4	93,3	0,90	832	5,9	3205	1,3	2,9	79	11,2	2430	2380
560	400 LA4	1489	96,7	95,7	93,6	0,87	961	5,9	3592	2,1	2,4	81	11,4	2700	2670
630		1489	96,8	95,8	93,7	0,87	1080	5,9	4041	2,1	2,5	81	13	2900	2870
710		1490	96,9	95,9	93,8	0,87	1216	6,7	4551	1,0	2,6	81	18	3100	3070
800	450 LA4	1492	97,2	96,2	94,1	0,89	774 ²⁾	6,0	5121	1,0	2,8	83	29	4250	4215
900	450 LB4	1493	97,3	96,3	94,2	0,89	870 ²⁾	6,3	5757	1,1	2,9	83	33	4530	4495
1000	450 LC4	1493	97,4	96,4	94,3	0,89	965 ²⁾	6,1	6397	1,1	2,9	83	37	4860	4825
1250	500 LA4	1493	97,6	96,6	94,5	0,89	1204 ²⁾	4,7	7996	0,6	2,2	85	47	6200	6090
1400		1493	97,7	96,7	94,6	0,89	1347 ²⁾	5,0	8955	0,7	2,4	85	53	6620	6510
1600 ¹⁾		1494	97,8	96,8	94,7	0,89	1538 ²⁾	5,2	10228	0,7	2,5	85	60	7140	7030

1) Temperature rise class F

2) Current at 690V - 50Hz

3) Unidirectional fan

2 poles 500 size motors are available on request.

THREE PHASE SQUIRREL CAGE - LOW VOLTAGE

DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

IE2 EFFICIENCY ACCORDING TO IEC 60034-30

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS										SOUND PRESSURE LEVEL L _{pa} dB(A)	MOMENT OF INERTIA J	WEIGHT IM 1001 (IM B3)	WEIGHT IM 3011 (IM V1)
		RATED SPEED	EFFICIENCY η %			POWER FACTOR cos φ	CURRENT		TORQUE						
			FULL LOAD	3/4 LOAD	2/4 LOAD		In A	Is/In p.u.	Tn Nm	Ts/Tn p.u.	Tmax/Tn p.u.				
kW		rpm													

6 poles - 400V - 50Hz

7,5	A5C	160 M6	975	88,7	89,2	88,3	0,80	15,3	7,3	73	2,5	3,4	62	0,110	103	113
11		160 L6	970	89,0	90,1	89,9	0,80	22,3	7,0	108	2,5	3,1	62	0,150	114	124
15		180 L6	975	90,0	90,5	90,8	0,84	28,6	6,9	147	2,3	2,6	63	0,214	152	156
18,5		200 LA6	975	90,8	92,0	91,5	0,83	35,4	6,8	181	2,4	2,9	63	0,260	179	183
22		200 LB6	975	91,0	92,3	92,6	0,83	42,0	6,6	215	2,3	2,8	63	0,280	192	199
30		225 M6	980	91,9	93,0	93,3	0,84	56,1	7,3	292	2,2	2,9	66	0,580	250	258
37		250 M6	980	92,3	93,5	93,0	0,82	70,6	6,9	360	2,6	2,7	66	0,740	304	325
45		280 S6	985	92,9	93,2	92,7	0,84	83,2	6,7	436	2,3	2,4	72	1,150	383	392
55		280 M6	985	93,3	93,7	93,2	0,84	101	6,8	533	2,4	2,4	72	1,380	424	432
75	B5C	315 MA6	990	93,9	94,0	92,0	0,87	132	7,0	723	2,4	2,3	74	3,4	782	795
90		315 MB6	990	94,2	94,8	94,3	0,85	162	7,2	868	2,7	2,3	74	4,1	852	865
110		315 MC6	990	94,4	94,6	94,0	0,87	193	6,8	1061	2,4	2,1	74	4,7	968	980
132		315 LA6	990	94,8	95,0	94,7	0,86	234	6,9	1273	2,6	2,1	74	6,0	1130	1160
160		315 LB6	990	95,0	95,3	94,9	0,86	283	7,2	1543	2,6	2,2	74	6,7	1220	1250
200		355 LA6	990	95,3	95,0	93,8	0,85	356	6,0	1929	2,1	2,1	75	10,5	1160	1200
250		355 LB6	990	95,5	95,3	94,2	0,85	444	6,0	2411	2,1	2,1	75	13,1	1890	1930
315		355 LC6	990	95,5	95,6	94,9	0,86	554	6,3	3038	2,3	2,3	75	17,0	2315	2355
355		355 LD6	990	95,6	95,4	94,4	0,87	616	6,5	3424	2,3	2,4	75	18,6	2390	2430
400		400 LA6	992	96,2	95,2	93,1	0,84	714	6,2	3851	1,6	2,6	76	17,50	2680	2650
450		400 LB6	992	96,4	95,4	93,3	0,85	793	6,5	4332	1,7	2,6	76	19,50	2850	2820
500		400 LC6	993	96,5	95,5	93,4	0,84	890	6,9	4809	1,8	2,7	76	22,00	3070	3040
560		400 LD6	994	96,5	95,5	93,4	0,87	963	6,2	5380	1,5	2,7	76	30,00	3200	3170
630		450 LA6	994	96,7	95,7	93,6	0,85	1106	5,6	6053	1,1	2,6	79	41,00	4300	4265
710		450 LB6	994	97,0	96,0	93,9	0,85	1243	5,9	6821	1,1	2,7	79	46,00	4600	4565
800 ¹⁾		450 LC6	994	97,1	96,1	94,0	0,85	1399	5,6	7686	1,1	2,6	79	51,00	4950	4915
950		500 LA6	995	97,2	96,2	94,1	0,86	951 ²⁾	4,7	9118	0,7	2,2	82	71,00	6000	5890
1100		500 LB6	995	97,3	96,3	94,2	0,87	1087 ²⁾	4,8	10558	0,7	2,3	82	82,00	6570	6460
1300 ¹⁾		500 LC6	995	97,5	96,5	94,4	0,87	1282	5,0	12477	0,9	2,3	82	97,00	7300	7190

8 poles - 400V - 50Hz

4	A5C	160 MA8	720	81,5	80,6	80,0	0,73	9,7	4,2	53	1,9	2,1	61	0,080	78	88
5,5		160 MB8	720	82,4	81,5	80,8	0,77	12,5	4,2	73	1,9	2,1	61	0,092	87	97
7,5		160 L8	720	84,7	84,3	83,2	0,77	16,6	4,2	99	2,0	2,1	61	0,110	98	106
11		180 L8	725	86,7	87,1	85,6	0,74	24,7	4,5	145	2,0	2,2	62	0,160	134	139
15		200 L8	725	87,1	87,5	86,1	0,74	33,6	5,0	198	2,1	2,3	62	0,220	174	182
18,5		225 S8	725	88,0	88,0	85,5	0,76	39,9	5,2	244	2,2	2,4	63	0,420	222	231
22		225 M8	730	88,9	88,4	86,0	0,74	48,3	5,3	288	2,2	2,4	63	0,520	230	240
30		250 M8	730	90,8	90,4	87,5	0,74	64,4	5,5	392	2,3	2,5	63	0,620	278	296
37		280 S8	735	92,2	92,6	90,4	0,79	73,3	6,0	481	2,5	2,5	72	1,050	345	352
45		280 M8	735	92,6	93,1	91,0	0,79	88,8	6,0	585	2,5	2,5	72	1,250	402	410
55		315 S8	735	93,0	92,9	91,1	0,81	105	5,8	714	2,0	2,2	72	1,6	459	468
75	B5C	315 MA8	735	93,8	94,1	92,0	0,81	142	6,0	974	2,1	2,2	74	2,8	735	755
90		315 MB8	735	94,4	94,3	92,8	0,83	166	6,2	1169	2,2	2,3	74	3,5	815	835
110		315 MC8	735	94,5	94,4	93,0	0,83	202	6,2	1429	2,2	2,3	74	4,0	883	910
132		315 MD8	735	94,6	94,6	93,1	0,83	243	6,2	1715	2,2	2,3	74	4,3	952	975
160		355 LA8	740	95,3	94,3	92,2	0,83	292	5,2	2065	2,2	2,2	70	12,7	1710	1635
200		355 LB8	740	95,4	94,4	92,3	0,83	365	5,0	2581	2,1	2,2	70	15,4	1910	1835
250		355 LC8	740	95,7	94,7	92,6	0,83	454	5,2	3226	2,1	2,1	70	18,8	2240	2190
315		355 LD8	740	95,7	94,7	92,6	0,83	572	5,4	4065	1,6	2,7	70	21,4	2390	2340
355		400 LA8	743	95,7	94,7	92,6	0,82	653	5,4	4563	1,4	2,4	73	26	2850	2820
400		400 LB8	743	95,9	94,9	92,8	0,82	734	5,6	5141	1,4	2,4	73	30	3070	3040
450		400 LC8	743	96,0	95,0	92,9	0,82	825	5,2	5784	1,3	2,3	73	33	3230	3200
500		450 LA8	745	96,5	95,5	93,4	0,84	890	4,8	6409	1,0	2,1	76	55	4350	4315
560		450 LB8	745	96,6	95,6	93,5	0,85	984	4,7	7179	1,0	2,1	76	61	4620	4585
630		450 LC8	745	96,7	95,7	93,6	0,85	1106	4,7	8076	1,0	2,1	76	69	5020	4985
710		500 LA8	745	97,0	96,0	93,9	0,85	721 ²⁾	4,7	9101	0,7	2,3	80	95	6180	6070
800		500 LB8	745	97,1	96,1	94,0	0,86	802 ²⁾	4,7	10255	0,7	2,3	80	110	6750	6640
900 ¹⁾		500 LC8	746	97,2	96,2	94,1	0,86	901 ²⁾	5,0	11521	0,9	2,3	80	122	7230	7120

1) Temperature rise class F

2) Current at 690V - 50Hz

THREE PHASE SQUIRREL CAGE - LOW VOLTAGE
DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)
IE2 EFFICIENCY ACCORDING TO IEC 60034-30

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS										SOUND PRESSURE LEVEL L _{pa} dB(A)	MOMENT OF INERTIA J	WEIGHT IM 1001 (IM B3) kg	WEIGHT IM 3011 (IM V1) kg
		RATED SPEED	EFFICIENCY η %			POWER FACTOR cos φ	CURRENT		TORQUE						
			FULL LOAD	3/4 LOAD	2/4 LOAD		I _n A	I _s /I _n p.u.	T _n Nm	T _s /T _n p.u.	T _{max} /T _n p.u.				
kW		rpm													

10 poles - 400V - 50Hz

55	B5C	315 MA10	590	92,0	91,9	90,1	0,78	111	5,0	890	1,4	2,6	74	4	735	755
75		315 MB10	590	92,0	92,1	90,0	0,79	149	4,8	1214	1,2	2,5	74	5	815	835
90		315 MC10	590	93,0	93,0	91,0	0,79	177	4,5	1456	1,1	2,3	74	5	883	910
125	B5C	355 LA10	591	93,3	92,3	90,2	0,78	248	4,1	2020	1,1	2,5	70	11	1660	1585
150		355 LB10	591	93,6	92,6	90,5	0,78	297	4,2	2424	1,1	2,5	70	14	1890	1815
180		355 LC10	591	93,9	92,9	90,8	0,77	359	4,6	2909	1,2	2,6	70	17	2315	2265
200		355 LD10	592	94,1	93,1	91,0	0,78	393	4,3	3226	1,1	2,5	70	18	2390	2340
250	400	LA10	593	95,0	94,0	91,9	0,78	487	4,3	4026	1,2	2,4	73	23	2680	2650
280		LB10	593	95,2	94,2	92,1	0,78	544	4,6	4509	1,3	2,5	73	27	2850	2820
315		LC10	593	95,3	94,3	92,2	0,78	612	4,6	5073	1,3	2,5	73	32	3070	3040
380	450	LA10	595	95,6	94,6	92,5	0,80	717	4,5	6099	0,9	2,3	75	64	4300	4265
420		LB10	595	95,7	94,7	92,6	0,80	792	4,5	6741	0,9	2,3	75	71	4600	4565
480		LC10	595	95,9	94,9	92,8	0,80	903	4,5	7704	0,9	2,3	75	80	4950	4915
550	500	LA10	595	96,3	95,3	93,2	0,81	1018	4,7	8828	0,9	2,4	78	98	6100	5990
620		LB10	595	96,5	95,5	93,4	0,82	1131	4,5	9951	0,7	2,3	78	111	6580	6470
700		LC10	596	96,6	95,6	93,5	0,82	1275	4,8	11216	0,9	2,5	78	126	7140	7030

12 poles - 400V - 50Hz

45	B5C	315 MA12	490	91,0	90,7	88,8	0,76	94	4,8	877	1,5	2,4	74	4	735	755
55		315 MB12	490	92,0	92,0	89,8	0,77	112	5,2	1072	1,4	2,5	74	5	815	835
75		315 MC12	490	92,0	92,0	90,0	0,77	153	4,3	1461	1,2	2,1	74	5	883	910
90		355 LA12	492	92,2	91,2	89,1	0,74	190	4,5	1747	1,4	2,4	70	11	1660	1585
110		355 LB12	492	92,8	91,8	89,7	0,75	228	4,5	2135	1,4	2,5	70	14	1890	1815
132		355 LC12	493	93,2	92,2	90,1	0,75	273	4,8	2557	1,5	2,5	70	17	2315	2265
150		355 LD12	493	93,4	92,4	90,3	0,75	309	4,7	2906	1,5	2,6	70	18	2390	2340
180	400	LA12	494	94,1	93,1	91,0	0,73	378	4,7	3480	1,5	2,5	73	28	2680	2650
200		LB12	495	94,2	93,2	91,1	0,73	420	5,0	3859	1,6	2,6	73	32	2850	2820
225		LC12	495	94,4	93,4	91,3	0,73	471	4,9	4341	1,6	2,6	73	34	3070	3040
280	450	LA12	496	95,5	94,5	92,4	0,78	543	5,1	5391	1,1	2,5	75	73	4300	4265
315		LB12	496	95,6	94,6	92,5	0,78	610	5,0	6065	1,1	2,5	75	81	4600	4565
355		LC12	496	94,7	93,7	91,6	0,78	694	4,8	6835	1,0	2,5	75	91	4950	4915
400	500	LA12	496	95,9	94,9	92,8	0,78	772	4,1	7702	0,6	2,4	78	101	6100	5990
480		LB12	496	96,1	95,1	93,0	0,80	901	4,0	9242	0,6	2,3	78	122	6580	6470
550		LC12	496	96,2	95,2	93,1	0,80	1032	4,0	10590	0,6	2,2	78	138	7140	7030

14 poles - 400V - 50Hz

75	B5C	355 LA14	419	93,1	92,1	90,0	0,82	142	4,5	1709	1,4	2,4	68	11	1675	1600
90		355 LB14	419	93,1	92,1	90,0	0,82	170	4,5	2051	1,4	2,5	68	14	1900	1825
115		355 LC14	419	93,1	92,1	90,0	0,81	220	4,8	2621	1,5	2,5	68	17	2340	2290
130		355 LD14	419	93,2	92,2	90,1	0,81	249	4,7	2963	1,5	2,6	68	18	2410	2360
150	400	LA14	424	94,0	93,0	90,9	0,81	284	4,7	3379	1,5	2,5	71	28	2700	2670
170		LB14	424	94,1	93,1	91,0	0,81	322	5,0	3829	1,6	2,6	71	32	2870	2840
190		LC14	423	94,1	93,1	91,0	0,81	360	4,9	4290	1,6	2,6	71	34	3100	3070
210	450	LA14	425	94,6	93,6	91,5	0,80	401	5,1	4719	1,1	2,5	73	73	4330	4295
240		LB14	424	94,6	93,6	91,5	0,80	458	5,0	5406	1,1	2,5	73	81	4650	4615
280		LC14	424	94,7	93,7	91,6	0,80	533	4,8	6307	1,0	2,5	73	91	4990	4955
330	500	LA14	425	95,0	94,0	91,9	0,81	619	4,1	7415	0,6	2,4	76	101	6150	6040
420		LB14	425	95,1	94,1	92,0	0,81	787	4,0	9438	0,6	2,3	76	122	6630	6520
480		LC14	424	95,0	94,0	91,9	0,80	912	4,0	10811	0,6	2,2	76	138	7200	7090

**THREE PHASE SQUIRREL CAGE - LOW VOLTAGE
DOUBLE SPEED MOTORS**

DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS								MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)	WEIGHT IM 3011 (IM V1)
		RATED SPEED	EFFICIENCY	POWER FACTOR	CURRENT		TORQUE					
kW		rpm	η %	$\cos \varphi$	I_n A	I_s/I_n p.u.	T_n Nm	T_s/T_n p.u.	T_{max}/T_n p.u.	J kgm ²	kg	kg

2/4 poles - 400V - 50Hz - Single winding

11	2,3	A4D 160 M2/4 160 L2/4	2880	1445	83	66	0,85	0,68	22,5	7,4	5,5	7,2	36	15	1,8	2,2	2,1	2,6	0,062	72	82
14	3		2890	1450	84	67	0,85	0,68	28,3	9,5	6,0	8,0	46	20	2,0	2,5	2,3	2,9	0,075	85	95
18,5	4	180 M2/4 180 LA2/4 180 LB2/4	2900	1455	85	67	0,86	0,68	36,5	12,7	6,0	8,0	61	26	2,0	2,6	2,3	3,0	0,09	108	118
22	4,6		2920	1460	86	70	0,87	0,70	42,4	13,6	6,5	8,0	72	30	2,0	2,5	2,3	2,8	0,11	144	154
25	5,5	200 L2/4	2920	1460	87	71	0,87	0,70	47,7	16,0	6,5	7,6	82	36	2,2	2,4	2,6	2,6	0,15	155	165
30	6,5		2920	1465	88	72	0,88	0,72	55,9	18,1	7,0	8,7	98	42	2,2	2,3	2,6	2,5	0,19	168	180
37	8,5	225 S2/4 225 M2/4	2930	1470	88	72	0,88	0,72	69,0	23,7	7,5	7,9	121	55	2,2	2,3	2,8	2,4	0,37	207	216
45	11		2930	1475	89	73	0,88	0,72	82,9	30,2	7,5	7,3	147	71	2,2	2,1	2,8	2,2	0,4	225	234
55	14	250 M2/4	2930	1475	89	74	0,88	0,72	101	37,9	7,5	7,0	179	91	2,0	2	2,8	2,1	0,5	238	250
70	18		2940	1480	90	76	0,87	0,74	129	46,2	7,0	6,9	227	116	2,0	2,1	2,4	2,1	0,91	370	380
80	21	280 M2/4	2940	1480	91	77	0,87	0,74	146	53,2	7,2	7,2	260	135	2,0	2,1	2,4	2,2	1,05	435	445
95	27		2940	1485	91	78	0,88	0,75	172	66,6	7,2	6,4	309	174	2,0	1,9	2,3	1,9	1,15	465	475
110	30	B4D 315 MA2/4 315 MC2/4 315 MD2/4	2945	1485	90	80	0,89	0,77	198	70,3	7,5	6,9	357	193	2,2	2,2	2,4	2,2	2,1	740	770
130	35		2945	1485	91	82	0,90	0,77	229	80,0	7,5	7,1	421	225	2,2	2,2	2,4	2,2	2,5	815	845
160	45		2945	1485	92	84	0,90	0,77	279	100	7,5	6,6	519	289	2,2	2,2	2,4	2,1	3,1	920	950

4/6 poles - 400V - 50Hz - Separate winding

7	2,4	A4D 160 M4/6 160 L4/6	1470	984	83	73	0,75	0,49	16,2	9,7	5,9	4,6	45	23	2,0	1,8	2,6	1,8	0,063	74	84
10	3,3		1475	984	85	78	0,75	0,49	22,6	12,5	6,4	5,1	65	32	2,2	1,9	2,8	1,9	0,075	88	98
12	4	180 M4/6 180 LA4/6	1475	985	86	79	0,75	0,51	26,8	14,3	6,6	5,2	78	39	2,4	2	2,9	2,0	0,09	100	110
15	5		1455	985	80	76	0,88	0,71	30,7	13,3	4,2	5,0	98	48	1,4	1,7	2	1,7	0,13	110	120
18	6	200 LA4/6 200 LB4/6	1460	984	82	77	0,87	0,71	36,2	15,8	4,5	5,0	118	58	1,6	1,8	2,2	1,8	0,17	125	137
23	7,5		1465	985	85	79	0,87	0,71	44,8	19,2	5,4	5,4	150	73	1,9	1,9	2,5	1,9	0,22	145	157
31	10,5	225 S4/6 225 M4/6	1460	985	86	84	0,84	0,85	61,9	21,4	5,2	6,0	203	102	1,3	2	1,8	2	0,42	195	204
38	12,5		1465	985	87	85	0,83	0,83	76,0	25,7	5,4	6,6	248	121	1,4	2,2	2	2,2	0,52	220	229
45	15	250 M4/6	1465	985	88	85	0,86	0,85	86,2	30,0	5,5	6,5	293	145	1,4	2,2	2	2,2	0,62	263	275
52	17,5		1480	988	92	86	0,83	0,87	98,6	33,8	5,5	5,2	335	169	1,9	2,1	2,4	2,1	1,07	353	365
68	22,5	280 M4/6 315 S4/6	1482	988	91	87	0,85	0,86	127	43,4	6,0	5,4	438	217	2,0	2,2	2,5	2,2	1,44	426	438
80	26		1485	990	90	87	0,85	0,83	151	52,0	5,3	6,0	514	251	1,5	2	2,2	2	2,6	707	740
95	32	B4D 315 MA4/6 315 MB4/6 315 MC4/6 315 MD4/6	1485	995	91	88	0,85	0,83	178	63,1	5,6	6,5	611	307	1,6	2,2	2,3	2,2	3	758	790
120	40		1490	995	91	88	0,82	0,81	232	80,6	6,0	7,7	769	384	1,8	2,7	2,5	2,7	3,6	848	870
150	50		1490	995	92	90	0,85	0,84	277	95,6	6,2	7,7	961	480	1,9	2,7	2,4	2,7	4,4	953	975

4/8 poles - 400V - 50Hz - Single winding

10	2,2	A4D 160 M4/8 160 L4/8	1460	730	85	75	0,79	0,53	21,6	8,0	5,6	3,2	65	29	2,2	1,8	2,5	2,2	0,063	74	84
13	2,8		1465	730	86	77	0,79	0,52	27,6	10,2	6,0	3,4	85	37	2,3	2	2,6	2,3	0,075	88	98
16	3,5	180 M4/8 180 L4/8	1465	730	87	78	0,80	0,53	33,4	12,3	6,0	3,5	104	46	2,4	1,9	2,6	2,5	0,09	100	110
18	4,5		1465	735	90	78	0,82	0,57	35,3	14,6	6,5	3,7	117	58	2,1	1,8	2,5	2	0,11	122	120
25	6,2	200 L4/8	1465	735	89	83	0,83	0,57	49,4	18,9	6,3	4,0	163	81	2,0	1,9	2,4	2,1	0,18	146	137
32	8		1480	740	92	86	0,83	0,58	60,8	23,2	7,7	5,3	206	103	2,2	2	2,6	2,5	0,32	207	157
40	10	225 S4/8 225 M4/8	1480	740	92	87	0,84	0,59	74,5	28,3	7,7	5,3	258	129	2,4	2	2,6	2,4	0,41	230	204
50	12		1480	740	93	87	0,83	0,56	93,9	35,6	8,2	5,4	323	155	2,6	2,2	2,8	2,8	0,32	264	229
55	13	280 S4/8 280 M4/8	1480	740	93	88	0,89	0,75	96,1	28,4	6,5	5,5	355	168	1,9	1,7	2,3	2,4	1,05	356	275
65	16		1480	740	93	89	0,90	0,77	112	33,9	6,3	5,1	419	206	2,0	1,6	2,5	2,2	1,25	388	365
80	19	B4D 315 MB4/8 315 MC4/8 315 MD4/8	1480	740	94	89	0,91	0,75	136	41,1	6,9	5,7	516	245	2,2	1,8	2,7	2,4	1,6	459	438
100	25		1480	740	94	90	0,90	0,78	171	51,3	6,0	5,0	645	323	1,4	1,6	2	1,8	3	758	740
120	30		1485	740	94	91	0,89	0,76	207	62,5	7,4	5,9	772	387	1,7	2	2,4	2,2	3,6	848	790
150	37		1485	740	94	92	0,90	0,78	255	74,6	7,1	5,7	964	477	1,7	1,9	2,3	2	4,4	953	870

THREE PHASE SQUIRREL CAGE - MEDIUM VOLTAGE

DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS										SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)	WEIGHT IM 3011 (IM V1)
		RATED SPEED	EFFICIENCY η %			POWER FACTOR	CURRENT		TORQUE						
			FULL LOAD	3/4 LOAD	2/4 LOAD		$\cos \varphi$	I_n A	I_s/I_n p.u.	T_n Nm	T_s/T_n p.u.				
kW		rpm	FULL LOAD	3/4 LOAD	2/4 LOAD	$\cos \varphi$	I_n A	I_s/I_n p.u.	T_n Nm	T_s/T_n p.u.	T_{max}/T_n p.u.	L_{pa} dB(A)	J kgm²	kg	kg

2 poles - 3000V - 50Hz

300	B5H	355 LA2	2975	95,5	94,5	92,4	0,91	66	5,4	963	0,5	2,7	82	3,8	1940	1865
340		355 LB2	2979	95,7	94,7	92,6	0,91	75	5,6	1090	0,6	2,9	82	4,3	2050	1975
380		355 LC2	2979	95,9	94,9	92,8	0,91	84	5,6	1218	0,6	2,9	82	4,8	2140	2090
470		400 LA2	2979	96,2	95,2	93,1	0,91	103	5,5	1507	0,5	2,7	82	5,7	2360	2330
530		400 LB2	2979	96,4	95,4	93,3	0,90	118	5,8	1699	0,5	2,7	82	6,4	2480	2450
600		400 LC2	2981	96,7	95,7	93,6	0,91	131	5,9	1922	0,6	2,7	82	7,2	2600	2570
740		450 LA2	2981	96,7	95,7	93,6	0,89	165	6,1	2371	0,5	2,7	84 ³⁾	9,7	3520	3485
820		450 LB2	2984	97,1	96,1	94,0	0,89	183	6,1	2624	0,5	2,7	84 ³⁾	11,0	3690	3655
930		450 LC2	2985	97,2	96,2	94,1	0,91	202	6,2	2975	0,6	2,7	84 ³⁾	12,2	3860	3825
1000		450 LD2	2985	97,2	96,2	94,1	0,90	220	6,4	3199	0,6	2,8	84 ³⁾	13,9	4100	4065
1100		500 LA2	2988	97,3	96,3	94,2	0,90	242	6,3	3516	0,5	2,8	85 ³⁾	on request on request on request		
1250		500 LB2	2988	97,4	96,4	94,3	0,91	271	6,4	3995	0,5	2,8	85 ³⁾			
1350		500 LC2	2989	97,5	96,5	94,4	0,90	296	6,4	4313	0,6	2,9	85 ³⁾			

4 poles - 3000V - 50Hz

310	B5H	355 LA4	1483	95,1	94,1	92,0	0,88	71	5,2	1996	0,7	2,3	79	6,4	2020	1945
340		355 LB4	1484	95,3	94,3	92,2	0,88	78	5,2	2188	0,8	2,6	79	7,2	2120	2045
380		355 LC4	1485	95,5	94,5	92,4	0,88	87	5,4	2444	0,9	2,8	79	8,0	2240	2190
430		355 LD4	1485	95,8	94,8	92,7	0,88	98	5,5	2765	0,9	2,8	79	9,0	2390	2340
520		400 LA4	1488	96,2	95,2	93,1	0,88	118	5,5	3337	0,7	2,4	81	12,7	2560	2530
580		400 LB4	1488	96,2	95,2	93,1	0,88	132	5,5	3722	0,7	2,3	81	14,2	2700	2670
620		400 LC4	1489	96,3	95,3	93,2	0,88	141	5,6	3976	0,7	2,6	81	15,5	2840	2810
700		450 LA4	1490	96,4	95,4	93,3	0,88	159	5,5	4487	0,7	2,3	83	25	3870	3835
800		450 LB4	1490	96,7	95,7	93,6	0,88	181	6,0	5128	0,7	2,4	83	28	4100	4065
880		450 LC4	1491	96,8	95,8	93,7	0,88	199	6,0	5636	0,7	2,4	83	31	4300	4265
1000		450 LD4	1491	97,0	96,0	93,9	0,88	225	6,1	6405	0,8	2,5	83	35	4600	4565
1100		500 LA4	1494	97,1	96,1	94,0	0,85	256	6,0	7031	0,7	2,5	85	49	6050	5940
1200		500 LB4	1493	97,2	96,2	94,1	0,86	276	6,0	7676	0,8	2,4	85	53	6320	6210
1300		500 LC4	1494	97,2	96,2	94,1	0,86	299	6,1	8310	0,8	2,5	85	59	6630	6520

6 poles - 3000V - 50Hz

240	B5H	355 LA6	989	94,3	93,3	91,2	0,82	60	5,0	2317	0,8	2,5	75	10,5	2170	2095
270		355 LB6	989	94,6	93,6	91,5	0,82	67	5,1	2607	0,9	2,7	75	11,8	2300	2225
300		355 LC6	989	94,8	93,8	91,7	0,83	73	5,1	2897	0,9	2,7	75	13,2	2440	2390
330		400 LA6	991	95,2	94,2	92,1	0,81	82	5,0	3180	0,8	2,5	76	19	2590	2560
370		400 LB6	991	95,3	94,3	92,2	0,82	91	5,1	3566	0,8	2,6	76	21	2750	2720
410		400 LC6	991	95,5	94,5	92,4	0,83	100	5,1	3951	0,8	2,5	76	24	2910	2880
530		450 LA6	992	95,7	94,7	92,6	0,83	128	5,2	5102	0,7	2,3	79	35	3870	3835
580		450 LB6	992	95,7	94,7	92,6	0,84	139	5,2	5584	0,7	2,3	79	40	4100	4065
660		450 LC6	993	96,0	95,0	92,9	0,85	156	5,3	6347	0,7	2,3	79	44	4350	4315
720		450 LD6	993	96,0	95,0	92,9	0,84	172	5,3	6924	0,7	2,3	79	60	4640	4605
830		500 LA6	992	96,2	95,2	93,1	0,88	189	5,5	7990	0,7	2,1	82	75	5960	5850
920		500 LB6	993	96,3	95,3	93,2	0,88	209	5,5	8848	0,7	2,3	82	82	6220	6110
1000		500 LC6	993	96,4	95,4	93,3	0,88	227	5,6	9617	0,8	2,3	82	92	6600	6490

8 poles - 3000V - 50Hz

230	B5H	400 LA8	740	93,4	92,4	90,3	0,73	65	5,0	2968	0,8	2,4	73	20	2620	2590
260		400 LB8	742	93,7	92,7	90,6	0,73	73	5,0	3346	0,9	2,7	73	23	2790	2760
290		400 LC8	742	94,0	93,0	90,9	0,74	80	5,1	3732	0,9	2,7	73	26	2950	2920
370		450 LA8	743	94,7	93,7	91,6	0,79	95	5,1	4756	0,6	2,4	76	39	3900	3865
410		450 LB8	743	94,9	93,9	91,8	0,80	104	5,1	5270	0,6	2,4	76	44	4140	4105
460		450 LC8	744	95,0	94,0	91,9	0,78	119	5,2	5905	0,7	2,5	76	50	4380	4345
520		450 LD8	744	95,3	94,3	92,2	0,80	131	5,2	6675	0,7	2,5	76	56	4670	4635
630		500 LA8	744	95,4	94,4	92,3	0,79	161	5,1	8087	0,6	2,3	80	79	5970	5860
680		500 LB8	744	95,5	94,5	92,4	0,80	171	5,1	8728	0,6	2,3	80	87	6270	6160
750		500 LC8	744	95,7	94,7	92,6	0,80	189	5,2	9627	0,7	2,3	80	95	6560	6450

3) Unidirectional fan

THREE PHASE SQUIRREL CAGE - MEDIUM VOLTAGE

DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS										SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)	WEIGHT IM 3011 (IM V1)
		RATED SPEED	EFFICIENCY η %			POWER FACTOR	CURRENT		TORQUE						
			FULL LOAD	3/4 LOAD	2/4 LOAD		cos φ	I _n A	I _s /I _n p.u.	T _n Nm	T _s /T _n p.u.				
kW		rpm										L _{pa} dB(A)	J kgm²	kg	kg

2 poles - 6000V - 50Hz

275	B5H	355 LA2	2977	95,3	94,3	92,2	0,90	31	5,4	882	0,5	2,7	82	3,8	1940	1865
310		355 LB2	2981	95,5	94,5	92,4	0,90	35	5,6	993	0,6	2,9	82	4,3	2050	1975
350		355 LC2	2981	95,7	94,7	92,6	0,90	39	5,6	1121	0,6	2,9	82	4,8	2140	2090
430		400 LA2	2981	96,1	95,1	93,0	0,90	48	5,5	1378	0,5	2,7	82	5,7	2360	2330
480		400 LB2	2981	96,3	95,3	93,2	0,90	53	5,8	1538	0,5	2,7	82	6,4	2480	2450
540		400 LC2	2982	96,6	95,6	93,5	0,90	60	5,9	1729	0,6	2,7	82	7,2	2600	2570
680		450 LA2	2982	96,7	95,7	93,6	0,88	77	6,1	2178	0,5	2,7	84 ³⁾	9,7	3520	3485
750		450 LB2	2985	97,1	96,1	94,0	0,89	84	6,1	2399	0,5	2,7	84 ³⁾	11,0	3690	3655
850		450 LC2	2986	97,2	96,2	94,1	0,90	93	6,2	2719	0,6	2,7	84 ³⁾	12,2	3860	3825
950		450 LD2	2986	97,2	96,2	94,1	0,90	104	6,4	3038	0,6	2,8	84 ³⁾	13,9	4100	4065
1050		500 LA2	2988	97,3	96,3	94,2	0,90	115	6,3	3356	0,5	2,8	85 ³⁾	on request		
1200		500 LB2	2988	97,4	96,4	94,3	0,91	130	6,4	3835	0,5	2,8	85 ³⁾	on request		
1300		500 LC2	2989	97,4	96,4	94,3	0,90	143	6,4	4154	0,6	2,9	85 ³⁾	on request		

4 poles - 6000V - 50Hz

280	B5H	355 LA4	1485	94,8	93,8	91,7	0,87	33	5,2	1801	0,7	2,3	79	6,4	2020	1945
315		355 LB4	1486	95,2	94,2	92,1	0,87	37	5,2	2024	0,8	2,6	79	7,2	2120	2045
355		355 LC4	1487	95,3	94,3	92,2	0,87	41	5,4	2280	0,9	2,8	79	8,0	2240	2190
400		355 LD4	1487	95,5	94,5	92,4	0,87	46	5,5	2569	0,9	2,8	79	9,0	2390	2340
450		400 LA4	1489	96,0	95,0	92,9	0,87	52	5,5	2886	0,7	2,4	81	12,7	2560	2530
500		400 LB4	1489	96,0	95,0	92,9	0,87	58	5,5	3207	0,7	2,3	81	14,2	2700	2670
560		400 LC4	1490	96,1	95,1	93,0	0,87	64	5,6	3589	0,7	2,6	81	15,5	2840	2810
630		450 LA4	1491	96,3	95,3	93,2	0,87	72	5,5	4035	0,7	2,3	83	25	3870	3835
710		450 LB4	1491	96,6	95,6	93,5	0,87	81	6,0	4548	0,7	2,4	83	28	4100	4065
800		450 LC4	1492	96,7	95,7	93,6	0,87	92	6,0	5121	0,7	2,4	83	31	4300	4265
900		450 LD4	1492	96,9	95,9	93,8	0,87	103	6,1	5761	0,8	2,5	83	35	4600	4565
1000		500 LA4	1494	97,1	96,1	94,0	0,85	117	6,0	6392	0,7	2,5	85	49	6050	5940
1100		500 LB4	1493	97,2	96,2	94,1	0,86	127	6,0	7036	0,8	2,4	85	53	6320	6210
1250		500 LC4	1494	97,2	96,2	94,1	0,86	144	6,1	7990	0,8	2,5	85	59	6630	6520

6 poles - 6000V - 50Hz

220	B5H	355 LA6	990	94,0	93,0	90,9	0,81	28	5,0	2122	0,8	2,5	75	10,5	2170	2095
250		355 LB6	990	94,3	93,3	91,2	0,81	31	5,1	2412	0,9	2,7	75	11,8	2300	2225
275		355 LC6	990	94,6	93,6	91,5	0,82	34	5,1	2653	0,9	2,7	75	13,2	2440	2390
310		400 LA6	992	95,1	94,1	92,0	0,81	39	5,0	2984	0,8	2,5	76	19	2590	2560
340		400 LB6	992	95,3	94,3	92,2	0,81	42	5,1	3273	0,8	2,6	76	21	2750	2720
380		400 LC6	992	95,4	94,4	92,3	0,82	47	5,1	3658	0,8	2,5	76	24	2910	2880
480		450 LA6	992	95,6	94,6	92,5	0,83	58	5,2	4621	0,7	2,3	79	35	3870	3835
530		450 LB6	992	95,7	94,7	92,6	0,84	63	5,2	5102	0,7	2,3	79	40	4100	4065
600		450 LC6	993	95,9	94,9	92,8	0,84	72	5,3	5770	0,7	2,3	79	44	4350	4315
660		450 LD6	993	96,0	95,0	92,9	0,84	79	5,3	6347	0,7	2,3	79	60	4640	4605
760		500 LA6	992	96,2	95,2	93,1	0,88	86	5,5	7317	0,7	2,1	82	75	5960	5850
840		500 LB6	993	96,3	95,3	93,2	0,88	95	5,5	8079	0,7	2,3	82	82	6220	6110
950		500 LC6	993	96,4	95,4	93,3	0,88	108	5,6	9136	0,8	2,3	82	92	6600	6490

8 poles - 6000V - 50Hz

220	B5H	400 LA8	741	93,4	92,4	90,3	0,73	31	5,0	2835	0,8	2,4	73	20	2620	2590
240		400 LB8	742	93,6	92,6	90,5	0,73	34	5,0	3089	0,9	2,7	73	23	2790	2760
265		400 LC8	742	93,9	92,9	90,8	0,74	37	5,1	3411	0,9	2,7	73	26	2950	2920
340		450 LA8	743	94,7	93,7	91,6	0,79	44	5,1	4370	0,6	2,4	76	39	3900	3865
390		450 LB8	743	94,9	93,9	91,8	0,80	49	5,1	5013	0,6	2,4	76	44	4140	4105
440		450 LC8	744	95,0	94,0	91,9	0,78	57	5,2	5648	0,7	2,5	76	50	4380	4345
490		450 LD8	744	95,3	94,3	92,2	0,80	62	5,2	6290	0,7	2,5	76	56	4670	4635
600		500 LA8	744	95,5	94,5	92,4	0,79	76	5,1	7702	0,6	2,3	80	79	5970	5860
650		500 LB8	744	95,6	94,6	92,5	0,80	82	5,1	8343	0,6	2,3	80	87	6270	6160
720		500 LC8	744	95,8	94,8	92,7	0,80	90	5,2	9242	0,7	2,3	80	95	6560	6450

3) Unidirectional fan

THREE PHASE SQUIRREL CAGE - HIGH VOLTAGE DETERMINATION OF EFFICIENCY ACCORDING TO IEC 60034-2-1 (2007)

Insulation class: F - Temperature rise class: B - Protection degree: IP 55 - Cooling method: IC 411

RATED OUTPUT	MOTOR TYPE	PERFORMANCES AT RATED OUTPUTS										SOUND PRESSURE LEVEL	MOMENT OF INERTIA	WEIGHT IM 1001 (IM B3)	WEIGHT IM 3011 (IM V1)
		RATED SPEED	EFFICIENCY η %			POWER FACTOR	CURRENT		TORQUE						
			FULL LOAD	3/4 LOAD	2/4 LOAD		cos φ	I _n A	I _s /I _n p.u.	T _n Nm	T _s /T _n p.u.				
kW		rpm										L _{pa} dB(A)	J kgm²	kg	kg

2 poles - 11000V - 50Hz

400	B5H	450 LA2	2984	95,4	94,4	92,3	0,91	24	7,1	1280	0,6	3,0	84 ³⁾	9,7	3800	3765
450		450 LB2	2985	95,6	94,6	92,5	0,90	27	7,1	1440	0,7	3,0	84 ³⁾	10,9	3900	3865
500		450 LC2	2986	95,8	94,8	92,7	0,91	30	7,2	1599	0,6	3,1	84 ³⁾	12,1	4000	3965
630		500 LA2	2988	96,2	95,2	93,1	0,92	37	7,1	2014	0,5	2,8	85 ³⁾	on request on request on request		
710		500 LB2	2988	96,3	95,3	93,2	0,91	43	7,1	2269	0,5	2,7	85 ³⁾			
800		500 LC2	2989	96,5	95,5	93,4	0,92	47	7,2	2556	0,5	2,8	85 ³⁾			

4 poles - 11000V - 50Hz

450	B5H	450 LA4	1491	96,1	95,1	93,0	0,86	28	6,2	2882	0,8	2,7	83	25,8	3800	3765
500		450 LB4	1492	96,3	95,3	93,2	0,85	32	6,5	3200	0,8	2,7	83	29,0	4100	4065
560		450 LC4	1492	96,5	95,5	93,4	0,86	35	6,8	3584	0,9	2,8	83	32,2	4350	4315
630		500 LA4	1492	96,5	95,5	93,4	0,86	40	6,2	4033	0,6	2,3	85	40,1	6100	5990
710		500 LB4	1492	96,5	95,5	93,4	0,86	45	6,2	4545	0,6	2,3	85	45,8	6400	6290
800		500 LC4	1493	96,7	95,7	93,6	0,87	50	6,3	5117	0,6	2,4	85	51,4	6650	6540

6 poles - 11000V - 50Hz

355	B5H	450 LA6	993	95,6	94,6	92,5	0,83	24	6,1	3414	0,9	2,7	79	36,7	3900	3865
400		450 LB6	994	95,8	94,8	92,7	0,82	26	6,2	3843	0,9	2,8	79	41,2	4150	4115
450		450 LC6	993	96,0	95,0	92,9	0,83	30	6,1	4328	0,9	2,8	79	46,3	4400	4365
560		500 LA6	995	96,3	95,3	93,2	0,83	36	6,0	5375	0,7	2,4	82	64,2	6000	5890
630		500 LB6	995	96,4	95,4	93,3	0,84	41	6,0	6047	0,7	2,5	82	72,9	6250	6140
710		500 LC6	995	96,4	95,4	93,3	0,84	46	6,1	6815	0,7	2,5	82	81,7	6650	6540

8 poles - 11000V - 50Hz

315	B5H	450 LA8	744	94,9	93,9	91,8	0,79	22	5,7	4043	0,9	2,5	76	41,2	4000	3965
355		450 LB8	744	95,0	94,0	91,9	0,79	25	5,6	4557	0,9	2,6	76	46,3	4200	4165
400		450 LC8	744	95,0	94,0	91,9	0,80	27	5,6	5134	0,9	2,6	76	52,0	4450	4415
500		500 LA8	744	95,4	94,4	92,3	0,78	35	5,4	6418	0,7	2,2	80	66,4	6000	5890
560		500 LB8	744	95,5	94,5	92,4	0,78	39	5,4	7188	0,7	2,3	80	75,4	6300	6190
630		500 LC8	745	95,5	94,5	92,4	0,79	44	5,3	8076	0,7	2,2	80	84,5	6650	6540

3) Unidirectional fan

The voltage range can be upto 13.6kV on request

THREADED HOLES IN THE SHAFT EXTENSION

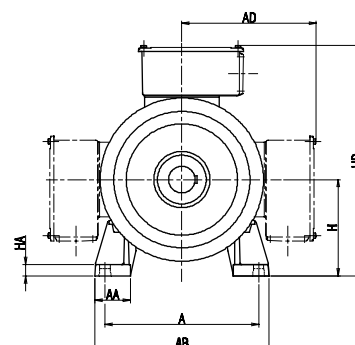
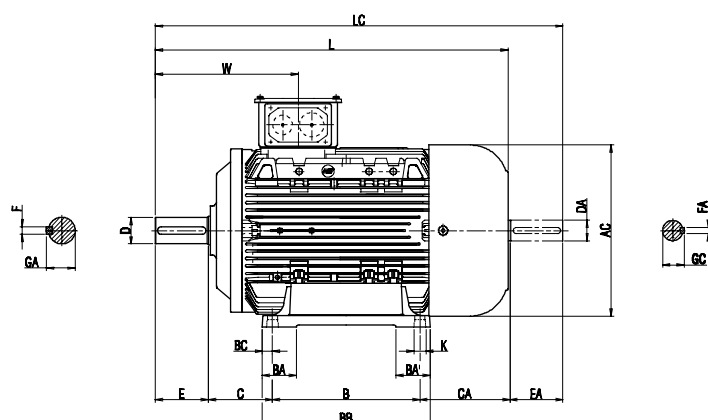
The following table contains information of the tapped holes in the shaft extension, as per DIN 332.

Frame size	Poles	Dimensions
160	All	M16 DIN 332
180	All	M16 DIN 332
200	All	M16 DIN 332
225	All	M16 DIN 332
250	All	M16 DIN 332
280	All	M16 DIN 332
315	All	M20 DIN 332
355	2	M20 DIN 332
	≥4	M24 DIN 332
400	2	M20 DIN 332
	≥4	M24 DIN 332
450	2	M20 DIN 332
	≥4	M24 DIN 332
500	≥4	M30 DIN 332

DIMENSIONS **IM B3 (IM 1001)**

MOTOR TYPE		POLES	A	AA	AB	AC	AD	B	BA	BB	BC	BA'	C	CA	H	HA	HD	K	L	LC	W
A5_160	M	2 - 8	254	55	296	314	258	210	60	296	21	90	108	223	160 ^{0.5}	20	418	14,5	648	761	279
	L		254	55	296	314	258	254	60	296	21	90	108	179	160 ^{0.5}	20	418	14,5	648	761	279
A5_180	M	2 - 4	279	58	320	354	278	241	80	320	20,5	80	121	254	180 ^{0.5}	22	458	14,5	723	836	296
	L	4 - 8	279	58	320	354	278	279	80	320	20,5	80	121	216	180 ^{0.5}	22	458	14,5	723	836	296
A5_200	L	2 - 8	318	74	360	354	278	305	70	347	21	70	133	220	200 ^{0.5}	24	478	18,5	764	877	296
A5_225	M	2	356	76	405	411	-	311	80	360	24,5	80	149	255	225 ^{0.5}	28	523	18,5	820	935	288
	S - M	4 - 8	356	76	405	411	-	311	80	360	24,5	80	149	255	225 ^{0.5}	28	523	18,5	850	965	318
A5_250	M	2	406	90	465	411	-	349	90	406	28,5	90	168	223	250 ^{0.5}	28	548	22	875	990	318
		4 - 8	406	90	465	411	-	349	90	406	28,5	90	168	223	250 ^{0.5}	28	548	22	875	990	318
A5_280	S	2	457	90	540	490	-	368	110	480	30,5	110	190	272	280 ⁻¹	40	640	24	959	1110	350
		4 - 8	457	90	540	490	-	368	110	480	30,5	110	190	272	280 ⁻¹	40	640	24	959	1110	350
	M	2	457	90	540	490	-	419	110	480	30,5	110	190	221	280 ⁻¹	40	640	24	959	1110	350
		4 - 8	457	90	540	490	-	416	110	480	30,5	110	190	221	280 ⁻¹	40	640	24	959	1110	350
B5_315	MA-MC	2	508	110	590	604	-	457	110	520	32	165	216	299	315 ⁻¹	43	800	27	1102	1252	387
		4 - 8	508	110	590	604	-	457	110	520	32	165	216	299	315 ⁻¹	43	800	27	1132	1282	417
	MD	8	508	110	590	604	-	457	110	520	32	165	216	299	315 ⁻¹	43	800	27	1132	1282	417
		2	508	110	590	604	-	508	110	582	32	200	216	398	315 ⁻¹	43	862	27	1252	1402	402
	L	4 - 6	508	110	590	604	-	508	110	582	32	200	216	398	315 ⁻¹	43	862	27	1282	1432	432

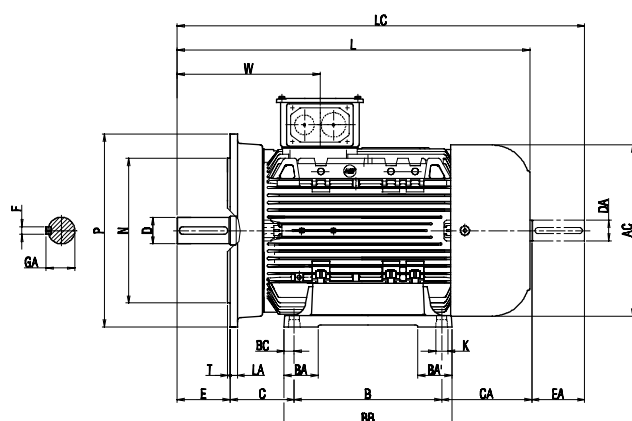
		Shaft extension										
MOTOR TYPE	POLES	D	E	F	GA	DA	EA	FA	GC			
A5_160	M	2 - 8	42 ^{k6}	110	12 ^{h9}	45	42 ^{k6}	110	12 ^{h9}	45		
	L		42 ^{k6}	110	12 ^{h9}	45	42 ^{k6}	110	12 ^{h9}	45		
A5_180	M	2 - 4	48 ^{k6}	110	14 ^{h9}	51,5	42 ^{k6}	110	12 ^{h9}	45		
	L	4 - 8	48 ^{k6}	110	14 ^{h9}	51,5	42 ^{k6}	110	12 ^{h9}	45		
A5_200	L	2 - 8	55 ^{m6}	110	16 ^{h9}	59	42 ^{k6}	110	12 ^{h9}	45		
A5_225	M	2	55 ^{m6}	110	16 ^{h9}	59	55 ^{m6}	110	16 ^{h9}	59		
	S - M	4 - 8	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59		
A5_250	M	2	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59		
		4 - 8	65 ^{m6}	140	18 ^{h9}	69	55 ^{m6}	110	16 ^{h9}	59		
A5_280	S	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64		
		4 - 8	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64		
	M	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64		
		4 - 8	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64		
B5_315	MA-MC	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64		
		4 - 8	80 ^{m6}	170	22 ^{h9}	85	65 ^{m6}	140	18 ^{h9}	69		
	MD	8	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69		
		L	2	70 ^{m6}	140	20 ^{h9}	74,5	65 ^{m6}	140	18 ^{h9}	64	
				4 - 6	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69



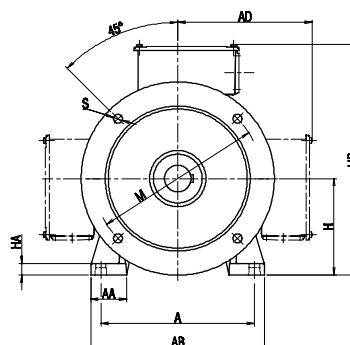
DIMENSIONS
IM B35 (IM 2001)

MOTOR TYPE		POLES	A	AA	AB	AC	AD	B	BA	BB	BC	BA'	C	CA	H	HA	HD	K	L	LC	W
A5_160	M	2 - 8	254	55	296	314	258	210	60	296	21	90	108	223	160 ^{0.5}	20	418	14,5	648	761	279
	L		254	55	296	314	258	254	60	296	21	90	108	179	160 ^{0.5}	20	418	14,5	648	761	279
A5_180	M	2 - 4	279	58	320	354	278	241	80	320	20,5	80	121	254	180 ^{0.5}	22	458	14,5	723	836	296
	L	4 - 8	279	58	320	354	278	279	80	320	20,5	80	121	216	180 ^{0.5}	22	458	14,5	723	836	296
A5_200	L	2 - 8	318	74	360	354	278	305	70	347	21	70	133	220	200 ^{0.5}	24	478	18,5	764	877	296
A5_225	M	2	356	76	405	411	-	311	80	360	24,5	80	149	255	225 ^{0.5}	28	523	18,5	820	935	288
	S - M	4 - 8	356	76	405	411	-	311	80	360	24,5	80	149	255	225 ^{0.5}	28	523	18,5	850	965	318
A5_250	M	2	406	90	465	411	-	349	90	406	28,5	90	168	223	250 ^{0.5}	28	548	22	875	990	318
		4 - 8	406	90	465	411	-	349	90	406	28,5	90	168	223	250 ^{0.5}	28	548	22	875	990	318
A5_280	S	2	457	90	540	490	-	368	110	480	30,5	110	190	272	280 ¹	40	640	24	959	1110	350
		4 - 8	457	90	540	490	-	368	110	480	30,5	110	190	272	280 ¹	40	640	24	959	1110	350
	M	2	457	90	540	490	-	419	110	480	30,5	110	190	221	280 ¹	40	640	24	959	1110	350
		4 - 8	457	90	540	490	-	416	110	480	30,5	110	190	221	280 ¹	40	640	24	959	1110	350
B5_315	MA-MC	2	508	110	590	604	-	457	110	520	32	165	216	299	315 ¹	43	800	27	1102	1252	387
		4 - 8	508	110	590	604	-	457	110	520	32	165	216	299	315 ¹	43	800	27	1132	1282	417
	MD	8	508	110	590	604	-	457	110	520	32	165	216	299	315 ¹	43	800	27	1132	1282	417
	L	2	508	110	590	604	-	508	110	582	32	200	216	398	315 ¹	43	862	27	1252	1402	402
		4 - 6	508	110	590	604	-	508	110	582	32	200	216	398	315 ¹	43	862	27	1282	1432	432

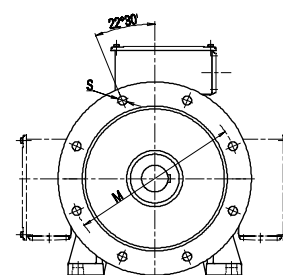
		Shaft extension								Flange B5						
MOTOR TYPE	POLES	D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T	
A5_160	M	2 - 8	42 ^{h6}	110	12 ^{h9}	45	42 ^{h6}	110	12 ^{h9}	45	15	300	250 ^{h6}	350	18,5	5
	L		42 ^{h6}	110	12 ^{h9}	45	42 ^{h6}	110	12 ^{h9}	45	15	300	250 ^{h6}	350	18,5	5
A5_180	M	2 - 4	48 ^{h6}	110	14 ^{h9}	51,5	42 ^{h6}	110	12 ^{h9}	45	14	300	250 ^{h6}	350	18,5	5
	L	4 - 8	48 ^{h6}	110	14 ^{h9}	51,5	42 ^{h6}	110	12 ^{h9}	45	14	300	250 ^{h6}	350	18,5	5
A5_200	L	2 - 8	55 ^{m6}	110	16 ^{h9}	59	42 ^{h6}	110	12 ^{h9}	45	15	350	300 ^{h6}	400	18,5	5
A5_225	M	2	55 ^{m6}	110	16 ^{h9}	59	55 ^{m6}	110	16 ^{h9}	59	16	400	350 ^{h6}	450	18,5	5
	S - M	4 - 8	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59	16	400	350 ^{h6}	450	18,5	5
A5_250	M	2	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59	18	500	450 ^{h6}	550	18,5	5
		4 - 8	65 ^{m6}	140	18 ^{h9}	69	55 ^{m6}	110	16 ^{h9}	59	18	500	450 ^{h6}	550	18,5	5
A5_280	S	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5
		4 - 8	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5
	M	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5
		4 - 8	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5
B5_315	MA-MC	2	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	22	600	550 ^{h6}	660	22	6
		4 - 8	80 ^{m6}	170	22 ^{h9}	85	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6
	MD	8	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6
	L	2	70 ^{m6}	140	20 ^{h9}	74,5	65 ^{m6}	140	18 ^{h9}	64	22	600	550 ^{h6}	660	22	6
		4 - 6	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6



160 - 200



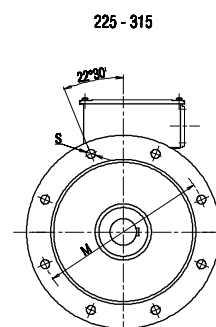
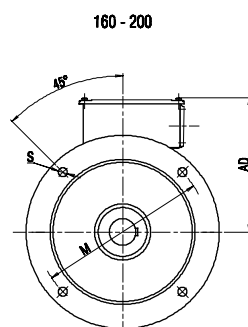
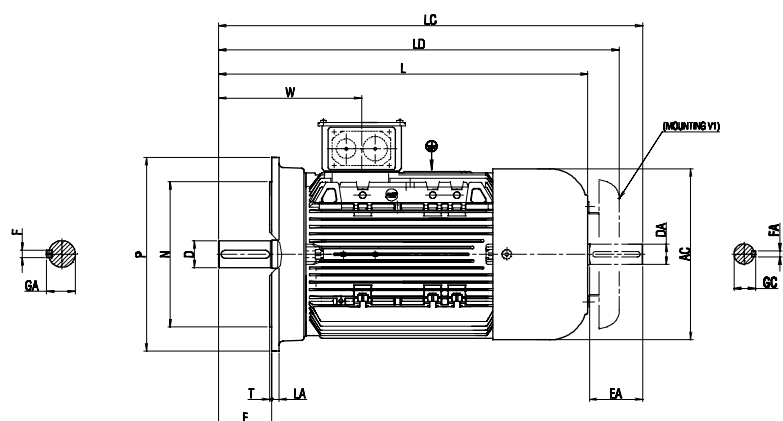
225 - 315



DIMENSIONS

IM B5 (IM 3001) - IM V1 (IM 3011)

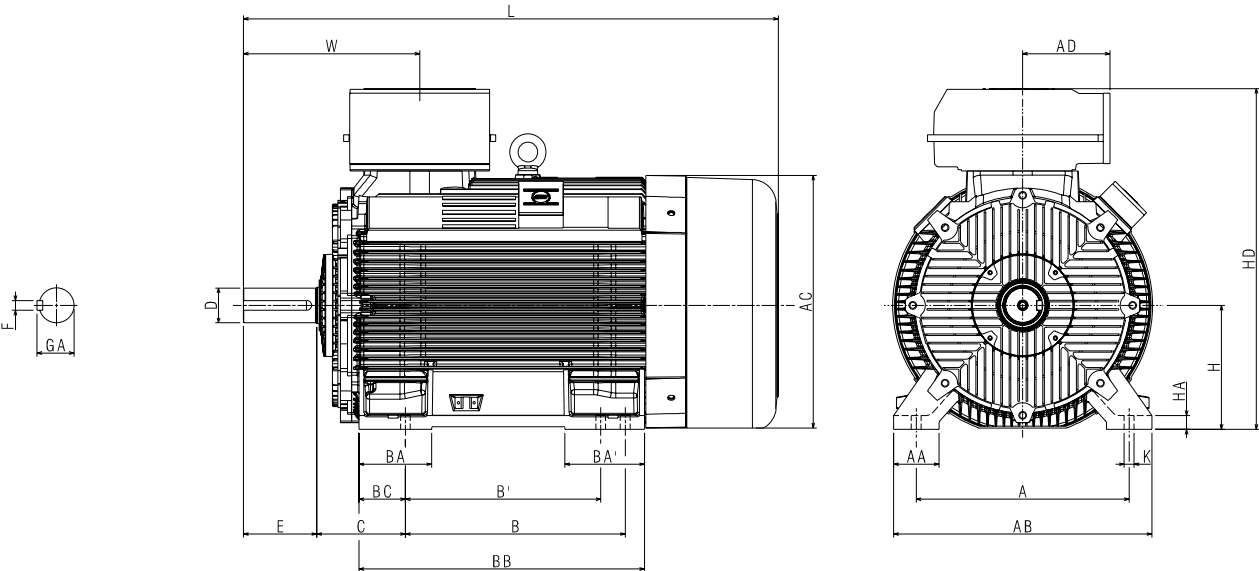
IM B5 (IM 3001) - IM V1 (IM 3011)									Shaft extension								Flange B5						
MOTOR TYPE	POLES	AC	AD	L	LC	LD	W		D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T	
A5_160	M	2 - 8	314	258	648	761	713	279	42 ^{m6}	110	12 ^{h9}	45	42 ^{k6}	110	12 ^{h9}	45	15	300	250 ^{h6}	350	18,5	5	
	L		314	258	648	761	713	279	42 ^{m6}	110	12 ^{h9}	45	42 ^{k6}	110	12 ^{h9}	45	15	300	250 ^{h6}	350	18,5	5	
A5_180	M	2 - 4	354	278	723	836	788	296	48 ^{h6}	110	14 ^{h9}	51,5	42 ^{k6}	110	12 ^{h9}	45	14	300	250 ^{h6}	350	18,5	5	
	L	4 - 8	354	278	723	836	788	296	48 ^{h6}	110	14 ^{h9}	51,5	42 ^{k6}	110	12 ^{h9}	45	14	300	250 ^{h6}	350	18,5	5	
A5_200	L	2 - 8	354	278	764	877	829	296	55 ^{m6}	110	16 ^{h9}	59	42 ^{k6}	110	12 ^{h9}	45	15	350	300 ^{h6}	400	18,5	5	
A5_225	M	2	411	298	820	935	885	288	55 ^{m6}	110	16 ^{h9}	59	55 ^{m6}	110	16 ^{h9}	59	16	400	350 ^{h6}	450	18,5	5	
	S - M	4 - 8	411	298	850	965	915	318	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59	16	400	350 ^{h6}	450	18,5	5	
A5_250	M	2	411	298	875	990	940	318	60 ^{m6}	140	18 ^{h9}	64	55 ^{m6}	110	16 ^{h9}	59	18	500	450 ^{h6}	550	18,5	5	
		4 - 8	411	298	875	990	940	318	65 ^{m6}	140	18 ^{h9}	69	55 ^{m6}	110	16 ^{h9}	59	18	500	450 ^{h6}	550	18,5	5	
A5_280	S	2	490	360	959	1110	1054	350	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5	
		4 - 8	490	360	959	1110	1054	350	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5	
	M	2	490	360	959	1110	1054	350	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5	
		4 - 8	490	360	959	1110	1054	350	75 ^{m6}	140	20 ^{h9}	79,5	60 ^{m6}	140	18 ^{h9}	64	18	500	450 ^{h6}	550	18,5	5	
B5_315	MA-MC	2	604	485	1102	1252	1177	387	65 ^{m6}	140	18 ^{h9}	69	60 ^{m6}	140	18 ^{h9}	64	22	600	550 ^{h6}	660	22	6	
		4 - 8	604	485	1132	1282	1207	417	80 ^{m6}	170	22 ^{h9}	85	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6	
	MD	8	604	485	1132	1282	1207	417	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6	
		L	2	604	547	1252	1402	1327	402	70 ^{m6}	140	20 ^{h9}	74,5	65 ^{m6}	140	18 ^{h9}	64	22	600	550 ^{h6}	660	22	6
			4 - 6	604	547	1282	1432	1357	432	90 ^{m6}	170	25 ^{h9}	95	65 ^{m6}	140	18 ^{h9}	69	22	600	550 ^{h6}	660	22	6



DIMENSIONS
IM B3 (IM 1001)

MOTOR TYPE		POLES	A	AA	AB	AC	AD	B	BA	BB	BC	B'	BA'	C	H	HA	HB	HD	K	L	LC	W
B5_355	LA - LB	2	610	130	740	770	267	630	208	818	133	560	228	254	355 ⁻¹	40	607	962	28	1475	1595	435
	LA - LB	4 - 12	610	130	740	770	267	630	208	818	133	560	228	254	355 ⁻¹	40	607	962	28	1545	1665	505
	LC - LE	2	610	130	740	770	267	630	208	1018	133	800	313	254	355 ⁻¹	40	607	962	28	1675	1795	435
	LC - LF	4 - 12	610	130	740	770	267	630	208	1018	133	800	313	254	355 ⁻¹	40	607	962	28	1745	1865	505
B5_400	LA - LC	2	686	140	830	850	267	710	248	1239	155	900	458	280	400 ⁻¹	42	657	1057	35	1910	2030	455
	LA - LD	4 - 12	686	140	830	850	267	710	248	1239	155	900	458	280	400 ⁻¹	42	657	1057	35	1980	2100	525
B5_450	LA - LC	2	800	150	950	950	620	1120	251	1373	130	1000	382	280	450 ⁻¹	42	865	1315	35	2135	2262	510
		4 - 12	800	150	950	950	620	1120	251	1373	130	1000	382	280	450 ⁻¹	42	865	1315	35	2175	2302	550
B5_500	LA - LC	4 - 12	900	170	1050	1070	620	1250	310	1552	130	-	310	280	500 ⁻¹	50	930	1430	42	2390	2515	590

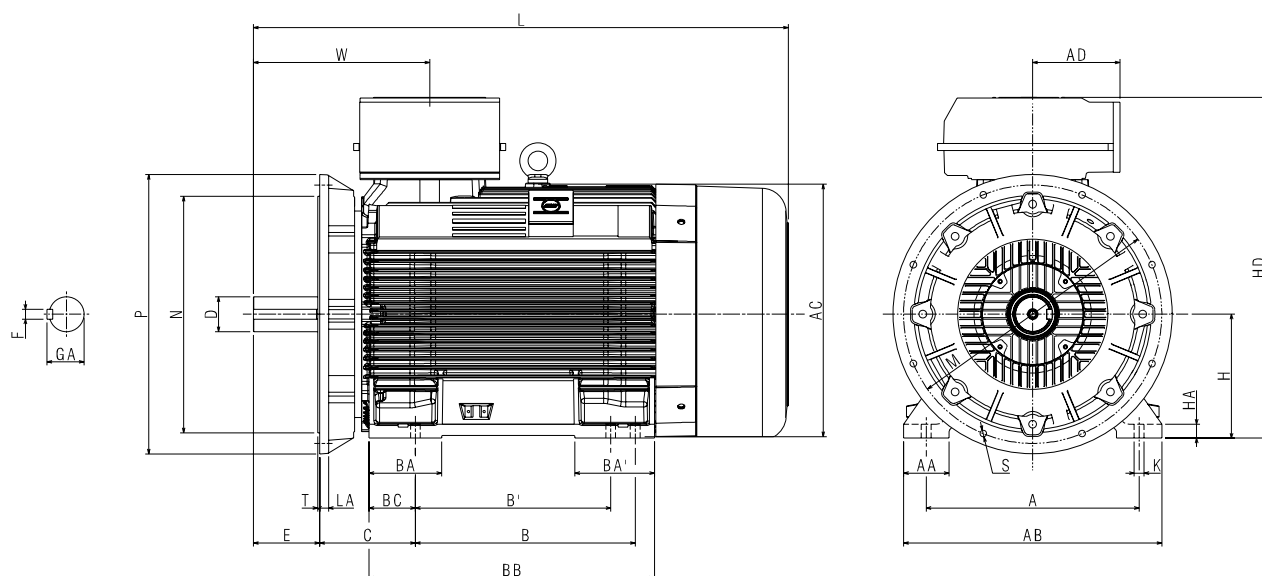
			Shaft extension			
MOTOR TYPE		POLES	D	E	F	GA
B5_ 355	LA - LB	2	75 ^{m6}	140	20 ^{h9}	79,5
	LA - LB	4 - 12	100 ^{m6}	210	28 ^{h9}	106
	LC - LE	2	75 ^{m6}	140	20 ^{h9}	79,5
	LC - LF	4 - 12	100 ^{m6}	210	28 ^{h9}	106
B5_ 400	LA - LC	2	75 ^{m6}	140	20 ^{h9}	79,5
	LA - LD	4 - 12	100 ^{m6}	210	28 ^{h9}	106
B5_ 450	LA - LC	2	90 ^{m6}	170	25 ^{h9}	95
		4 - 12	120 ^{m6}	210	32 ^{h9}	127
B5_ 500	LA - LC	4 - 12	130 ^{m6}	250	32 ^{h9}	137



DIMENSIONS
IM B35 (IM 2001)

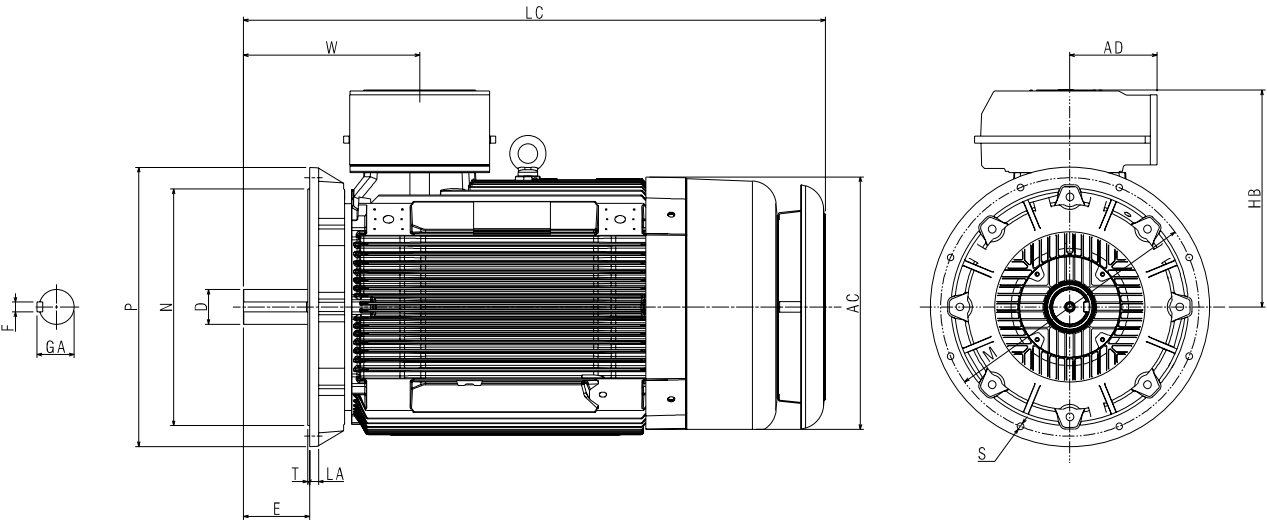
MOTOR TYPE	POLES	A	AA	AB	AC	AD	B	BA	BB	BC	B'	BA'	C	H	HA	HB	HD	K	L	LC	W	
B5_355	LA - LB	2	610	130	740	770	267	630	208	818	133	560	228	254	355 ⁻¹	40	607	962	28	1475	1595	435
	LA - LB	4 - 12	610	130	740	770	267	630	208	818	133	560	228	254	355 ⁻¹	40	607	962	28	1545	1665	505
	LC - LE	2	610	130	740	770	267	630	208	1018	133	800	313	254	355 ⁻¹	40	607	962	28	1675	1795	435
	LC - LF	4 - 12	610	130	740	770	267	630	208	1018	133	800	313	254	355 ⁻¹	40	607	962	28	1745	1865	505
B5_400	LA - LC	2	686	140	830	850	267	710	248	1239	155	900	458	280	400 ⁻¹	42	657	1057	35	1910	2030	455
	LA - LD	4 - 12	686	140	830	850	267	710	248	1239	155	900	458	280	400 ⁻¹	42	657	1057	35	1980	2100	525
B5_450	LA - LC	2	800	150	950	950	620	1120	251	1373	130	1000	382	280	450 ⁻¹	42	865	1315	35	2135	2262	510
	LA - LC	4 - 12	800	150	950	950	620	1120	251	1373	130	1000	382	280	450 ⁻¹	42	865	1315	35	2175	2302	550
B5_500	LA - LC	4 - 12	900	170	1050	1070	620	1250	310	1552	130	-	310	280	500 ⁻¹	50	930	1430	42	2390	2515	590

			Shaft extension				Flange B5					
MOTOR TYPE	POLES		D	E	F	GA	LA	M	N	P	S	T
B5_ 355	LA - LB	2	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LA - LB	4 - 12	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
	LC - LE	2	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LC - LF	4 - 12	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
B5_ 400	LA - LC	2	75 ^{m6}	140	20 ^{h9}	79,5	28	940	880 ^{h6}	1000	28	6
	LA - LD	4 - 12	100 ^{m6}	210	28 ^{h9}	106	28	940	880 ^{h6}	1000	28	6
B5_ 450	LA - LC	2	90 ^{m6}	170	25 ^{h9}	95	30	1080	1000 ^{h6}	1150	28	6
	LA - LC	4 - 12	120 ^{m6}	210	32 ^{h9}	127	30	1080	1000 ^{h6}	1150	28	6
B5_ 500	LA - LC	4 - 12	130 ^{m6}	250	32 ^{h9}	137	30	1080	1000 ^{h6}	1150	28	6



DIMENSIONS
IM V1 (IM 3011)

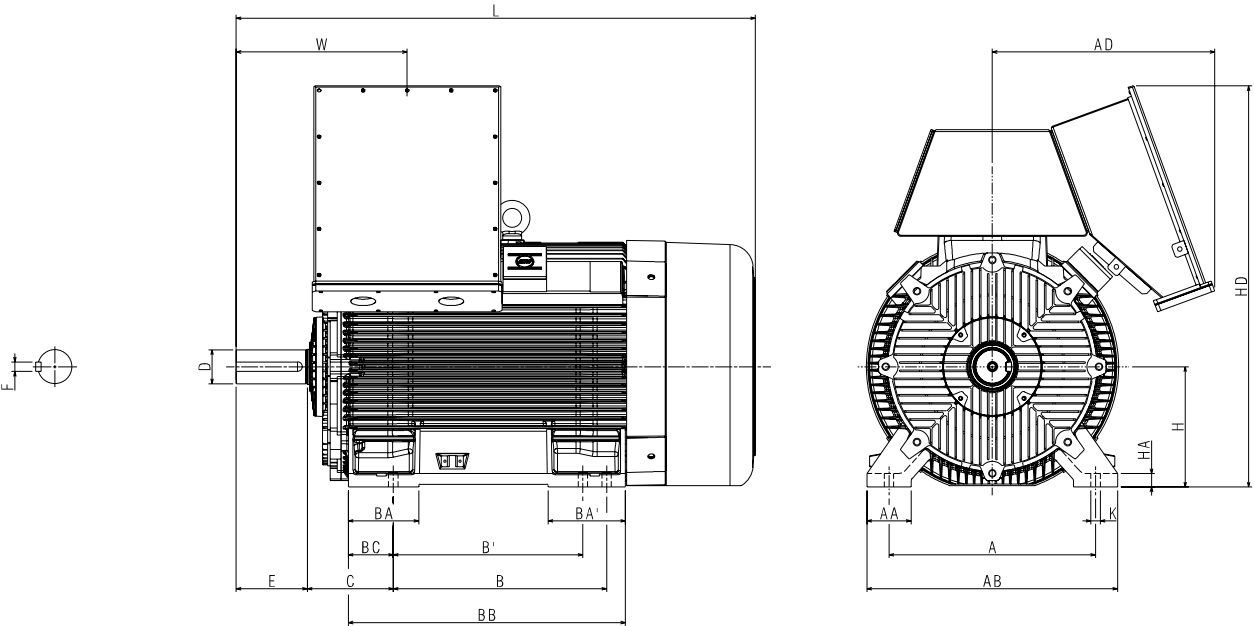
							Shaft extension				Flange B5						
MOTOR TYPE	POLES	AC	AD	HB	LC	W	D	E	F	GA	LA	M	N	P	S	T	
B5_355	LA - LB	2	770	267	607	1595	435	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LA - LB	4 - 12	770	267	607	1665	505	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
	LC - LE	2	770	267	607	1795	435	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LC - LF	4 - 12	770	267	607	1865	505	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
B5_400	LA - LC	2	850	267	657	2030	455	75 ^{m6}	140	20 ^{h9}	79,5	28	940	880 ^{h6}	1000	28	6
	LA - LD	4 - 12	850	267	657	2100	525	100 ^{m6}	210	28 ^{h9}	106	28	940	880 ^{h6}	1000	28	6
B5_450	LA - LC	2	950	620	865	2262	510	90 ^{m6}	170	25 ^{h9}	95	30	1080	1000 ^{h6}	1150	28	6
		4 - 12	950	620	865	2302	550	120 ^{m6}	210	32 ^{h9}	127	30	1080	1000 ^{h6}	1150	28	6
B5_500	LA - LC	4 - 12	1070	620	930	2515	590	130 ^{m6}	250	32 ^{h9}	137	-	930	1430	42	2390	2515



DIMENSIONS
IM B3 (IM 1001)

MOTOR TYPE		POLES	A	AA	AB	AC	AD	B	BA	BB	BC	B'	BA'	C	H	HA	HB	HD	K	L	LC	W
B5_355	LA	2	610	130	740	770	650	630	208	1018	133	800	313	254	355 ⁻¹	40	835	1190	28	1675	1795	435
	LA	4 - 8	610	130	740	770	650	630	208	1018	133	800	313	254	355 ⁻¹	40	835	1190	28	1745	1865	505
	LB - LC	2	610	130	740	770	650	800	248	1168	133	900	293	254	355 ⁻¹	40	835	1190	28	1825	1945	435
	LB - LD	4 - 8	610	130	740	770	650	800	248	1168	133	900	293	254	355 ⁻¹	40	835	1190	28	1895	2015	505
B5_400	LA - LC	2	686	140	830	850	650	710	248	1239	155	900	458	280	400 ⁻¹	42	885	1285	35	1910	2030	455
	LA - LD	4 - 8	686	140	830	850	650	710	248	1239	155	900	458	280	400 ⁻¹	42	885	1285	35	1980	2100	525
B5_450 LA - LD	2	800	150	950	950	650	1120	251	1373	130	1000	382	280	450 ⁻¹	42	948	1398	35	2135	2262	510	
	4 - 8	800	150	950	950	650	1120	251	1373	130	1000	382	280	450 ⁻¹	42	948	1398	35	2175	2302	550	
B5_500 LA - LC	2	Dimensions available on request																				
	4 - 8	900	170	1050	1070	650	1250	310	1552	130	-	310	280	500 ⁻¹	50	1010	1510	42	2390	2515	590	

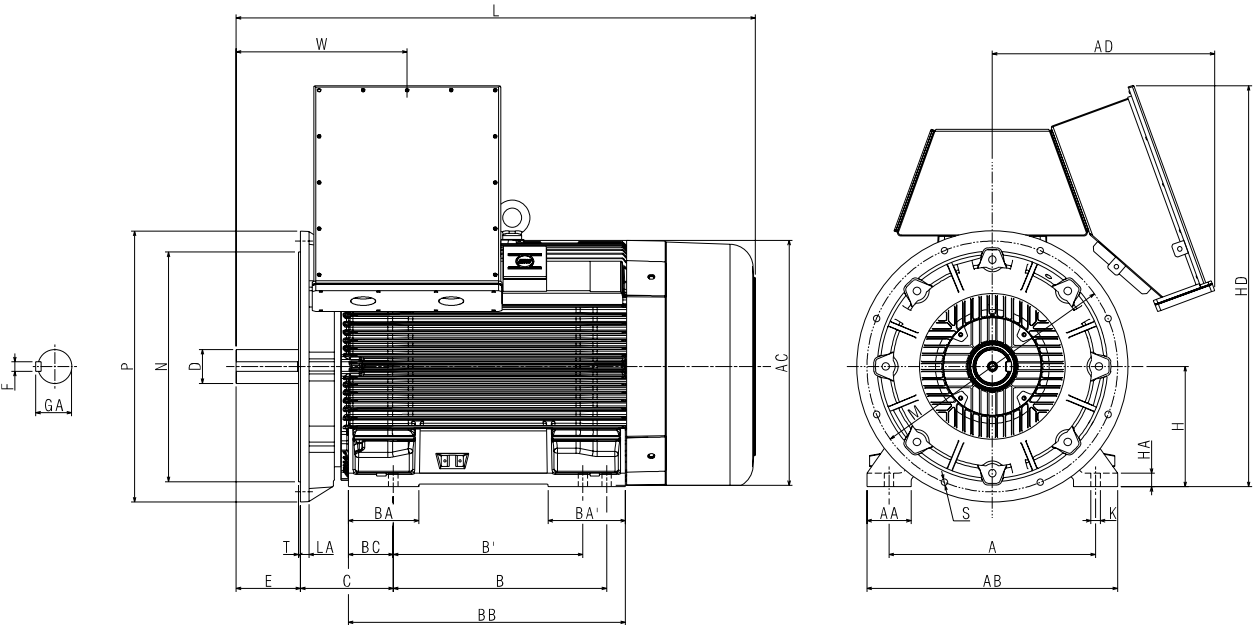
			Shaft extension			
MOTOR TYPE		POLES	D	E	F	GA
B5_ 355	LA	2	75 ^{m6}	140	20 ^{h9}	79,5
	LA	4 - 8	100 ^{m6}	210	28 ^{h9}	106
	LB - LC	2	75 ^{m6}	140	20 ^{h9}	79,5
	LB - LD	4 - 8	100 ^{m6}	210	28 ^{h9}	106
B5_ 400	LA - LC	2	75 ^{m6}	140	20 ^{h9}	79,5
	LA - LD	4 - 8	100 ^{m6}	210	28 ^{h9}	106
B5_ 450	LA - LD	2	90 ^{m6}	170	25 ^{h9}	95
		4 - 8	120 ^{m6}	210	32 ^{h9}	127
B5_ 500	LA - LC	2	Dimensions available on request			
		4 - 8	130 ^{m6}	250	32 ^{h9}	137



DIMENSIONS
IM B35 (IM 2001)

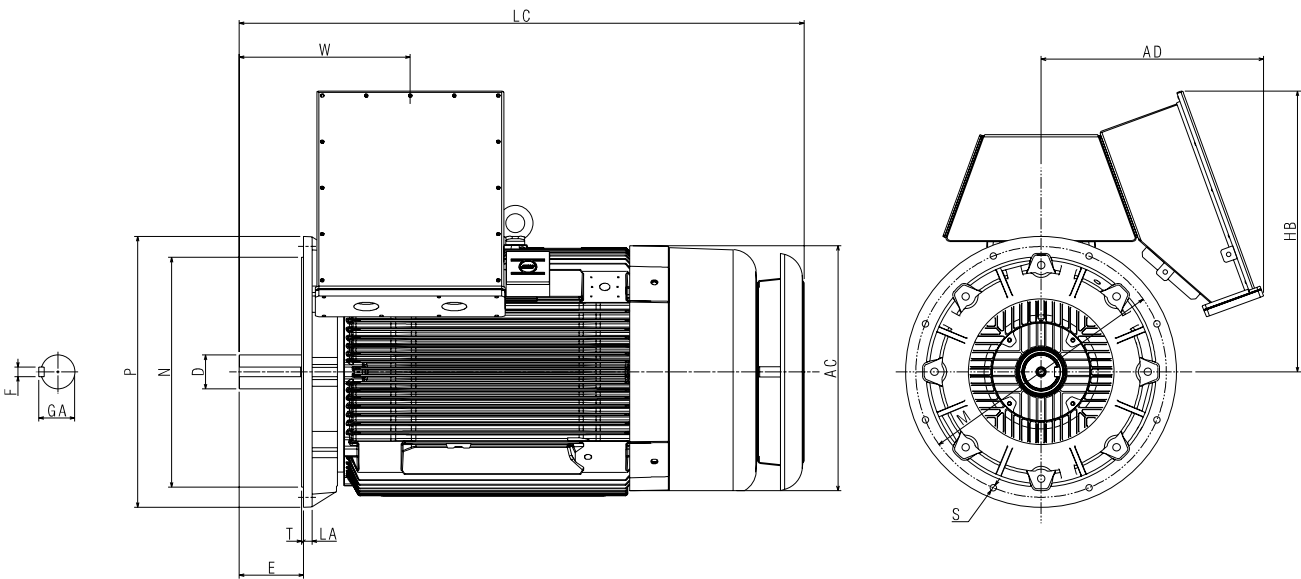
MOTOR TYPE		POLES	A	AA	AB	AC	AD	B	BA	BB	BC	B'	BA'	C	H	HA	HB	HD	K	L	LC	W
B5_ 355	LA	2	610	130	740	770	650	630	208	1018	133	800	313	254	355 ⁻¹	40	835	1190	28	1675	1795	435
	LA	4 - 8	610	130	740	770	650	630	208	1018	133	800	313	254	355 ⁻¹	40	835	1190	28	1745	1865	505
	LB - LC	2	610	130	740	770	650	800	248	1168	133	900	293	254	355 ⁻¹	40	835	1190	28	1825	1945	435
	LB - LD	4 - 8	610	130	740	770	650	800	248	1168	133	900	293	254	355 ⁻¹	40	835	1190	28	1895	2015	505
B5_ 400	LA - LC	2	686	140	830	850	650	710	248	1239	155	900	458	280	400 ⁻¹	42	885	1285	35	1910	2030	455
	LA - LD	4 - 8	686	140	830	850	650	710	248	1239	155	900	458	280	400 ⁻¹	42	885	1285	35	1980	2100	525
B5_ 450 LA - LD	2	800	150	950	950	650	1120	251	1373	130	1000	382	280	450 ⁻¹	42	948	1398	35	2135	2262	510	
	4 - 8	800	150	950	950	650	1120	251	1373	130	1000	382	280	450 ⁻¹	42	948	1398	35	2175	2302	550	
B5_ 500 LA - LC	2	Dimensions available on request																				
	4 - 8	900	170	1050	1070	650	1250	310	1552	130	-	310	280	500 ⁻¹	50	1010	1510	42	2390	2515	590	

			Shaft extension				Flange B5					
MOTOR TYPE	POLES		D	E	F	GA	LA	M	N	P	S	T
B5_355	LA	2	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LA	4 - 8	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
	LB - LC	2	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LB - LD	4 - 8	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
B5_400	LA - LC	2	75 ^{m6}	140	20 ^{h9}	79,5	28	940	880 ^{h6}	1000	28	6
	LA - LD	4 - 8	100 ^{m6}	210	28 ^{h9}	106	28	940	880 ^{h6}	1000	28	6
B5_450 LA - LD		2	90 ^{m6}	170	25 ^{h9}	95	30	1080	1000 ^{h6}	1150	28	6
		4 - 8	120 ^{m6}	210	32 ^{h9}	127	30	1080	1000 ^{h6}	1150	28	6
B5_500 LA - LC		2	Dimensions available on request				NA					
		4 - 8	130 ^{m6}	250	32 ^{h9}	137	30	1080	1000 ^{h6}	1150	28	6



DIMENSIONS
IM V1 (IM 3011)

							Shaft extension				Flange B5						
MOTOR TYPE	POLES	AC	AD	HB	LC	W	D	E	F	GA	LA	M	N	P	S	T	
B5_355	LA	2	770	650	835	1795	435	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LA	4 - 8	770	650	835	1865	505	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
	LB - LC	2	770	650	835	1945	435	75 ^{m6}	140	20 ^{h9}	79,5	25	740	680 ^{h6}	800	24	6
	LB - LD	4 - 8	770	650	835	2015	505	100 ^{m6}	210	28 ^{h9}	106	25	740	680 ^{h6}	800	24	6
B5_400	LA - LC	2	850	650	885	2030	455	75 ^{m6}	140	20 ^{h9}	79,5	28	940	880 ^{h6}	1000	28	6
	LA - LD	4 - 8	850	650	885	2100	525	100 ^{m6}	210	28 ^{h9}	106	28	940	880 ^{h6}	1000	28	6
B5_450	LA - LD	2	950	650	948	2262	510	90 ^{m6}	170	25 ^{h9}	95	30	1080	1000 ^{h6}	1150	28	6
		4 - 8	950	650	948	2302	550	120 ^{m6}	210	32 ^{h9}	127	30	1080	1000 ^{h6}	1150	28	6
B5_500	LA - LC	2	Dimensions available on request									NA					
		4 - 8	1070	650	1010	2515	590	130 ^{m6}	250	32 ^{h9}	137	30	1080	1000 ^{h6}	1150	28	6



OPTIONS CODES

Code	Option Description	Size										
		160	180	200	225	250	280	315	355	400	450	500
100	Insulation class H	0	0	0	0	0	0	0	0	0	0	0
102	N° 9 Terminals	0	0	0	0	0	0	0	0	0	0	0
103	N° 12 Terminals	0	0	0	0	0	0	0	0	0	0	0
104	Flying Leads = L mm	0	0	0	0	0	0	0	0	0	0	0
107	Tropicalisation	0	0	0	0	0	S	S	S	S	S	S
108	Anticondensation heaters, with terminals in main terminal box	0	0	0	0	0	0	0	NA	NA	NA	NA
109	Anticondensation heaters, with terminals in auxiliary terminal box	0	0	0	0	0	0	0	0	0	0	0
110	Bi-metal cut-out switch with terminals in main terminal box	0	0	0	0	0	0	0	NA	NA	NA	NA
111	PTC thermistors with terminals in main terminal box	0	0	0	0	0	0	S	NA	NA	NA	NA
112	PT100 thermodetectors with terminals in main terminal box	0	0	0	0	0	0	0	NA	NA	NA	NA
113	Bi-metal cut-out switch with terminals in auxiliary terminal box	0	0	0	0	0	0	0	0	0	0	0
114	PTC thermistors with terminals in auxiliary terminal box	0	0	0	0	0	0	0	S	S	S	S
115	PT100 thermodetectors with terminals in auxiliary terminal box	0	0	0	0	0	0	0	0	0	0	0
122	Thermodetectors PT100 in Bearings	0	0	0	0	0	0	0	0	0	0	0
125	Protection degree IP56	0	0	0	0	0	0	0	0	0	0	0
126	Protection degree IP65	0	0	0	0	0	0	0	NA	NA	NA	NA
127	Second shaft end	0	0	0	0	0	0	0	0	0	0	0
128	Sealed bearings	0	0	0	0	0	0	0	0	0	0	0
129	Roller bearings on D-end	0	0	0	0	0	S*	S*	S	S	S	S
130	Oil seal	0	0	0	0	0	0	0	0	0	0	0
131	Drainage hole with tap	0	0	0	0	0	0	S	S	S	S	S
132	Vibration level A	S	S	S	S	S	S	S	S	S	S	S
133	Vibration level B	0	0	0	0	0	0	0	0	0	0	0
134	Metallic Fan	0	0	0	0	0	0	0	S	S	S	S
135	Fan cover textile	0	0	0	0	0	0	0	NA	NA	NA	NA
136	D-end special shaft extension	0	0	0	0	0	0	0	0	0	0	0
137	Low temperature duty -25°C. -40°C	0	0	0	0	0	0	0	0	0	0	0
138	D-end and N-end grease nipples	0	0	0	0	0	S	S	S	S	S	S
139	Arrangement for SPM	0	0	0	0	0	0	0	S	S	S	S
154	Arrangement for tachometer	0	0	0	0	0	0	0	0	0	0	0
159	Complete with tachometer	0	0	0	0	0	0	0	0	0	0	0
160	Arrangement for encoder standard type	0	0	0	0	0	0	0	0	0	0	0
161	Complete with encoder standard type	0	0	0	0	0	0	0	0	0	0	0
170	Anti rain canopy for IM V1	S	S	S	S	S	S	S	S	S	S	S
174	Locked D-end bearing	0	0	0	0	0	S*	S*	S	S	S	S
175	Insulated D-end bearing	NA	NA	NA	NA	NA	0	0	0	0	0	0
177	Forced ventilation	0	0	0	0	0	0	0	0	0	0	0
178	Enhanced insulation system for Inverter application	NA	NA	NA	NA	NA	0	0	0	0	0	0
179	Special fan for reduced noise level	NA	NA	NA	NA	NA	NA	0	0	0	0	0
304	Special voltage and/or frequency	0	0	0	0	0	0	0	0	0	0	0
312	Special cable entry	0	0	0	0	0	0	0	0	0	0	0
313	Brass cablglands	0	0	0	0	0	0	0	0	0	0	0
919	Non standard RAL paint colour	0	0	0	0	0	0	0	0	0	0	0
930	Special painting process for aggressive environments	0	0	0	0	0	0	0	0	0	0	0

* Optional for 2 poles

0 Optional

S Standard

NA Not Available

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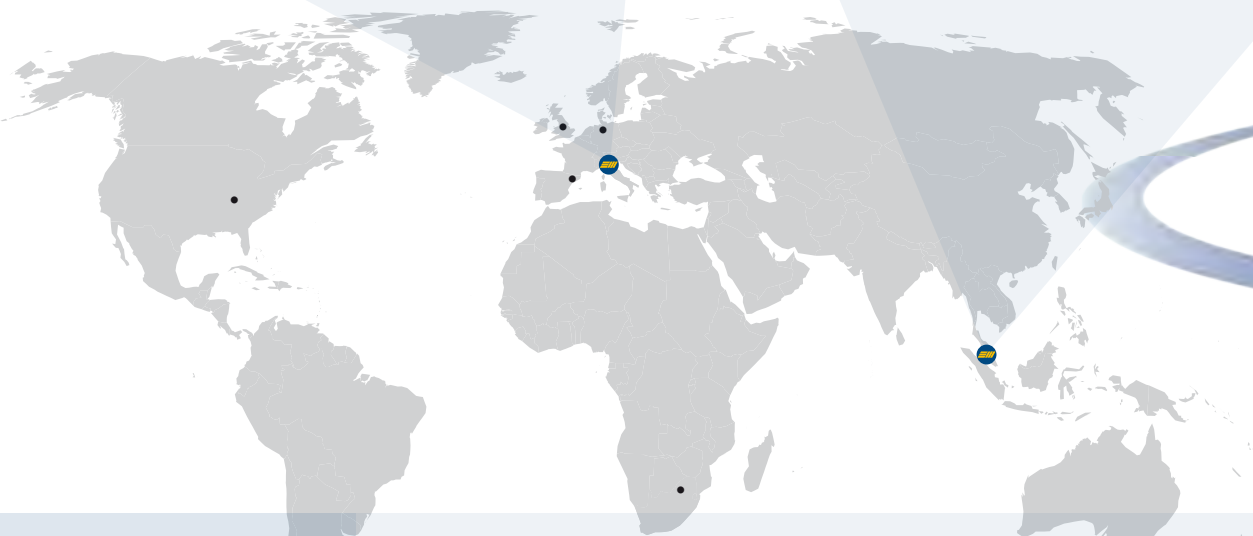




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Malaysian Manufacturing Plant



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