Motors for Hazardous Areas

D5 SERIES

FKI Energy Technology

MarelliMotori

ASI.CT.028.1 GB

INDEX

GENERAL ASPECTS OF THE ATEX DIRECTIVE

The directive 94/9/EC, better known as ATEX from the French term ATmosphères EXplosibles, is a European Community Directive, which defines the minimum health and safety requirements for apparatus intended for use in potentially dangerous environments. The directive is adopted by the European Union (EU) to facilitate free trade in the EU of products to which the Directive applies.
It conforms to the safety demands in essence by:
- The application of harmonised specific standards,
- The EC-type examination of products from a notified body, resulting in the appropriate certification,
- The manufacture of the product under a quality management system approved by a notified body.

In order to use electrical equipment in a potentially explosive atmosphere, such as combustible air – gas mixtures or combustible or conductive dust, the environment must first be classified in accordance with standard EN 60079-10 and with its related guide.
The classification, carried out by qualified competent professionals, identifying:
- the group of equipment,
- the category,
- the protection method,
- the temperature class, or the maximum surface temperature

characteristics of the electrical motors to be used in this application.

DANGEROUS AREAS

The dangerous environments are classified into **zones**, shown in the following scheme:

Gas	Dust	Presence of potentially explosive atmosphere
Zone 0	**Zone 20**	Always present, frequent or lasting long periods during normal operation. **The use of electric motors is not allowed**.
Zone 1	**Zone 21**	Incidental presence: likely to occur during normal operation of the equipment.
Zone 2	**Zone 22**	Accidental presence: unlikely to occur during normal operation of the equipment.

GROUPS

The electrical apparatus is subdivided into two **groups** (EN 50014), according to the environments in which the equipment will operate.

Group	I	II
Environment	Used in subterranean mines and on the surface of mines in the presence of grisou and / or combustible dust.	Explosive atmospheres other than mines; surface industries.

CATEGORIES

Each group is classified into **categories**, according to the level of protection the apparatus must have:

	Category	M1	M2
Group I	**Level of Protection**	Very high	High
	In the presence of explosive atmosphere	The apparatus must remain operative	The electrical supply to the equipment must be interrupted

	Category	1	2	3
Group II	**Level of Protection**	Very high	High	Normal
	Presence of explosive atmosphere	High probability (always, often, for extended periods)	Probable	Low probability (rare and for a short time)
	Zones in which the equipment may be fed and may operate	0, 1, 2 and / or 20, 21, 22	only 1, 2 and/or 21, 22	only 2 and/or 22

The equipment belonging to group II is also specified by the **nature of the atmosphere** and can be arranged into the following categories:

G = mixture of air and gas, vapour or mist **D** = mixture of air and combustible dust

Gas atmospheres are further divided into three sub – groups, according to the nature of the gas:

Group	Examples of some substances
II A	acetone, acetic acid, methanol, ethanol, benzene, ethane, methane, propane, toluene, xylene, combustible oil, kerosene, acetaldehyde, ethylbenzene, isoprene.
II B	coke-oven gas, ethylene, ethylene oxide, ethyl ether, formic aldehyde.
II C	hydrogen, acetylene, water gas, carbon sulphur.

A motor belonging to a particular group is also suitable for use in a lower group (e.g. a motor used in group IIB is also suitable for group IIA).

TYPES OF PROTECTION

The EN 60079-10 standard classifies the dangerous areas, while the standard EN 60079-14 defines the compatibility between the protection method with the aforementioned dangerous zones. The types of protection are defined as follows:

For mixtures of air and gas, vapour or fog	For mixtures of air and dust
"d" - Flameproof enclosures (EN 50018)	IP y5 + maximum permitted surface temperature (y=6 for category 2D; y=5 for category 3D). Electrical apparatus intended for use in environments with the presence of combustible dust. (EN 50281-1-1). When only this method of protection is requested, it is not necessary for the motors to be explosion proof, but in addition to the grade of protection mentioned above, they must have a maximum surface temperature limited to a specified value.
"e" - Increased safety (EN 50019)	
"n" - in accordance with standard EN 50021	

TEMPERATURE CLASS

See definition on page 4: "Maximum surface temperature".

DEGREE OF PROTECTION IP56

Motors of Category 2G operating at a maximum ambient temperature of 40° C can be supplied on request with IP56 protection degree under the following temperature class:
- 2 pole motors: temperature class T3
- ≥ 4 pole motors: temperature class T3, T4

DEFINITIONS

The present catalogue lists motors for use in potentially explosive atmosphere, relative to:
- Group I - Category M2, for motor sizes 160-315;
- Gruppo II - Category 2G, 2D.

EXPLOSIVE ATMOSPHERE

Is a mixture of flammable substances in the state of gas, vapour, mist and dust:
- with air,
- in which, after ignition, combustion spreads throughout the unconsumed mixture.

POTENTIALLY EXPLOSIVE ATMOSPHERE

It is an atmosphere which could become explosive either as a result of local and / or operating environmental conditions.
The ATEX directive applies to products for use in this environment.

TYPE OF PROTECTION "d"

The electrical equipment has an enclosure suitable to:
- resist the internal pressure arising from the ignition of an explosive mixture within the equipment.
- avoid the transmission of the explosion to the external atmosphere in which the equipment is being used.
- Ensure that the maximum external surface temperature is maintained within the limits specified by the temperature class of the equipment.

TYPE OF PROTECTION – INCREASED SAFETY "e"

A type of protection in which additional measures are applied so as to give increased security against the possibility of
- excessive temperature,
- the occurrence of arcs and sparks both inside and on external parts of electrical apparatus which does not produce arcs or sparks in normal service.

COMBINED TYPE OF PROTECTION " de"

Combines the essential requirements of protection types "d" and "e" (in accordance with standards EN 50018 and EN 50019) specifically:
- motor enclosures with protection "d" (in accordance with standard EN50018);
- terminal boxes with increased safety "e" (in accordance with standard EN 50019).

COMBINED CATEGORY 2G/2D

Combines the essential safety requirements:
- of protection type "d" (in accordance with standard EN50018),
- of the protection mode for electrical apparatus intended for use in environments with the presence of combustible dust, protection degree IP65 (EN50281.1.1).

MAXIMUM SURFACE TEMPERATURE

It is the maximum operating temperature reached in the most unfavourable conditions (but within relative limits) on the surface of the electrical apparatus.
For equipment of group I, the maximum surface temperature must not exceed 150°C.
The following table is relevant to apparatus of category 2G, which is based on a predetermined temperature classification:

Temperature class	T1	T2	T3	T4	T5	T6
Maximum Surface Temperature (°C)	450	300	200	135	100	85

The maximum surface temperature is meant to be:
- the temperature of the external surfaces, for motors with protection mode "d",
- the temperature of the external surfaces and of the internal points of the terminal box, for motors with protection mode "de"

In a potentially explosive atmosphere, the maximum surface temperature of the equipment must remain lower than the lowest possible spontaneous ignition temperature of the atmosphere surrounding it.
Electrical apparatus of category 2D are classified based the on maximum surface temperature. This catalogue applies to motors having either of the following three maximum surface temperatures: T 150°C, T 135°C and T 100°C. In the case of atmospheres with combustible dust, the maximum permitted surface temperature depends on: the type of dust, the thickness of the layer of dust and on a safety factor used according to (EN 50281-1-2).
Motors of category 2G can also be used in installations requiring apparatus in category 3G, provided that they comply with the specified temperature class. Likewise, category 2D motors can be used in category 3D installations requiring the same or a higher maximum surface temperature.

MARKINGS

According to the 94/4/EC Directive, motors come with 3 markings giving the indispensable indications to safely use the product. These indications let the user check the compatibility between the protection mode of the motor and the classification of the area of its installation.
The data shown on the nameplate must therefore contain, in addition to the functional information, the 3 markings described below in sequence (CE, specific and supplementary) and the reference to the notified body in charge of the certification.

CE MARKING

The CE marking indicates that the D5 series motor conforms to all the applicable directives (and specifically to the ATEX directive).
It is a declaration of the manufacturer that the product conforms to the applicable directives and that the product conforms to the prototype on the basis of the quality check procedures it was submitted to.
The conformity procedure for the apparatus with respect to categories M2 and 2 demands for:
- EC-type examination released by a notified body (that issues the relative certification);
- product quality assurance (the product must be manufactured under a quality system which was valued and approved by a notified body).

MARKING SPECIFIC TO THE PROTECTION FROM EXPLOSIONS

In accordance with the 94/4/EC directive and EN 50014 standard, the apparatus must be supplied with the markings specific to protection from explosions:

Simbol  + GROUP (I or II) + CATEGORY (M2 or 2) + (only for group II) letter G (Gas) and/or D (dust)

SUPPLEMENTARY MARKING

The supplementary marking, in accordance with the 94/4/EC directive and to the EN 50014 standard, uses the following symbols:

EEx indicating that the product conforms to one or more protection types, subject to the specific European standards;
d, e, type of protection;
I, II, equipment group with sub-group of gas for group II
T3, temperature class (for category 2G) or maximum surface temperature (for category 2D).
IP65 protection degree of the motor enclosure for category 2D.
T xxx°C maximum surface temperature for motors of category 2D and 3D.

STANDARDS

Standards relevant to electrical apparatus for potentially explosive atmospheres

Title	Standard
General requirements	EN 50014
Flameproof enclosure "d"	EN 50018
Increased safety "e"	EN 50019
Electrical apparatus for use in the presence of combustible dust – Electrical apparatus protected by enclosures – Construction and testing	EN 50281-1-1

General standards for electric motors

Title	Standard
Rating and Performance	EN 60034-1 (*)
Methods for determining losses and efficiency	EN 60034-2 (*)
Classification of degrees of protection (IP code)	EN 60034-5 (*)
Methods of cooling (IC code)	EN 60034-6 (*)
Classification of type of construction and mounting arrangement (IM code)	EN 60034-7 (*)
Terminal markings and direction of rotation	EN 60034-8 (*)
Noise limits	EN 60034-9 (*)
Built-in thermal protections	IEC 60034-11
Starting performance of rotating electrical machines	EN 60034-12 (*)
Mechanical vibration	EN 60034-14 (*)
Standard Voltages	IEC 38
Dimensions and outputs for electrical machines	EN 60072-1 (*)
General purpose three-phase induction motors having standard dimensions and outputs	EN 50347

(*) Exist as IEC standards.

NOMENCLATURE OF THE D5 SERIES MOTORS

Tha D5 series motors are divided into the following types:

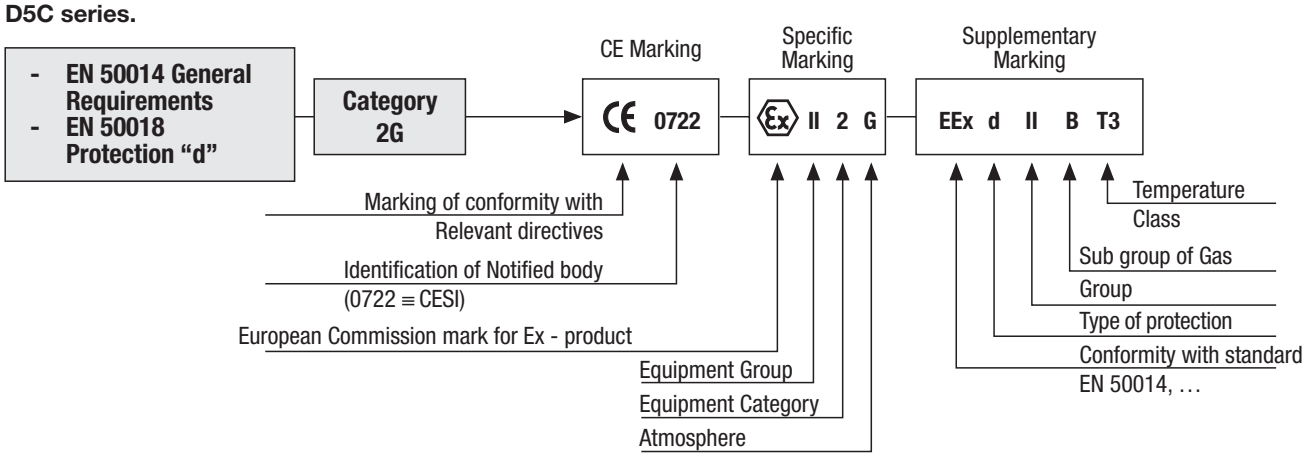
	Specific Making			Supplementary Marking							
Series (*)	Ex	Group	Category	Protection	Group	Temperature Class (Maximum surface temperature)	Polarity		Supply		Frame size where applicable
							single	double	mains	inverter	
D5C	Ex	II	2G	EEx d	II B	T3, T4, T5	x		x		71 - 400
D5D (***)								x	x		
D5X	Ex	II	2G	EEx de	II B	T3, T4, T5	x		x		71 - 400
D5E (***)								x	x		
D5F	Ex	II	2G	EEx d	II B	T3, T4	x			x	71 - 400
D5S				EEx de			x			x	
D5K	Ex	II	2G	EEx d	II C	T3, T4	x		x		160 - 315
								x	x		
D5Y	Ex	II	2G	EEx de	II C	T3, T4	x		x		160 - 315
								x	x		
D5R	Ex	II	2G	EEx d	II C	T3, T4	x			x	160 - 315
D5V				EEx de			x			x	
D5T	Ex	I	M2	EEx d	I		x		x		160 - 315
D5U				EEx de				x	x		
D5A	Ex	II	2D	IP 65		(T 150° C) (T 135°C) (T 100°C)	x		x	(**)	71 - 400
D5B (***)								x	x		

(*) Series name of combined category 2G/2D motors = Series name of category 2G motors.
(**)The D5A motors can be supplied on request for frequency converter application with maximum surface temperature of T135°C or T150°C.
(***) Motors available with Temperature Class T3 (D5D, D5E) and Maximum Surface Temperature T150°C (D5B).

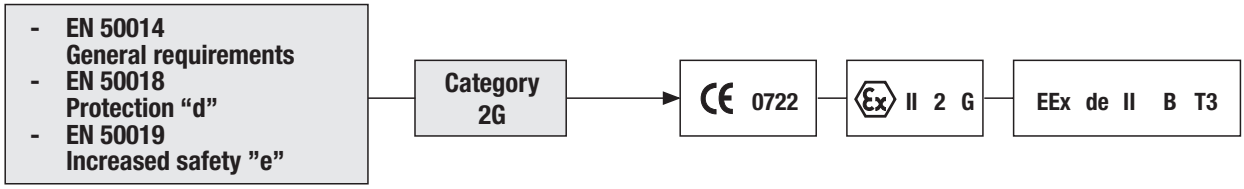
EXAMPLES OF MARKINGS

The following indicates some examples of markings for D5 series motors

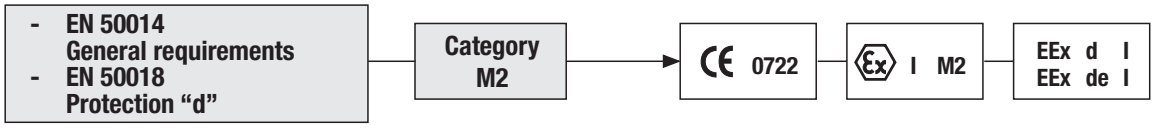
D5C series.



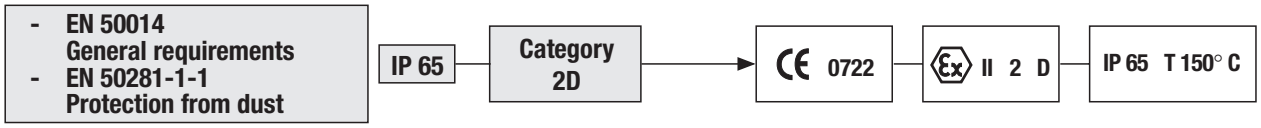
D5X series.



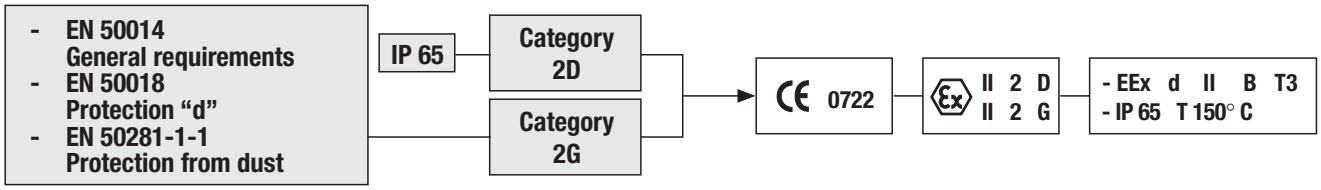
D5T and D5U series.



D5A and D5B series.

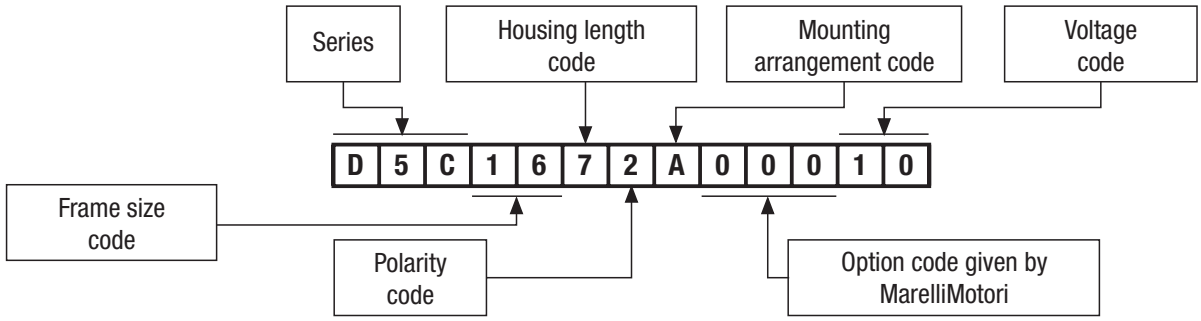


D5C series - Combined category



PRODUCT CODE STRUCTURE

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



MOUNTINGS AND POSITIONS

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

Code I (Semplified)

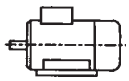
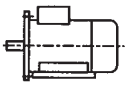
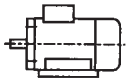
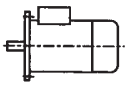
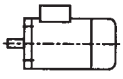
IM _ _

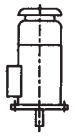
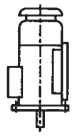
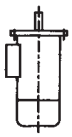
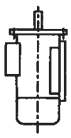
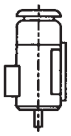
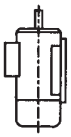
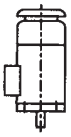
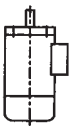
B: Horizontal - V: Vertical | Mounting code

Code II (Complete)

IM _ _ _ _

Mounting category (1-9) | Mounting arrangement | Type of shaft extension (1-9)

Code I	Code II		71 - 112	132	160 - 250	280 - 315	355 - 400
IM B3	IM 1001	 1)	●	●	●	●	●
IM B35	IM 2001	 1) 2)	●	●	●	●	●
IM B34	IM 2101	 1) 3)	●				
IM B5	IM 3001	 2)	●	●	●	X	
IM B6	IM 1051	 1)	●	●	●	X	
IM B7	IM 1061	 1)	●	●	●	X	
IM B8	IM 1071	 1)	●	●	●	X	
IM B14	IM 3601	 3)	●				

Code I	Code II		71 - 112	132	160 - 250	280 - 315	355 - 400
IM V1	IM 3011	 2)	●	●	●	●	●
IM V15	IM 2011	 1) 2)	●	●	●	●	●
IM V3	IM 3031	 2)	●	●	●	X	
IM V36	IM2031	 1) 2)	●	●	●	X	
IM V5	IM 1011	 1)	●	●	●	X	
IM V6	IM 1031	 1)	●	●	●	X	
IM V18	IM 3611	 3)	●				
IM V19	IM 3631	 3)	●				

1) Motors with feet
2) Flanged motors: unthreaded through holes
3) Flanged motors: threaded dead holes
● Standard
X Consults MarelliMotori

For other designations refer to IEC 60034-7.

MATERIALS

The mechanical components used in D5 series motors are made of the materials shown in the table below:

Components	Size					
	71 - 132	160 - 280	315		355 - 400	
			2 - 6 poles	≥ 8 poles	2 - 4 poles	≥ 6 poles
Frame	Cast Iron	Cast Iron (*)			Steel	
Endshields						
Fan cowl	Aluminium Alloy	Steel				
Fan	Thermoplastic (**)			Metal		
Terminal Box	Cast Iron				Steel	

(*) Steel for EEx d IIC motors.

(**) Metal is used for motors of M2 category.

BALANCING AND VIBRATION GRADES

The motors are dynamically balanced with a half key applied to the shaft extension in accordance with standard EN 60034-14 to vibration grade normal (N) in standard configuration.
Larger vibrations may occur on motors installed at site, due to various factors such as unsuitable foundations or resonance with the driven system. In such cases additional checks should also be carried out on each element of the installation.
Motors can be supplied with reduced (R) or special (S) vibration level on request.
The following table indicates the maximum vibration limits with respect to the different shaft heights

Vibration grade	Rated speed (min $^{-1}$)	Maximum rms value of vibration speed for shaft height H in mm. [mm/s].		
		71 ≤ H ≤ 132	132 < H ≤ 225	250 < H ≤ 400
N normal	600 - 3600	1,8	2,8	3,5
R reduced	600 - 1800	0,71	1,12	1,8
	> 1800 - 3600	1,12	1,8	2,8
S special	600 - 1800	0,45	0,71	1,12
	> 1800 - 3600	0,71	1,12	1,8

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

NOISE

The following table shows the medium values of A-sound pressure level (LpA) and A-sound power level (LwA) for group IIB motors, measured at a one-metre distance according to standard ISO R 1680. The sound levels are measured with the motor running at 50 Hz, in no-load conditions and have a tolerance of 3 dB(A). At 60 Hz the values of sound pressure increase by approximately 4 dB(A).

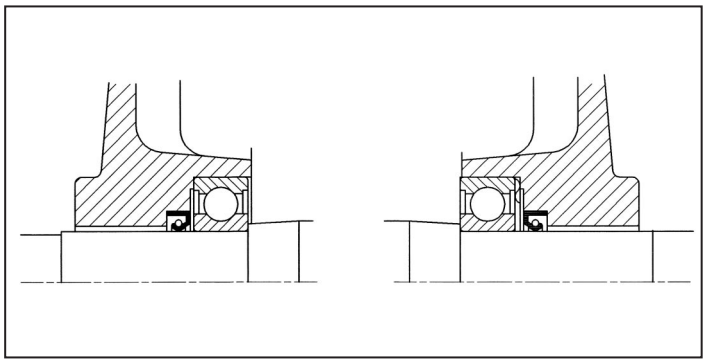
Frame size	A-sound pressure level (LpA) – A-sound power level (LwA) [dB(A)]							
	2 poles		4 poles		6 poles		8 poles	
	LpA	LwA	LpA	LwA	LpA	LwA	LpA	LwA
71	64	74	59	69	55	65	52	62
80	68	78	61	71	58	68	55	65
90	70	80	63	73	60	70	58	68
100	74	84	65	75	62	72	60	70
112	76	86	66	76	62	72	60	70
132	77	87	66	76	62	72	60	70
160	78	88	66	76	62	72	60	70
180 M	78	88	66	76	62	72	60	70
180 L	80	91	68	79	62	73	62	73
200	80	91	68	79	62	73	62	73
225	85	96	71	82	65	76	63	74
250	85	96	71	82	65	76	63	74
280	86	97	78	88	73	84	73	84
315 SM	86	97	80	91	73	84	73	84
315 M	87	99	81	90	75	86	75	86
355	88	100	84	96	76	88	76	88
400	90	103	86	99	78	91	78	91

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

Motors with frame sizes from 71 to 132 in standard configuration have double screen prelubricated ball bearings.
The correspondent grease life under normal operating conditions for a motor with horizontal shaft, running at 50 Hz and at 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.

The axial positioning of the rotor is carried out by means of a preload washer at the N-end, as shown in the diagram to the right.
The following table describes the bearing types used on the different frame sizes.



Frame Size	D-End (*)	N-End (*)
71	6202-2Z	6202-2Z
80	6204-2Z	6204-2Z
90	6205-2Z	6205-2Z
100	6206-2Z	6206-2Z
112	6206-2Z	6206-2Z
132	6308-2Z	6308-2Z

(*) Different types can be supplied on D5A and D5B series motors.

Category 2G group IIB motors from 160 to 315 frame size in standard configuration are equipped with:
- single screen prelubricated ball bearings (160 - 250 without regreasing system; 280 - 315 with regreasing system) for group IIB; 160 - 250 frame motors can be supplied with regreasing system and the relative grease exhausts on request. The N-end bearing is axially preloaded by means of a preload washer.
- D-end roller bearing (except for 2 pole motors) and N-end ball bearing for group IIC motors.

	Group IIB				Group IIC			
	D-End (*)		N-End (*)		D-End (*)		N-End (*)	
Frame Size	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
160-180M	6310-Z-C3		6209-Z-C3		NU 210 E-C3		6209-2Z-C3	
180 L	6310-Z-C3		6210-Z-C3		NU 210 E-C3		6210-2Z-C3	
200	6312-Z-C3		6210-Z-C3		NU 212 E-C3		6210-2Z-C3	
225	6313-Z-C3		6213-Z-C3		NU 213 E-C3		6213-2Z-C3	
250	6314-Z-C3		6213-Z-C3		NU 214 E-C3		6213-2Z-C3	
280 - 2 poles	6314-Z-C3		6314-Z-C3		6314-C3		6314 C3	
280 ≥ 4 poles	NU2217-EC-C3		6314-Z-C3		NU2217-EC-C3		6314-C3	
315 - 2 poles	6316-C3		6316-C3		6316-C3		6316-C3	
315 ≥ 4 poles	NU2219-EC-C3		6316-C3		NU2219-EC-C3		6316-C3	

(*) Different types can be fitted with series D5A and D5B motors.

Motors from 355 to 400 frame size in standard configuration are equipped with regreasable rolling bearings.
The supports are equipped with grease nipples. In standard configuration, the rotor is axially fixed on the N-End side.

MOUNTING ARRANGEMENT B3 - IM1001

Frame Size	Poles	D-End	N-End
355 ÷ 400	2	6217 - C3	6217 - C3
355	≥ 4	NU 222 - C3	6217 - C3
400	≥ 4	NU 222 - C3	6222 - C3

MOUNTING ARRANGEMENT V1 - IM3011

Frame Size	Poles	D-End	N-End
355 ÷ 400	2	6217 - C3	7217 B
355	≥ 4	NU 222 - C3	6217 - C3 + 7217 B
400	≥ 4	NU 222 - C3	6222 - C3 + 7222 B

For different bearing configurations contact Marelli Motori.

LUBRICATION INTERVALS

The following table indicates the lubrication intervals of motors without regreasing system in standard configuration and the relubrication intervals of motors with regreasing system in standard configuration.
The shown values refer to normal operating conditions at a maximum ambient temperature of 40°C.

Motors without regreasing system - Group IIB

Frame Size	Lubrication Interval (H)							
	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	7000	7500	12000	14000	16000	18000	21000	26000
200	5500	7000	11000	12000	14000	16000	18000	23000
225	5500	7000	10000	11000	14000	16000	18000	22000
250	5000	5500	9500	11000	13000	14000	17000	20000

Motors with regreasing system - Group IIB

Frame Size	Relubrication Interval (H)							
	3600 min^{-1}	3000 min^{-1}	1800 min^{-1}	1500 min^{-1}	1200 min^{-1}	1000 min^{-1}	900 min^{-1}	750 min^{-1}
280	3200	4000	2000	2200	2800	3400	3800	4600
315	2800	3400	1700	2000	2600	3000	3400	4200
355 - 400 (B3)	3400	4000	1500	1800	2200	2800	3000	3600
355 - 400 (V1)	2000	2200	1500	1800	2200	2800	3000	3600

Motors with regreasing system - Group IIC

Frame Size	Relubrication Interval (H)							
	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	1700	2000	3400	4000	5000	6000	6500	8000
200	1400	1700	2800	3200	4200	5000	5500	6600
225	1300	1500	2600	3000	3800	4500	5000	6000
250	1200	1500	2400	2800	3600	4400	4500	5500
280	3200	4000	2000	2200	2800	3400	3800	4600
315	2800	3400	1700	2000	2600	3000	3400	4200

TERMINAL BOX AND CABLE ENTRANCE

Motors from 71 to 132 frame size have main terminal box on the right side (when seen from D-end, B3 mounting) and are normally equipped with 6 terminals.
The terminal box can be rotated in steps of 90°.

Frame Size	Type of terminal	Terminal thread	Cable entrance holes
71 ÷ 90	Threaded terminals	M6	M25 x 1,5
100 ÷ 132	Threaded terminals	M6	M32 x 1,5

Motors from 160 to 400 frame size have the main terminal box on top (B3 mounting) and are normally equipped with 6 terminals.
The terminal box can be rotated in steps of 90°.

Frame Size	Type of terminal	Terminal thread	Cable entrance holes
160 - 200	Threaded terminals	M6	M40x1,5 + M40x1,5 (1)
225 - 250	Threaded terminals	M8	M50x1,5 + M50x1,5 (1) + M20x1,5 (1)
280 - 315	Threaded terminals	M12	M75x1,5 + M75x1,5 (1) + M20x1,5 (1)
355 - 400	Threaded terminals	M20	M75x1,5 + M75x1,5

(1) Closed with a certified plug, in accordance with Directive 94/4/EC, when not used.

PROTECTIVE TREATMENTS

EXTERNAL SURFACES

The **standard painting process** consists of the application of epoxy-vinyl/polyurethane paint: the surface treatment, material and paint thickness make D5 series motors suitable for use in standard industrial environments.

A **special painting process**, consisting of epoxy-vinyl paint followed by polyacrilic paint is available on request. This process is particularly recommended for:
- aggressive environments;
- outdoor installations where salt is present or environments with the presence of anhydridic gases;
- marine installations;

The standard finishing colour is RAL 5010. Other RAL and MUNSELL colours are available on request.

Description	Process	Characteristics	Thickness
Painting	Standard	Two-component paint formulated with solid epoxy resins modified with vinyl polyamide catalysers	≥ 50 μm
	On request	Std + additional polyacrilic coat formulated with an aromatic semiolphatic catalyser	≥ 200 μm
Finishing paint	Standard	RAL 5010	
	On request	RAL & MUNSELL colours	

INTERNAL SURFACES

The internal parts of the motors are treated with an insulating enamel to prevent motor corrosion due to humidity and agressive substances. Such treatment added to the impregnation of active parts is an essential requirement for motors intended for use in industrial, tropical-humid environments.

THERMAL PROTECTIONS

The motors must be protected against overload by setting the omnipolar timer to time inversion (EN 60079-14) (timer not scope of Marelli Motori supply). The motors can however be equipped with additional thermal protections which characteristics are given in the following table.

Additional built-in thermal protections		
Type	**Operating principle**	**Frame sizes where applicable**
Bimetallic devices	Motoprotectors with contacts Normally Closed. The disc opens when the winding temperature reaches limits dangerous to the insulation system of the motor.	90÷400
(Positive Temperature Coefficient) Thermistors **PTC**	At the active temperature this device quickly changes its resistance value.	90÷400
Platinum resistance thermometers **PT100**	Variable linear resistance with the winding temperature, particularly suitable for a continuous winding temperature monitoring.	160÷400

The intervention temperature of the thermal protection to be selected is dependent on the temperature class and/or on the allowed maximum surface temperature.
D5 series motors from frame size 225 and above in standard configuration have 3 PTC with terminals in the main terminal box.
All motors for frequency converter application must be equipped with PTC having suitable intervention temperature.
In this case, the connection between the temperature-sensitive element to the dedicated protection equipment (not scope of Marelli Motori supply) is mandatory and the control must be set, so that the motor can be used only when the thermal protection equipment is operative.
The use of the motor is dependent on the state of the thermal protections.

GROUNDING

All motors are equipped with two grounding terminals, one inside the terminal box and one outside. Both are dimensioned for connection to suitable earthing wires conforming to EN 50014 standard.

COUPLING

Elastic or flexible couplings must be properly done to avoid the transmission of axial and/or radial loads to the motor shaft and bearings.
For possible external axial and / or radial loads contact Marelli Motori.

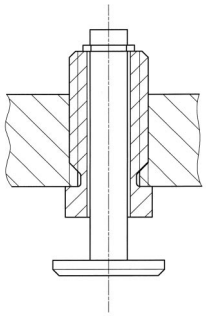
ANTICONDENSATION HEATERS

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 normally switched on when the supply to the motor is interrupted, heating the motor to avoid water condensation. Normal feeding voltage is 230V.
Motors from frame size 100 and above can be supplied with anticondensation heaters with terminals in main terminal box or, from 160 frame size and above of category 2G and of category 2D, with terminals in a separate terminal box. The power values normally used are shown in the table below.

Frame Size	Power (W)
100 - 112	8
132	25
160 - 180	50
200 - 250	65
280	100
315	200
355	300
400	400

CONDENSATION DRAINAGE

Motors of category 2G from frame size 160 and above can be supplied on request with condensation drainage holes. This option is advisable, for example, in environments with high humidity levels and large ambient temperature variations.



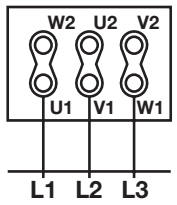
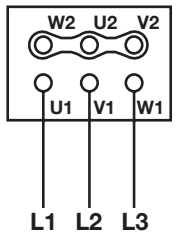
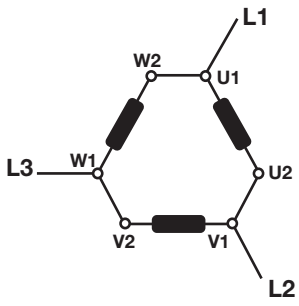
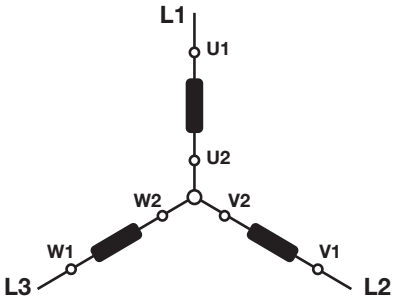
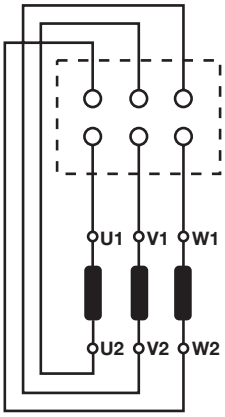
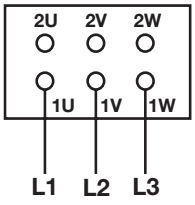
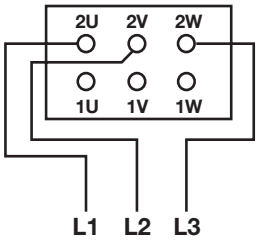
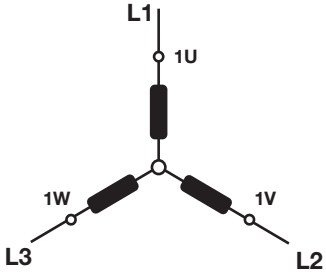
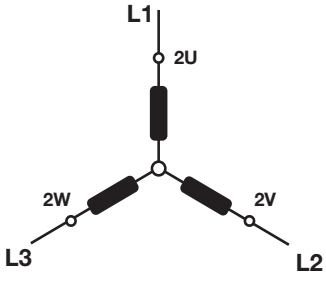
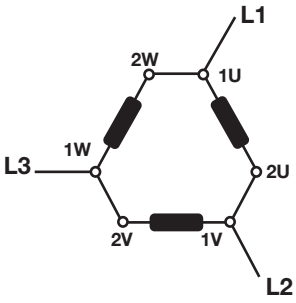
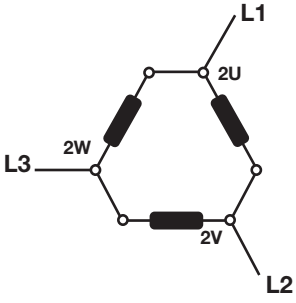
The following table shows some possible configurations of D5 series motors (on request).

Frame Size	Type of Protection	PTC (n°3)	PT100 (n°3)	Anticondensation Heaters	PTC+Heaters	PT100+Heaters
71 - 90	d	X				
	de	(1)				
100 - 132	d	X		X		
	de	X		X		
160 -250	d	X	X	X	X	
	de	X	X (2)	X	X	X (2)
280 - 315	d	X	X	X	X	X
	de	X	X (2)	X	X	X (2)
355 - 400	d	X	X	X	X	X
	de	X	X	X	X	X

(1) For motors fed by frequency converter consult Marelli Motori.
(2) PT100 with terminals in separate terminal box only. Option not available oncategory M2 motors.

For combination of more than one option contact Marelli Motori.

CONNECTION DIAGRAMS

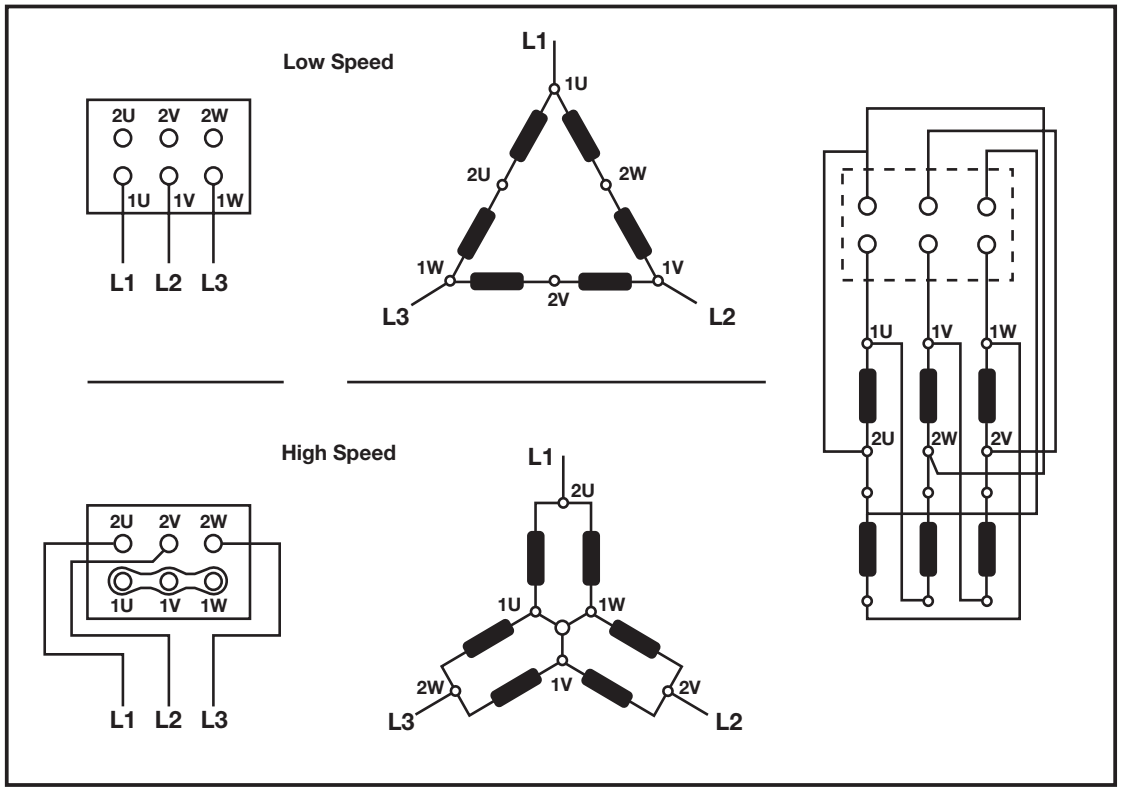
	Manually Operated External Connection Diagram	Outline Diagram	Internal Connection Diagram
MOTORS WITH 6 TERMINALS Y / Δ CONNECTION	 	 	
TWO SPEED MOTORS WITH 6 TERMINALS Y/Y AND Δ / Δ CONNECTIONS **Separate Windings**	Low Speed  High Speed 	 	 

CONNECTION DIAGRAMS

	Manually Operated External Connection Diagram	Outline Diagram	Internal Connection Diagram

TWO SPEED MOTORS WITH 6 TERMINALS YY / Δ CONNECTIONS

(Single winding)



VOLTAGE AND FREQUENCY

The motors described in this catalogue, if not otherwise specified, are designed to operate under feeding voltage of 230V/400V 10% - 50Hz. They are therefore suitable for use on the following supply voltages:

- 220/380V 5%, 50Hz
- 230/400V 5% , 50Hz
- 240/415V 5%, 50Hz

according to standard 60034-1, zone A.

The motors can be supplied with different voltages and frequencies on request.

OUTPUTS AND DERATINGS

The output ratings listed in this catalogue refer to continuous duty S1, rated voltage and frequency, ambient temperature between -20°C and +40°C and altitude up to 1000 m. a.s.l. In different environmental conditions the output ratings of temperature-class-T3 motors can be obtained by applying the derating factors given in the following table:

Altitude	Ambient temperature (°C)			
	40	45	50	55
1000	1,00	0,96	0,92	0,87
1500	0,97	0,93	0,89	0,84
2000	0,97	0,90	0,86	0,82
2500	0,90	0,86	0,83	0,78
3000	0,86	0,82	0,79	0,75
3500	0,82	0,79	0,75	0,71
4000	0,77	0,74	0,71	0,67

EFFICIENCY AND POWER FACTOR

The efficiency (η) and power factor (cos φ) values referred to rated output are given in the technical data tables for each motor. The values for other loads can be estimated from the following tables.

Efficiency (η%) and power factor (cos φ)							
4/4		3/4		2/4		1/4	
η	cos φ	η	cos φ	η	cos φ	η	cos φ
97	0,91	97	0,88	96	0,82	92	0,64
96	0,90	96	0,87	94,5	0,80	90	0,63
95	0,89	95	0,86	93,5	0,79	88	0,60
94	0,88	93,5	0,85	92	0,78	86	0,58
93	0,87	93	0,84	91	0,77	85	0,57
92	0,86	92	0,83	90	0,75	84	0,55
91	0,85	91	0,82	89	0,73	82	0,53
90	0,84	90	0,81	87	0,72	90	0,51
89	0,83	89	0,80	86	0,70	79	0,49
88	0,82	88	0,78	85,5	0,67	78,5	0,47
87	0,81	87	0,76	85	0,66	78	0,45
86	0,80	86	0,75	84,5	0,65	77,5	0,43
85	0,79	85	0,73	84	0,63	77	0,42
84	0,78	84	0,73	83	0,60	76	0,41
83	0,77	83	0,72	81	0,59	74	0,40
82	0,76	82	0,70	80,5	0,58	73	0,38
81	0,75	81	0,69	80	0,56	72	0,36
80	0,74	80	0,67	79	0,54	70	0,36
79	0,73	79	0,66	78	0,52	69,5	0,35
78	0,72	78	0,65	76	0,51	69	0,34
77	0,71	77	0,64	75	0,50	68	0,34
76	0,70	76	0,63	74	0,48	67	0,33
75	0,69	75	0,62	73	0,47	66	0,33
74	0,68	74	0,61	72	0,45	64	0,32
73	0,67	73	0,60	71	0,43	63	0,30
72	0,66	72	0,58	69	0,41	61	0,28
71	0,65	71	0,57	68	0,40	59	0,27
70	0,64	70	0,56	67	0,39	58	0,26
69	0,63	69	0,55	66	0,38	57	0,25
68	0,62	68	0,54	65	0,37	55,5	0,24
66	0,61	65,5	0,53	63	0,36	53,5	0,23
64	0,60	63,5	0,52	61	0,35	52	0,22
62	0,59	61,5	0,51	59	0,34	49	0,21
60	0,58	59,5	0,50	57	0,33	47,5	0,20

ELECTRICAL TOLERANCES

Electrical tolerances in accordance with standard IEC 60034-1.

Power factor	-1/6 di (1-cosφ)	min. 0,02 max. 0,07	Locked rotor current	+20%	of guaranteed value
Efficiency	-15% di (1-η) -10% di (1-η)	Pn ≤ 50 kW Pn > 50 kW	Locked rotor torque	-15% +20%	of guaranteed value
Speed	± 20% ± 30% of guaranteed slip	Pn ≥ 1 kW Pn < 1 kW	Pull out torque	-10%	of guaranteed value

MECHANICAL TOLERANCES

Tolerances according to IEC 60072-1 are shown in the following table.
The second shaft extension is built only on request.

Part	Dimension	Tolerance
Shaft Extension	D-DA	from 11 to 28mm ø j6 / 38 to 48mm ø k6 / 55 to 100mm øm6
Key	F-FA	h9
Flange Concentricity	N	up to frame size 132 j6 / greater than 132 h6
Shaft Height	H	up to frame size 250 - 0,5mm / greater than 250 - 1mm

STANDARD AND SPECIAL TESTS

All Marelli Motori products are subject to routine tests carried out in accordance with CEI/IEC standards. The following additional tests can also be carried out on request

Additional Test	**Basic** • Measurement of winding resistance (cold). • High voltage test plus insulation resistances immediately before and after the test. • Dielectric test. • No load test.
	Complete (= Basic +) • Locked rotor test. • Full load winding temperature with method by resistance variation. • Determination of efficiency and power factor at 1/4 , 2/4 and 3/4 of load.
Extra Test	• On-load test with variable voltage. • Measurement of curve C = f(n). • Measurement of vibration in accordance with IEC 60034-14. • Measurement of noise level, (no load). • Verification of IP protection in accordance with IEC 60034-5.

MOTORS FED BY FREQUENCY CONVERTER

The operating characteristics of the motors described in this section of the catalogue refer to the electrical supply by frequency converter with a commutating frequency higher than 3kHz.
Motors fed by inverter and intended for use in installations in potentially explosive atmospheres must be:
- explicitly requested for this type of supply,
- specifically chosen considering the load and speed range,
- using appropriate passive thermal protection (thermistors, PT100), with connection to suitable supply system protection apparatus.
- given a nameplate identifying: supply characteristics of the frequency converter, torque and speed range.

The maximum supply frequency value is dependent on the frame and polarity of the motor, as shown in the following table.

Frame Size	N° poles	Temperature class T3	Temperature class T3
71 ÷ 225	2	75 Hz	60 Hz
≥ 250	2	60 Hz	60 Hz
71 ÷ 225	≥ 4	75 Hz	75 Hz
≥ 250	≥ 4	75 Hz	75 Hz

For motors ≥4 poles and supply frequency between 75-100 Hz contact Marelli Motori.
The performances of motors fed by frequency converter are given in the specific tables.

EFFECTS OF INVERTER SUPPLY ON THE MOTOR

A motor fed by a frequency converter (inverter) does not receive a purely sinusoidal feed (voltage, current), which leads to an increase in:
- additional losses,
- noise and vibrations,
- stresses on the electrical insulation,

As well as:
- the production of voltages and currents in the bearings,
- the need to provide additional solutions to satisfy the EMC requirements for the installation.

ADDITIONAL LOSSES

Additional losses increase the heat of the motor, which may lead to an increase in the temperature of the bearings.
These effects must be considered (by using appropriate derating with respect to the supply by the mains), in particular for potentially explosive environments where limits to the maximum surface temperature are applied.

NOISE VIBRATION

The increase in magnetic noise depends mainly on the commutating frequency of the inverter and as well as the harmonic content.
Self-ventilated motors, when running at frequencies higher than the rated value, give an increased noise level due to the increased ventilation. For speed values sensibly higher than the rated one, the maximum speed reachable by the motor or the critical speed of the system must not be exceeded.
In this case, the use of separate ventilation is recommended to reduce any possible excessive noise.

EFFECTS ON ELECTRICAL INSULATION

The insulation system in a motor is subjected to an increased dielectric effect when fed by inverter. Depending on the supply system characteristics, the indications given in the paragraph “Instructions for the correct use of motors fed by frequency converter” must be considered.

GENERATION OF VOLTAGE AND CURRENT IN THE BEARINGS

The inverter induces high frequency voltages into the shaft, possibly causing bearing currents which must be avoided in all motors for potentially explosive atmospheres.

The paragraph “Instructions for the correct use of motors fed by frequency converter” gives the indications which must be followed for the use of insulated bearings / supports or of appropriate filters between the inverter and motor to avoid the risk of current circulation in the bearings.
D5 seiries motors from 280 to 400 frame size when designed for inverter application, are supplied with insulated N-End bearings.

EMC REQUIREMENTS FOR THE INSTALLATION

The use of cables and connections conforming to EMC (electromagnetic compatibility) recommendations is necessary.
Supply cables to the motor must be both shielded and symmetrical.
The motor and the driven system must be properly earthed, to avoid possible voltages and currents in the bearings of the motor.
The additional instructions given by the inverter manufacturer must also be followed.

INSTRUCTIONS FOR THE CORRECT USE OF MOTORS FED BY FREQUENCY CONVERTER

The type of the inverter and of the filters must be properly selected to guarantee a peak voltage at the motor terminals of less than 1060V.

The following table indicates the solutions to be applied on motors fed by frequency converters. They are classified with respect to the input voltage of the inverter.

Voltage / Frame Size	$U_N \leq 500V$	$U_N \leq 690V$
≤ 250	Standard insulation	Standard insulation + filter dU/dt (*)
280 ÷ 315	Reinforced insulation + insulated bearing	Reinforced insulation + Insulated bearing + filter dU/dt (*)
355 ÷ 400	Reinforced insulation + insulated bearing	Reinforced insulation + Insulated bearing + filter dU/dt (*) + common mode filter (*)

(*) Not scope of MarelliMotori supply.

SELF-VENTILATED MOTORS

The ventilation in a self-ventilated motor is a function of the speed of the motor itself (and therefore also of the feeding frequency). Consequently the cooling and noise level vary according to the inverter output frequency, thus:

- in the frequency range lower than the rated value, a further power derating must be considered (see the relevant graphs in the dedicated section)
- in the frequency range higher than the rated value, the noise increases approximately by the values given in the following table:

Frequency [Hz]	60	75
Additional noise [db (A)]	4 - 5	9

MOTORS WITH FORCED VENTILATION

Forced ventilated motors are equipped with an auxiliary motor which must have a classification compatible with the main one.
The use of forced ventilation is recommended in the presence of wide range of speed variation and when constant torques are requested.
The operation of the main motor must be made dependent to the correct operation of the forced ventilation unit.

For the correct selection of motors fed by inverters, refer to the corresponding specific tables.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
3000/3600 min^{-1} = 2 poles - 50/60 Hz											**Temperature Class T1 ÷ T4, T 135°C**		
0,37	0,37	71 MA2	2730	3330	69,5	0,78	1,0	1,3	4,4	2,8	-	0,0004	15,3
0,55	0,55	71 MB2	2730	3330	72,3	0,79	1,4	1,9	4,6	3,0	-	0,0005	17,3
0,75	0,75	80 MA2	2800	3400	74,1	0,83	1,8	2,6	5,6	2,4	2,3	0,0008	20,8
1,1	1,1	80 MB2	2830	3430	77,5	0,84	2,4	3,7	5,9	2,6	2,6	0,0010	22,8
1,5	1,6	90 S2	2810	3410	78,7	0,84	3,3	5,1	6,1	2,5	2,6	0,0016	26,8
2,2	2,3	90 L2	2850	3450	81,1	0,83	4,7	7,4	6,4	2,7	2,8	0,0022	32,3
3	3,2	100 LA2	2900	3500	83,0	0,84	6,2	9,9	6,8	2,1	2,6	0,0050	48,3
4	4,2	112 M2	2910	3510	84,4	0,85	8,1	13,1	7,2	2,5	2,9	0,0063	55,8
5,5	6	132 SA2	2915	3515	85,7	0,85	10,9	18,1	7,5	2,5	2,8	0,0160	75,8
7,5	8	132 SB2	2915	3515	87,0	0,87	14,3	24,7	7,8	2,6	3,2	0,0190	81,8
9	9,5	132 MB2	2915	3515	87,2	0,87	17,1	29,5	7,8	2,9	3,6	0,0230	91,8
11	12	160 MA2	2920	3520	88,4	0,82	21,9	36	6,2	2,1	2,8	0,030	115
15	16,5	160 MB2	2925	3525	89,8	0,83	29,0	49	6,6	2,4	3,0	0,035	129
18,5	20	160 L2	2925	3525	90,0	0,81	36,7	60	7,1	2,6	3,0	0,040	143
22	24	180 M2 •	2930	3530	90,5	0,84	41,8	72	7,0	2,5	3,0	0,048	154
30	33	200 LA2	2945	3545	92,0	0,87	54	97	6,8	2,3	2,9	0,165	189
37	40	200 LB2 •	2945	3545	92,2	0,87	67	120	6,9	2,4	3,0	0,180	209
45	50	225 M2	2960	3560	92,5	0,88	80	145	6,6	2,4	3,0	0,225	289
55	60	250 M2	2960	3560	93,0	0,87	98	177	6,7	2,4	3,0	0,250	321
75	83	280 S2	2960	3560	93,6	0,87	133	242	6,8	2,3	2,7	0,350	471
90	100	280 M2	2960	3560	94,2	0,88	157	290	7,2	2,3	2,7	0,416	514
110	121	315 SM2	2975	3575	94,3	0,87	194	353	6,4	2,4	2,4	0,95	760
132	158	315 MA2 •	2970	3570	94,3	0,86	235	424	6,5	2,5	2,5	0,95	760
160	192	315 MC2 •	2975	3575	94,4	0,87	281	513	6,5	2,5	2,5	1,12	827
200	240	315 MD2 •	2980	3580	94,7	0,87	351	640	6,5	2,5	2,5	1,30	887
											Temperature Class T1 ÷ T3, T 150°C		
230	280	355 LX2 •	2980	3580	94,5	0,90	390	736	6,5	2,0	2,8	4,4	1770
280	330	355 LW2 •	2980	3580	95,4	0,90	471	896	6,5	2,0	3,0	5,1	1950
330	400	355 LY2 •	2980	3580	95,8	0,91	547	1056	6,8	2,1	3,0	6,0	2145
375	450	400 LX2 •	2980	3580	94,5	0,91	630	1201	7,0	2,2	2,8	7,9	2780
450	540	400 LW2 •	2980	3580	95,0	0,91	752	1441	7,0	2,2	3,0	8,9	2940
560	630	400 LY2 •	2980	3580	95,0	0,91	936	1793	7,2	2,2	3,0	10,0	3150
											Temperature Class T4 , T 135°C		
200	200	355 LX2 •	2980	3580	94,5	0,90	339	640	6,5	2,0	2,8	4,4	1770
250	250	355 LW2 •	2980	3580	95,4	0,90	420	800	6,5	2,0	3,0	5,1	1950
280	280	355 LY2 •	2980	3580	95,8	0,91	464	896	6,8	2,1	3,0	6,0	2145
330	330	400 LX2 •	2980	3580	94,5	0,91	555	1056	7,0	2,2	2,8	7,9	2780
400	400	400 LW2 •	2980	3580	95,0	0,91	669	1281	7,0	2,2	3,0	8,9	2940
500	500	400 LY2 •	2980	3580	95,0	0,91	936	1601	7,2	2,2	3,0	10,0	3150

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V/60Hz on request.

• Motor not multivoltage. Output values at 440V/60Hz refer to motors with dedicated winding.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
1500/1800 min^{-1} = 4 poles - 50/60 Hz											**Temperature Class T1 ÷ T4, T 135°C**		
0,25	**0,25**	**71 MA4**	1380	1680	67,6	0,68	0,8	1,73	3,8	2,3	2,3	0,0005	16,3
0,37	**0,37**	**71 MB4**	1380	1680	69,5	0,68	1,1	2,6	3,8	2,5	2,5	0,0006	17,3
0,55	**0,55**	**80 MA4**	1380	1680	72,0	0,74	1,5	3,8	4,6	2,6	2,4	0,0013	21,3
0,75	**0,75**	**80 MB4**	1385	1685	73,0	0,74	2,0	5,2	4,75	2,75	2,5	0,0016	22,8
1,1	**1,2**	**90 S4**	1390	1690	76,5	0,79	2,6	7,6	4,5	2,5	2,4	0,0033	27,3
1,5	**1,6**	**90 L4**	1390	1690	79,1	0,82	3,4	10,3	4,7	2,7	2,5	0,0040	31,8
2,2	**2,3**	**100 LA4**	1420	1720	81,1	0,81	4,9	14,8	5,3	2,0	2,3	0,0073	46,8
3	**3,2**	**100 LB4**	1420	1720	83,0	0,81	6,4	20,2	5,5	2,1	2,5	0,0090	50,8
4	**4,4**	**112 M4** •	1425	1720	84,2	0,83	8,3	26,8	5,7	2,35	2,7	0,0115	59,3
5,5	**5,8**	**132 SA4**	1440	1740	85,7	0,82	11,4	36,5	6,5	2,0	2,6	0,0238	78,3
7,5	**7,9**	**132 MA4**	1450	1750	87,4	0,84	14,8	49,4	6,7	2,2	2,75	0,0300	91,3
11	**12**	**160 M4**	1455	1760	88,6	0,81	22,1	72	5,2	2,0	2,1	0,034	123
15	**16**	**160 L4**	1460	1760	89,4	0,81	29,9	98	5,8	2,2	2,4	0,075	135
18,5	**20**	**180 M4** •	1460	1765	90,0	0,82	36,2	121	6,2	2,3	2,5	0,090	148
22	**24**	**180 L4**	1465	1765	90,5	0,84	41,8	143	6,3	2,4	2,5	0,110	177
30	**33**	**200 L4**	1470	1765	91,6	0,84	56	195	6,4	2,4	2,8	0,180	205
37	**40**	**225 S4**	1475	1770	92,5	0,86	67	239	6,5	2,3	2,8	0,320	287
45	**50**	**225 M4**	1475	1775	92,5	0,86	82	291	6,5	2,4	2,8	0,410	317
55	**60**	**250 M4**	1475	1775	93,0	0,87	98	356	6,4	2,3	2,6	0,520	355
75	**83**	**280 S4**	1480	1780	93,7	0,86	134	483	7,0	2,5	2,3	0,885	512
90	**100**	**280 M4**	1480	1780	93,9	0,88	157	580	7,1	2,7	2,4	1,060	571
110	**121**	**315 SM4**	1488	1780	93,6	0,85	200	705	6,5	2,6	2,6	2,10	780
132	**158**	**315 MA4** •	1485	1785	94,5	0,85	237	848	6,2	2,5	2,5	2,10	780
160	**192**	**315 MC4** •	1485	1785	94,8	0,85	287	1028	6,2	2,5	2,5	2,50	859
200	**240**	**315 MD4** •	1485	1785	95,3	0,86	353	1285	6,5	2,5	2,6	3,10	965
											Temperature Class T1 ÷ T3, T 150°C		
250	**300**	**355 LX4** •	1490	1790	95,4	0,87	435	1601	6,8	2,2	2,1	7,5	1730
300	**350**	**355 LW4** •	1490	1790	95,4	0,87	522	1921	6,8	2,2	2,4	9,3	1960
330	**400**	**355 LY4** •	1490	1790	95,7	0,87	572	2113	6,8	2,2	2,5	11,2	2180
375	**450**	**400 LX4** •	1490	1790	95,5	0,88	644	2401	6,8	2,3	2,1	15,8	2880
450	**540**	**400 LW4** •	1490	1790	95,5	0,88	773	2881	6,8	2,3	2,4	18,8	3030
560	**630**	**400 LY4** •	1490	1790	95,5	0,88	962	3586	6,8	2,3	2,5	20,7	3240
											Temperature Class T4, T 135°C		
210	**210**	**355 LX4** •	1490	1790	95,3	0,86	370	1345	6,8	2,2	2,4	7,5	1730
270	**270**	**355 LW4** •	1490	1790	95,5	0,87	469	1729	6,8	2,2	2,4	9,3	1960
300	**300**	**355 LY4** •	1490	1790	95,5	0,87	521	1921	6,8	2,2	2,5	11,2	2180
330	**330**	**400 LX4** •	1490	1790	95,1	0,88	569	2113	6,8	2,3	2,2	15,8	2880
400	**400**	**400 LW4** •	1490	1790	95,5	0,88	687	2561	6,8	2,3	2,3	18,8	3030
500	**500**	**400 LY4** •	1490	1790	95,5	0,88	859	3201	7,2	1,2	2,5	20,7	3240

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V/60Hz on request.

• Motor not multivoltage. Output values at 440V/60Hz refer to motors with dedicated winding.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
1000/1200 min^{-1} = 6 poles - 50/60 Hz											**Temperature Class T1 ÷ T4, T 135°C**		
0,37	0,44	80 MA6	930	1130	65,2	0,72	1,1	3,8	3,6	1,9	2,25	0,0024	21,3
0,55	0,66	80 MB6	930	1130	68,0	0,73	1,6	5,6	3,9	2,1	2,4	0,0028	23,3
0,75	0,9	90 S6	930	1130	71,1	0,73	2,1	7,7	4,6	2,1	2,3	0,0038	27,8
1,1	1,3	90 L6	930	1130	74,5	0,71	3,0	11,3	4,8	2,5	2,6	0,0050	34,3
1,5	1,8	100 LA6	940	1140	75,3	0,75	3,8	15,2	5,1	2,0	2,3	0,0100	47,3
2,2	2,6	112 M6	940	1140	78,2	0,75	5,4	22,3	5,3	2,0	2,5	0,0150	56,3
3	3,6	132 SA6	950	1150	80,1	0,76	7,1	30,2	5,5	2,1	2,4	0,0300	72,8
4	4,8	132 MA6	950	1150	81,0	0,78	9,1	40,2	5,7	2,3	2,6	0,0380	83,8
5,5	6,6	132 MB6	950	1150	82,0	0,78	12,4	55,3	6,2	2,5	2,8	0,0460	93,8
7,5	9	160 M6	965	1165	86,0	0,82	15,4	74	5,0	2,0	2,3	0,087	131
11	13,2	160 L6	967	1165	88,0	0,82	22,0	108	5,5	2,3	2,5	0,110	147
15	18	180 L6	970	1170	88,2	0,82	30,0	147	5,2	2,3	2,2	0,130	165
18,5	22	200 LA6	970	1170	88,2	0,83	36	182	5,2	2,1	2,3	0,170	185
22	26	200 LB6	972	1170	89,0	0,83	43	216	5,5	2,4	2,4	0,220	203
30	36	225 M6	975	1175	90,5	0,84	57	294	6,2	2,4	2,4	0,470	294
37	44	250 M6	975	1175	91,0	0,84	70	362	6,5	2,6	2,6	0,570	327
45	54	280 S6	980	1180	92,5	0,83	85	438	6,0	2,5	2,5	0,850	466
55	66	280 M6	980	1180	93,0	0,84	102	535	6,0	2,5	2,5	1,075	505
75	90	315 SM6	985	1185	94,0	0,83	139	726	6,3	2,6	2,6	2,60	748
90	108	315 MA6	985	1185	94,0	0,84	165	872	6,0	2,5	2,5	2,60	748
110	132	315 MB6	985	1185	94,0	0,84	201	1065	6,0	2,5	2,5	3,00	799
132	158	315 MC6	985	1185	93,3	0,85	240	1278	6,3	2,5	2,5	3,60	889
160	192	315 MD6	985	1185	94,8	0,86	283	1550	6,3	2,7	2,5	4,40	994
											Temperature Class T1 ÷ T3, T 150°C		
200	240	355 LX6	990	1190	95,0	0,86	354	1927	6,2	2,2	2,3	11,2	1820
250	300	355 LW6	990	1190	95,0	0,86	442	2409	6,5	2,2	2,5	14,0	2060
280	330	355 LY6	990	1190	95,0	0,86	493	2698	6,5	2,2	2,2	15,5	2190
315	380	400 LX6	995	1190	95,0	0,87	551	3020	6,5	2,1	2,3	22,7	2860
355	420	400 LW6	995	1190	95,0	0,87	621	3404	6,5	2,1	2,5	25,5	3040
400	480	400 LY6	995	1190	95,0	0,87	699	3835	6,5	2,1	2,2	29,0	3300
											Temperature Class T4, T 135°C		
160	160	355 LX6	990	1190	95,0	0,86	283	1542	6,8	2,3	2,5	11,2	1820
230	230	355 LW6	990	1190	95,0	0,86	407	2216	7,0	2,3	2,6	14,0	2060
250	250	355 LY6	990	1190	95,0	0,86	440	2409	7,0	2,3	2,4	15,5	2190
280	280	400 LX6	995	1194	95,0	0,87	490	2685	6,8	2,2	2,4	22,7	2860
315	315	400 LW6	995	1194	95,0	0,87	551	3020	6,8	2,2	2,4	25,5	3040
350	350	400 LY6	995	1194	95,0	0,87	612	3356	7,0	2,2	2,4	29,0	3300

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V / 60Hz on request.

The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
750/900 min^{-1} = 8 poles - 50/60 Hz											**Temperature Class T1 ÷ T4, T 135°C**		
0,18	0,22	80 MA8	660	810	53,0	0,72	0,7	2,6	3,5	2,0	1,8	0,0024	21,8
0,25	0,3	80 MB8	690	860	56,3	0,67	1,0	3,5	3,5	2,0	1,8	0,0027	22,8
0,37	0,44	90 S8	675	825	59,3	0,66	1,4	5,2	3,5	2,0	1,8	0,0037	27,3
0,55	0,66	90 L8	695	845	63,3	0,64	2,0	7,6	3,5	2,0	1,8	0,0050	35,8
0,75	0,9	100 LA8	680	830	70,5	0,69	2,2	10,5	4,0	2,1	2,0	0,0093	45,3
1,1	1,32	100 LB8	695	845	71,5	0,69	3,2	15,1	4,1	2,3	2,3	0,0123	50,3
1,5	1,8	112 M8	700	850	73,0	0,70	4,2	20,5	4,4	2,4	2,4	0,0168	58,8
2,2	2,6	132 SA8	710	840	75,0	0,74	5,7	29,6	4,4	2,0	2,2	0,0380	78,8
3	3,6	132 MA8	705	845	77,0	0,76	7,4	40,6	4,6	2,1	2,3	0,0460	92,8
4	4,8	160 MA8	710	860	81,5	0,73	9,7	54	4,2	1,9	2,1	0,080	115
5,5	6,6	160 MB8	720	870	82,4	0,74	13,0	73	4,2	1,9	2,1	0,092	123
7,5	9	160 L8	720	870	84,7	0,74	17,3	99	4,2	2,0	2,1	0,110	133
11	13,2	180 L8	725	875	86,7	0,75	24,4	145	4,5	2,0	2,2	0,160	188
15	18	200 L8	725	875	88,0	0,75	33	197	5,0	2,1	2,3	0,220	216
18,5	22	225 S8	730	880	89,0	0,76	40	242	5,2	2,2	2,4	0,420	279
22	26	225 M8	730	880	90,0	0,76	47	288	5,3	2,2	2,4	0,520	311
30	36	250 M8	730	880	91,0	0,76	63	392	5,5	2,3	2,5	0,620	341
37	44	280 S8	735	885	92,5	0,80	72	480	6,0	2,5	2,5	1,050	507
45	54	280 M8	735	885	93,0	0,80	87	584	6,0	2,5	2,5	1,250	540
55	66	315 SM8	740	890	93,5	0,81	105	709	6,5	2,3	2,4	2,80	776
75	90	315 MA8	740	890	93,8	0,82	141	967	6,0	2,1	2,2	2,80	776
90	108	315 MC8	740	890	94,4	0,83	166	1160	6,2	2,2	2,3	3,50	886
110	132	315 MD8	740	890	94,5	0,83	202	1418	6,2	2,2	2,3	4,00	924
132	158	315 ME8	740	890	94,6	0,83	243	1702	6,2	2,2	2,3	4,30	993
											Temperature Class T1 ÷ T3, T 150°C		
160	180	355 LX8	740	890	94,8	0,84	290	2063	6,0	1,4	2,2	13,2	1840
200	240	355 LW8	743	890	95,3	0,84	361	2568	6,2	1,4	2,3	16,2	2040
220	270	355 LY8	744	893	95,6	0,85	391	2821	6,7	1,8	2,5	18,0	2170
250	300	400 LX8	745	893	95,6	0,80	472	3201	6,2	2,0	2,1	25,0	2760
280	330	400 LW8	745	894	95,5	0,80	530	3586	6,2	2,0	2,1	29,7	2940
315	380	400 LY8	745	894	95,6	0,80	595	4034	6,2	2,0	2,1	33,2	3200
											Temperature Class T4, T 135°C		
150	150	355 LX8	740	890	94,8	0,84	272	1934	6,6	1,5	2,4	13,2	1840
180	180	355 LW8	743	893	95,3	0,84	325	2311	6,8	1,5	2,5	16,2	2040
200	200	355 LY8	744	894	95,6	0,85	356	2565	7,2	2,0	2,6	18,0	2170
230	230	400 LX8	745	895	95,6	0,81	429	2945	6,6	2,1	2,2	25,0	2760
250	250	400 LW8	745	895	95,5	0,82	461	3201	6,8	2,2	2,3	29,7	2940
280	280	400 LY8	745	895	95,6	0,83	510	3586	6,8	2,2	2,2	33,2	3200

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V / 60Hz on request.

The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
600/720 min^{-1} = 10 poles - 50/60 Hz											**Temperature Class T1 ÷ T3, T 150°C**		
15	**18**	**225 M10**	570	688	0,72	83,5	36	251	3,2	1,0	2,0	0,920	311
18,5	**22**	**250 M10**	580	698	0,73	85,5	43	304	4,2	1,5	2,6	1,100	351
30	**36**	**280 S10**	585	705	0,76	88,8	64	489	4,6	1,4	2,6	1,500	467
37	**45**	**280 M10**	585	705	0,77	89,2	78	603	4,8	1,5	2,6	1,800	504
45	**54**	**315 SM10**	590	710	0,79	91,9	89	728	5,0	1,4	1,6	4,00	776
55	**66**	**315 MA10**	590	710	0,78	92,0	111	889	5,0	1,4	2,6	4,00	776
75	**90**	**315 MC10**	590	710	0,79	92,1	149	1213	4,8	1,2	2,5	4,70	856
90	**110**	**315 MD10**	590	710	0,79	93,0	177	1455	4,5	1,1	2,3	5,50	924
											Temperature Class T1 ÷ T3, T 150°C		
110	**132**	**355 LX10**	590	710	94,0	0,78	217	1779	6,2	1,9	2,1	14,5	1900
132	**160**	**355 LW10**	590	710	94,5	0,78	259	2134	6,2	1,9	2,1	17,5	2100
160	**180**	**355 LY10**	590	710	95,0	0,78	312	2587	6,2	1,9	2,1	20,7	2230
180	**210**	**400 LX10**	595	713	95,0	0,78	351	2886	6,2	1,8	2,0	28,0	2850
200	**240**	**400 LW10**	595	713	95,0	0,78	390	3207	6,2	1,8	2,0	33,0	2950
225	**270**	**400 LY10**	595	713	95,0	0,78	439	3608	6,2	1,8	2,0	36,0	3220
											Temperature Class T4, T 135°C		
100	**100**	**355 LX10**	590	710	94,0	0,78	197	1617	6,8	2,0	2,3	14,5	1900
120	**120**	**355 LW10**	590	710	94,5	0,78	235	1940	6,8	2,0	2,3	17,5	2100
140	**140**	**355 LY10**	590	710	95,0	0,78	273	2264	6,2	2,0	2,3	20,7	2230
160	**160**	**400 LX10**	595	715	95,0	0,78	312	2565	6,8	1,9	2,2	28,0	2850
180	**180**	**400 LW10**	595	715	95,0	0,78	351	2886	6,8	1,9	2,2	33,0	2950
200	**200**	**400 LY10**	595	715	95,0	0,78	390	3207	6,8	1,9	2,2	36,0	3220

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V / 60Hz on request.

The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	PERFORMANCE AT FULL VOLTAGE 400V 50Hz: RATED CURRENT I A	RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
500/600 min⁻¹ = 12 poles - 50/60 Hz											**Temperature Class T1 ÷ T3, T 150°C**		
15	**18**	**250 M12**	470	570	0,73	83,0	36	304	3,5	1,2	1,9	1,100	351
22	**26**	**280 S12**	485	583	0,73	87,5	50	433	4,2	1,6	1,9	1,500	508
30	**36**	**280 M12**	485	583	0,74	88,5	66	590	4,3	1,7	2,0	1,800	540
37	**45**	**315 SM12**	490	590	0,77	90,7	76	720	4,8	1,5	2,4	4,00	776
45	**54**	**315 MA12**	490	590	0,76	90,7	94	876	4,8	1,5	2,4	4,00	776
55	**66**	**315 MC12**	490	590	0,77	92,0	112	1071	5,2	1,4	2,5	4,70	856
75	**90**	**315 MD12**	490	590	0,77	92,0	153	1460	4,3	1,2	2,1	5,50	924
											Temperature Class T1 ÷ T3, T 150°C		
90	**110**	**355 LX12**	490	590	93,0	0,76	184	1752	5,7	1,4	2,7	14,5	1900
110	**132**	**355 LW12**	491	590	93,5	0,76	224	2137	5,7	1,4	2,7	17,5	2100
132	**160**	**355 LY12**	491	590	93,5	0,77	265	2565	5,8	1,5	2,8	20,7	2230
160	**180**	**400 LX12**	495	583	94,0	0,78	315	3084	6,0	1,6	1,9	28,0	2850
180	**210**	**400 LW12**	495	594	94,5	0,78	353	3469	6,0	1,6	1,9	33,0	2950
200	**240**	**400 LY12**	495	594	94,5	0,78	392	3855	6,0	1,6	1,9	36,0	3220
											Temperature Class T4, T 135°C		
80	**80**	**355 LX12**	490	590	93,0	0,76	164	1558	6,2	1,5	2,8	14,5	1900
100	**100**	**355 LW12**	491	590	93,5	0,76	203	1943	6,2	1,5	2,8	17,5	2100
110	**110**	**355 LY12**	491	590	93,5	0,77	221	2137	6,4	1,6	2,8	20,7	2230
140	**140**	**400 LX12**	495	595	94,0	0,78	276	2698	6,6	1,7	2,1	28,0	2850
160	**160**	**400 LW12**	495	595	94,5	0,78	314	3084	6,6	1,7	2,1	33,0	2950
180	**180**	**400 LY12**	495	595	94,5	0,78	353	3469	6,0	1,7	2,1	36,0	3220

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.
Detailed data for 440V / 60Hz on request.
The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

3000/3600 min^{-1} = 2 poles- 50/60 Hz — Temperature Class T5, T 100°C

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	400V 50Hz RATED CURRENT I A	400V 50Hz RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm^2	WEIGHT IM 1001 Approx. kg
0,37	0,37	71 MA2	2730	3350	69,5	0,78	1,0	1,3	4,4	2,8	-	0,0004	15,3
0,55	0,55	71 MB2	2730	3360	72,3	0,79	1,4	1,9	4,6	3,0	-	0,0005	17,3
0,75	0,75	80 MA2	2800	3430	74,1	0,83	1,8	2,6	5,6	2,4	2,3	0,0008	20,8
1,1	1,1	80 MB2	2830	3470	77,5	0,84	2,4	3,7	5,9	2,6	2,6	0,0010	22,8
1,5	1,5	90 S2	2810	3460	78,7	0,84	3,3	5,1	6,1	2,5	2,6	0,0016	26,8
2,2	2,2	90 L2	2850	3480	81,1	0,83	4,7	7,4	6,4	2,7	2,9	0,0022	32,3
3,0	3,0	100 LA2	2900	3510	83,0	0,84	6,2	9,9	6,8	2,1	2,6	0,0050	48,3
5,5	5,5	132 SA2	2905	3490	85,7	0,85	10,9	18,1	7,5	2,5	2,8	0,0160	75,8
7,5	7,5	132 SB2	2905	3510	87,0	0,87	14,3	24,7	7,8	2,6	3,2	0,0190	81,8
9,0	9,0	132 MB2	2915	3520	87,2	0,87	17,1	29,5	7,8	2,9	3,6	0,0230	91,8
11	12,5	160 MA2	2900	3500	86	0,83	22,2	36	6,2	2,1	2,8	0,030	115
15	17	160 MB2	2910	3510	87	0,84	29,6	49	6,4	2,2	3,0	0,035	129
18,5	21	160 L2	2925	3525	89	0,83	36,2	60	6,8	2,4	3,0	0,040	143
22	25	180 M2	2930	3530	88,5	0,77	46,7	72	6,8	2,4	3,0	0,048	154
30	36	200 LA2	2945	3545	90	0,87	55	97	6,7	2,3	2,9	0,165	189
37	42,5	200 LB2	2950	3550	91	0,87	68	120	6,5	2,4	3,0	0,180	209
40,5	46,5	225 M2	2960	3560	92	0,88	72	131	6,7	2,4	3,0	0,225	289
50	57,5	250 M2	2955	3555	90	0,86	93	161	6,7	2,4	3,0	0,250	321
70	80,5	280 S2	2955	3560	92	0,87	126	226	6,8	2,3	2,7	0,350	471
84	96,5	280 M2	2955	3560	92	0,88	150	271	7,2	2,3	2,7	0,416	514
110	125	315 SM2	2975	3570	92,5	0,84	205	353	7,5	2,4	2,7	0,950	760
120	138	315 MA2	2970	3570	92	0,86	219	385	6,8	2,5	2,6	0,950	760
145	160	315 MC2	2975	3575	93,5	0,86	261	465	6,8	2,6	2,6	1,120	827
185	213	315 MD2	2980	3580	93,5	0,87	329	592	6,8	2,6	2,6	1,300	887

1500/1800 min^{-1} = 4 poles - 50/60 Hz — Temperature Class T5, T 100°C

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	SPEED n 1/min 50 Hz	SPEED n 1/min 60 Hz	EFFICIENCY η %	POWER FACTOR cos φ	400V 50Hz RATED CURRENT I A	400V 50Hz RATED TORQUE Tn Nm	STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm^2	WEIGHT IM 1001 Approx. kg
0,25	0,25	71 MA4	1380	1700	67,6	0,68	0,8	1,73	3,8	2,3	2,3	0,0005	16,3
0,37	0,37	71 MB4	1380	1710	69,5	0,68	1,1	2,6	3,8	2,5	2,5	0,0006	17,3
0,55	0,55	80 MA4	1380	1685	72,0	0,74	1,5	3,8	4,6	2,6	2,4	0,0013	21,3
0,75	0,75	80 MB4	1385	1720	73,0	0,74	2,0	5,2	4,75	2,75	2,5	0,0016	22,8
1,1	1,1	90 S4	1390	1720	76,5	0,79	2,6	7,6	4,5	2,5	2,4	0,0033	27,3
1,5	1,5	90 L4	1390	1705	79,1	0,82	3,4	10,3	4,7	2,7	2,5	0,0040	31,8
2,2	2,2	100 LA4	1420	1725	81,1	0,81	4,9	14,8	5,3	2,0	2,3	0,0073	46,8
3,0	3,0	100 LB4	1420	1730	83,0	0,81	6,4	20,2	5,5	2,1	2,5	0,0090	50,8
5,5	5,5	132 SA4	1440	1755	85,7	0,82	11,4	36,5	6,5	2,0	2,6	0,0238	78,3
7,5	7,5	132 MA4	1450	1760	87,4	0,84	14,8	49,4	6,7	2,2	2,75	0,0300	91,3
11	12,5	160 M4	1455	1755	87	0,81	22,5	72	5,2	2,0	2,1	0,063	123
15	17	160 L4	1455	1755	87	0,81	30,7	98	5,8	2,2	2,4	0,075	135
18,5	21	180 M4	1460	1760	88	0,81	37,5	121	6,2	2,3	2,5	0,090	148
22	26	180 L4	1465	1765	90	0,85	41,5	143	6,3	2,4	2,5	0,110	177
27	32	200 L4	1470	1770	90	0,83	52	175	6,6	2,4	2,8	0,180	205
33	38	225 S4	1475	1775	92	0,83	62	213	6,7	2,4	2,8	0,320	287
40,5	46,5	225 M4	1475	1775	92	0,83	77	262	6,7	2,4	2,8	0,410	317
50	57,5	250 M4	1475	1775	92	0,87	90	323	6,4	2,4	2,5	0,520	355
61	70	280 S4	1485	1780	93,5	0,85	111	392	7,7	2,7	2,6	0,885	512
75	86	280 M4	1485	1780	94	0,87	132	482	7,7	2,7	2,6	1,060	571
110	110	315 SM4	1486	1790	94	0,83	204	706	6,9	2,8	2,8	2,100	780
115	132	315 MA4	1485	1785	94	0,84	210	739	6,5	2,6	2,6	2,100	780
138	158	315 MC4	1485	1785	94	0,84	252	887	6,5	2,6	2,6	2,500	859
170	195	315 MD4	1485	1785	94	0,85	307	1092	6,8	2,7	2,6	3,100	965

Is = Starting current, **Ts** = Starting torque, **TMAX** = Breakdown torque.

Detailed data for 440V / 60Hz on request.

The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

RATED OUTPUT kW		MOTOR TYPE	PERFORMANCE AT RATED OUTPUT				PERFORMANCE AT FULL VOLTAGE					MOMENT OF INERTIA	WEIGHT IM 1001
			SPEED		EFFICIENCY	POWER FACTOR	400V 50Hz						
			n		η	cos φ	RATED CURRENT	RATED TORQUE	STARTING CURRENT	STARTING TORQUE	BREAKDOWNT TORQUE	J	Approx.
			1/min		%		I	T_n	I_s/I_n	T_s/T_n	T_{MAX}/T_n	kgm^2	kg
50 Hz	60 Hz		50 Hz	60 Hz			A	Nm	p.u.	p.u.	p.u.		
1000/1200 min^{-1} = 6 poles - 50/60 Hz											**Temperature Class T5, T 100°C**		
0,37	**0,37**	**80 MA6**	930	1130	65,2	0,72	1,1	3,8	3,6	1,9	2,25	0,0024	21,3
0,55	**0,55**	**80 MB6**	930	1140	68,0	0,73	1,6	5,6	3,9	2,1	2,4	0,0028	23,3
0,75	**0,75**	**90 S6**	930	1120	71,1	0,73	2,1	7,7	4,6	2,1	2,3	0,0038	27,8
1,5	**1,5**	**100 LA6**	940	1140	75,3	0,75	3,8	15,2	5,1	2,0	2,3	0,0100	47,3
3,0	**3,0**	**132 SA6**	950	1150	80,1	0,76	7,1	30,2	5,5	2,1	2,4	0,0300	72,8
7,5	**9**	**160 M6**	965	1165	86	0,82	15,4	74	5,0	2,0	2,3	0,087	131
11	**13**	**160 L6**	975	1175	86,5	0,82	22,4	108	5,5	2,3	2,5	0,110	147
13,5	**15,5**	**180 L6**	975	1175	88	0,82	27	132	5,2	2,3	2,2	0,130	165
17,0	**19,5**	**200 LA6**	970	1170	88	0,83	33,6	167	5,5	2,2	2,3	0,170	185
20	**23**	**200 LB6**	975	1175	89	0,83	39,1	196	6,0	2,5	2,5	0,220	203
26	**30**	**225 M6**	980	1180	90	0,81	52	253	6,5	2,6	2,7	0,470	294
32	**36,5**	**250 M6**	975	1185	90	0,83	62	313	6,5	2,6	2,6	0,570	327
36	**41,5**	**280 S6**	988	1180	92	0,82	69	348	6,0	2,5	2,5	0,850	466
45	**51,5**	**280 M6**	988	1180	92	0,82	86	435	6,0	2,5	2,5	1,075	505
70	**80**	**315 SM6**	987	1185	94	0,83	130	677	6,9	2,9	2,9	2,600	748
75	**86**	**315 MA6**	985	1185	94	0,84	137	726	6,3	2,6	2,6	2,600	748
90	**103**	**315 MB6**	985	1185	94	0,84	165	872	6,3	2,6	2,6	3,000	799
105	**120**	**315 MC6**	985	1185	94	0,84	192	1017	6,6	2,6	2,6	3,600	889
128	**147**	**315 MD6**	985	1185	94	0,85	232	1240	6,6	2,8	2,6	4,400	994
750/900 min^{-1} = 8 poles - 50/60 Hz											**Temperature Class T5, T 100°C**		
0,18	**0,18**	**80 MA8**	660	820	53,0	0,72	0,7	2,6	3,5	2,0	1,8	0,0024	21,8
0,25	**0,25**	**80 MB8**	690	835	56,3	0,67	1,0	3,5	3,5	2,0	1,8	0,0028	22,8
0,37	**0,37**	**90 S8**	675	840	59,3	0,66	1,4	5,2	3,5	2,0	1,8	0,0038	27,3
0,55	**0,55**	**90 L8**	695	850	63,3	0,64	2,0	7,6	3,5	2,0	1,8	0,0050	35,8
0,75	**0,75**	**100 LA8**	680	865	70,5	0,69	2,2	10,5	4,0	2,1	2,0	0,0093	45,3
1,1	**1,1**	**100 LB8**	695	865	71,5	0,69	3,2	15,1	4,1	2,3	2,3	0,0123	50,3
2,2	**2,2**	**132 SA8**	710	860	75,0	0,74	5,7	29,6	4,4	2,0	2,2	0,0380	78,8
4,0	**4,5**	**160 MA8**	720	870	81	0,73	9,8	53	4,2	1,9	2,1	0,080	115
5,5	**6,0**	**160 MB8**	720	870	82	0,74	13,1	73	4,2	1,9	2,1	0,092	123
7,0	**8,0**	**160 L8**	725	875	83	0,73	16,7	92	4,2	2,0	2,1	0,110	133
10,0	**12,0**	**180 L8**	728	880	86	0,74	22,7	131	4,5	2,0	2,2	0,160	188
13,5	**16,0**	**200 L8**	728	880	87	0,75	29,9	177	5,0	2,1	2,3	0,220	216
17,0	**19,5**	**225 S8**	728	880	89	0,76	36,3	227	5,3	2,3	2,4	0,420	279
20,5	**23,5**	**225 M8**	730	880	90	0,74	44,5	268	5,7	2,4	2,5	0,520	311
28	**32**	**250 M8**	730	880	91	0,76	59	366	5,7	2,4	2,5	0,620	341
34	**39**	**280 S8**	737	885	92	0,79	68	433	6,0	2,5	2,7	1,050	507
41	**47**	**280 M8**	737	885	92	0,79	82	527	6,0	2,5	2,7	1,250	540
60	**65**	**315 SM8**	741	891	93	0,79	118	644	6,8	2,4	2,5	2,8	776
65	**74,5**	**315 MA8**	740	890	93,5	0,80	126	838	6,3	2,2	2,3	2,8	776
80	**91,5**	**315 MC8**	740	890	94	0,81	152	1031	6,5	2,3	2,4	3,5	886
95	**109**	**315 MD8**	740	890	94	0,81	180	1225	6,5	2,3	2,4	4,0	824
112	**128**	**315 ME8**	740	890	94	0,81	213	1444	6,5	2,3	2,4	4,3	993

I_s = Starting current, **T_s** = Starting torque, **T_{MAX}** = Breakdown torque.

Detailed data for 440V / 60Hz on request.

The motors shown on this page are not multivoltage. Output values at 440/60 Hz refer to motors with dedicated winding.

RATED OUTPUT		MOTOR TYPE	PERFORMANCE AT RATED OUTPUT				DATA AT FULL VOLTAGE				INERTIA	WEIGHT (IM 1001)
			SPEED		RATED CURRENT (400 V)		STARTING CURRENT		STARTING TORQUE			
kW			n min^{-1}		I A		I_s/I_n p.u.		T_s/T_n p.u.		J kgm^2	Approx. kg
2 / 4 poles = 3000 / 1500 min^{-1} - 50 Hz - single winding - YY / Δ connection												**Temperature Class T1 ÷ T3, T 150°C**
0,31	**0,20**	**71 MA**	2600	1340	0,86	0,60	3,2	3,0	1,9	2,0	0,0005	16,3
0,44	**0,29**	**71 MB**	2640	1360	1,19	0,84	3,8	3,2	2,4	2,6	0,0006	17,3
0,62	**0,42**	**80 MA**	2600	1370	1,69	1,19	3,5	3,4	2,5	2,1	0,0013	21,3
0,85	**0,59**	**80 MB**	2710	1380	2,38	1,48	3,3	3,8	2,6	2,3	0,0016	22,8
1,18	**0,92**	**90 S**	2730	1380	2,95	2,17	3,6	3,9	2,5	2,4	0,0033	27,3
1,55	**1,25**	**90 L**	2780	1390	3,8	2,85	4,2	4,4	2,9	2,6	0,0040	31,8
2,05	**1,45**	**100 LA**	2810	1400	4,8	3,4	4,5	4,6	2,4	2,2	0,0073	46,8
3,1	**2,4**	**100 LB**	2850	1405	7,1	5,4	5,0	4,6	2,5	2,2	0,0090	50,8
4,4	**3,5**	**112 M**	2985	1435	9,7	7,7	6	6	3,0	3,0	0,0115	59,3
5	**4**	**132 SA**	2910	1465	10,5	8,3	6,6	6,6	2,5	2,3	0,0238	78,3
7	**5,6**	**132 MA**	2915	1475	15,2	11,4	7,3	6,9	2,5	2,5	0,0300	91,5
11	**9**	**160 M**	2880	1450	22,8	18,5	5,5	5,5	1,8	2,0	0,062	133
14	**12**	**160 L**	2890	1460	27,6	23,8	6,0	6,0	2,0	2,3	0,075	143
18,5	**16**	**180 M**	2900	1460	36,1	31,4	6,0	6,0	2,0	2,3	0,090	168
22	**18,5**	**180 LA**	2920	1460	42,8	35,2	6,5	6,0	2,2	2,2	0,110	188
25	**21**	**180 LB**	2920	1465	48,5	40,0	6,5	6,0	2,2	2,2	0,150	199
30	**26**	**200 L**	2920	1465	58	49	7,0	6,5	2,2	2,0	0,190	216
37	**31**	**225 S**	2930	1465	68	56	7,5	6,5	2,2	2,2	0,370	286
45	**37**	**225 M**	2930	1470	82	67	7,5	6,5	2,2	2,2	0,400	304
55	**45**	**250 M**	2930	1470	100	81	7,5	6,5	2,2	2,2	0,500	331
70	**59**	**280 S**	2940	1470	124	105	7,0	6,3	2,0	2,2	0,910	522
80	**70**	**280 M**	2940	1470	143	124	7,2	6,5	2,0	2,2	1,050	587
95	**80**	**315 SM**	2940	1470	171	147	7,2	6,5	2,0	2,2	1,15	605
110	**95**	**315 MA**	2945	1475	193	167	7,5	6,5	2,2	2,4	2,10	787
130	**110**	**315 MC**	2945	1475	223	190	7,5	6,8	2,2	2,4	2,50	862
160	**132**	**315 MD**	2945	1475	276	228	7,5	6,8	2,2	2,4	3,10	967
4 / 6 poles = 1500 / 1000 min^{-1} - 50 Hz - two separate windings												**Temperature Class T1 ÷ T3, T 150°C**
0,43	**0,31**	**80 MA**	1400	920	1,62	1,25	3,4	3,1	1,75	2,3	0,0024	21,3
0,62	**0,45**	**80 MB**	1410	930	1,90	1,52	3,5	3,2	1,8	2,5	0,0027	23,3
0,88	**0,66**	**90 S**	1415	930	2,66	2,09	3,8	3,3	1,8	2,4	0,0037	27,8
1,32	**0,95**	**90 L**	1420	940	3,90	2,90	4,8	4,0	2,0	2,5	0,0050	34,3
1,75	**1,0**	**100 LA**	1420	940	4,5	3,5	4,5	4,1	1,5	2,3	0,0073	46,8
2,2	**1,4**	**100 LB**	1420	945	5,3	4,7	4,8	3,7	1,7	2,4	0,0090	50,8
2,8	**1,85**	**112 M**	1430	945	6,5	6,2	5,5	4,3	2,0	2,7	0,0115	59,3
4,0	**2,9**	**132 SA**	1440	950	9,1	8,6	6,7	5,3	2,1	2,4	0,0238	78,3
5,3	**3,7**	**132 MA**	1445	960	11,8	10,5	7,5	5,5	2,2	2,6	0,0300	91,5
6,6	**4,4**	**160 M**	1470	965	12,8	9,0	6,0	5,0	1,9	2,0	0,063	136
8,8	**6**	**160 L**	1475	970	17,1	12,4	6,5	5,5	2,2	2,2	0,075	143
11	**7,5**	**180 M**	1475	970	20,9	15,2	6,8	5,8	2,2	2,2	0,090	166
13	**9**	**180 LA**	1475	970	24,7	18,1	7,0	6,5	2,2	2,2	0,160	189
15	**10**	**180 LB**	1475	970	28,5	20,0	7,0	6,5	2,0	2,2	0,220	196
18,5	**12,5**	**200 L**	1475	970	35	25	7,0	6,5	2,0	2,2	0,270	216
25	**16**	**225 S**	1475	970	43	28	6,5	6,5	2,0	2,2	0,420	273
30	**20**	**225 M**	1475	970	52	36	7,0	7,0	2,0	2,2	0,520	298
40	**27**	**250 M**	1480	975	73	50	7,0	7,0	2,0	2,2	0,670	346
51	**34**	**280 S**	1480	980	93	62	6,5	6,0	2,0	2,2	1,050	472
63	**42**	**280 M**	1480	980	114	76	6,5	6,0	2,0	2,2	1,250	512
70	**47**	**315 SM**	1480	980	124	86	6,5	6,2	2,0	2,2	1,43	575
85	**55**	**315 MA**	1480	980	147	100	6,5	6,0	1,6	2,0	2,60	757
103	**70**	**315 MB**	1480	980	181	124	6,5	6,0	1,8	2,0	3,00	807
118	**80**	**315 MC**	1480	980	209	143	6,5	6,0	1,8	2,0	3,60	897
140	**90**	**315 MD**	1480	980	247	162	6,5	6,0	1,8	2,0	4,45	1002
6 / 8 poles = 1000 / 750 min^{-1} - 50 Hz - two separate windings												**Temperature Class T1 ÷ T3, T 150°C**
3,7	**2,6**	**160 MA**	965	710	7,6	5,7	5,5	4,5	1,7	1,7	0,087	131
4,4	**3,3**	**160 MB**	965	715	9,0	7,3	6,0	4,8	1,8	1,7	0,092	134
6	**4,4**	**160 L**	970	725	11,9	9,5	6,0	5,0	1,8	1,8	0,110	144
7,5	**5,5**	**180 LA**	970	730	14,3	11,9	6,0	5,0	1,8	1,8	0,160	189
9	**6,5**	**180 LB**	970	730	17,1	13,8	6,0	5,0	1,8	1,8	0,220	196
10,5	**8**	**200 L**	970	735	20	17	6,0	5,8	1,8	1,8	0,270	216
15	**11**	**225 S**	975	735	28	23	6,0	6,0	1,8	1,8	0,420	273
19	**15**	**225 M**	975	735	35	20	6,0	6,0	1,8	1,8	0,520	298
25	**18,5**	**250 M**	975	735	51	41	6,0	6,0	1,8	1,8	0,670	346
35	**26**	**280 S**	975	740	65	51	6,0	5,5	1,8	1,8	1,050	512
43	**32**	**280 M**	975	740	78	62	6,0	5,5	1,8	1,8	1,250	542
48	**37**	**315 SM**	980	740	87	71	6,0	5,5	1,8	1,8	2,81	607
60	**45**	**315 MA**	980	740	109	87	6,0	5,5	1,8	1,8	2,62	757
70	**52**	**315 MB**	980	740	128	100	6,0	5,5	1,8	1,8	3,00	807
77	**60**	**315 MC**	980	740	141	114	6,0	5,5	1,8	1,8	3,60	897
100	**75**	**315 MD**	980	740	181	143	6,0	5,5	1,8	1,8	4,40	1002

I_s = Starting current, **T_s** = Starting torque
The motors shown on this page are not multivoltage.

The following tables give the outputs of self-ventilated motors (IC411), fed by frequency converter for quadratic torque loads.

3000 min^{-1} = 2 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
71 MA	0,35	1,20
71 MB	0,50	1,80
80 MA	0,68	2,30
80 MB	1,00	3,40
90 S	1,30	4,40
90 L	1,90	6,20
100 LA	2,60	8,60
112 M	3,40	11,20
132 SA	5,00	16,40
132 SB	6,70	22,00
132 MB	8,0	26,2

1500 min^{-1} = 4 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
71 MA	0,23	1,60
71 MB	0,34	2,30
80 MA	0,50	3,50
80 MB	0,69	4,70
90 S	1,00	6,90
90 L	1,36	9,30
100 LA	2,00	13,40
100 LB	2,60	17,50
112 M	3,40	22,80
132 SA	5,00	33,20
132 MA	6,5	42,8

1000 min^{-1} = 6 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
80 MA	0,33	3,40
80 MB	0,50	5,10
90 S	0,68	6,90
90 L	1,00	10,30
100 LA	1,35	13,70
112 M	2,00	20,30
132 SA	2,70	27,10
132 MA	3,4	34,2
132 MB	4,6	46,2

750 min^{-1} = 8 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
80 MA	0,16	2,30
80 MB	0,23	3,10
90 S	0,33	4,70
90 L	0,50	6,80
100 LA	0,68	9,50
100 LB	1,00	13,70
112 M	1,30	17,70
132 SA	2,00	26,90
132 MA	2,7	36,6

If the requested frequency range is different than that indicated in the tables, the torque values must be recalculated by multiplying the table values with a corrective factor Kc (found in figure 1) relative to the maximum frequency requested.

When constant resistant torque is requested, the power value can be obtained by multiplying the above data by the smaller of the two corrective factors Kc found in figure 1, correspondent to the minimum and the maximum frequency values of the speed range.

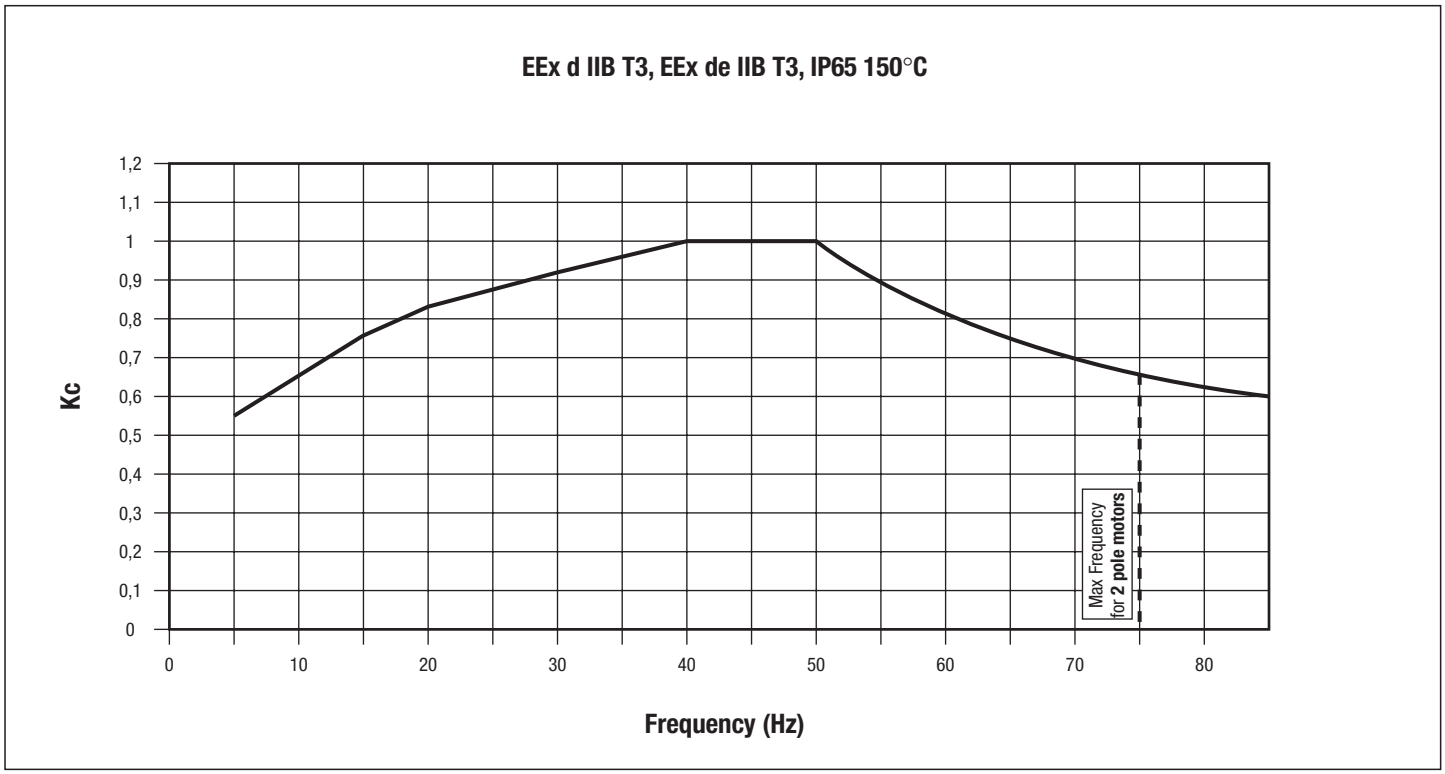


Figure 1: Corrective Factor Kc.

The following tables give the outputs of self-ventilated motors (IC411), fed by frequency converter for quadratic torque loads.

3000 min^{-1} = 2 poles- 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
71 MA	0,30	1,00
71 MB	0,44	1,50
80 MA	0,60	2,00
80 MB	0,88	3,00
90 S	1,20	4,10
90 L	1,76	5,90
100 LA	2,40	7,90
112 M	3,20	10,50
132 SA	4,40	14,50
132 SB	6,00	19,70
132 MB	7,2	23,6

1500 min^{-1} = 4 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
71 MA	0,20	1,40
71 MB	0,30	2,00
80 MA	0,44	3,00
80 MB	0,60	4,10
90 S	0,88	6,00
90 L	1,20	8,20
100 LA	1,76	11,80
100 LB	2,40	16,10
112 M	3,20	21,40
132 SA	4,40	29,20
132 MA	6,0	39,5

1000 min^{-1} = 6 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
80 MA	0,30	3,04
80 MB	0,44	4,52
90 S	0,60	6,16
90 L	0,88	9,04
100 LA	1,20	12,19
112 M	1,76	17,88
132 SA	2,40	24,12
132 MA	3,2	32,17
132 MB	4,4	44,23

750 min^{-1} = 8 poles- 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
80 MA	0,14	2,10
80 MB	0,20	2,80
90 S	0,30	4,20
90 L	0,44	6,00
100 LA	0,60	8,40
100 LB	0,88	12,10
112 M	1,20	16,40
132 SA	1,76	23,70
132 MA	2,4	32,5

If the requested frequency range is different than that indicated in the tables, the torque values must be recalculated by multiplying the table values with a corrective factor Kc (found in figure 2) relative to the maximum frequency requested.

When constant resistant torque is requested, the power value can be obtained by multiplying the above data by the smaller of the two corrective factors Kc found in figure 2, correspondent to the minimum and the maximum frequency values of the speed range.

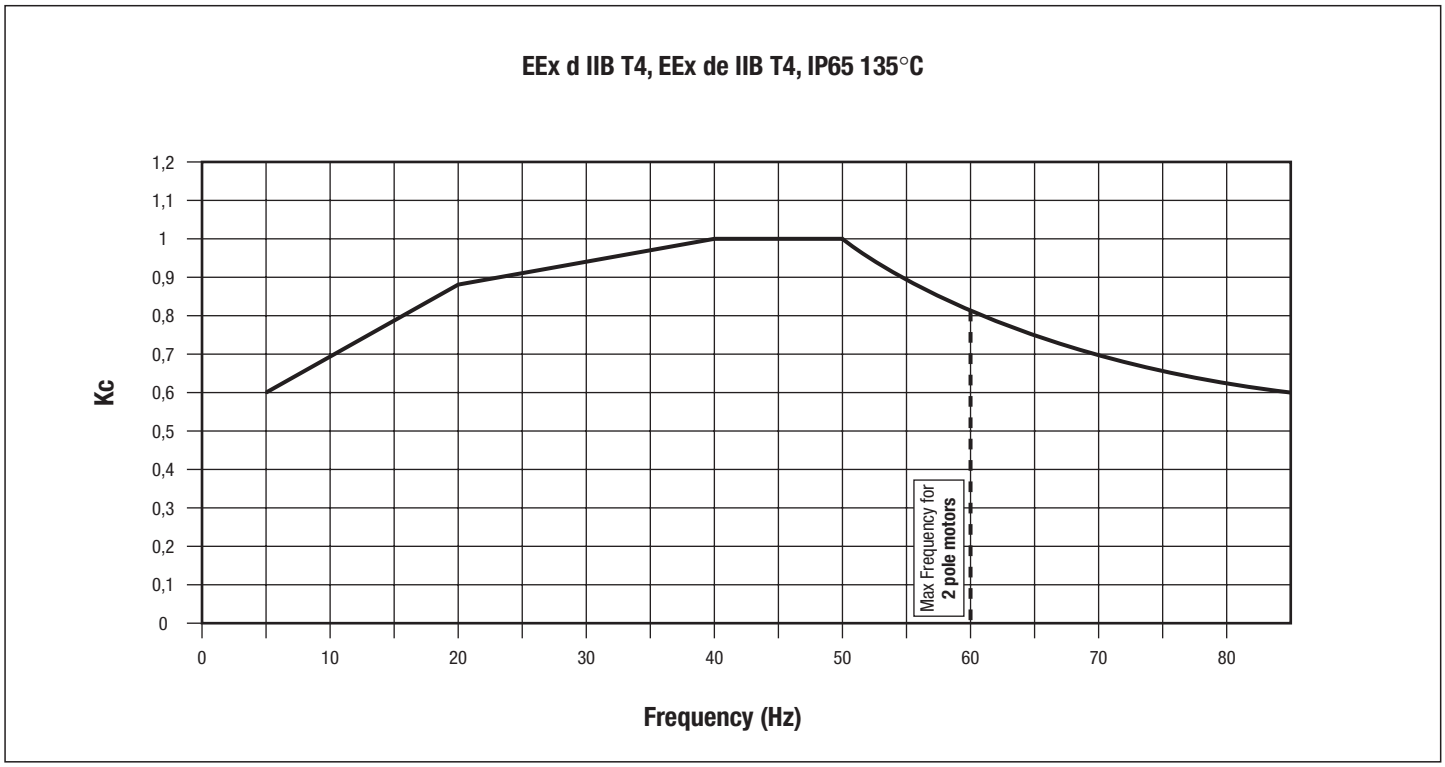


Figure 2: Corrective Factor Kc.

The following tables give the outputs of self-ventilated motors (IC411), fed by frequency converter for quadratic torque loads.

3000 min^{-1} = 2 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 MA	10,3	34
160 MB	13,9	45
160 L	17,2	56
180 M	19,8	64
200 LA	27,8	90
200 LB	33,3	108
225 M	43	139
250 M	52	167
280 S	69	223
280 M	81	261
315 SM	113	363
315 MA	119	382
315 MC	140	449
315 MD	166	531
355 LX	201	644
355 LW	245	784
355 LY	289	924
400 LX	328	1050
400 LW	394	1260
400 LY	490	1586

1500 min^{-1} = 4 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 M	10,2	67
160 L	13,5	88
180 M	16,2	106
180 L	20,2	131
200 L	26,7	173
225 S	34,3	222
225 M	42	270
250 M	49	318
280 S	72	463
280 M	86	556
315 SM	109	699
315 MA	122	787
315 MC	138	889
315 MD	175	1124
355 LX	219	1400
355 LW	262	1680
355 LY	289	1848
400 LX	328	2100
400 LW	394	2520
400 LY	490	3136

1000 min^{-1} = 6 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 M	7,4	74
160 L	11,4	113
180 L	14,7	144
200 LA	16,7	164
200 LB	20	197
225 M	28,2	276
250 M	34,3	336
280 S	41	404
280 M	53	520
315 SM	-	-
315 MA	87	841
315 MB	109	1057
315 MC	133	1286
315 MD	136	1319
355 LX	175	1686
355 LW	219	2107
355 LY	245	2360
400 LX	276	2647
400 LW	310	2983
400 LY	350	3354

750 min^{-1} = 8 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 MA	4,2	56
160 MB	5,3	70
160 L	7,4	98
180 L	11,3	149
200 L	14	184
225 S	16,7	218
225 M	20,4	267
250 M	30,4	397
280 S	39,6	514
280 M	48,2	626
315 SM	-	-
315 MA	83,2	1072
315 MC	96,4	1243
315 MD	114,1	1471
355 LX	140	1804
355 LW	175	2246
355 LY	192	2467
400 LX	219	2800
400 LW	245	3136
400 LY	276	3528

If the requested frequency range is different than that indicated in the tables, the torque values must be recalculated by multiplying the table values with a corrective factor Kc (found in figure 1) relative to the maximum frequency requested.

When constant resistant torque is requested, the power value can be obtained by multiplying the above data by the smaller of the two corrective factors Kc found in figure 1, correspondent to the minimum and the maximum frequency values of the speed range.

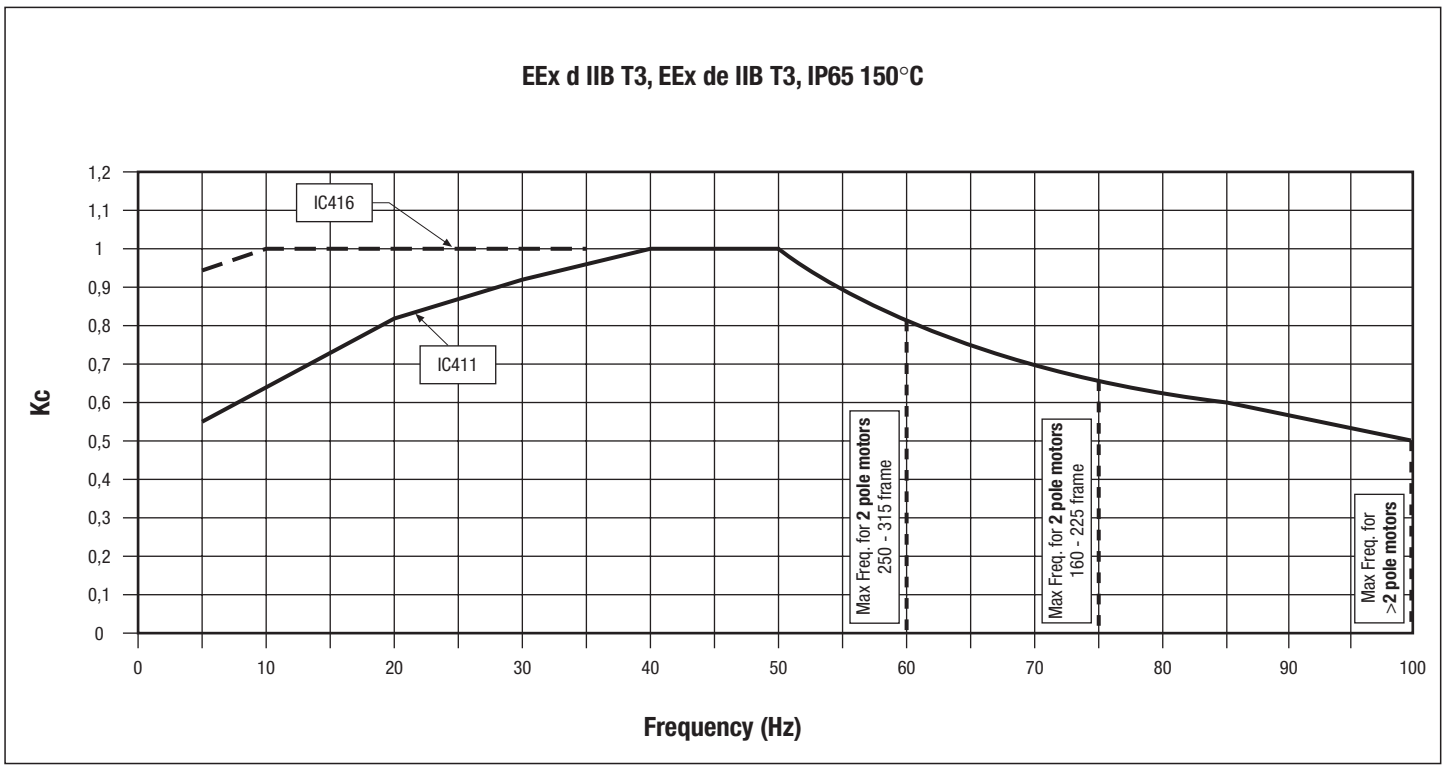


Figure 1: Corrective Factor Kc.

The following tables give the outputs of self-ventilated motors (IC411), fed by frequency converter for quadratic torque loads.

3000 min^{-1} = 2 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 MA	8,8	29
160 MB	12	39
160 L	14,8	48
180 M	17,6	57
200 LA	24	78
200 LB	29,6	96
225 M	36	116
250 M	44	142
280 S	60	193
280 M	72	232
315 SM	88	282
315 MA	106	339
315 MC	128	410
315 MD	160	512
355 LX	160	512
355 LW	200	640
355 LY	224	717
400 LX	264	845
400 LW	320	1024
400 LY	400	1281

1500 min^{-1} = 4 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 M	8,8	58
160 L	12	78
180 M	14,8	97
180 L	17,6	115
200 L	24	156
225 S	30	191
225 M	36	233
250 M	44	285
280 S	60	387
280 M	72	464
315 SM	88	564
315 MA	106	678
315 MC	128	822
315 MD	160	1028
355 LX	168	1076
355 LW	216	1383
355 LY	240	1537
400 LX	264	1690
400 LW	320	2049
400 LY	400	2561

1000 min^{-1} = 6 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 M	6	59
160 L	8,8	87
180 L	12	118
200 LA	14,8	146
200 LB	17,6	173
225 M	24	235
250 M	30	290
280 S	39	350
280 M	44	428
315 SM	-	-
315 MA	72	697
315 MB	88	852
315 MC	106	1023
315 MD	128	1240
355 LX	128	1233
355 LW	184	1773
355 LY	200	1927
400 LX	224	2148
400 LW	252	2416
400 LY	200	2685

750 min^{-1} = 8 poles - 50 Hz

MOTOR TYPE	QUADRATIC TORQUE 5 - 50 Hz	
	P_n (kW)	T_n (Nm)
160 MA	3,2	43
160 MB	4,4	58
160 L	6	80
180 L	8,8	116
200 L	12	158
225 S	14,8	193
225 M	17,6	230
250 M	24	314
280 S	30	384
280 M	36	467
315 SM	44	567
315 MA	60	774
315 MC	72	928
315 MD	88	1134
355 LX	120	1547
355 LW	144	1849
355 LY	160	2052
400 LX	184	2356
400 LW	200	2561
400 LY	224	2868

If the requested frequency range is different than that indicated in the tables, the torque values must be recalculated by multiplying the table values with a corrective factor Kc (found in figure 2) relative to the maximum frequency requested.

When constant resistant torque is requested, the power value can be obtained by multiplying the above data by the smaller of the two corrective factors Kc found in figure 2, correspondent to the minimum and the maximum frequency values of the speed range.

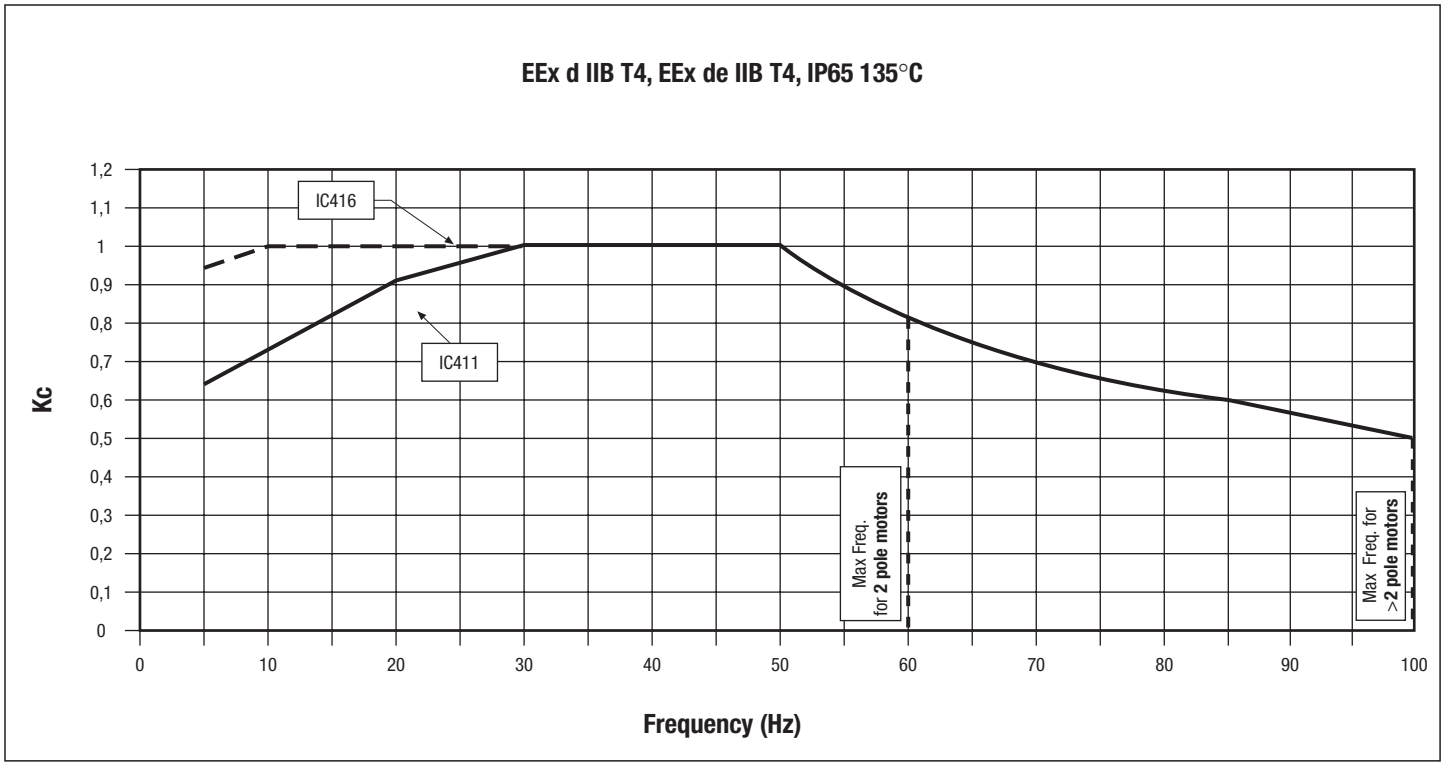


Figure 2: Corrective Factor Kc.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min	EFFICIENCY η %	POWER FACTOR cos φ	RATED CURRENT I A	RATED TORQUE Tn Nm	PERFORMANCE AT FULL VOLTAGE: STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
3000 min^{-1} = 2 poles - 50 Hz										**Temperature Class T1 ÷ T4, T 135°C**		
11	**15**	**160 MA2**	2920	88,4	0,82	21,9	36	6,2	2,2	2,8	0,030	155
15	**18,5**	**160 MB2**	2925	89,8	0,83	29,0	49	6,4	2,2	3,0	0,035	160
18,5	**22**	**160 L2**	2925	90,0	0,81	36,7	60	6,8	2,3	3,0	0,040	165
22	**30**	**180 M2**	2930	90,5	0,84	41,8	72	6,8	2,4	3,0	0,048	188
30	**37**	**200 LA2**	2945	92,0	0,87	54	97	6,7	2,3	2,9	0,165	250
37	**45**	**200 LB2**	2945	92,2	0,87	67	120	6,9	2,4	3,0	0,180	260
45	**55**	**225 M2**	2960	92,5	0,88	80	145	6,6	2,4	3,0	0,225	320
55	**75**	**250 M2**	2960	93,0	0,87	98	177	6,7	2,4	3,0	0,250	360
75	**90**	**280 S2**	2960	93,6	0,87	133	242	6,8	2,3	2,7	0,350	575
90	**110**	**280 M2**	2960	94,2	0,88	157	290	7,2	2,3	2,7	0,416	630
110	**132**	**315 SM2**	2975	94,3	0,87	194	353	6,4	2,4	2,4	0,95	1050
132	**160**	**315 MA2**	2970	94,3	0,86	235	424	6,5	2,5	2,5	0,95	1050
160	**200**	**315 MC2**	2975	94,4	0,87	281	513	6,5	2,5	2,5	1,12	1115
200	**250**	**315 MD2**	2980	94,7	0,87	351	640	6,5	2,5	2,5	1,30	1195
1500 min^{-1} = 4 poles - 50 Hz										**Temperature Class T1 ÷ T4, T 135°C**		
11	**15**	**160 M4**	1455	88,6	0,81	22,1	72	5,2	2,0	2,1	0,034	165
15	**18,5**	**160 L4**	1460	89,4	0,81	29,9	98	5,8	2,2	2,4	0,075	182
18,5	**22**	**180 M4**	1460	90,0	0,82	36,2	121	6,2	2,3	2,5	0,090	190
22	**30**	**180 L4**	1465	90,5	0,84	41,8	143	6,3	2,4	2,5	0,110	240
30	**37**	**200 L4**	1470	91,6	0,84	56	195	6,4	2,4	2,8	0,180	270
37	**45**	**225 S4**	1475	92,5	0,86	67	239	6,5	2,3	2,8	0,320	325
45	**55**	**225 M4**	1475	92,5	0,86	82	291	6,5	2,4	2,8	0,410	342
55	**75**	**250 M4**	1475	93,0	0,87	98	356	6,4	2,3	2,6	0,520	410
75	**90**	**280 S4**	1480	93,7	0,86	134	483	7,0	2,5	2,3	0,885	608
90	**110**	**280 M4**	1480	93,9	0,88	157	580	7,1	2,7	2,4	1,060	665
110	**132**	**315 SM4**	1488	93,6	0,85	200	705	6,5	2,6	2,6	2,10	1080
132	**160**	**315 MA4**	1485	94,5	0,85	237	848	6,2	2,5	2,5	2,10	1080
160	**200**	**315 MC4**	1485	94,8	0,85	287	1028	6,2	2,5	2,5	2,50	1210
200	**250**	**315 MD4**	1485	95,3	0,86	353	1285	6,5	2,5	2,6	3,10	1370
1000 min^{-1} = 6 poles - 50 Hz										**Temperature Class T1 ÷ T4, T 135°C**		
7,5	**11**	**160 M6**	965	86,0	0,82	15,4	74	5,0	2,2	2,3	0,087	175
11	**15**	**160 L6**	967	88,0	0,82	22,0	108	5,5	2,3	2,5	0,110	182
15	**18,5**	**180 L6**	970	88,2	0,82	30,0	147	5,2	2,3	2,2	0,130	231
18,5	**22**	**200 LA6**	970	88,2	0,83	36,5	182	5,2	2,1	2,3	0,170	250
22	**30**	**200 LB6**	972	89,0	0,83	43	216	5,5	2,4	2,4	0,220	270
30	**37**	**225 M6**	975	90,5	0,84	58	294	6,2	2,4	2,4	0,470	330
37	**45**	**250 M6**	975	91,0	0,84	70	362	6,5	2,6	2,6	0,570	400
45	**55**	**280 S6**	980	92,5	0,84	84	440	6,0	2,5	2,5	0,850	560
55	**75**	**280 M6**	980	93,0	0,83	103	535	6,0	2,5	2,5	1,075	665
75	**90**	**315 SM6**	985	94,0	0,83	136	730	6,3	2,6	2,6	2,60	1000
90	**110**	**315 MA6**	985	94,0	0,85	163	872	6,0	2,5	2,5	2,60	1000
110	**132**	**315 MB6**	985	94,0	0,84	199	1065	6,0	2,5	2,5	3,00	1070
132	**160**	**315 MC6**	985	93,3	0,85	238	1278	6,3	2,5	2,5	3,60	1180
143	**200**	**315 MD6**	985	94,8	0,86	253	1385	6,3	2,5	2,5	4,40	1310

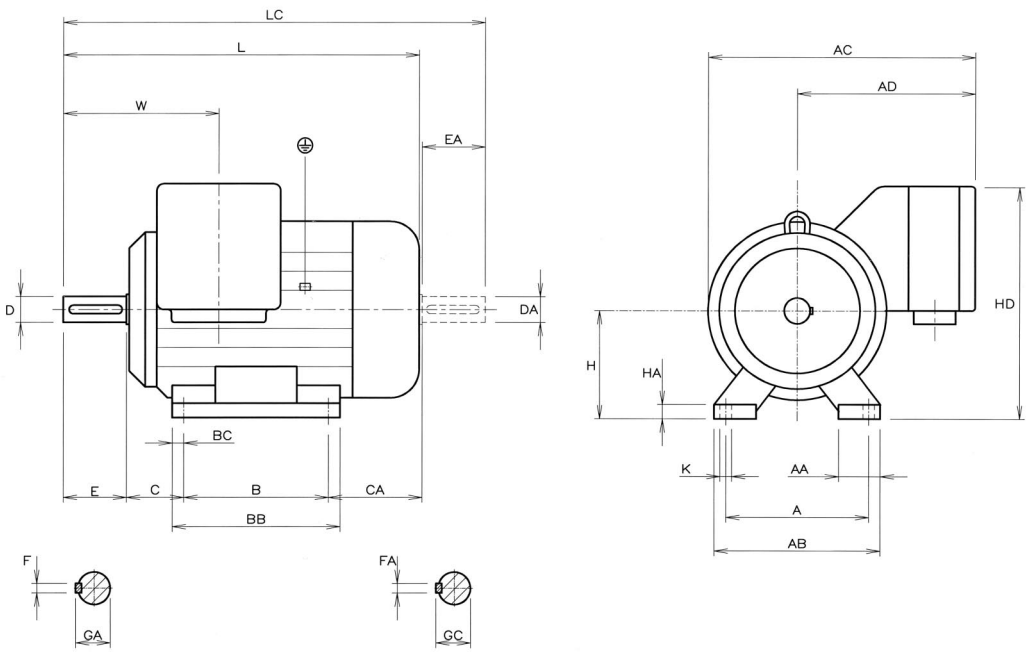
Is = Starting current, **Ts** = Starting torque, Tmax = Breakdown torque.
The motors shown on this page are not multivoltage.

RATED OUTPUT kW 50 Hz	RATED OUTPUT kW 60 Hz	MOTOR TYPE	PERFORMANCE AT RATED OUTPUT: SPEED n 1/min	EFFICIENCY η %	POWER FACTOR cos φ	RATED CURRENT (400V) I A	RATED TORQUE Tn Nm	DATA AT FULL VOLTAGE: STARTING CURRENT Is/In p.u.	STARTING TORQUE Ts/Tn p.u.	BREAKDOWN TORQUE TMAX/Tn p.u.	MOMENT OF INERTIA J kgm²	WEIGHT IM 1001 Approx. kg
750 min^{-1} = 8 poles - 50 Hz												**Temperature Class T1 ÷ T4, T 135°C**
4		**160 MA8**	710	81,0	0,73	9,8	54	4,2	1,9	2,1	0,080	140
5,5		**160 MB8**	720	82,4	0,74	13,0	73	4,2	1,9	2,1	0,092	151
7,5		**160 L8**	720	84,7	0,74	17,3	99	4,2	2,0	2,1	0,110	184
11		**180 L8**	725	86,7	0,75	24,4	145	4,5	2,0	2,2	0,160	255
15		**200 L8**	725	88,0	0,75	32,8	197	5,0	2,1	2,3	0,220	280
18,5		**225 S8**	730	89,0	0,76	39,5	242	5,2	2,2	2,4	0,420	324
22		**225 M8**	730	90,0	0,76	46,4	288	5,3	2,2	2,4	0,520	340
30		**250 M8**	730	91,0	0,76	63	392	5,5	2,3	2,5	0,620	405
37		**280 S8**	735	92,5	0,80	72	480	6,0	2,5	2,5	1,05	505
45		**280 M8**	735	93,0	0,80	87	569	6,0	2,5	2,5	1,25	640
55		**315 SM8**	740	93,5	0,82	104	709	6,5	2,3	2,4	2,8	1050
75		**315 MA8**	740	93,8	0,82	139	967	6,0	2,1	2,2	2,8	1050
90		**315 MC8**	740	94,4	0,83	166	1160	6,2	2,2	2,3	3,5	1280
110		**315 MD8**	740	94,5	0,83	202	1418	6,2	2,2	2,3	4,0	1370
132		**315 ME8**	740	94,6	0,83	243	1702	6,2	2,2	2,3	4,3	1440

Is = Starting current, **Ts** = Starting torque, **Tmax** = Breakdown torque.
The motors shown on this page are not multivoltage.

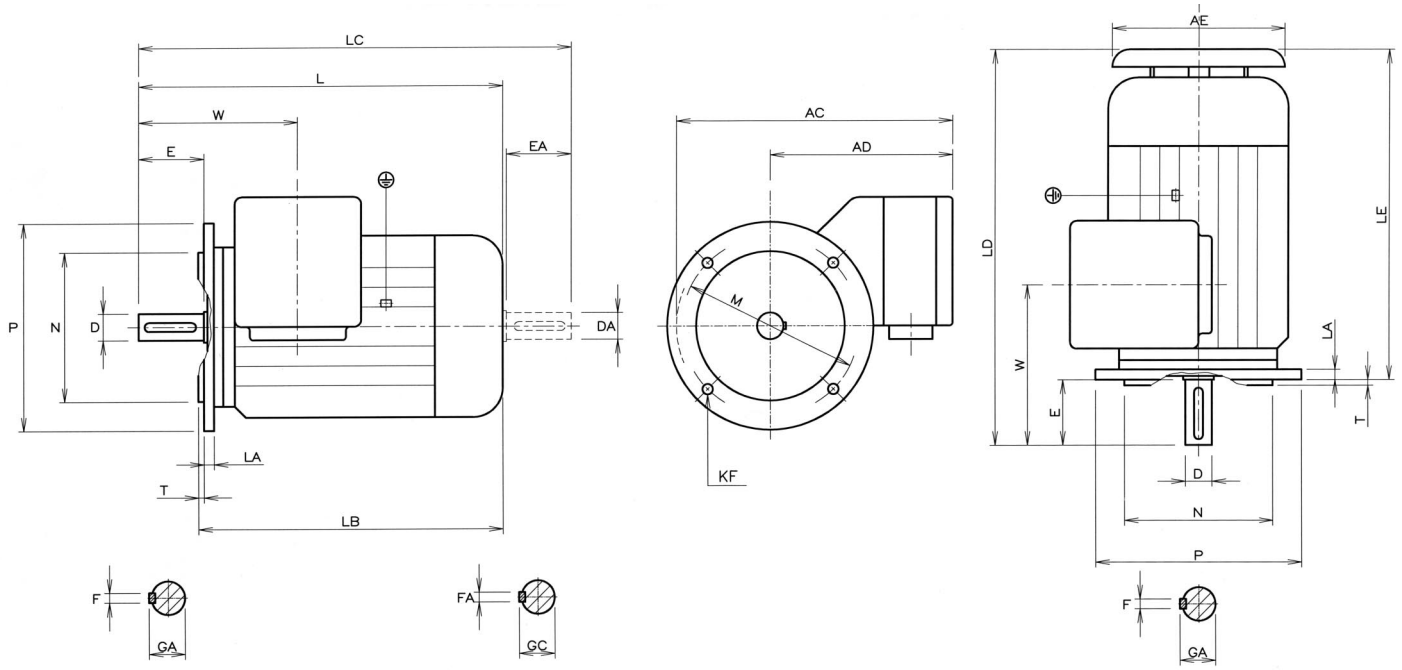
RATED OUTPUT kW		MOTOR TYPE	PERFORMANCE AT RATED OUTPUT		DATA AT FULL VOLTAGE				INERTIA	WEIGHT (IM 1001)
			SPEED	RATED CURRENT (400V)	STARTING CURRENT		STARTING TORQUE			
			n	I	I_s/I_n		T_s/T_n		J	Approx.
			min^{-1}	A	p.u.		p.u.		kgm^2	kg
2 / 4 poles = 3000 / 1500 min^{-1} - 50 Hz - single winding - YY / Δ connection										**Temperature Class T1 ÷ T3, T 150°C**
11	**9**	**160 M**	2880	1450	22,8	18,5	5,5	5,5	1,8	2,0	0,062	165
14	**12**	**160 L**	2890	1460	27,6	23,8	6,0	6,0	2,0	2,3	0,075	182
18,5	**16**	**180 M**	2900	1460	36,1	31,4	6,0	6,0	2,0	2,3	0,090	190
22	**18,5**	**180 LA**	2920	1460	42,8	35,2	6,5	6,0	2,2	2,2	0,110	240
25	**21**	**180 LB**	2920	1465	48,5	40,0	6,5	6,0	2,2	2,2	0,150	251
30	**26**	**200 L**	2920	1465	58	49	7,0	6,5	2,2	2,0	0,190	270
37	**31**	**225 S**	2930	1465	68	56	7,5	6,5	2,2	2,2	0,370	325
45	**37**	**225 M**	2930	1470	82	67	7,5	6,5	2,2	2,2	0,400	342
55	**45**	**250 M**	2930	1470	100	81	7,5	6,5	2,2	2,2	0,500	360
70	**59**	**280 S**	2940	1470	124	105	7,0	6,3	2,0	2,2	0,910	616
80	**70**	**280 M**	2940	1470	143	124	7,2	6,5	2,0	2,2	1,050	673
95	**80**	**315 SM**	2940	1470	171	147	7,2	6,5	2,0	2,2	1,15	1082
110	**95**	**315 MA**	2945	1475	193	167	7,5	6,5	2,2	2,4	2,10	1082
130	**110**	**315 MC**	2945	1475	223	190	7,5	6,8	2,2	2,4	2,50	1213
160	**132**	**315 MD**	2945	1475	276	228	7,5	6,8	2,2	2,4	3,10	1373
4 / 6 poles = 1500 / 1000 min^{-1} - 50 Hz - two separate windings										**Temperature Class T1 ÷ T3, T 150°C**
6,6	**4,4**	**160 M**	1470	965	12,8	9,0	6,0	5,0	1,9	2,0	0,063	165
8,8	**6**	**160 L**	1475	970	17,1	12,4	6,5	5,5	2,2	2,2	0,075	182
11	**7,5**	**180 M**	1475	970	20,9	15,2	6,8	5,8	2,2	2,2	0,090	190
13	**9**	**180 LA**	1475	970	24,7	18,1	7,0	6,5	2,2	2,2	0,160	217
15	**10**	**180 LB**	1475	970	28,5	20,0	7,0	6,5	2,0	2,2	0,220	224
18,5	**12,5**	**200 L**	1475	970	35	25	7,0	6,5	2,0	2,2	0,270	247
25	**16**	**225 S**	1475	970	43	28	6,5	6,5	2,0	2,2	0,420	313
30	**20**	**225 M**	1475	970	52	36	7,0	7,0	2,0	2,2	0,520	337
40	**27**	**250 M**	1480	975	73	50	7,0	7,0	2,0	2,2	0,670	409
51	**34**	**280 S**	1480	980	93	62	6,5	6,0	2,0	2,2	1,050	566
63	**42**	**280 M**	1480	980	114	76	6,5	6,0	2,0	2,2	1,250	598
70	**47**	**315 SM**	1480	980	124	86	6,5	6,2	2,0	2,2	1,43	1004
85	**55**	**315 MA**	1480	980	147	100	6,5	6,0	1,6	2,0	2,60	1004
103	**70**	**315 MB**	1480	980	181	124	6,5	6,0	1,8	2,0	3,00	1072
118	**80**	**315 MC**	1480	980	209	143	6,5	6,0	1,8	2,0	3,60	1182
140	**90**	**315 MD**	1480	980	247	162	6,5	6,0	1,8	2,0	4,45	1312
4 / 8 poles = 1500 / 750 min^{-1} - 50 Hz - single winding - YY / Δ connection										**Temperature Class T1 ÷ T3, T 150°C**
7	**4**	**160 MA**	1460	710	13,3	10,0	6,0	4,5	1,8	1,8	0,087	175
8	**5**	**160 MB**	1460	715	15,2	12,4	6,0	4,5	1,8	1,8	0,093	178
11	**6,5**	**160 L**	1460	725	20,9	16,2	6,0	4,5	1,8	1,8	0,110	194
15	**9**	**180 LA**	1465	730	28,5	20,9	6,0	5,0	2,0	2,0	0,160	255
18,5	**11**	**180 LB**	1465	730	36,1	24,7	6,0	5,0	2,0	2,0	0,220	262
21	**13**	**200 L**	1465	735	41	29	6,5	6,0	2,0	2,2	0,270	283
23	**15**	**225 S**	1470	735	44	33	7,0	6,0	2,2	2,2	0,420	324
32	**22**	**225 M**	1470	735	57	49	7,0	6,0	2,2	2,2	0,570	340
40	**26**	**250 M**	1470	735	71	57	7,0	6,0	2,2	2,2	0,620	405
51	**31**	**280 S**	1475	740	90	67	6,5	5,5	2,0	2,0	1,050	608
63	**37**	**280 M**	1475	740	107	78	6,5	5,5	2,0	2,0	1,250	644
66	**45**	**315 SM**	1480	735	114	95	6,8	5,7	2,0	2,2	1,37	1040
80	**52**	**315 MA**	1480	740	140	105	6,5	5,5	2,0	2,0	2,62	1040
95	**63**	**315 MB**	1480	740	163	125	6,5	5,5	2,0	2,0	3,00	1070
110	**75**	**315 MC**	1480	740	185	147	6,5	5,5	2,0	2,0	3,60	1183
132	**88**	**315 MD**	1480	740	223	171	6,5	5,5	2,0	2,0	4,40	1313
6 / 8 poles = 1000 / 750 min^{-1} - 50 Hz - two separate windings										**Temperature Class T1 ÷ T3, T 150°C**
3,7	**2,6**	**160 MA**	965	710	7,6	5,7	5,5	4,5	1,7	1,7	0,087	175
4,4	**3,3**	**160 MB**	965	715	9,0	7,3	6,0	4,8	1,8	1,7	0,092	178
6	**4,4**	**160 L**	970	725	11,9	9,5	6,0	5,0	1,8	1,8	0,110	194
7,5	**5,5**	**180 LA**	970	730	14,3	11,9	6,0	5,0	1,8	1,8	0,160	255
9	**6,5**	**180 LB**	970	730	17,1	13,8	6,0	5,0	1,8	1,8	0,220	262
10,5	**8**	**200 L**	970	735	20	17	6,0	5,8	1,8	1,8	0,270	283
15	**11**	**225 S**	975	735	28	23	6,0	6,0	1,8	1,8	0,420	324
19	**15**	**225 M**	975	735	35	20	6,0	6,0	1,8	1,8	0,520	340
25	**18,5**	**250 M**	975	735	51	41	6,0	6,0	1,8	1,8	0,670	405
35	**26**	**280 S**	975	740	65	51	6,0	5,5	1,8	1,8	1,050	608
43	**32**	**280 M**	975	740	78	62	6,0	5,5	1,8	1,8	1,250	644
48	**37**	**315 SM**	980	740	87	71	6,0	5,5	1,8	1,8	2,81	1040
60	**45**	**315 MA**	980	740	109	87	6,0	5,5	1,8	1,8	2,62	1040
70	**52**	**315 MB**	980	740	128	100	6,0	5,5	1,8	1,8	3,00	1070
77	**60**	**315 MC**	980	740	141	114	6,0	5,5	1,8	1,8	3,60	1183
100	**75**	**315 MD**	980	740	181	143	6,0	5,5	1,8	1,8	4,40	1313

I_s = Starting current, T_s = Starting torque.The motors shown on this page are not multivoltage.



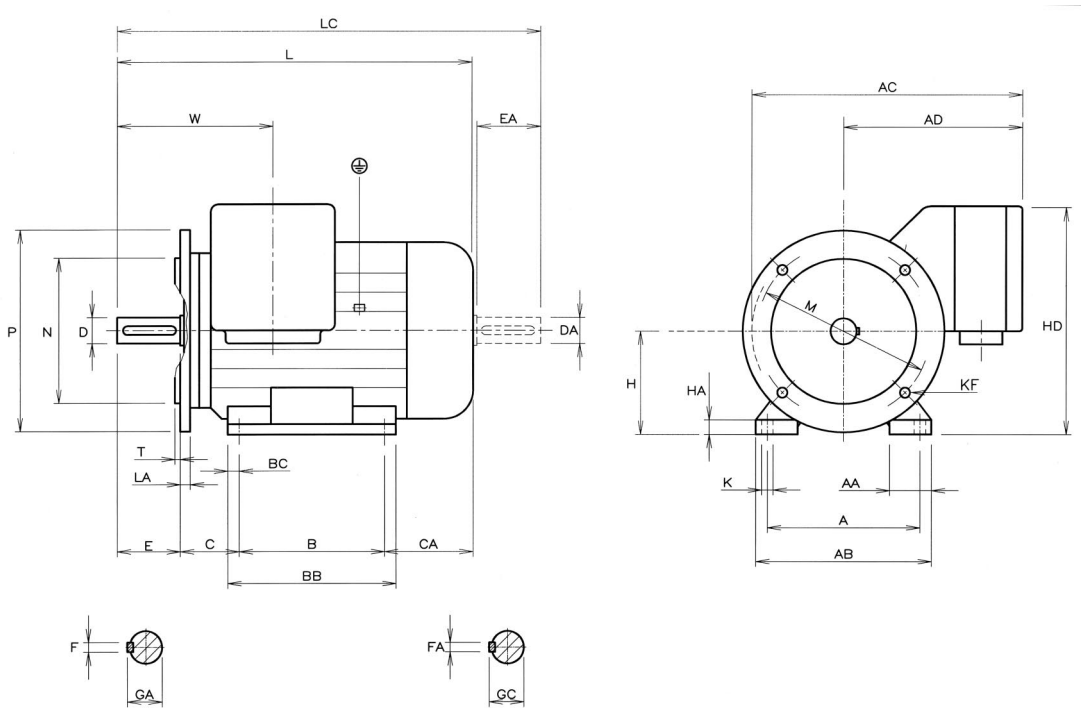
FRAME SIZE		A	AA	AB	AC	AD	B	BB	BC	C	CA	H	HA	HD	K
71		112	26	135	255	175	90	110	10	45	104	71	8	161	7
80		125	25	150	275	185	100	125	12,5	50	112	80	8	180	9
90	S	140	30	175	312	192	100	125	12,5	56	111	90	10	206	9
	L	140	30	175	302	192	125	150	12,5	56	126	90	10	206	9
100	L	160	31	195	336	214	140	170	15	63	138	100	12	240	12
112	M	190	39	225	336	214	140	170	15	70	171	112	12	252	12
132	S	216	41	255	386	236	140	185	22,5	89	168	132	15	273	12
	M	216	41	255	386	236	178	223	22,5	89	168	132	15	273	12

FRAME SIZE		L	LD	LC	W	SHAFT EXTENSION							
						D	E	F	GA	DA	EA	FA	GC
71		266	297	299	120	14	30	5	16	14	30	5	16
80		299	330	342	130	19	40	6	21,5	19	40	6	21,5
90	S	314	345	367	142	24	50	8	27	24	50	8	27
	L	354	385	407	142	24	50	8	27	24	50	8	27
100	L	397	425	461	162	28	60	8	31	28	60	8	31
112	M	437	468	501	172	28	60	8	31	28	60	8	31
132	S	473	504	557	202	38	80	10	41	38	80	10	41
	M	511	542	595	202	38	80	10	41	38	80	10	41



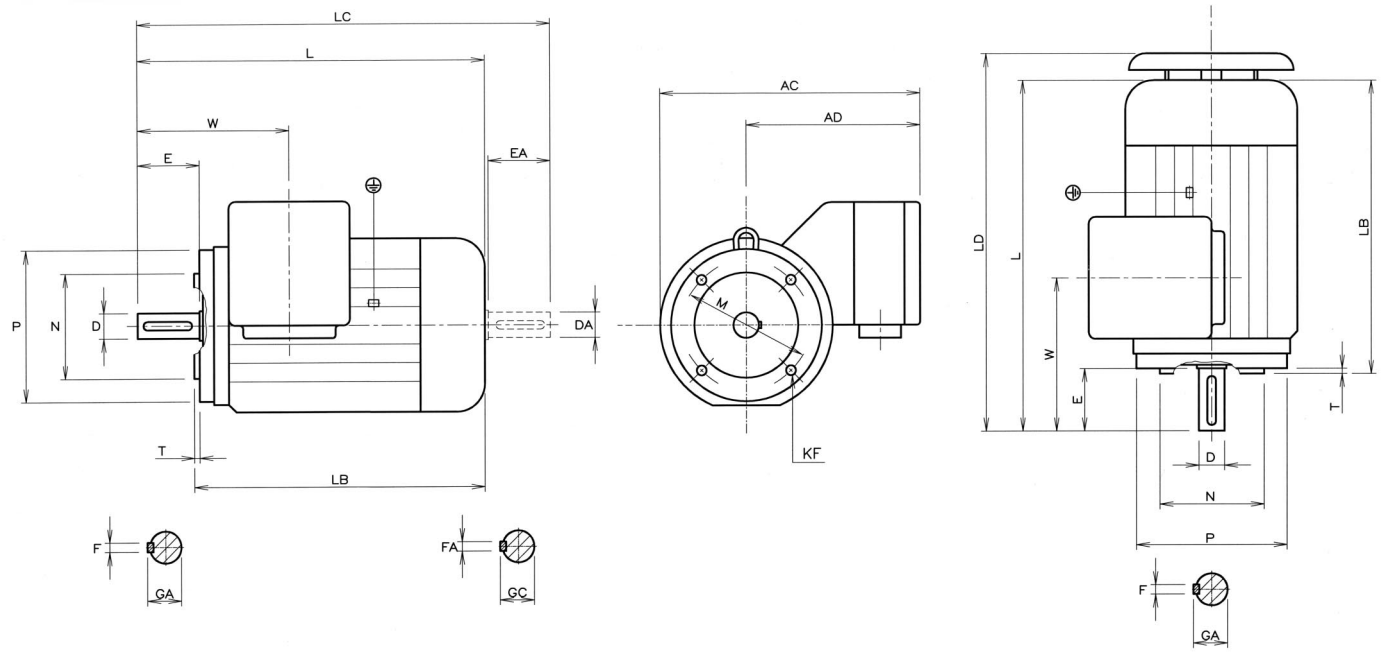
FRAME SIZE		AC	AD	AE	L	LB	LC	LD	W	LE	SHAFT EXTENSION							
											D	E	F	GA	DA	EA	FA	GC
71		255	175	125	266	239	299	297	120	267	14	30	5	16	14	30	5	16
80		275	185	182	299	262	342	330	130	290	19	40	6	21,5	19	40	6	21,5
90	S	304	192	182	314	267	367	345	142	295	24	50	8	27	24	50	8	27
	L	304	192	182	354	307	407	328	142	335	24	50	8	27	24	50	8	27
100	L	336	214	212	397	341	461	428	172	368	28	60	8	31	28	60	8	31
112	M	336	214	212	437	381	501	468	172	408	28	60	8	31	28	60	8	31
132	S	386	236	264	473	397	557	504	202	424	38	80	10	41	38	80	10	41
	M	386	236	264	511	435	595	542	202	462	38	80	10	41	38	80	10	41

FRAME SIZE		FLANGE B5					
		M	N	P	LA	KF	T
71		130	110	160	6	9,5	3,5
80		165	130	200	9	11,5	3,5
90	S	165	130	200	9	11,5	3,5
	L	165	130	200	9	11,5	3,5
100	L	215	180	250	14	14,0	4
112	M	215	180	250	14	14,0	4
132	S	265	230	300	14	14,0	4
	M	265	230	300	14	14,0	4



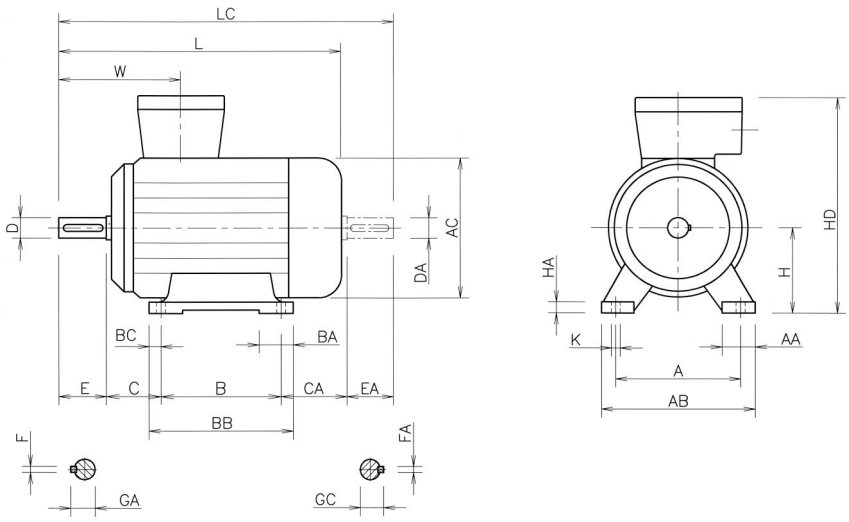
FRAME SIZE		A	AA	AB	AC	AD	B	BB	BC	C	CA	H	HA	HD	K
71		112	26	135	255	175	90	110	10	45	104	71	8	161	7
80		125	25	150	275	185	100	125	12,5	50	112	80	8	180	9
90	S	140	30	175	312	192	100	125	12,5	56	111	90	10	206	9
	L	140	30	175	302	192	125	150	12,5	56	126	90	10	206	9
100	L	160	31	195	336	214	140	170	15	63	138	100	12	240	12
112	M	190	39	225	336	214	140	170	15	70	171	112	12	252	12
132	S	216	41	255	386	236	140	185	22,5	89	168	132	15	273	12
	M	216	41	255	386	236	178	223	22,5	89	168	132	15	273	12

FRAME SIZE						FLANGE B5						SHAFT EXTENSION							
		L	LD	LC	W	M	N	P	LA	KF	T	D	E	F	GA	DA	EA	FA	GC
71		266	297	299	120	130	110	160	6	9,5	3,5	14	30	5	16	14	30	5	16
80		299	330	342	130	165	130	200	9	11,5	3,5	19	40	6	21,5	19	40	6	21,5
90	S	314	345	367	142	165	130	200	9	11,5	3,5	24	50	8	27	24	50	8	27
	L	354	385	407	142	165	130	200	9	11,5	3,5	24	50	8	27	24	50	8	27
100	L	397	425	461	162	215	180	250	14	14,0	4	28	60	8	31	28	60	8	31
112	M	437	468	501	172	215	180	250	14	14,0	4	28	60	8	31	28	60	8	31
132	S	473	504	557	202	265	230	300	14	14,0	4	38	80	10	41	38	80	10	41
	M	511	542	595	202	265	230	300	14	14,0	4	38	80	10	41	38	80	10	41



FRAME SIZE		AC	AD	AE	L	LB	LC	LD	W	FLANGE B 14				
										M	N	P	KF	T
71		255	175	125	266	239	299	297	120	85	70	105	M6	2,5
80		275	185	182	299	262	342	330	130	100	80	120	M6	3,0
90	S	304	192	182	314	267	367	345	142	115	95	140	M8	3,0
	L	304	192	182	354	307	407	328	142	115	95	140	M8	3,0
100	L	336	214	212	397	341	461	428	172	130	110	160	M8	3,5
112	M	336	214	212	437	381	501	468	172	130	110	160	M8	3,5

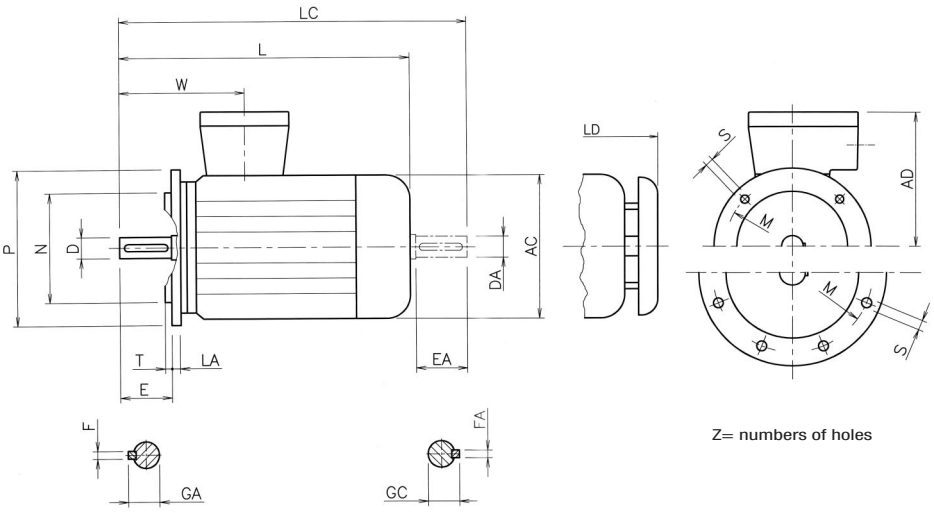
FRAME SIZE		SHAFT EXTENSION									
		D	E	F	GA	DA	GA	DA	EA	FA	GC
71		14	30	5	16	14	16	14	30	5	16
80		19	40	6	21,5	19	21,5	19	40	6	21,5
90	S	24	50	8	27	24	27	24	50	8	27
	L	24	50	8	27	24	27	24	50	8	27
100	L	28	60	8	31	28	31	28	60	8	31
112	M	28	60	8	31	28	31	28	60	8	31



FRAME SIZE		POLES	A	AA	AB	AC	B	BA	BB	BC	C	CA	H	HA	HD	K	L
D5_160	M	2-8	254	55	300	314	210	95	296	21	108	223	160	22	446	14	648
	L		254	55	300	314	254	95	296	21	108	179	160	22	446	14	648
D5_180	M	2-4	279	58	324	314	241	65	283	21	121	179	180	24	466	14	648
	L	4-8	279	58	324	354	279	90	321	21	121	216	180	24	488	14	723
D5_200	L	2-8	318	63	368	354	305	75	350	22,5	133	178	200	24	508	18	723
D5_225	S	4-8	356	76	406	411	286	100	360	24,5	149	260	225	28	593	18	830
	M	2	356	76	406	411	311	100	360	24,5	149	235	225	28	593	18	800
		4-8	356	76	406	411	311	100	360	24,5	149	235	225	28	593	18	830
D5_250	M	2	406	90	465	411	349	95	406	28,5	168	178	250	28	618	22	830
		4-8	406	90	465	411	349	95	406	28,5	168	178	250	28	618	22	830
D5_280	S	2	457	90	540	490	368	110	480	30,5	190	272	280	40	710	22	960
		4-8	457	90	540	490	368	110	480	30,5	190	272	280	40	710	22	960
	M	2	457	90	540	490	419	110	480	30,5	190	221	280	40	710	22	960
		4-8	457	90	540	490	419	110	480	30,5	190	221	280	40	710	22	960
D5_315	SM	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102
	SM	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132
	MA	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102
	MA-MC	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132
	MD	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102
	MD-ME	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132

FRAME SIZE		POLES	LC	W	SHAFT EXTENSION							
					D	E	F	GA	DA	EA	FA	GC
D5_160	M	2-8	761	279	42	110	12	45	42	110	12	45
	L		761	279	42	110	12	45	42	110	12	45
D5_180	M	2-4	761	279	48	110	14	51,5	42	110	12	45
	L	4-8	836	296	48	110	14	51,5	42	110	12	45
D5_200	L	2-8	836	296	55	110	16	59	42	110	12	45
D5_225	S	4-8	945	318	60	140	18	64	55	110	16	59
	M	2	915	288	55	110	16	59	55	110	16	59
		4-8	945	318	60	140	18	64	55	110	16	59
D5_250	M	2	945	318	60	140	18	64	55	110	16	59
		4-8	945	318	65	140	18	69	55	110	16	59
D5_280	S	2	1110	350	65	140	18	69	60	140	18	64
		4-8	1110	350	75	140	20	79,5	60	140	18	64
	M	2	1110	350	65	140	18	69	60	140	18	64
		4-8	1110	350	75	140	20	79,5	60	140	18	64
D5_315	SM	2	1252	387	65	140	18	69	60	140	18	64
	SM	4-8	1282	417	80	170	22	85	65	140	18	69
	MA	2	1252	387	65	140	18	69	60	140	18	64
	MA-MC	4-8	1282	417	80	170	22	85	65	140	18	69
	MD	2	1252	387	70	140	20	74,5	60	140	18	64
	MD-ME	4-8	1282	417	90	170	25	95	65	140	18	69

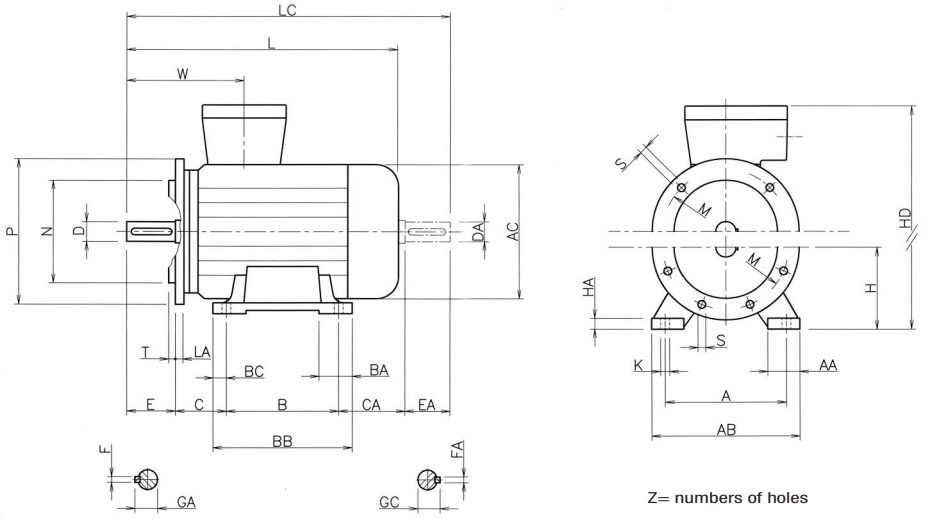
Dimensions not valid for IIC motors.



FRAME SIZE		POLES	AC	AD	L	LC	LD	W	SHAFT EXTENSION							
									D	E	F	GA	DA	EA	FA	GC
D5_160	M	2-8	314	286	648	761	710	279	42	110	12	45	42	110	12	45
	L		314	286	648	761	710	279	42	110	12	45	42	110	12	45
D5_180	M	2-4	314	286	648	761	710	279	48	110	14	51,5	42	110	12	45
	L	4-8	354	308	723	836	790	296	48	110	14	51,5	42	110	12	45
D5_200	L	2-8	354	308	723	836	790	296	55	110	16	59	42	110	12	45
D5_225	S	4-8	411	368	830	945	895	318	60	140	18	64	55	110	16	59
	M	2	411	368	800	915	865	288	55	110	16	59	55	110	16	59
		4-8	411	368	830	945	895	318	60	140	18	64	55	110	16	59
D5_250	M	2	411	368	830	945	895	318	60	140	18	64	55	110	16	59
		4-8	411	368	830	945	895	318	65	140	18	69	55	110	16	59
D5_280	S	2	490	430	960	1110	1045	350	65	140	18	69	60	140	18	64
		4-8	490	430	960	1110	1045	350	75	140	20	79,5	60	140	18	64
	M	2	490	430	960	1110	1045	350	65	140	18	69	60	140	18	64
		4-8	490	430	960	1110	1045	350	75	140	20	79,5	60	140	18	64
D5_315	SM	2	604	505	1102	1252	1177	387	65	140	18	69	60	140	18	64
	SM	4-8	604	505	1132	1282	1207	417	80	170	22	85	65	140	18	69
	MA	2	604	505	1102	1252	1177	387	65	140	18	69	60	140	18	64
	MA-MC	4-8	604	505	1132	1282	1207	417	80	170	22	85	65	140	18	69
	MD	2	604	505	1102	1252	1177	387	70	140	20	74,5	60	140	18	64
	MD-ME	4-8	604	505	1132	1282	1207	417	90	170	25	95	65	140	18	69

FRAME SIZE		POLES	FLANGE						
			LA	M	N	P	S	T	Z
D5_160	M	2-8	15	300	250	350	18	5	4
	L		15	300	250	350	18	5	4
D5_180	M	2-4	15	300	250	350	18	5	4
	L	4-8	15	300	250	350	18	5	4
D5_200	L	2-8	18	350	300	400	18	5	4
D5_225	S	4-8	16	400	350	450	18	5	8
	M	2	16	400	350	450	18	5	8
		4-8	16	400	350	450	18	5	8
D5_250	M	2	18	500	450	550	18	5	8
		4-8	18	500	450	550	18	5	8
D5_280	S	2	18	500	450	550	18	5	8
		4-8	18	500	450	550	18	5	8
	M	2	18	500	450	550	18	5	8
		4-8	18	500	450	550	18	5	8
D5_315	SM	2	22	600	550	660	22	6	8
	SM	4-8	22	600	550	660	22	6	8
	MA	2	22	600	550	660	22	6	8
	MA-MC	4-8	22	600	550	660	22	6	8
	MD	2	22	600	550	660	22	6	8
	MD-ME	4-8	22	600	550	660	22	6	8

Dimensions not valid for IIC motors.

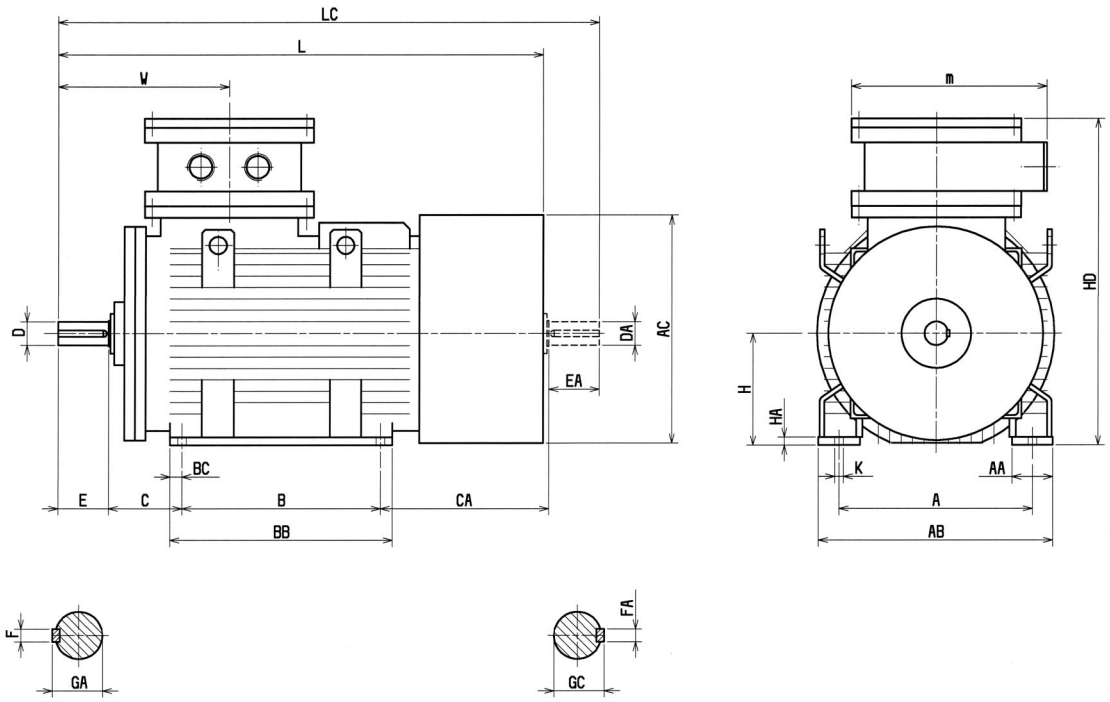


Z= numbers of holes

FRAME SIZE		POLES	A	AA	AB	AC	B	BA	BB	BC	C	CA	H	HA	HD	K	L	LC
D5_160	M	2-8	254	55	300	314	210	95	296	21	108	223	160	22	446	14	648	761
	L		254	55	300	314	254	95	296	21	108	179	160	22	446	14	648	761
D5_180	M	2-4	279	58	324	314	241	65	283	21	121	179	180	24	466	14	648	761
	L	4-8	279	58	324	354	279	90	321	21	121	216	180	24	488	14	723	836
D5_200	L	2-8	318	63	368	354	305	75	350	22,5	133	178	200	24	508	18	723	836
D5_225	S	4-8	356	76	406	411	286	100	360	24,5	149	260	225	28	593	18	830	945
	M	2	356	76	406	411	311	100	360	24,5	149	235	225	28	593	18	800	915
		4-8	356	76	406	411	311	100	360	24,5	149	235	225	28	593	18	830	945
D5_250	M	2	406	90	465	411	349	95	406	28,5	168	178	250	28	618	22	830	945
		4-8	406	90	465	411	349	95	406	28,5	168	178	250	28	618	22	830	945
D5_280	S	2	457	90	540	490	368	110	480	30,5	190	272	280	40	710	22	960	1110
		4-8	457	90	540	490	368	110	480	30,5	190	272	280	40	710	22	960	1110
	M	2	457	90	540	490	419	110	480	30,5	190	221	280	40	710	22	960	1110
		4-8	457	90	540	490	419	110	480	30,5	190	221	280	40	710	22	960	1110
D5_315	SM	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102	1252
	SM	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132	1282
	MA	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102	1252
	MA-MC	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132	1282
	MD	2	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1102	1252
	MD-ME	4-8	508	110	590	604	457	165	520	32	216	299	315	45	820	27	1132	1282

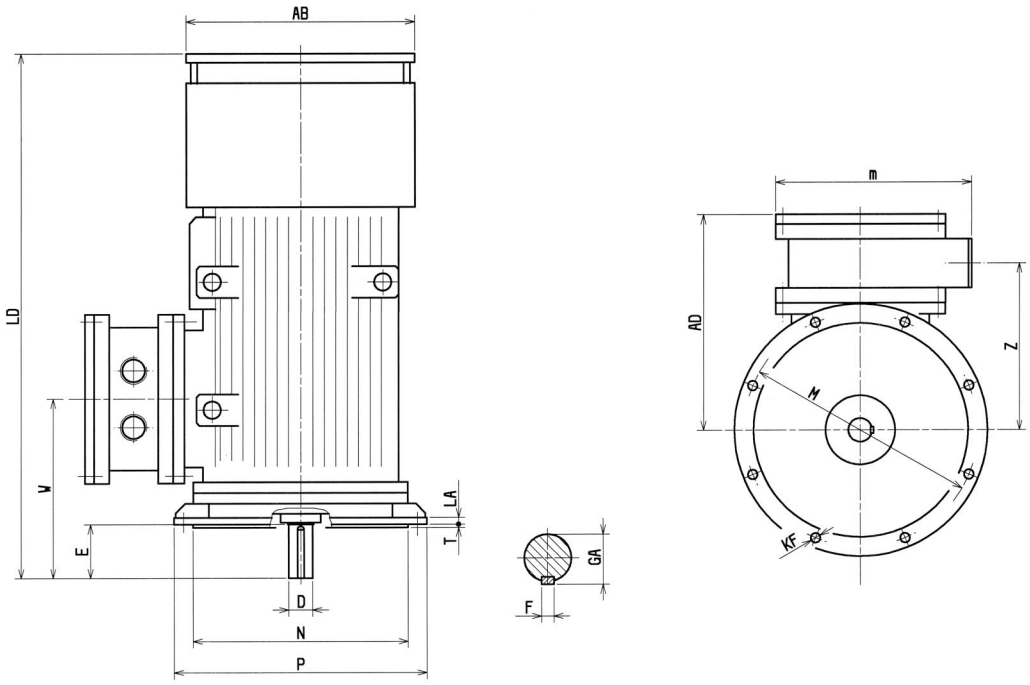
FRAME SIZE		POLES	W	SHAFT EXTENSION								FLANGE						
				D	E	F	GA	DA	EA	FA	GC	LA	M	N	P	S	T	Z
D5_160	M	2-8	279	42	110	12	45	42	110	12	45	15	300	250	350	18	5	4
	L		279	42	110	12	45	42	110	12	45	15	300	250	350	18	5	4
D5_180	M	2-4	279	48	110	14	51,5	42	110	12	45	15	300	250	350	18	5	4
	L	4-8	296	48	110	14	51,5	42	110	12	45	15	300	250	350	18	5	4
D5_200	L	2-8	296	55	110	16	59	42	110	12	45	18	350	300	400	18	5	4
D5_225	S	4-8	318	60	140	18	64	55	110	16	59	16	400	350	450	18	5	8
	M	2	288	55	110	16	59	55	110	16	59	16	400	350	450	18	5	8
		4-8	318	60	140	18	64	55	110	16	59	16	400	350	450	18	5	8
D5_250	M	2	318	60	140	18	64	55	110	16	59	18	500	450	550	18	5	8
		4-8	318	65	140	18	69	55	110	16	59	18	500	450	550	18	5	8
D5_280	S	2	350	65	140	18	69	60	140	18	64	18	500	450	550	18	5	8
		4-8	350	75	140	20	79,5	60	140	18	64	18	500	450	550	18	5	8
	M	2	350	65	140	18	69	60	140	18	64	18	500	450	550	18	5	8
		4-8	350	75	140	20	79,5	60	140	18	64	18	500	450	550	18	5	8
D5_315	SM	2	387	65	140	18	69	60	140	18	64	22	600	550	660	22	6	8
	SM	4-8	417	80	170	22	85	65	140	18	69	22	600	550	660	22	6	8
	MA	2	387	65	140	18	69	60	140	18	64	22	600	550	660	22	6	8
	MA-MC	4-8	417	80	170	22	85	65	140	18	69	22	600	550	660	22	6	8
	MD	2	387	70	140	20	74,5	60	140	18	64	22	600	550	660	22	6	8
	MD-ME	4-8	417	90	170	25	95	65	140	18	69	22	600	550	660	22	6	8

Dimensions not valido for IIC motors.



FRAME SIZE		POLES	A	AA	AB	AC	AD	AE	B	BB	BC	C	CA	H	HA	HD	K	L	LC	W
D5_355	L	2	610	130	740	750	695	755	630	706	38	254	526	355	26	1050	27	1550	1695	550
		4-8	610	130	740	750	695	755	630	706	38	254	596	355	26	1050	27	1620	1765	620
D5_400	LX - LW - LY	2	686	150	836	805	730	820	710	880	85	280	655	400	35	1130	33	1780	1925	580
	LZ		686	150	836	805	730	820	710	1025	85	280	755	400	35	1130	33	1880	2025	580
	LX - LW - LY	4-8	686	150	836	805	730	820	710	880	85	280	655	400	35	1130	33	1850	1995	650
	LZ		686	150	836	805	730	820	710	1025	85	280	755	400	35	1130	33	1950	2095	650

FRAME SIZE		POLES	SHAFT EXTENSION							
			D	E	F	GA	DA	EA	FA	GC
D5_355	L	2	75	140	20	79,5	75	140	20	79,5
		>=4	100	210	29	106	75	140	20	79,5
D5_400	L	2	75	140	20	79,5	75	140	20	79,5
		>=4	100	210	28	106	75	140	20	79,5



FRAME SIZE		POLES	AB	AD	LD	m	Z	W	SHAFT EXTENSION			
									D	E	F	GA
D5_355	L	2	755	695	1655	618	528	550	75	140	20	79,5
		4-8	755	695	1725	618	528	620	100	210	29	106
D5_400	LX - LW - LY	2	820	730	1880	618	578	580	75	140	20	79,5
	LZ		820	730	1980	618	578	580	75	140	20	79,5
	LX - LW - LY	4-8	820	730	1950	618	578	650	100	210	28	106
	LZ		820	730	2000	618	578	650	100	210	28	106

FRAME SIZE		POLES	FLANGE					
			M	N	P	LA	KF	T
D5_355	L	2	740	680	800	25	n°8x24	6
		>=4	740	680	800	25	n°8x24	6
D5_400	L	2	940	880	1000	26	n°8x28	6
		>=4	940	880	1000	26	n°8x28	6

NOTES

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