

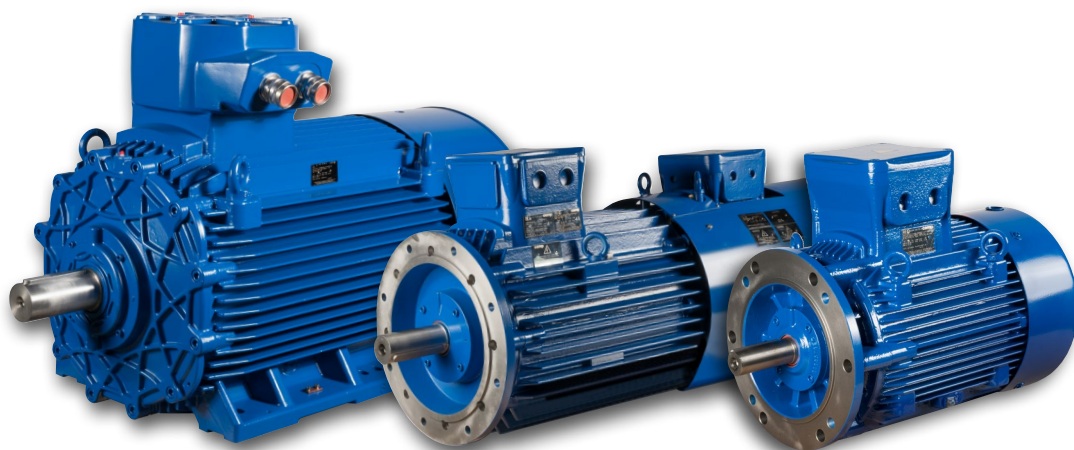
# cemp<sup>®</sup>

Flameproof  
Motors

PRODUCT CATALOG



## INDUSTRIAL HAZARDOUS AREA ELECTRIC MOTORS IE1, IE2, IE3, IE4



Kolmer Elektromotoren B.V.

Industrieweg 16  
NL-3881 LB Putten  
T +31 (0) 341 - 36 96 96  
F +31 (0) 341 - 36 96 90  
E [info@kolmer.nl](mailto:info@kolmer.nl)  
I [www.kolmer.nl](http://www.kolmer.nl)

**KOLMER** ELEKTROMOTOREN

# TABLE OF CONTENTS

(Click on each page title below to navigate the page.)

<b>0 INTRODUCTION</b>	<b>2</b>
0.1 SI units and conversion equations	2
0.2 Engineering formulae for motor drives	3
0.3 Standards and specifications	4
0.4 Protection against explosions in dangerous areas	5-10
0.5 Efficiency IE1, IE2, IE3, IE4	11-12
<b>1 GENERAL INFORMATIONS</b>	<b>13</b>
1.1 Range of motors	13-15
1.2 Common main characteristics	16
1.3 Main options	17
1.4 Nomenclature	18-19
<b>2 DESIGN FEATURES</b>	<b>20</b>
2.1 Installation and applications	20
2.2 Low temperature version and anti-condensation heating	21
2.3 Materials, painting and nameplate	21-22
2.4 Shaft ends, balancing, vibrations, noise level coupling and belt drives	22
2.5 Brake motors	23-24
2.6 Bearing system	25-26
2.7 Permissible radial loads on the shaft with standard bearings	27
2.8 Permissible axial load on the shaft with standard bearings	28
2.9 Terminal box design	29
2.10 Position of terminal box and terminals	30
2.11 Cable-entries	30
<b>3 ELECTRICAL DESIGN</b>	<b>31</b>
3.1 Standard operating conditions	31
3.2 Efficiency and power factor at partial load	32
3.3 Insulation and temperature rise	32
3.4 Duty types	33-34
3.5 Connecting diagrams	35
3.6 Brake connection diagrams	36
3.7 Hourly start-ups allowed (Braking: n° per hour)	36
3.8 Additional terminals marking	37
3.9 Protection devices	37
3.10 Frequency converter driven motors	38
<b>4 PERFORMANCE DATA</b>	<b>39</b>
4.1 Three-phase motors, 1 speed	39-42
4.2 Three-phase motors, 1 speed IE2	43-46
4.3 Three-phase motors, 1 speed IE3	47-50
4.4 Three-phase motors, 1 speed IE4	51-53
4.5 Three-phase motors, 2 speeds, (constant torque)	54-57
4.6 Three-phase motors, 2 speeds, (quadratic torque)	58-61
4.7 Single-phase motors, 1 speed	62
4.8 Three-phase motors with brake, 1 or 2 speeds	63-65
4.9 Motors energized by inverter	66-72
<b>5 OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS</b>	<b>73</b>
5.1 Mounting arrangements	73
5.2 Overall dimensions of standard and mining version motors	74-81
5.3 Overall dimensions of motors with brakes	82-87
5.4 Overall dimensions of IC416 motors	88-89
<b>6 SPARE PARTS</b>	<b>90-97</b>



# 0. INTRODUCTION

## 0.1 SI UNITS AND CONVERSION EQUATIONS

Table 0A

Description	Formular symbols	SI		Conversion equations
		Unit symbol	Unit name	
Distance	$L$	m	metre	$1 \text{ m}^3 = 1000 \text{ dm}^3$ $1 \text{ dm}^3 = 1 \text{ l}$
Area	$A$	$\text{m}^2$		
Volume	$V$	$\text{m}^3$		
Angle in one plane	$\alpha, \beta, \gamma$	rad	radian	$1^\circ = \frac{\pi}{180} \text{ rad}$ $1' = 1^\circ/60$ $1'' = 1'/60$
Time	$t$	s	second	$1 \text{ Hz} = 1/\text{s}$
Frequency	$f$	Hz	Hertz	
Speed	$n$	1/min		$1 \text{ km/h} = \frac{1}{3.6} \text{ m/s}$
Velocity	$v$	m/s		
Angular velocity	$\omega$	rad/s		
Acceleration	$a$	$\text{m/s}^2$		
Angular acceleration	$\alpha$	$\text{rad/s}^2$		
Mass	$m$	kg	kilogram	
Density	$\rho$	$\text{kg/m}^3$		
Force	$F$	N	Newton	$1 \text{ N} = 1 \text{ kg} \cdot 1 \text{ m/s}^2$ $9.81 \text{ N} = 1 \text{ kgf}$
Pressure	$p$	$\text{Pa} = \text{N/m}^2$	Pascal	$9.81 \cdot 10^4 \text{ N/m}^2 = 1 \text{ kgf/cm}^2$
Mechanical stress	$\sigma$	$\text{N/mm}^2$		$9.81 \text{ N/mm}^2 = 1 \text{ kgf/mm}^2$
Work done	$W$	$J = Nm$	Joule	$9.81 \text{ Nm} = 1 \text{ kgfm}$
Energy	$W$			$4187 \text{ J} = 1 \text{ kcal}$
Thermal quantity	$Q$			$1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$
Torque	$M$	Nm		$9.81 \text{ Nm} = 1 \text{ kgfm}$ $1 \text{ Nm} = 0.102 \text{ kgfm}$
Power	$P$	$\text{W} = \text{J/s} = \text{Nm/s}$	Watt	$735.5 \text{ W} = 1 \text{ hp}$
Moment of inertia	$J$	$\text{kg m}^2$		$9.81 \text{ kg m}^2 = 1 \text{ kpms}^2$ $\text{PD2} = 4 \text{ J}$
Dynamic viscosity	$\eta$	$\text{Pa} \cdot \text{s}$		$10^{-1} \text{ Pa} \cdot \text{s} = 1 \text{ P (Poise)}$
Kinematic viscosity	$\nu$	$\text{m}^2/\text{s}$		$10^{-4} \text{ m}^2/\text{s} = 1 \text{ St (Stokes)}$
Electric current	$I$	A	Ampere	$1 \text{ A} = 1 \text{ W/V} = 1 \text{ V}/\Omega$
Electric voltage	$U$	V	Volt	$1 \text{ V} = 1 \text{ W/A}$
Electric resistance	$R$	$\Omega$	Ohm	$1 \Omega = 1 \text{ V/A} = 1/\text{S}$
Electric conductivity	$G$	S	Siemens	$1 \text{ S} = 1/\Omega$
Electric capacity	$C$	F	Faraday	$1 \text{ F} = 1 \text{ C/V}$
Charge	$Q$	C	Coulomb	$1 \text{ C} = 1 \text{ A} \cdot \text{s}$
Inductance	$L$	H	Henry	$1 \text{ H} = 1 \text{ Vs/A}$
Magnetic flux density	B	T	Tesla	$1 \text{ T} = 1 \text{ Wb/m}^2$
Magnetic field strength	H	A/m		
Magnetic flux	$\Phi$	Wb	Weber	$1 \text{ Wb} = 1 \text{ V} \cdot \text{s}$
Temperature difference	$T$ $\theta$	K $^\circ\text{C}$	Kelvin	$0 \text{ K} = -273.15 \text{ }^\circ\text{C}$

## 0.2 ENGINEERING FORMULAE FOR MOTOR DRIVES

Power (3-phase motors)	Torque from motor power	Factor of Inertia FI
<p>P1 = power input =  <math>U \cdot I \cdot \cos \phi \cdot \sqrt{3} \cdot 10^{-3}</math> [kW]                      P2 = power output = <math>P1 \cdot \eta</math> [kW]</p> <p>Where:                      U = voltage [V]                      I = current [A]  <math>\cos \phi</math> = power factor  <math>\eta</math> = efficiency</p> <p><b>Power requirements of some applications</b></p> <p>Lifting:  <math>P = \frac{m \cdot v}{\eta} \cdot 9.81 \cdot 10^{-3}</math> [kW]</p> <p>Rotation:  <math>P = \frac{M \cdot n}{9550 \cdot \eta}</math> [kW]</p> <p>Fan and pump drives:  <math>P = \frac{H \cdot Q}{\eta}</math> [W]</p> <p>Where:                      P = power [kW]                      m = mass [kg]                      v = speed [m/s]                      n = rotational speed [min<sup>-1</sup>]  <math>\eta</math> = efficiency                      M = torque [Nm]                      Q = output [m<sup>3</sup>/s]                      H = head [N/m<sup>2</sup>]</p>	<p><math>M = 9550 \cdot \frac{P_2}{n}</math> [Nm]</p> <p>Where:                      P<sub>2</sub> = motor output [kW]                      n = motor speed</p> <p>Conversion of torque for step-up and step-down speed ratios:</p> $M_2 = \frac{M_1 \cdot n_1}{n_2}$ <p>Where:                      n<sub>1</sub> = motor speed [min<sup>-1</sup>]                      M<sub>1</sub> = motor torque at n<sub>1</sub> [Nm]                      n<sub>2</sub> = speed of load [min<sup>-1</sup>]                      M<sub>2</sub> = torque of load at n<sub>2</sub> [Nm]</p> <p><b>Moment of Inertia J</b></p> <p>Moment of Inertia of a cylindrical flywheel:  <math>J = \frac{m d^2}{8}</math></p> <p>Where:                      m = mass [kg]                      d = flywheel diameter [m]</p> <p>Effective moment of inertia on the motor of a linearly moved load:  <math>J = 91.2 \cdot m \cdot \left(\frac{v}{n}\right)^2</math></p> <p>Where:                      m = mass [kg]                      v = velocity [m/s]                      n = motor speed [min<sup>-1</sup>]</p> <p>Conversions of moments of inertia for step-up or step-down speed ratio:</p> $J_2 = J_1 \cdot \left(\frac{n_1}{n_2}\right)^2$ <p>Where:                      n<sub>1</sub> = motor speed                      J<sub>1</sub> = moment of inertia at n<sub>1</sub>                      n<sub>2</sub> = speed of load                      J<sub>2</sub> = moment of inertia</p>	<p><math>FI = \frac{J_{mot} + J_{load}}{J_{mot}}</math></p> <p>Where:                      J<sub>mot</sub> = moment of inertia of motor                      J<sub>load</sub> = moment of inertia of load</p> <p><b>Starting time t<sub>a</sub></b></p> $t_a = \frac{FI \cdot J_{mot} \cdot n}{9.55 \cdot (M_{mot} - M_{load})}$ [s] <p>Where:                      FI = Factor of inertia                      J<sub>mot</sub> = moment of inertia of motor [kgm<sup>2</sup>]                      n = motor speed [min<sup>-1</sup>]                      M<sub>mot</sub> = motor torque during starting (mean) [Nm]                      M<sub>load</sub> = counter torque of load during starting (mean) [Nm]</p> <p><b>Speed</b></p> <p>The no-load speed is virtually the same as the synchronous speed. The synchronous speed of the motor is calculated as follow:</p> $n_s = 120 \cdot f/p$ [min <sup>-1</sup> ] <p>Where:                      f = frequency [Hz]                      p = number of pole</p> <p>The synchronous speed is reduced by the slip (S) to the rated speed:</p> $n_n = n_s \cdot (1-S)$ [min <sup>-1</sup> ]

### 0.3 STANDARDS AND SPECIFICATIONS

Flameproof motors conform to the following standards and specifications:

**Table 0B**

TITLE	INTERNATIONAL IEC®*	EU CENELEC®*
Electrical rotating machines/rated operation and characteristic data	IEC 60034-1	EN 60034-1
Methods for determining losses and efficiency of rotating electrical machines	IEC 60034-2	EN 60034-2
Protection types rotating electrical machines	IEC 60034-5	EN 60034-5
Cooling methods of rotating electrical machines	IEC 60034-6	EN 60034-6
Construction types of rotating electrical machines	IEC 60034-7	EN 60034-7
Terminal markings and direction of rotation for electrical machines	IEC 60034-8	EN 60034-8
Noise emission, limit values	IEC 60034-9	EN 60034-9
Start-up behaviour of squirrel-cage motors at 50Hz up to 660V	IEC 60034-12	EN 60034-12
Vibration severity of rotating electrical machines	IEC 60034-14	EN 60034-14
Protection level provided by enclosures for electrical equipment against mechanical impact (Code IK)	IEC 60068-1 IEC 60068-2-75	EN 60068-1 EN 60068-2-75
Fixing dimensions and outputs for IM B3	IEC 60072	EN 60072
Fixing dimensions and outputs for IM B5, IM B14	IEC 60072	EN 60072
Cylindrical shaft ends for electrical machines	IEC 60072	EN 60072
Electrical equipment for hazardous areas General provisions	IEC 60079-0	EN 60079-0
Electrical equipment for hazardous areas Flame-proof enclosure "db"	IEC 60079-1	EN 60079-1
Electrical equipment for hazardous areas Increased safety "e"	IEC 60079-7	EN 60079-7
Equipment with protection type "t" for use in the presence of flammable dusts	IEC 60079-31	EN 60079-31

## 0.4 PROTECTION AGAINST EXPLOSIONS IN DANGEROUS AREAS

### 0.4.1 TYPES PROTECTION

The use of an electrical apparatus in potentially explosive atmospheres is quite usual today. This equipment has to be manufactured in such a way that there is no risk of explosion.

An explosion occurs when of the three following conditions happen:

- Presence of a potentially explosive atmosphere;
- Possibility of transmission of the explosion;
- Existence of an ignition source.

The recognized types of protection eliminate one of these conditions and thus make an explosion impossible.

#### Protection methods for GAS

Two types of protection prevent the presence of a potentially explosive atmosphere inside the electrical apparatus:

- Oil immersion (safety "ob", "oc", "op");
- Pressurized apparatus (safety "pv", "pxb", "pyb", "pzc").

Two types of protection make the transmission of an internal explosion to the potentially explosive atmosphere surrounding the electrical apparatus impossible:

- Sand filling (safety "q");
- Flameproof enclosure (safety "db").

Lastly, three types of protection eliminate any source of ignition, such as sparks, overheating, etc.:

- Increased safety (safety "eb", "ec");
- Intrinsic safety (safety "ia", "ib", "ic");
- Protection "nA", "nC", "nR" (restricted to zone 2).

#### Protection method for flammable dusts

For flammable dusts, only one method of protection is provided for:

- Housing which prevents the infiltration of dust and surface temperature limitation (protection type "tb", "tc").

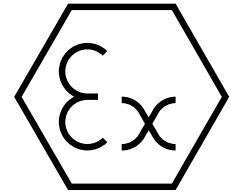
#### Protection method for electric motors

In practice only five of these eight methods of protection are applicable to the electric motor:

- Pressurized apparatus (symbol Ex pv, Ex pxb, Ex pyb, Ex pzc);
- Flameproof enclosure (symbol Ex db);
- Increased safety (symbol Ex eb, Ex ec);
- Non sparking protection (symbol Ex nA);
- Protection by a housing (symbol Ex tb, Ex tc).

Electric motors have another method of protection for gas (symbol Ex db eb) which is a combination of:

- Flameproof enclosure "db" for motor frame;
- Increased safety "eb" for terminal box.



**Fig. 0A** - Specific marking for protection against explosions - Directive 2014/34/EU.

#### 0.4.2 DANGEROUS AREAS AND ZONES

Dangerous areas include any area in which explosive atmospheres may occur under specific conditions. An explosive atmosphere is a mixture of air and combustible gases, vapours, fumes or dust under atmospheric conditions where combustion expands itself (explosion) after ignition.

Only local authorities can classify hazardous areas. The users shall classify the hazardous areas as indicated in the European directive 1999/92/EC under their own responsibility.

International standards IEC<sup>®</sup>\* 61241-10 provide instructions on how to classify the hazardous areas in relation to the chemical nature, to the physical characteristics and to the amount of substances used and based on the frequency and period of time in which an explosive mix may develop.

#### Zones susceptible to gas

When the hazard is due to the presence of gas, vapours or mists of flammable substances, the European directive 1999/92/EC envisages a classification in three zones defined as follows:

<b>Zone 0</b>	Areas constantly susceptible to an explosive atmosphere, or for long periods of time. Power equipment with double insulation must be installed in this area.
<b>Zone 1</b>	Areas where an explosive atmosphere is likely to develop during normal conditions. Flameproof electric motors or motors with added protection means can be installed in this zone (for the latter, restrictions by the standards apply).
<b>Zone 2</b>	Areas rarely susceptible to an explosive atmosphere and for a short period of time. Flameproof motors or motors with added protection can be installed in this zone, as well as non-sparking motors.



**Fig. 0B** - Warning sign for areas subject to the risk of explosion - Directive 99/92/EC

#### Zones susceptible to combustible dust

When the hazard is due to the presence of combustible dust, the European directive 1999/92/EC envisages a classification in three zones defined as follows:

<b>Zone 20</b>	Areas constantly susceptible to an explosive atmosphere, or for long periods of time. Power apparatus cannot be installed in this zone.
<b>Zone 21</b>	Areas where an explosive atmosphere is likely to develop during normal conditions. Electric motors certified in compliance with the ATEX <sup>®</sup> * directive with IP6x protection rating can be installed in this zone
<b>Zone 22</b>	Areas rarely susceptible to an explosive atmosphere, and only for a short period of time. Depending on the type of dust also in zone 22 it may be necessary to have IP6x construction (see 0.4.4).

**Table 0C** - Dangerous areas classified into zones

Usage area in the presence of <b>GAS</b>	Usage area in the presence of <b>COMBUSTIBLE DUSTS</b>	Hazardous level of the operational <b>ZONE</b>
Zone 0	Zone 20	Explosive atmosphere <b>ALWAYS PRESENT</b>
Zone 1	Zone 21	<b>PROBABLE</b> explosive atmosphere
Zone 2	Zone 22	Explosive atmosphere <b>UNLIKELY</b>

\* ATEX is a trademark of European Union; IEC is a trademark of International Electrotechnical Commission.

### 0.4.3 APPARATUS CLASSIFICATION

The ATEX<sup>®</sup>\* 2014/34/EU European Directive classifies equipment into three categories, with differing protection levels, related to the protection guaranteed.

**NOTE:** Equipment of higher categories can also be installed instead of those of a lower category.

**Table 0D** - Equipment categories

PROTECTION LEVEL guaranteed by the equipment Category	MINE	SURFACE	
	Category	Gas Category	Combustible Dust Category
Very high	M1	1G	1D
High	M2	2G	2D
Normal	not provided for	3G	3D

### 0.4.4 ENCLOSURE GROUPS

The standards classify electrical equipment into two groups.

<b>Group I</b>	electric apparatus to be installed in mines or galleries susceptible to firedamp or coal dust.
<b>Group II</b>	electric apparatus to be installed in surface plants susceptible to other explosive atmospheres.

The housings for equipment to be used at the surface in the presence of gas, with protection method "db" (explosion proof), are in turn subdivided into three sub-groups depending on the flammable substances for which they are suitable: Group IIA, Group IIB, Group IIC.

A motor that belongs to a certain enclosure group is also suitable for lower enclosure groups:

A motor in group IIB is also suitable for group IIA; a motor in group IIC is also suitable for group IIA and IIB.

The housings for equipment to be used in atmospheres containing flammable dust, with protection method "t", are separated into three sub-groups depending on the type of dust:

IIIA: flammable particles

IIIB: non-conducting dust

IIIC: conducting dust

**NOTE:** for the IIIC group and also for installation in zone 22 a minimum protection level of IP6x is necessary.

### 0.4.5 TEMPERATURE CLASSES (FOR GAS ATMOSPHERES)

The electrical apparatus is classified into 6 classes according to the maximum surface temperatures.

The maximum surface temperature is the highest temperature which is attained in service under the conditions described in the standards, by any part of the electrical apparatus, which, could ignite the surrounding atmosphere.

For electric motors this is:

- Temperature of the outside surface of the enclosure for "db" and "p" protection modes;
- Temperature of any internal or external point for type of protection "e" or "n".

**Table 0E**

Ignition temperature of medium relative to limit temperature [°C]	Temperature class	Maximum surface temperature of electrical equipment including 40°C ambient temperature	
		[°C]	[°F]
over 450	T1	450	842
from 300 to 450	T2	300	572
from 200 to 300	T3	200	392
from 135 to 200	T4	135	275
from 100 to 135	T5	100	212
from 85 to 100	T6	85	185



#### 0.4.6 COMBUSTION TEMPERATURES OF GASES, VAPOURS AND GROUPS

Combustible gases and vapours are divided into classes according to their ignition temperature and into groups according to their explosive capacity.

Markings on motors and other electrical equipment with the symbols used to indicate the protection mode, the enclosure group, and the temperature class, indicate the zone in which such equipment can be installed.

The indications contained in table 0F are shown only as an example. Classification of the substances is not the responsibility of the supplier of the equipment. Responsibility for the choice of equipment lies with the user.

**Table 0F** - Classification of the more common combustible gases and vapours according to temperature class and group

Group	Temperature Classes					
	T1	T2	T3	T4	T5	T6
I	Methane (firedamp)					
IIA	Acetic acid Acetone Ammonia Benzole Benzene Butanone Carbon monoxide Ethane Ethyl acetate Ethyl Chloride Methane Methanol Methyl acetate Methyl alcohol Methyl Chloride Naphtalene Propane Xylene	Acetic anhydride I amyl acetate n butane n butyl alcohol Amylic alcohol Butyl acetate Cyclohexanon Ethyl alcohol Iso butylic alcohol Liquefied gas Natural gas Propyl acetate	Cyclohexane Cyclohexanol Decane Diesel fuels Gasoline Heating oil Heptane Hexane Jet fuels Pentane Petroleum*	Acetaldehyde Ether		
IIB	Coke-oven gas Water gas (carburetted)	1,3- butadiene Ethylene Ethylbenzene Ethylene oxide	Hydrogen sulphide Isoprene Petroleum*	Ethyl ether		
IIC	Hydrogen	Acetylene				Carbon disulphide Ethyl nitrate

\*depending on composition

**0.4.7 TEMPERATURE FOR ATMOSPHERES WITH COMBUSTIBLE DUSTS**

The flash point of the dust must be taken into account in providing protection against flammable dust, in both the cloud form and in layers.

The surface temperature of the enclosure indicated on the motor nameplate must be less than the reference ignition temperature. The reference temperature is the lowest between the two values thus calculated:

TS1 = 2/3 Tcl (Tcl = ignition temperature of the cloud of dust)  
 TS2 = T5mm – 75K (T5mm = ignition temperature of a 5mm layer of dust).  
 Tamm = lowest between TS1 and TS2.

Dust ignition temperature	Cloud Tcl	Layer T5mm
↓		
Safety temperature	TS1 = 2/3 Tcl	TS2 = T5mm - 75K
↓		
Maximum surface temperature	Tamm = lowest between Ts1 and Ts2	
↓		
Surface temperature of the motor ≤ Tamm		

**Table 0G** - Calculation of the flash points for combustible dusts

The surface temperature class is expressed as degrees Celsius, the manufacturer determines the temperature class depending on the thermal characteristics of its own product.

The temperature classes for the Cemp® product are as follows:  
 T150°C - T135°C - T125°C - T100°C - T85°C.

The indications contained in table 0H are given only by way of example. Classification of the substances is not the responsibility of the supplier of the equipment. Responsibility for the choice of equipment lies with the user.

**Table 0H** - Examples of flash points for combustible dusts

	Cloud [°C]	Layer [°C]
Aluminium	590	>450
Carbon dust	380	225
Flour	490	340
Wheat dust	510	300
Methylcellulose	420	320
Phenolic resin	530	>450
Polyethylene	420	melting
PVC	700	>450
Soot	810	570
Starch	460	435
Sugar	490	460

Source SIRA Ltd

#### 0.4.7 LEVEL OF PROTECTION FOR THE EQUIPMENT (EPL, EQUIPMENT PROTECTION LEVEL)

In accordance with standard IEC®\* EN 60079-0 the marking of equipment to be used in a potentially explosive atmosphere must also have the suffix EPL.

EPL is defined as the level of protection assigned to electrical equipment based on the probability of it becoming a source of ignition. The EPL also makes it possible to distinguish between the different explosive atmospheres.

The first letter makes the following distinctions:	
<b>M</b>	for mining
<b>G</b>	for gas
<b>D</b>	for dust

The second letter gives information on the probability of becoming a source of ignition:		
<b>a</b>	“very high”	protection level (guarantees safety in normal operation, during foreseeable malfunctions and when subject to rare cases of malfunction);
<b>b</b>	“high”	protection level (guarantees safety in normal operation and when subject to foreseeable malfunctions);
<b>c</b>	“increased”	protection level (it is not a source of ignition during normal operation and has some additional protection measures to ensure that it remains an inactive source of ignition in events occurring regularly).

#### 0.4.8 CHOICE OF SAFETY-ELECTRIC MOTOR

The connection between danger zones and the categories of equipment to be used is defined in Directive 1999/92/EC. The specific construction standards for the protection modes (e.g. Ex db) also define the motor category that can be obtained by applying the standards (e.g. 2G).

**Table 0I** - Choosing the protection mode for zones in which gas is present

Explosive Atmosphere	Danger Zone	Protection guaranteed by Equipment	Motor Category	Protection Mode
ALWAYS PRESENT	0	Very High	1G	IEC EN 60079-26
PROBABLE	1	High	2G	Ex db Ex db eb Ex eb
IMPROBABLE	2	Normal	3G	Ex nA or Ex ec

**Table 0L** - Choice of protection mode for areas where combustible dust is present

Explosive Atmosphere	Danger Zone	Protection guaranteed by Equipment	Motor Category	Protection Mode
ALWAYS PRESENT	20	Very High	1D	Ex ta
PROBABLE	21	High	2D	Ex tb - IP6x
IMPROBABLE	22 Conductive dusts	Normal	2D	Ex tb - IP6x
IMPROBABLE	22 Conductive dusts	Normal	3D	Ex tc - IP5x

N. B. Equipment of a higher category can be installed in place of equipment of a lower category.

\*IEC is a trademark of International Electrotechnical Commission

## 0.5 EFFICIENCY IE1, IE2, IE3, IE4

Cemp® product is available on IE1, IE2, IE3 and IE4 version. Efficiency level is defined by the tables 0M, 0N, 0O and 0P as per IEC®\* 60034-30 norm. Motor efficiency is measured following the requirements of IEC 60034-2-1 in force.

**Table 0M** - Nominal efficiency limits (%) for 50 and 60Hz for IE1

kW	2 POLE		4 POLE		6 POLE		8 POLE	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
0.12	45.0	57.5	50.0	62.0	38.3	48.0	31.0	36.0
0.18	52.8	62.0	57.0	66.0	45.5	52.5	38.0	40.0
0.20	54.6	-	58.5	-	47.6	-	39.7	-
0.25	58.2	64.0	61.5	68.0	52.1	57.5	43.4	50.5
0.37	63.9	70.0	66.0	70.0	59.7	62.0	49.7	57.5
0.40	64.9	-	66.8	-	61.1	-	50.9	-
0.55	69.0	72.0	70.0	74.0	65.8	66.0	56.1	59.5
0.75	72.1	74.0	72.1	77.0	70.0	72.0	61.2	64.0
1.10	75.0	74.0	75.0	77.0	72.9	75.0	66.5	73.5
1.50	77.2	81.0	77.2	81.5	75.2	77.0	70.2	77.0
2.20	79.7	81.5	79.7	83.0	77.7	78.5	74.2	78.0
3.00	81.5	-	81.5	-	79.7	-	77.0	-
3.70	-	84.5	-	85.0	-	83.5	-	80.0
4.00	83.1	-	83.1	-	81.4	-	79.2	-
5.50	84.7	86.0	84.7	87.0	83.1	85.0	81.4	84.0
7.50	86.0	87.5	86.0	87.5	84.7	86.0	83.1	85.0
11.00	87.6	87.5	87.6	88.5	86.4	89.0	85.0	87.5
15.00	88.7	88.5	88.7	89.5	87.7	89.5	86.2	88.5
18.50	89.3	89.5	89.3	90.5	88.6	90.2	86.9	88.5
22.00	89.9	89.5	89.9	91.0	89.2	91.0	87.4	90.2
30.00	90.7	90.2	90.7	91.7	90.2	91.7	88.3	90.2
37.00	91.2	91.5	91.2	92.4	90.8	91.7	88.8	91.0
45.00	91.7	91.7	91.7	93.0	91.4	91.7	89.2	91.0
55.00	92.1	92.4	92.1	93.0	91.9	92.1	89.7	91.5
75.00	92.7	93.0	92.7	93.2	92.6	93.0	90.3	92.0
90.00	93.0	93.0	93.0	93.2	92.9	93.0	90.7	92.5
110.00	93.3	93.0	93.3	93.5	93.3	94.1	91.1	92.5
132.00	93.5	-	93.5	-	93.5	-	91.5	-
160.00	93.8	-	93.8	-	93.8	-	91.9	-
200.00	94.0	-	94.0	-	94.0	-	92.5	-

**Table 0N** - Nominal efficiency limits (%) for 50 and 60Hz for IE2

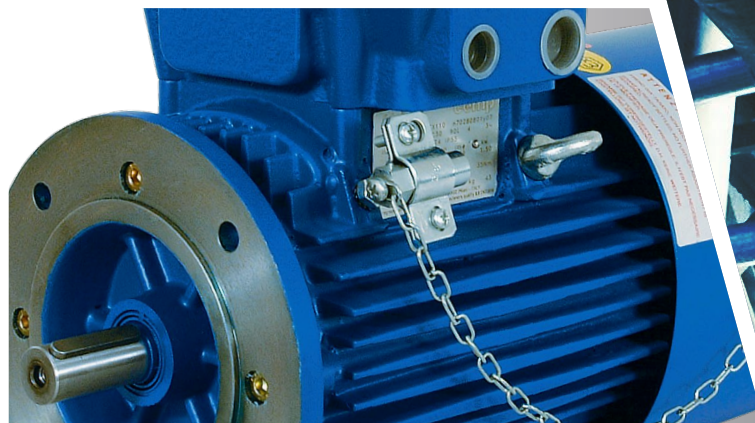
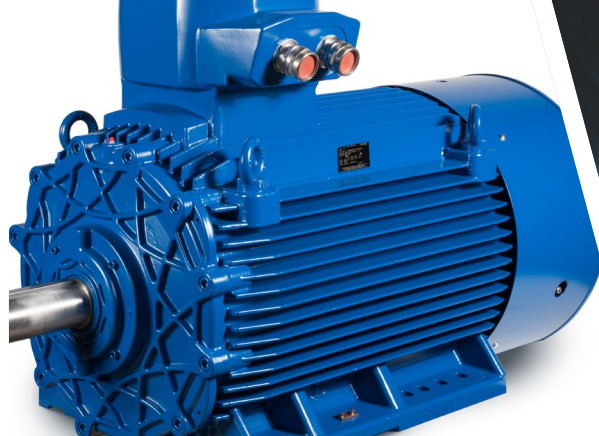
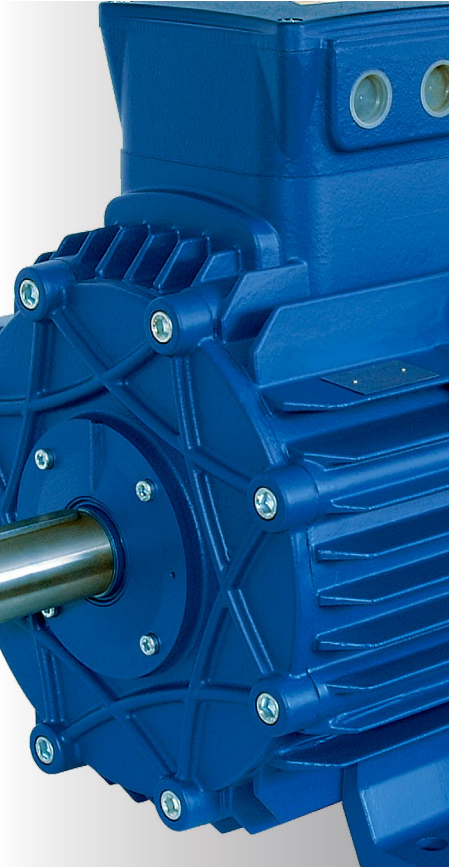
kW	2 POLE		4 POLE		6 POLE		6 POLE	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
0.12	53.6	59.5	59.1	64.0	50.6	50.5	39.8	40.0
0.18	60.4	64.0	64.7	68.0	56.6	55.0	45.9	46.0
0.20	61.9	-	65.9	-	58.2	-	47.4	-
0.25	64.8	68.0	68.5	70.0	61.6	59.5	50.6	52.0
0.37	69.5	72.0	72.7	72.0	67.6	64.0	56.1	58.0
0.40	70.4	-	73.5	-	68.8	-	57.2	-
0.55	74.1	74.0	77.1	75.5	73.1	68.0	61.7	62.0
0.75	77.4	75.5	79.6	78.0	75.9	73.0	66.2	66.0
1.10	79.6	82.5	81.4	84.0	78.1	85.5	70.8	75.5
1.50	81.3	84.0	82.8	84.0	79.8	86.5	74.1	82.5
2.20	83.2	85.5	84.3	87.5	81.8	87.5	77.6	84
3.00	84.6	-	85.5	-	83.3	-	80.0	-
3.70	-	87.5	-	87.5	-	87.5	-	85.5
4.00	85.8	-	86.6	-	84.6	-	81.9	-
5.50	87.0	88.5	87.7	89.5	86.0	89.5	83.8	85.5
7.50	88.1	89.5	88.7	89.5	87.2	89.5	85.3	88.5
11.00	89.4	90.2	89.8	91.0	88.7	90.2	86.9	88.5
15.00	90.3	90.2	90.6	91.0	89.7	90.2	88.0	89.5
18.50	90.9	91.0	91.2	92.4	90.4	91.7	88.6	89.5
22.00	91.3	91.0	91.6	92.4	90.9	91.7	89.1	91.0
30.00	92.0	91.7	92.3	93.0	91.7	93.0	89.8	91.0
37.00	92.5	92.4	92.7	93.0	92.2	93.0	90.3	91.7
45.00	92.9	93.0	93.1	93.6	92.7	93.6	90.7	91.7
55.00	93.2	93.0	93.5	94.1	93.1	93.6	91.0	93.0
75.00	93.8	93.6	94.0	94.5	93.7	94.1	91.6	93.0
90.00	94.1	94.5	94.2	94.5	94.0	94.1	91.9	93.6
110.00	94.3	94.5	94.5	95.0	94.3	95.0	92.3	93.6
132.00	94.6	-	94.7	-	94.6	-	92.6	-
150.00	-	95.0	-	95.0	-	95.0	-	93.6
160.00	94.8	-	94.9	-	94.8	-	93.0	-
185.00	-	95.4	-	95.0	-	95.0	-	93.6
220,00 up to 335,00	-	95.4	-	95.4	-	95.0	-	93.6

**Table 00** - Nominal efficiency limits (%) for 50 and 60Hz for IE3

kW	2 POLE		4 POLE		6 POLE		8 POLE	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
0.12	60.8	62.0	64.8	66.0	57.7	64.0	50.7	59.5
0.18	65.9	65.6	69.9	69.5	63.9	67.5	58.7	64.0
0.20	67.2	-	71.1	-	65.4	-	60.6	-
0.25	69.7	69.5	73.5	73.4	68.6	71.4	64.1	68.0
0.37	73.8	73.4	77.3	78.2	73.5	75.3	69.3	72.0
0.40	74.6	-	78.0	-	74.4	-	70.1	-
0.55	77.8	76.8	80.8	81.1	77.2	81.7	73.0	74.0
0.75	80.7	77.0	82.5	83.5	78.9	82.5	75.0	75.5
1.10	82.7	84.0	84.1	86.5	81.0	87.5	77.7	78.5
1.50	84.2	85.5	85.3	86.5	82.5	88.5	79.7	84.0
2.20	85.9	86.5	86.7	89.5	84.3	89.5	81.9	85.5
3.00	87.1	-	87.7	-	85.6	-	83.5	-
3.70	-	88.5	-	89.5	-	89.5	-	86.5
4.00	88.1	-	88.6	-	86.8	-	84.8	-
5.50	89.2	89.5	89.6	91.7	88.0	91.0	86.2	86.5
7.50	90.1	90.2	90.4	91.7	89.1	91.0	87.3	89.5
11.00	91.2	91.0	91.4	92.4	90.3	91.7	88.6	89.5
15.00	91.9	91.0	92.1	93.0	91.2	91.7	89.6	90.2
18.50	92.4	91.7	92.6	93.6	91.7	93.0	90.1	90.2
22.00	92.7	91.7	93.0	93.6	92.2	93.0	90.6	91.7
30.00	93.3	92.4	93.6	94.1	92.9	94.1	91.3	91.7
37.00	93.7	93.0	93.9	94.5	93.3	94.1	91.8	92.4
45.00	94.0	93.6	94.2	95.0	93.7	94.5	92.2	92.4
55.00	94.3	93.6	94.6	95.4	94.1	94.5	92.5	93.6
75.00	94.7	94.1	95.0	95.4	94.6	95.0	93.1	93.6
90.00	95.0	95.0	95.2	95.4	94.9	95.0	93.4	94.1
110.00	95.2	95.0	95.4	95.8	95.1	95.8	93.7	94.1
132.00	95.4	-	95.6	-	95.4	-	94.0	-
150.00	-	95.4	-	96.2	-	95.8	-	94.5
160.00	95.6	-	95.8	-	95.6	-	94.3	-

**Table 0P** - Nominal efficiency limits (%) for 50 and 60Hz for IE4

kW	2 POLE		4 POLE		6 POLE		8 POLE	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
0.12	66.5	66.0	69.8	70.0	64.9	68.0	62.3	64.0
0.18	70.8	70.0	74.7	74.0	70.1	72.0	67.2	68.0
0.20	71.9	-	75.8	-	71.4	-	68.4	-
0.25	74.3	74.0	77.9	77.0	74.1	75.5	70.8	72.0
0.37	78.1	77.0	81.1	81.5	78.0	78.5	74.3	75.5
0.40	78.9	-	81.7	-	78.7	-	74.9	-
0.55	81.5	80.0	83.9	84.0	80.9	82.5	77.0	77.0
0.75	83.5	82.5	85.7	85.5	82.7	84.0	78.4	78.5
1.10	85.2	85.5	87.2	87.5	84.5	88.5	80.8	81.5
1.50	86.5	86.5	88.2	88.5	85.9	89.5	82.6	85.5
2.20	88.0	88.5	89.5	91.0	87.4	90.2	84.5	87.5
3.00	89.1	-	90.4	-	88.6	-	85.9	-
3.70	-	89.5	-	91.0	-	90.2	-	88.5
4.00	90.0	-	91.1	-	89.5	-	87.1	-
5.50	90.9	90.2	91.9	92.4	90.5	91.7	88.3	88.5
7.50	91.7	91.7	92.6	92.4	91.3	92.4	89.3	91.0
11.00	92.6	92.4	93.3	93.6	92.3	93.0	90.4	91.0
15.00	93.3	92.4	93.9	94.1	92.9	93.0	91.2	91.7
18.50	93.7	93.0	94.2	94.5	93.4	94.1	91.7	91.7
22.00	94.0	93.0	94.5	94.5	93.7	94.1	92.1	93.0
30.00	94.5	93.6	94.9	95.0	94.2	95.0	92.7	93.0
37.00	94.8	94.1	95.2	95.4	94.5	95.0	93.1	93.6
45.00	95.0	94.5	95.4	95.4	94.8	95.4	93.4	93.6
55.00	95.3	94.5	95.7	95.8	95.1	95.4	93.7	94.5
75.00	95.6	95.0	96.0	96.2	95.4	95.8	94.2	94.5
90.00	95.8	95.4	96.1	96.2	95.6	95.8	94.4	95.0
110.00	96.0	95.4	96.3	96.2	95.8	96.2	94.7	95.0
132.00	96.2	-	96.4	-	96.0	-	94.9	-
150.00	-	95.8	-	96.5	-	96.2	-	95.4
160.00	96.3	-	96.6	-	96.2	-	95.1	-
185.00	-	96.2	-	96.5	-	96.2	-	95.4
200.00	96.5	-	96.7	-	96.3	-	95.4	-
220.00	-	96.2	-	96.8	-	96.5	-	95.4
250.00	96.5	96.2	96.7	96.8	96.5	96.5	95.4	95.8



# CEMP<sup>®</sup> IE1, IE2, IE3, IE4 MOTORS

## 1. GENERAL INFORMATION

### 1.1 RANGE OF MOTORS

The motors presented in this catalogue respect the standards in relation to equipment and protection systems for use on safe areas or potentially explosive atmospheres, in conformity with European directive n. 2014/34/EU dated 26/02/14, known as the ATEX<sup>®\*</sup> directive.

Classification of the areas is the responsibility of the user and for the choice of motor the indications are given in Table 1A.

The ATEX directive states that two different certificates of conformity are to be issued. One is the "EC-Type examination certificate" for the homologation of the prototype and the other is for the "Production Quality Assurance Notification".

The certificates are issued by Certification Bodies, defined as Notified Bodies, to which the European Community assigns the task of assessing the conformity of products to community directives.

**The list of notified bodies can be found in the site of the European Union on the page**

<https://ec.europa.eu/growth/tools-databases/nando/index.cfm?fuseaction=notifiedbody.main>

**The certificates of the motors can be found on Internet at**

<https://www.regalrexnord.com/brands/Cemp/Certificates>

**IECEX<sup>®\*</sup> certificates can also be found at**

<http://www.iecex.com>

All certificates may be supplied on request.



**Table 1A - Cemp® range of motors: Classic Series (IE1, IE2) + IE3 below 0.75kW**

Explosion-proof Gas	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T4			
							EPL = Gb			
							Ex db	Ex db eb	Ex db	Ex db eb
							IIB		IIC	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315	0.05 ÷ 375.00	IC411	S1	AB 30r	AB 35r	AC 30r	AC 35r	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.15 ÷ 300.00	IC411	S1	AB 20r	AB 25r	AC 20r	AC 25r	
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	63 ÷ 315	0.18 ÷ 300.00	IC411	S1	AB 40r	AB 45r	AC 40r	AC 45r	
	Single phase, (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 3.00	IC411	S1	AB 10r	AB 15r	AC 10r	AC 15r	
	Single-phase with capacitor in extra-size terminal box (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 1.10	IC411	S1	AB 12r	-	AC 12r	-	
	Motors fed by inverter (2, 4, 6, 8 pole)	63 ÷ 315	0.09 ÷ 375.00	IC411	S9	AB 70r	AB 75r	AC 70r	AC 75r	
With brake	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315 71 ÷ 160	0.05 ÷ 160.00 0.15 ÷ 18.50	IC410 IC411	S4	DB 30r HB 30r	DB 35r HB 35r	DC 30r HC 30r	DC 35r HC 35r	
	Single speed, three phase (4, 6, 8 pole)	180 ÷ 315	18.50 ÷ 200.00	IC416	S4	DB 30r	DB 35r	DC 30r	DC 35r	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.05 ÷ 160.00	IC410	S4	DB 20r	DB 25r	DC 20r	DC 25r	
		71 ÷ 160	0.15 ÷ 18.50	IC411	S4	HB 20r	HB 25r	HC 20r	HC 25r	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DB 20r	DB 25r	DC 20r	DC 25r	
	Single speed, three phase (6 pole) for hoist applications	71 ÷ 315	0.18 ÷ 200.00	IC410	S4	DB 50r	DB 55r	DC 50r	DC 55r	
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HB 50r	HB 55r	HC 50r	HC 55r	
		180 ÷ 315	15.00 ÷ 160.00	IC416	S4	DB 50r	DB 55r	DC 50r	DC 55r	
	Two speeds, three phase (2/8, 4/12, 4/16 pole) for hoist applications	71 ÷ 315	0.06 ÷ 160.00	IC410	S4	DB 50r	DB 55r	DC 50r	DC 55r	
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HB 50r	HB 55r	HC 50r	HC 55r	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DB 50r	DB 55r	DC 50r	DC 55r	

Explosion-proof Gas + Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T4 - T 135°C			
							EPL = Gb - Db			
							Ex db	Ex db eb	Ex db	Ex db eb
							IIB		IIC	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315	0.05 ÷ 375.00	IC411	S1	AB 30r	AB 35r	AC 30r	AC 35r	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.15 ÷ 300.00	IC411	S1	AB 20r	AB 25r	AC 20r	AC 25r	
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	63 ÷ 315	0.18 ÷ 300.00	IC411	S1	AB 40r	AB 45r	AC 40r	AC 45r	
	Single phase, (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 3.00	IC411	S1	AB 10r	AB 15r	AC 10r	AC 15r	
	Single-phase with capacitor in extra-size terminal box (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 1.10	IC411	S1	AB 12r	-	AC 12r	-	
	Motors fed by inverter (2, 4, 6, 8 pole)	63 ÷ 315	0.09 ÷ 375.00	IC411	S9	AB 70r	AB 75r	AC 70r	AC 75r	
With brake	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315 71 ÷ 160	0.05 ÷ 160.00 0.15 ÷ 18.50	IC410 IC411	S4	DB 30r HB 30r	DB 35r HB 35r	DC 30r HC 30r	DC 35r HC 35r	
	Single speed, three phase (4, 6, 8 pole)	180 ÷ 315	18.50 ÷ 200.00	IC416	S4	DB 30r	DB 35r	DC 30r	DC 35r	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.05 ÷ 160.00	IC410	S4	DB 20r	DB 25r	DC 20r	DC 25r	
		71 ÷ 160	0.15 ÷ 18.50	IC411	S4	HB 20r	HB 25r	HC 20r	HC 25r	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DB 20r	DB 25r	DC 20r	DC 25r	
	Single speed, three phase (6 pole) for hoist applications	71 ÷ 315	0.18 ÷ 200.00	IC410	S4	DB 50r	DB 55r	DC 50r	DC 55r	
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HB 50r	HB 55r	HC 50r	HC 55r	
		180 ÷ 315	15.00 ÷ 160.00	IC416	S4	DB 50r	DB 55r	DC 50r	DC 55r	
	Two speeds, three phase (2/8, 4/12, 4/16 pole) for hoist applications	71 ÷ 315	0.06 ÷ 160.00	IC410	S4	DB 50r	DB 55r	DC 50r	DC 55r	
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HB 50r	HB 55r	HC 50r	HC 55r	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DB 50r	DB 55r	DC 50r	DC 55r	

Non-sparking Gas	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T3	
							EPL = Gc	
							Ex ec	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315	0.18 ÷ 375.00	IC411	S1	AN 30		
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.15 ÷ 300.00	IC411	S1	AN 30		
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	63 ÷ 315	0.18 ÷ 300.00	IC411	S1	AN 30		
	Motors fed by inverter (2, 4, 6, 8 pole)	63 ÷ 315	0.09 ÷ 375.00	IC411	S9	AN 30		

Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T 135°C			
							EPL = Db		EPL = Dc	
							Ex tb		Ex tc	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315	0.18 ÷ 375.00	IC411	S1	AD 30	AD 30			
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.15 ÷ 300.00	IC411	S1	AD 20	AD 20			
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	63 ÷ 315	0.18 ÷ 300.00	IC411	S1	AD 40	AD 40			
	Single phase, (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 3.00	IC411	S1	AD 10	AD 10			
	Single-phase with capacitor in extra-size terminal box (2, 4, 6 pole)	63 ÷ 100	0.10 ÷ 1.10	IC411	S1	AD 12	AD 12			
	Motors fed by inverter (2, 4, 6, 8 pole)	63 ÷ 315	0.09 ÷ 375.00	IC411	S9	AD 70	AD 70			
With brake	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315 71 ÷ 160	0.05 ÷ 160.00 0.15 ÷ 18.50	IC410 IC411	S4	DD 30 HD 30	DD 30 HD 30			
	Single speed, three phase (4, 6, 8 pole)	180 ÷ 315	18.50 ÷ 200.00	IC416	S4	DD 30	DD 30			
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.05 ÷ 160.00	IC410	S4	DD 20	DD 20			
		71 ÷ 160	0.15 ÷ 18.50	IC411	S4	HD 20	HD 20			
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DD 20	DD 20			
	Single speed, three phase (6 pole) for hoist applications	71 ÷ 315	0.18 ÷ 200.00	IC410	S4	DD 50	DD 50			
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HD 50	HD 50			
		180 ÷ 315	15.00 ÷ 160.00	IC416	S4	DD 50	DD 50			
	Two speeds, three phase (2/8, 4/12, 4/16 pole) for hoist applications	71 ÷ 315	0.06 ÷ 160.00	IC410	S4	DD 50	DD 50			
		71 ÷ 160	0.18 ÷ 11.00	IC411	S4	HD 50	HD 50			
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	DD 50	DD 50			

Non-sparking Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T3 - T 150°C	
							EPL = Gc - Db	
							Ex ec - Ex tc	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	63 ÷ 315	0.18 ÷ 375.00	IC411	S1	AQ 30	AQ 30	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	63 ÷ 315	0.15 ÷ 300.00	IC411	S1	AQ 20	AQ 20	
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	63 ÷ 315	0.18 ÷ 300.00	IC411	S1	AQ 40	AQ 40	
	Motors fed by inverter (2, 4, 6, 8 pole)	63 ÷ 315	0.09 ÷ 375.00	IC411	S9	AQ 70	AQ 70	

**Table 1B - Cemp® range of motors: Premium Series (IE3, IE4)**

Explosion-proof Gas	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T4			
							EPL = Gb			
							Ex db	Ex db eb	Ex db	Ex db eb
							IIB		IIC	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315*	0.55 ÷ 375.00	IC411	S1	E..AB 30	E..AB 35	E..AC 30	E..AC 35	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	80 ÷ 315	0.15 ÷ 50.00	IC411	S1	E3AB 20	E3AB 25	E3AC 20	E3AC 25	
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	80 ÷ 315	0.18 ÷ 50.00	IC411	S1	E3AB 40	E3AB 45	E3AC 40	E3AC 45	
	Motors fed by inverter (2, 4, 6, 8 pole)	80 ÷ 315*	0.75 ÷ 375.00	IC411	S9	E..AB 70	E..AB 75	E..AC 70	E..AC 75	
With brake	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315*	0.75 ÷ 375.00	IC410	S4	E..DB 30	E..DB 35	E..DC 30	E..DC 35	
		80 ÷ 160	0.75 ÷ 18.50	IC411	S4	E..HB 30	E..HB 35	E..HC 30	E..HC 35	
	Single speed, three phase (4, 6, 8 pole)	180 ÷ 315	18.50 ÷ 250.00	IC416	S4	E..DB 30	E..DB 35	E..DC 30	E..DC 35	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	80 ÷ 315	0.15 ÷ 160.00	IC410	S4	E3DB 20	E3DB 25	E3DC 20	E3DC 25	
		80 ÷ 160	0.12 ÷ 11.00	IC411	S4	E3HB 20	E3HB 25	E3HC 20	E3HC 25	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	E3DB 20	E3DB 25	E3DC 20	E3DC 25	
	Single speed, three phase (6 pole) for hoist applications	80 ÷ 315	0.75 ÷ 75.00	IC410	S4	E..DB 50	E..DB 55	E..DC 50	E..DC 55	
		80 ÷ 160	0.75 ÷ 11.00	IC411	S4	E..HB 50	E..HB 55	E..HC 50	E..HC 55	
		180 ÷ 315	15.00 ÷ 160.00	IC416	S4	E..DB 50	E..DB 55	DC 50	E..DC 55	
	Two speeds, three phase (2/8, 4/12, 4/16, 2/12 pole) for hoist applications	80 ÷ 315	0.12 ÷ 90.00	IC410	S4	E3DB 50	E3DB 55	E3DC 50	E3DC 55	
		80 ÷ 160	0.12 ÷ 7.50	IC411	S4	E3HB 50	E3HB 55	E3HC 50	E3HC 55	
		180 ÷ 315	2.00 ÷ 37.00	IC416	S4	E3DB 50	E3DB 55	E3DC 50	E3DC 55	

Explosion-proof Gas + Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T4 - T 135°C			
							EPL = Gb - Db			
							Ex db	Ex db eb	Ex db	Ex db eb
							IIB		IIC	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315*	0.55 ÷ 375.00	IC411	S1	E..AB 30	E..AB 35	E..AC 30	E..AC 35	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	80 ÷ 315	0.15 ÷ 50.00	IC411	S1	E3AB 20	E3AB 25	E3AC 20	E3AC 25	
	Two speeds, three phase (2/4, 4/8, pole) quadratic-torque	80 ÷ 315	0.18 ÷ 50.00	IC411	S1	E3AB 40	E3AB 45	E3AC 40	E3AC 45	
	Motors fed by inverter (2, 4, 6, 8 pole)	80 ÷ 315*	0.75 ÷ 375.00	IC411	S9	E..AB 70	E..AB 75	E..AC 70	E..AC 75	
With brake	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315*	0.75 ÷ 375.00	IC410	S4	E..DB 30	E..DB 35	E..DC 30	E..DC 35	
		80 ÷ 160	0.75 ÷ 18.50	IC411	S4	E..HB 30	E..HB 35	E..HC 30	E..HC 35	
	Single speed, three phase (4, 6, 8 pole)	180 ÷ 315	18.50 ÷ 250.00	IC416	S4	E..DB 30	E..DB 35	E..DC 30	E..DC 35	
	Two speeds, three phase (2/4, 4/8, pole) constant-torque	80 ÷ 315	0.15 ÷ 160.00	IC410	S4	E3DB 20	E3DB 25	E3DC 20	E3DC 25	
		80 ÷ 160	0.12 ÷ 11.00	IC411	S4	E3HB 20	E3HB 25	E3HC 20	E3HC 25	
		180 ÷ 315	18.50 ÷ 160.00	IC416	S4	E3DB 20	E3DB 25	E3DC 20	E3DC 25	
	Single speed, three phase (6 pole) for hoist applications	80 ÷ 315	0.75 ÷ 75.00	IC410	S4	E..DB 50	E..DB 55	E..DC 50	E..DC 55	
		80 ÷ 160	0.75 ÷ 11.00	IC411	S4	E..HB 50	E..HB 55	E..HC 50	E..HC 55	
		180 ÷ 315	15.00 ÷ 160.00	IC416	S4	E..DB 50	E..DB 55	E..DC 50	E..DC 55	
	Two speeds, three phase (2/8, 4/12, 4/16, 2/12 pole) for hoist applications	80 ÷ 315	0.12 ÷ 90.00	IC410	S4	E3DB 50	E3DB 55	E3DC 50	E3DC 55	
		80 ÷ 160	0.12 ÷ 7.50	IC411	S4	E3HB 50	E3HB 55	E3HC 50	E3HC 55	
		180 ÷ 315	2.00 ÷ 37.00	IC416	S4	E3DB 50	E3DB 55	E3DC 50	E3DC 55	

Non-sparking Gas	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T3	
							EPL = Gc	
							Ex ec	
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S1	E..AN 30		
	Motors fed by inverter (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S9	E..AN 70		

Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T 135°C	
							EPL = Db	
							Ex tb	EPL = Dc Ex tc
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S1	E..AD 30	E..AD 30	
	Motors fed by inverter (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S9	E..AD 70	E..AD 70	

Non-sparking Dust	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T3 - T 150°C	
							EPL = Gc - Db	
							Ex ec - Ex tb	Ex ec - Ex tc
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S1	E..AQ 30	E..AQ 30	
	Motors fed by inverter (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S9	E..AQ 70	E..AQ 70	

Mining	Type	Version	Frame Size [mm]	Output Range [kW]	Ventilation	Operation	T 150°C	
							EPL = Mb	
							Ex db	Ex db eb
Standard	Single speed, three phase (2, 4, 6, 8 pole)	80 ÷ 315	0.55 ÷ 200.00	IC411	S1	E..AM 30	E..AM 35	

\*For the frame size 355, the series name may be different because of certifications matters.



## 1.2 COMMON MAIN CHARACTERISTICS

Available in versions IE1, IE2, IE3 and IE4.
Flameproof motors compliant with the Standards IEC®* EN 60079-0, 60079-1, 60079-7 for atmospheres where gas is present and IEC EN 60079-31 for areas where combustible dust is present.
Three phase and single phase Squirrel Cage Asynchronous Induction motors.
Totally enclosed, fan cooled, frame IP55 with Terminal box IP65.
The motors dimensions comply with IEC 60072 standard.
Power Supply 400V/50Hz. Three-phase, 1-speed motors, 2-4-6-8 poles, T4 (for sizes between 63 and 250, multi-voltage power supply 380-400-415V/50Hz and 460V/60Hz).
Class F insulation.
Terminal Box: <ul style="list-style-type: none"> <li>- Available both in a flameproof, or increased safety version</li> <li>- Standard position- top, opposite feet</li> <li>- Rotate by 90° in 4 positions</li> </ul>
Motor frame and terminal box enclosure separated to avoid the transmission of explosions.
Winding cables connected to the terminal board by means of terminal blocks or by a flameproof sealing device.
Internal and external mechanical components painted with epoxy polyester powders. <ul style="list-style-type: none"> <li>- Stainless steel nameplate</li> <li>- Anti-corrosion screws</li> </ul>
Highly resistant to impact: <ul style="list-style-type: none"> <li>- Cast iron made frame, terminal box and endshields</li> <li>- Fan cover in sheet steel</li> </ul>
Low friction dust seals.
The conformity certificates also cover alternatives, such as: <ul style="list-style-type: none"> <li>- Altitude over 1000m</li> <li>- Modification of the rated voltage and rated frequency</li> <li>- Power supply from an inverter</li> <li>- Motor protection through temperature detectors</li> <li>- Duty S1 to S9</li> </ul>

### 1.2.1 SPECIAL CHARACTERISTICS FOR MOTORS FOR MINING APPLICATIONS

The motors in the ATEX®* Premium Series (IE3, IE4) for mines come under group I Category M2. They are intended for use below ground and in surface areas of mines where firedamp or combustible powder can be found. This equipment is meant to be de-energised in an explosive atmosphere.
Mounting options B3, B5, B35, B14, B34.
High protection against corrosion: <ul style="list-style-type: none"> <li>- Inside and outside surfaces poly-ester powder painting (minimum thickness 150 µm)</li> <li>- Stainless steel nameplate</li> <li>- Anticorrosion plated fasteners</li> </ul>
Highly resistant to impact: special fan cover in sheet steel with rear grid protection.
The conformity certificates also cover alternatives, such as: <ul style="list-style-type: none"> <li>- Modification of the rated voltage and rated frequency</li> <li>- Power supply from an inverter</li> <li>- Motor protection through temperature detectors</li> <li>- Duty S1 to S9</li> </ul>

## 1.3 MAIN OPTIONS

<b>Electrical variants</b>
Non-standard voltages and frequencies (maximum voltage 1000V).
Motors for tropical climates.
Motors for low temperatures up to -50°C Classic Series (IE1, IE2), up to -60°C Premium Series (IE3, IE4)
Temperature rise below Class B.
Motors insulated to Class H.
Motors with bimetallic detector, thermistor PTC or thermistor PT100.
Motors with anti-condensation heaters.
Motors with special electrical design.
Single-phase motors with capacitor fitted in a large-size terminal box (Ex db).
<b>Mechanical variants</b>
Special flanges and shafts.
Double ended shafts.
Cable gland fitted to terminal box.
Terminal box with special cable entries.
Motors protection IP56 - IP65 - IP66.
Motors with condensation drain valves.
Motors with special bearings (uni-directional, with sensors, with rollers, insulated, oversized, thrust bearings).
Vibration level Grade A or B, according to IEC®* 60034-14.
Motors with a rain cap or sun shield, water-shedding disc.
Side terminal box frame size 180 to 355 (from frame 160 for Premium Series IE3, IE4).
Separate terminal box for auxiliary terminals.
Low noise emission version.
High protection against corrosion for tropical climates or applications in marine environments: <ul style="list-style-type: none"> <li>- External mechanical components finished with epoxy paint;</li> <li>- Protection of the internal parts (winding and rotor) with protective paint;</li> <li>- Stainless steel screws.</li> </ul>
<b>Accessories</b>
Motors suitable for frequency inverter drive.
Motors with encoder.
Motors with forced ventilation (from frame size 90).
<b>Certificates</b>
Motors according to ATEX, IECEX®*, CU-TR, CCOE®*, ECAS®*, CCC®*, CEL, AEx, JPN®* and many others.

\*ATEX is a trademark of European Union; CCC is a trademark of Certification and Accreditation Administration of the People's Republic of China; CCOE is a trademark of the Government of India's Petroleum and Explosives Safety Organization; ECAS is a trademark of ESMA; IEC and IECEX are trademarks or trade names of International Electrotechnical Commission; JPN is a trademark of JPN Co.,Ltd.

# 1.4 NOMENCLATURE - CLASSIC SERIES (IE1, IE2) + IE3 BELOW 0.75 KW

POS. 1 = Motor series:

<b>A</b>	ATEX®*	<b>H</b>	Motors with self-ventilating brakes
<b>D</b>	Motors with brakes without Ventilation or with forced ventilation		

POS. 2 = Type of application:

<b>B</b>	Enclosure group IIB	<b>Q</b>	Non sparking + Dust
<b>C</b>	Enclosure group IIC	<b>N</b>	Non sparking
<b>D</b>	Dust	<b>M</b>	Group I for mines

POS. 3 = Type of motor (electric characteristics):

<b>1</b>	Single phase	<b>4</b>	4 Three-phase 2 speed quadratic torque
<b>2</b>	Three-phase 2 speed, constant torque	<b>5</b>	For lifting
<b>3</b>	Three-phase 1 speed	<b>7</b>	For inverters

POS. 4 = Terminal box version:

<b>0r</b>	Standard version	<b>5r</b>	Protection method Ex eb
<b>3r</b>	Without box, with plate Ex db	<b>2r</b>	Ex db capacitor holder in extra-size box

POS. 5 = Frame size:

<b>63</b>		<b>90</b>		<b>132</b>		<b>200</b>		<b>280</b>
<b>71</b>		<b>100</b>		<b>160</b>		<b>225</b>		<b>315</b>
<b>80</b>		<b>112</b>		<b>180</b>		<b>250</b>		<b>355</b>

POS. 6 = Stator pack:

Refer to section 4. PERFORMANCE DATA

POS. 7 = Polarity:

<b>2</b>	2 poles	<b>24</b>	Double polarity: 2/4 poles	<b>46</b>	Double polarity: 4/6 poles
<b>4</b>	4 poles	<b>28</b>	Double polarity: 2/8 poles	<b>48</b>	Double polarity: 4/8 poles
<b>6</b>	6 poles	<b>21</b>	Double polarity: 2/12 poles	<b>41</b>	Double polarity: 4/12 poles
<b>8</b>	8 poles			<b>43</b>	Double polarity: 4/16 poles
<b>10</b>	10 poles			<b>68</b>	Double polarity: 6/8 poles
<b>12</b>	12 poles			<b>61</b>	Double polarity: 6/12 poles

POS. 8 = Mounting (IM Code I):

<b>B3</b>		<b>V5</b>		<b>V6</b>
<b>B5</b>		<b>V1</b>		<b>V3</b>
<b>B14</b>		<b>V18</b>		<b>V19</b>
<b>B35</b>		<b>V15</b>		<b>V36</b>

POS. 9 = Version with terminal box:

<b>3F xxxD / xxxS / xx</b>	Three-phase 1-speed; voltage for delta connection; voltage for star connection; frequency
<b>3F xxx / xx</b>	Three-phase, 2-speed: voltage; frequency
<b>1F xxx / xx</b>	Single-phase; voltage; frequency

**A B 2 5r 132 S 46 B5 3F 400/50 = Example of the commercial codes**

# 1.4 NOMENCLATURE - PREMIUM SERIES (IE3, IE4)

**POS. 0** = Efficiency level

<b>E3</b> Efficiency level IE3	<b>E4</b> Efficiency level IE4
--------------------------------	--------------------------------

**POS. 1** = Motor series:

<b>A</b> ATEX®* IE1	<b>H</b> Motors with self-ventilating brakes
<b>D</b> Motors with brakes without Ventilation or with forced ventilation	

**POS. 2** = Type of application:

<b>B</b> Enclosure group IIB	<b>Q</b> Non sparking + Dust
<b>C</b> Enclosure group IIC	<b>N</b> Non sparking
<b>D</b> Dust	<b>M</b> Group I for mines

**POS. 3** = Type of motor (electric characteristics):

<b>1</b> Single phase	<b>4</b> Three-phase 2 speed quadratic torque
<b>2</b> Three-phase 2 speed, constant torque	<b>5</b> For lifting
<b>3</b> Three-phase 1 speed	<b>7</b> For inverters

**POS. 4** = Terminal box version:

<b>0r</b> Standard version	<b>5r</b> Protection method Ex eb
<b>3r</b> Without box, with plate Ex db	<b>2r</b> Ex db capacitor holder in extra-size box

**POS. 5** = Frame size:

<b>63</b>	<b>90</b>	<b>132</b>	<b>200</b>	<b>280</b>
<b>71</b>	<b>100</b>	<b>160</b>	<b>225</b>	<b>315</b>
<b>80</b>	<b>112</b>	<b>180</b>	<b>250</b>	<b>355</b>

**POS. 6** = Stator pack:

Refer to section 4. PERFORMANCE DATA

**POS. 7** = Polarity:

<b>2</b> 2 poles	<b>24</b> Double polarity: 2/4 poles	<b>46</b> Double polarity: 4/6 poles
<b>4</b> 4 poles	<b>28</b> Double polarity: 2/8 poles	<b>48</b> Double polarity: 4/8 poles
<b>6</b> 6 poles	<b>21</b> Double polarity: 2/12 poles	<b>41</b> Double polarity: 4/12 poles
<b>8</b> 8 poles		<b>43</b> Double polarity: 4/16 poles
<b>10</b> 10 poles		<b>68</b> Double polarity: 6/8 poles
<b>12</b> 12 poles		<b>61</b> Double polarity: 6/12 poles

**POS. 8** = Mounting (IM Code I):

<b>B3</b>	<b>V5</b>	<b>V6</b>
<b>B5</b>	<b>V1</b>	<b>V3</b>
<b>B14</b>	<b>V18</b>	<b>V19</b>
<b>B35</b>	<b>V15</b>	<b>V36</b>

**POS. 9** = Version with terminal box:

<b>3F xxxD / xxxS / xx</b>	Three-phase 1-speed; voltage for delta connection; voltage for star connection; frequency
<b>3F xxx / xx</b>	Three-phase, 2-speed: voltage; frequency
<b>1F xxx / xx</b>	Single-phase; voltage; frequency

**E3 A B 2 5 132 S 46 B5 3F 400/50 = Example of the commercial codes**

## 2. DESIGN FEATURES

### 2.1 INSTALLATION AND APPLICATION

#### Standard installation

The motors can be installed outdoors and in dusty, moist and chemically aggressive environments (industrial climate) at ambient temperatures from -20°C to 40°C.

#### Mechanical protection (IP); Table 2A

The mechanical protection systems for electric motors are classified with the IP code followed by two numbers and, in some applications, by a letter.

<b>IP</b>	(International Protection)	this indicates the level of protection against accidental contacts of foreign bodies and against water.
<b>0 - 6</b>	(1st digit)	this indicates the level of protection against accidental contacts of foreign bodies.
<b>0 - 8</b>	(2nd digit)	this indicates the level of protection against water.

#### On-Deck Installation

Motors meant for installation on board ships and offshore areas are designed to comply with the specifications of the relevant classification authorities (see 1.3 Main options - Certificates).

#### Gear mounting, Oil-protected Flange

In some applications, it is necessary that the flange and the drive shaft are completely sealed against oil. This need must be specified during the order phase.

#### Fixed bearings

Some applications need to have a "zero axial play". This need must be specified during the order phase.

#### Cooling

Motors are air-cooled by means of external surface ventilation (IC 411). Standard motors have radial flow fan allowing fully reversible rotation. Reference standards are: IEC<sup>®\*</sup> 60034-6. From frame size 100 to 315 motors may be supplied with forced ventilation.

**Table 2A** - Mechanical protection to IEC 60034-5

Protection against accidental contact and the penetration of foreign bodies	International protection	Protection against water
Complete protection against contact and approaching of voltage-carrying parts as well as against contact with rotating parts inside the housing. Protection against harmful dust deposits. The penetration of dust is not completely prevented but the dust cannot enter in such quantities as to affect operation.	<b>IP55</b> standard design	A jet of water squirting out of a nozzle towards the motor from all directions has no harmful effect.
	<b>IP56</b> special design	In case of temporary flood, e. g. heavy seas, water cannot enter into the motor in harmful quantities.
Complete protection against contact of voltage-carrying parts as well as against contact with rotating parts inside the housing. Protection against the penetration of dust (dust-proof).	<b>IP65</b> special design	A jet of water squirting out of a nozzle towards the motor from all directions has no harmful effect.
Complete protection against contact of voltage-carrying parts as well as against contact with rotating parts inside the housing. Protection against the penetration of dust (dust-proof).	<b>IP66</b> special design	In case of temporary flood, e. g. heavy seas, water cannot enter into the motor in harmful quantities.

## 2.2 LOW TEMPERATURE VERSION AND ANTI-CONDENSATION HEATING

### Low Temperature Version

Motors intended for use at extremely low temperatures are specially designed. Flameproof certificates are valid for temperatures as low as -50°C on Classic Series and -60°C on Premium Series.

### Anti-condensation heating

Condensate may form inside the motor due to temperature fluctuations. To prevent this from happening, motors must be heated using strip type heaters on the end windings or low voltage power can be supplied to the winding via terminals U1 and V1. The heat output is given in table 2B. It is vital that during the motor operation the heaters are turned off. The supply voltage for the heaters is 230V ± 10% (115V ± 10% on request)

**Table 2B** - Cemp® range of motors

Frame Size	For preventing condensation							For protection at temperature below -20°C (down to -50°C)						
	With heater	Via Motor Winding						With heater	Via Motor Winding					
		Heating voltage with a rated motor voltage of							Heating voltage with a rated motor voltage of					
	Output [W]	Output [VA]	230V [V]	400V [V]	440V [V]	550V [V]	690V [V]	Output [W]	Output [VA]	230V [V]	400V [V]	440V [V]	550V [V]	690V [V]
63	25	35	45	75	90	100	130	50	90	70	120	140	160	210
71	25	55	35	65	75	85	110	50	130	60	100	120	135	175
80	25	70	30	55	65	75	100	50	180	50	90	100	115	155
90	25	100	25	45	50	60	80	50	250	40	70	80	95	125
100	25	140	20	35	40	50	65	50	440	40	65	75	85	115
112	50	190	20	38	45	50	65	100	450	35	60	70	80	105
132	50	300	20	35	40	45	60	100	700	30	55	65	70	90
160	50	420	17	30	35	40	50	100	950	25	45	55	60	80
180	100	500	15	25	30	35	45	200	1200	25	40	50	55	70
200	100	720	13	20	25	30	40	200	1500	20	35	40	45	60
225	100	800	13	20	25	30	40	200	2200	20	35	40	45	60
250	100	950	10	20	25	30	40	200	2700	20	35	40	45	60
280	200	1700	-	20	22	25	30	200	3000	-	28	35	40	50
315	200	1900	-	16	20	25	30	200	3600	-	25	32	38	48
315L	200	2100	-	14	18	24	30	200	4800	-	22	30	35	45
355	200	2100	-	14	18	24	30	200	4800	-	22	30	35	45

## 2.3 MATERIALS, PAINTING AND NAMEPLATE

### 2.3.1 MATERIALS

**Table 2C** - Materials of the main components:

<b>Frame Endshields Terminal box</b>	Cast iron G200 (ISO 185)
<b>Fan cover Rain cap</b>	Steel
<b>Fan</b>	Non sparking thermoplastic material or aluminum. Brass for motors for mining applications and on request
<b>Shaft</b>	Steel C45
<b>Rotor</b>	Squirrel cage in pressure cast aluminum
<b>Winding</b>	Insulation class F or H
<b>Bolts and screws</b>	Galvanised steel 8.8 or A4-80 UNI EN ISO 3506-1
<b>Cable gland (on request)</b>	Brass, nickel plated brass or stainless steel
<b>Brake enclosure</b>	Cast iron
<b>Brake terminal box</b>	Cast iron

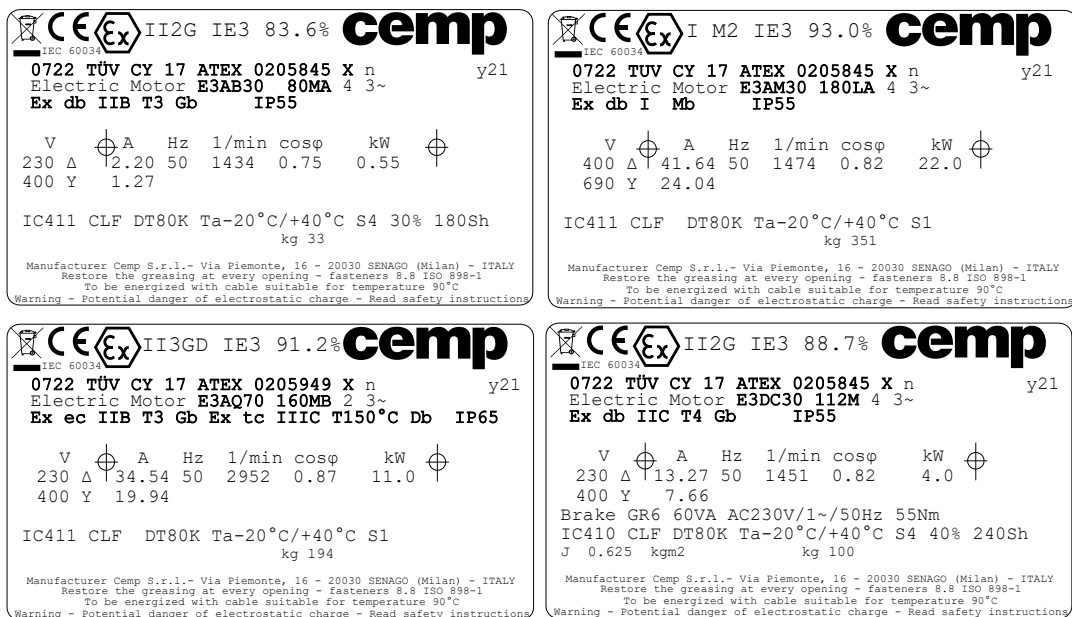
### 2.3.2 PAINTING

**Table 2D** - Materials of the main components:

Frame size	63+250	280+355
<b>Pretreatment</b>	All components are sandblasted, cleaned and degreased	All components are sandblasted, cleaned and degreased
<b>Painting</b>	Polymerised epoxy polyester powder, oven-baked at 200°C	Treatment with anti-corrosion primer Final coat of enamel paint
<b>Thickness</b>	Total 120 µm (different thicknesses available upon request)	Total 120 µm (different thicknesses available upon request)
<b>Colour</b>	RAL 5010 (special colours available upon request)	RAL 5010 (special colours available upon request)
<b>Mechanical strength</b>	Non-abrasive, elastic, insensitive to scratches, resistant to impact	Non-abrasive, elastic, insensitive to scratches, resistant to impact
<b>Corrosion resistance</b>	Highly resistant to water, water vapour, salt water	Highly resistant to water, water vapour, salt water
<b>Chemical resistance</b>	Good resistance in chemically aggressive environments	Good resistance in chemically aggressive environments
<b>Temperature range</b>	-60°C +130°C	-60°C +130°C

### 2.3.3 NAMEPLATE

The stainless steel nameplate is fitted on the motor frame.



**Fig. 2A** - Example of nameplates

## 2.4 SHAFT ENDS, BALANCING, VIBRATIONS, NOISE LEVELS, COUPLING AND BELT DRIVES

### Shaft ends

The shaft ends are cylindrical and comply with IEC<sup>®</sup>\* 60072 in their design and in their correspondence to frame sizes and outputs. The shaft ends of all motors are equipped with a tapped hole to assist in the fitting of pulleys and couplings. The keys are always supplied along with the motors.

On request, special shaft ends or a second free shaft end can be provided. Pole-changing motors with a 2-pole speed have the same shaft ends as single-speed 2-pole motors.

### Balancing, and vibration

The motors are dynamically balanced with half keys in accordance with vibration grade "A" (N) normal balance IEC 60034-14 (and ISO 8821).

The low-vibration version "B" (R) (reduced) can be supplied where high demands are made on quiet running. Care must be taken to ensure that transmission parts (pulleys, couplings) supplied by others are dynamically balanced with half key.

\*IEC is a trademark of International Electrotechnical Commission

## Noise level

Noise measurements are performed to IEC<sup>®</sup>\* 60034-9.

In the performance data, the sound pressure levels “Lp” are given in dB (A) for the individual frame sizes.

They apply for no load at 50Hz. The tolerance is + 3 dB (A).

At 60Hz the values of sound pressure increase approximately by 3 dB (A).

## Coupling drive

When aligning a motor to be coupled directly to the machine, care must be taken that the rollers and balls of the bearings do not jam. Elastic couplings are permissible with all motors.

To ensure vibration-free running and to avoid any inadmissible stress on the bearings, the machine to be coupled must still be exactly aligned in the case of elastic coupling. Maximum accuracy must be applied to the coupling of 2-pole motors.

## Belt drive

Slide rails are used for motors for easy tensioning and readjustment at the belts. Permissible forces have to be taken into consideration (See Table 2I). Pulleys and couplings must only be fitted and removed by means of specific tools.

**Table 2E** - Vibration limits according to IEC 60034-14

Balancing rate	Limit values of the speed of vibration/oscillation for frame sizes:			
	63÷132 [mm/s]	160÷280 [mm/s]	315 [mm/s]	355 [mm/s]
A	1.6	2.2	2.8	2.8
B	0.7	1.1	1.8	1.8

Terms of measure: Free standing

## 2.5 BRAKE MOTORS

### Construction method

Motors in these two series are built with an integrated brake and are considered as an integral unit, consequently, a single ATEX<sup>®</sup>\* certificate is provided for both motor and brake.

The brake is enclosed in a special enclosure built with a Ex db IIB or IIC protection type and IP65 mechanical protection. The temperature class and maximum surface temperature are those of the motor. The electro-magnet winding is encapsulated in resin which isolates it and provides mechanical protection.

### Classic Series (IE1, IE2)

Motors with frame size 63 to 160 are normally fitted with a three-phase magneto with a power supply of 110V to 690V. Alternatively, upon request, a magneto can be supplied with a direct current power supply using a rectifier, with a single-phase power supply of 48V to 440V. If you have a direct current power supply line, the magneto can be powered directly using that line (from 24V to 230V).

### Premium Series (IE3, IE4)

Motors are fitted with a direct current power supply using a rectifier with a single-phase power supply from 48V to 500V a.c. single phase. If you have a direct current supply line, the electromagnet can be powered directly using direct voltage supply from 48V to 500V. Other voltage can be made on purpose.

Motors with an axle height of 180 to 315 use a “K10” type brake, which is only available with the magneto powered using direct current. This type of brake is always supplied with a direct current power supply using a rectifier, with a single-phase power supply of 48V to 440V.

Classic Series (IE1, IE2)
Frame size 63-315
Three phase brake included as standard up to frame size 160, DC brake or DC brake with AC 1Ph rectifier from frame size 180 up to frame size 315 / DC brake or DC brake with AC 1Ph rectifier as option up to frame size 160
One terminal box for motor and brake power supply up to frame size 160 included, separate brake terminal box from frame size 180 and above.
Single brake disc included as standard / double brake disc available on request
Max brake speed 3600 RPM up to frame size 160 / max brake speed 1800 RPM from frame size 180 and above
IC410-IC411-IC416 versions available up to frame size 160 included, IC410-IC416 versions available from frame size 180 and above
2 bearings, double shaft extension available on request only for manual rotation up to frame size 160 included
Manual release available as option on all frame sizes (single brake disc version)
Micro switch available as option from frame size 132 and above
Standard AC 1Ph rectifier available on request

\* ATEX is a trademark of European Union; IEC is a trademark of International Electrotechnical Commission.



<b>Premium Series (IE3, IE4)</b>
Frame size 80-250
DC brake or DC brake with AC 1Ph rectifier up to frame size 250
One terminal box for motor and brake power supply up to frame size 132 included, separate brake terminal box from frame size 160 and above
Single brake disc version with wide brake torque regulation
Max brake speed 3600 RPM up to frame size 250
IC410-IC411-IC416 versions available up to frame size 250
3 bearings, double shaft extension available on request for manual release or for normal service duty
Manual release available as option on all frame sizes (single brake disc version)
Micro switch available as option from frame size 90 and above
Fast acting AC 1Ph rectifier included as standard

## Operation

The brake is made up of:

- Magnet
- Counter-magnet (or mobil armature) supported by three small columns where it can slide
- Braking disk
- Toothed hub secured to the motor shaft

When the coil is powered, the magnet attracts the mobil armature which thus releases the braking disk so the motor can rotate freely. By removing voltage to the magnet, the springs push the mobil armature against the braking disk, which, by creating friction against the motor shield, locks the shaft rotation. In rest conditions, when the brake is notpowered, the motor remains locked.

## Braking torque calibration

The motor is supplied with a ready-to-use calibrated brake.

Special calibration available on request. This is carried out during assembly before final testing.

Table 2F shows the standard braking torques.

## Manual release

DB, DC, HB, HC, E..DB, E..DC, E..HB, E..HC series flameproof motors with brake can be supplied on request with hand release lever for the brake. Pressure is applied on the release mechanism which moves the mobile armature, freeing the motor's shaft. When releasing pressure on the mechanism the brake automatically returns to the fail safe position.

**Table 2.1F** - Standard technical data of the integrated brake for Classic Series (IE1, IE2)

Frame size	Brake model	Static braking torque [Nm]	Air gap (+0.1 / 0) [mm]	On-off braking time requested [ms]	Number of disks [n°]	Max. Speed [1/min]	Power [VA]
63 (*)	AC1	4	0.2	20	1	3600	40
71 (*)	MEC 63	9	0.3	25	1	3600	50
80 (*)	T80	17	0.3	30	1	3600	60
90 (*)	MEC 80	35	0.3	40	1	3600	14
100 (*)	MEC 90 (◆)	48	0.3	40	1	3600	180
112 (*)	MEC 100 (◆)	70	0.3	45	1	3600	250
132 (*)	MEC 110 (◆)	90	0.3	90	1	3600	400
160 (*)	T140 (◆)	130	0.3	100	1	3600	480
180-200 (●)	K10 (◆)	400	0.3	220	1	1800	140
225-250 (●)	K10 (◆)	800	0.3	220	1	1800	140
280-315 S-M-L (●)	K10	240 - 400 - 800	0.3	220	1	1800	140
		1500		220			

(\*) AC 3 phase or DC Brake (with or without single phase rectifier) versions available on request

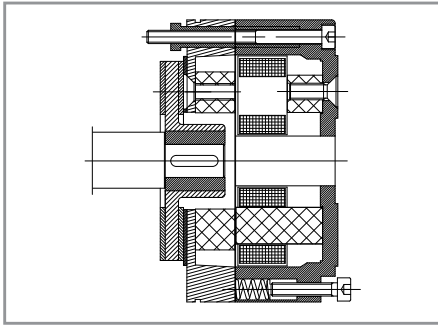
(●) DC Brake (with or without single phase rectifier) versions available on request

(◆) 2 brake discs (braking torque about +50%) available on request

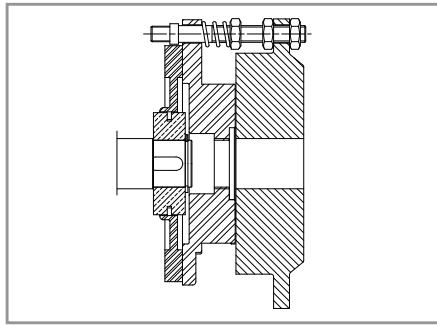
**Table 2.2F** - Standard technical data of the integrated brake for Premium Series (IE3, IE4)

Frame size	Brake model	Static braking torque [Nm]	Air gap (+0.1 / 0) [mm]	On-off braking time requested [ms]	Number of disks [n°]	Max. Speed [1/min]	Power [W]
80 (●)	GR4	17	0.4	30	1	3600	30
90 (●)	GR5	35	0.4	40	1	3600	50
100 (●)	GR6	55	0.4	45	1	3600	60
112 (●)	GR6	55	0.4	45	1	3600	60
132 (●)	GR8	130	0.4	90	1	3600	75
160 (●)	GR9	280	0.4	100	1	3600	80
180 (●)	GR9	280	0.4	100	1	3600	80
200 (●)	GR10	600	0.4	220	1	3600	130
225 (●)	GR10	600	0.4	220	1	3600	130
250 (●)	GR10	600	0.4	220	1	3600	130

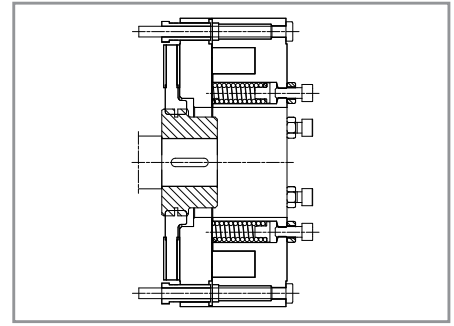
(●) DC Brake (with or without single phase rectifier) versions available on request



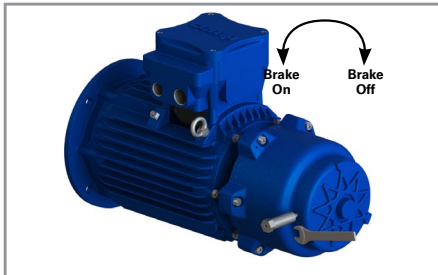
**Fig. 2B** - Construction diagram for a 63 brake for Classic Series (IE1, IE2)



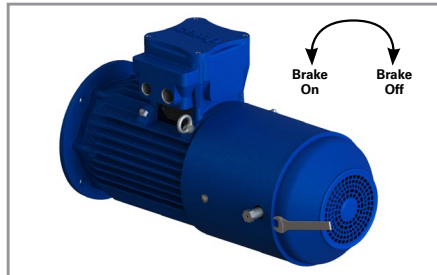
**Fig. 2C** - Construction diagram for a 71÷160 brake for Classic Series (IE1, IE2)



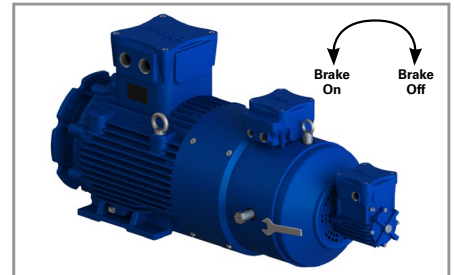
**Fig. 2D** - Construction diagram for a 180÷315 brake for Classic Series (IE1, IE2) and for a 80-250 brake for Premium Series (IE3, IE4)



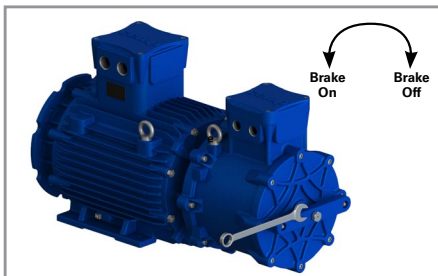
Manual release (optional on request) for motors 80-180 IE3-IE4, 71-160 IE1-IE2 - IC410



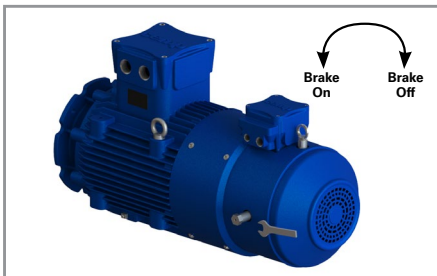
Manual release (optional on request) for motors 80-132 IE3-IE4, 71-160 IE1-IE2 - IC411



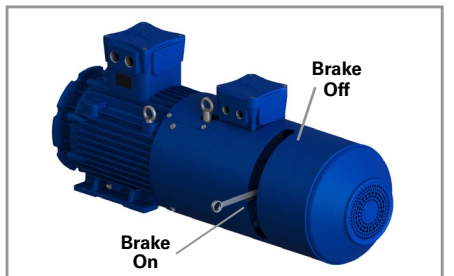
Manual release (optional on request) for motors 90-180 IE3-IE4, 90-160 IE1-IE2 - IC416



Manual release (optional on request) for motors 200-250 IE3-IE4, 180-315 IE1-IE2 - IC410



Manual release (optional on request) for motors 160-180 IE3-IE4 - IC411



Manual release (optional on request) for motors 200-250 IE3-IE4, 180-315 IE1-IE2 - IC416

## 2.6 BEARING SYSTEM

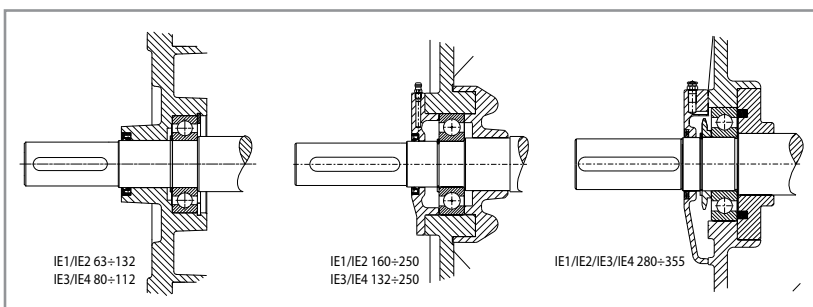
Standard motors are equipped with radial deep groove ball bearings (ZZ pre-greased series) or open bearings complete with grease nipples. Where requested roller, or other special bearings can be fitted.

### Lubrication

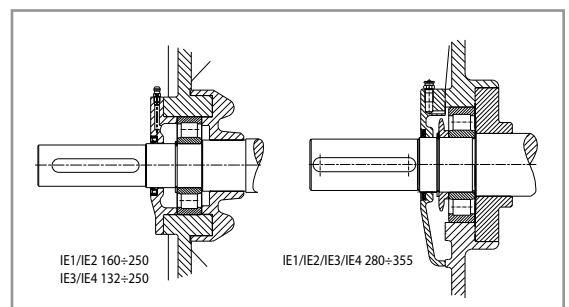
The ZZ series bearings are lubricated for life and require no further lubrication. Open bearings are supplied with grease nipples and are to be lubricated according to the indications given in the table 2G - 2H.

### Bearing Seal

In order to prevent dust and water penetration, a seal ring is fitted to the endshield on the driving and non-driving ends. These seal rings are highly resistant to vibrations, thermally stable, and resistant to mineral oils and diluted acids. Seals for media not listed above are available on request.



**Fig. 2H** - Ball bearings - DE (front)



**Fig. 2I** - Roller bearings - On request execution DE (front)

**Table 2G** - Standard model

Frame size	Poles	Bearing	
		Drive end	Non-Drive end
63	2 - 4 - 6 - 8	6202 ZZ	
71	2 - 4 - 6 - 8	6203 ZZ	
80	2 - 4 - 6 - 8	6204 ZZ	
90	2 - 4 - 6 - 8	6205 ZZ	
100	2 - 4 - 6 - 8	6206 ZZ	
112	2 - 4 - 6 - 8	6306 ZZ	
132	2 - 4 - 6 - 8	6308 ZZ C3	
160	2 - 4 - 6 - 8	6309 ZZ C3	
180	2 - 4 - 6 - 8	6310 ZZ C3	
200	2 - 4 - 6 - 8	6312 ZZ C3	
225	2 - 4 - 6 - 8	6313 ZZ C3	
250	2	6313 ZZ C3	
	4 - 6 - 8	6314 ZZ C3	6313 ZZ C3
280	2 - 4 - 6 - 8	6316 ZZ C3	
315	2	6316 ZZ C3	
	4 - 6 - 8	6317 ZZ C3	6316 ZZ C3
355	2	6317 C3	6316 C3
	4 - 6	6322 C3	6316 C3

**Table 2H** - Upon request

Frame size	Poles	Bearing			Time interval for lubrication (hours)	Amount of grease*
		Front ball bearings	Front rollers	Rear ball bearings		
132	2	6308 C3	NU 308	6308 C3	3000	12 g
	4				6000	
	6 - 8				9000	
160	2	6309 C3	NU 309	6309 C3	5500	12 g
	4				8250	
	6 - 8				11000	
180	2	6310 C3	NU 310	6310 C3	2000	12 g
	4				6000	15 g
	6 - 8				7000	
200	2	6312 C3	NU 312	6312 C3	2100	12 g
	4				5000	15 g
	6 - 8				7000	
225	2	6313 C3	NU 313	6313 C3	2000	15 g
	4				4500	20 g
	6				5600	
	8				6400	
250	2	6313 C3	NU 313	6313 C3	2000	20 g
	4	6314 C3	NU 314		4100	
	6				5300	
	8				6200	
280 S	2	6316 C3	NU 316	6316 C3	3700	33 g
	4				4300	
	6				4600	
	8				4800	
280 M	2	6316 C3	NU 316	6316 C3	3700	33 g
	4				4300	
	6				4600	
	8				4800	
315 S	2	6316 C3	NU 316	6316 C3	3300	37 g
	4	6317 C3	NU 317		9500	
	6				13700	
	8				15300	
315 M	2	6316 C3	NU 316	6316 C3	2900	37 g
	4	6317 C3	NU 317		7800	
	6				11300	
	8				13600	
315 LA	2	6316 C3	NU 316	6316 C3	4100	33 g
	4 - 6	6317 C3	NU 317		11100	37 g
	8				19500	
315 LB	2	6316 C3	NU 316	6316 C3	3500	37 g
	4 - 6	6317 C3	NU 317		9500	
	8				16550	
315 LC	2	6316 C3	NU 316	6316 C3	2900	33 g
	4 - 6	6317 C3	NU 317		7800	37 g
	8				13600	
355	2	6317 C3	NU 317	6316 C3	3400	40 g
	4	6322 C3	NU 322		6900	60 g
	6				11200	

## 2.7 PERMISSIBLE RADIAL LOADS ON THE SHAFT WITH STANDARD BEARINGS

Table 21 shows the values of radial load calculated considering:

- Frequency 50Hz;
- Temperature not exceeding 90°C;
- 20,000 hours of life for 2-pole motors;
- 40,000 hours of life for 4, 6, 8-pole motors.

For operation at 60Hz the values have to be reduced by 6% in order to achieve the same useful life. For double speed motors, consider always the higher speed.

The distance of the point of action of force  $F_R$  from the shoulder of the shaft must not exceed the length of the shaft end.

$F_R$  = Maximum radial load (e. g. belt load + weight of belt pulley)

$$F = \frac{\text{Belt load [N]} = 2 \cdot K \cdot M}{D}$$

$$M = \frac{\text{Torque [Nm]} = 9550 \cdot P}{n}$$

$P$  = Rated motor output [kW]

$n$  = Rated motor speed [1/min]

$D$  = Belt pulley diameter [m]

$K$  = Prestress factor governed by belt type: it is assumed approximately as follows

$K = 3$  For normal flat belts without tensioning pulley

$K = 2$  For normal flat belts with tensioning pulley

$K = 2.2$  For V-belts or special flat belts

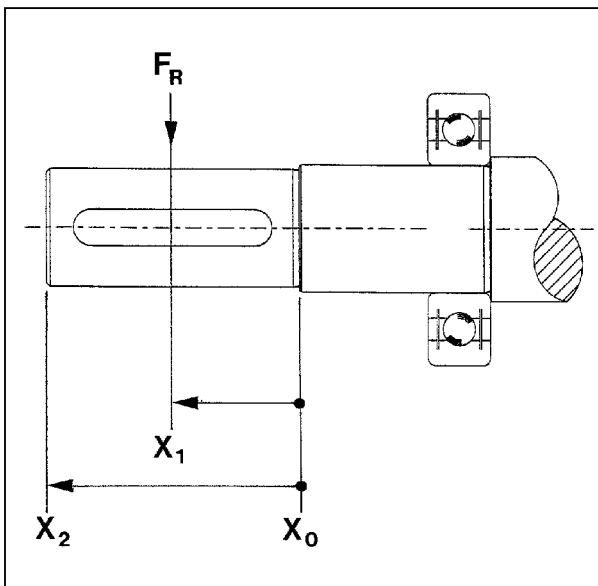


Fig. 2L

For special applications and for 355 motors, verification of admissible loads will be calculated during the offer phase.

Table 21

Frame size	Pole number	Permissible radial load $F_R$ [N]					
		Ball bearings			Roller bearings		
		$X_0$	$X_1$	$X_2$	$X_0$	$X_1$	$X_2$
63	2	390	360	340	—	—	—
	4	390	360	340	—	—	—
	6	440	410	380	—	—	—
	8	490	450	420	—	—	—
71	2	490	450	420	—	—	—
	4	480	450	420	—	—	—
	6	550	510	480	—	—	—
	8	610	560	520	—	—	—
80	2	640	590	540	—	—	—
	4	640	580	540	—	—	—
	6	730	660	610	—	—	—
	8	800	730	670	—	—	—
90	2	730	660	610	—	—	—
	4	720	660	600	—	—	—
	6	820	750	680	—	—	—
	8	910	820	750	—	—	—
100	2	1020	910	830	—	—	—
	4	1010	910	820	—	—	—
	6	1150	1030	940	—	—	—
	8	1270	1140	1030	—	—	—
112	2	1480	1350	1240	—	—	—
	4	1470	1340	1230	—	—	—
	6	1680	1530	1410	—	—	—
	8	1850	1680	1550	—	—	—
132	2	2160	1930	1750	—	—	—
	4	2140	1910	1720	—	—	—
	6	2450	2190	1970	—	—	—
	8	2700	2410	2180	—	—	—
160	2	2790	2470	2210	5720	5200	4680
	4	2770	2450	2190	5885	5350	4815
	6	3150	2790	2490	5995	5450	4905
	8	3480	3080	2750	6050	5500	4950
180	2	3600	3200	2950	6490	5900	5310
	4	3500	3350	2850	7040	6400	5760
	6	3900	3600	3300	7370	6700	6030
	8	4300	3950	3700	7480	6800	6120
200	2	4500	4300	4000	9680	8800	7920
	4	4550	4350	4100	10450	9500	8550
	6	5300	5500	5000	10780	9800	8820
	8	5500	5350	5050	10945	9950	8955
225	2	5500	5000	4650	11880	10800	9720
	4	5350	4900	4500	12760	11600	10440
	6	5950	5650	5200	13200	12000	10800
	8	6400	6100	5700	13420	12200	10980
250	2	5300	5100	4750	13860	12600	11340
	4	5650	5400	5300	15950	14500	13050
	6	5820	5600	5370	16500	15000	13500
	8	6420	5980	5520	16665	15150	13635
280	2	5500	5000	4500	15400	14000	12600
	4	5665	5150	4635	15950	14500	13050
	6	6930	6300	5670	16500	15000	13500
	8	7920	7200	6480	18150	16500	14850
315 S-M	2	5500	5000	4500	14300	13000	11700
	4	6270	5700	5130	28050	25500	22950
	6	7370	6700	6030	29150	26500	23850
	8	8360	7600	6840	29700	27000	24300
315 L	2	6820	6200	5580	13640	12400	11160
	4	7095	6450	5805	24750	22500	20250
	6	8030	7300	6570	27500	25000	22500
	8	9020	8200	7380	30800	28000	25200
355 S-M	2	5500	5000	4800	12500	11500	9800
	4						
	6	11200	10500	9500	25000	18000	12000
355 L	2	5200	4800	4500	12000	11700	9950
	4						
	6	10500	9500	9000	30000	22000	14000
	8						

## 2.8 PERMISSIBLE AXIAL LOAD ON THE SHAFT WITH STANDARD BEARINGS

If the shaft end is loaded at  $X^2$  with the permissible radial load  $F_A$ , an additional axial load is allowed (table 2L).

If the permissible radial load is not fully utilized, higher loads are possible in axial direction (Values on request).

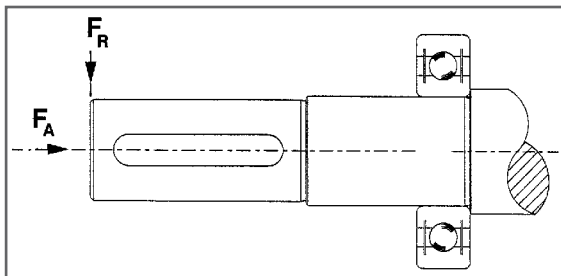


Fig. 2M

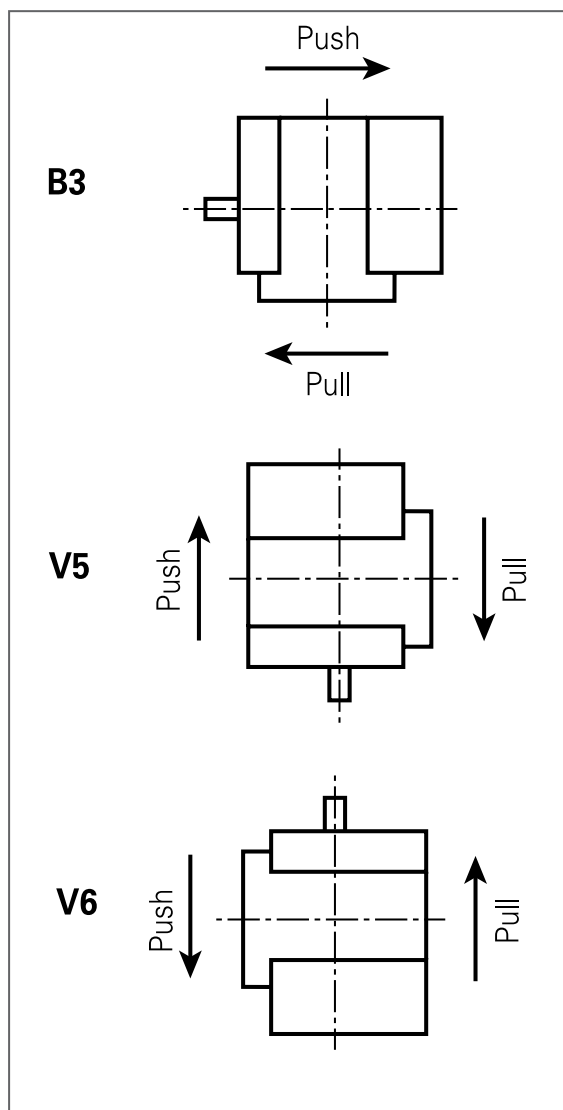


Fig. 2N

Table 2L

Frame size	Pole number	Limit axial load with $F_R$ at $X_2 - F_A$ [N]			
		Ball bearings		Roller bearings	
		B3 push/pull	V5/V6 push/pull	B3 push/pull	V5/V6 push/pull
63	2	120	110	—	—
	4	120	110	—	—
	6	140	130	—	—
	8	160	150	—	—
71	2	140	130	—	—
	4	140	120	—	—
	6	170	150	—	—
	8	190	170	—	—
80	2	190	170	—	—
	4	190	160	—	—
	6	220	190	—	—
	8	250	220	—	—
90	2	200	170	—	—
	4	200	160	—	—
	6	240	190	—	—
	8	270	220	—	—
100	2	280	230	—	—
	4	280	220	—	—
	6	330	260	—	—
	8	370	300	—	—
112	2	410	330	—	—
	4	410	320	—	—
	6	480	370	—	—
	8	540	430	—	—
132	2	590	430	—	—
	4	590	380	—	—
	6	690	470	—	—
	8	780	560	—	—
160	2	750	490	1000	700
	4	750	450	1200	840
	6	880	520	1300	910
	8	1000	640	1400	980
180	2	880	950	1000	700
	4	880	1150	1250	875
	6	1030	1350	1350	945
	8	1160	1550	1550	1085
200	2	1160	1100	1100	770
	4	1160	1200	1200	840
	6	1360	1400	1400	980
	8	1520	1600	1600	1120
225	2	1300	1250	1250	875
	4	1300	1350	1350	945
	6	1520	1600	1600	1120
	8	1710	1850	1850	1295
250	2	1460	1300	1300	910
	4	1460	1400	1400	980
	6	1710	1600	1600	1120
	8	1920	1920	1900	1330
280	2	5500	3850	3700	2590
	4	5500	3850	3700	2590
	6	6500	4550	4000	2800
	8	7400	5180	4500	3150
315 S-M	2	5500	3850	3700	2590
	4	5800	4060	3500	2450
	6	6800	4760	4000	2800
	8	7650	5355	4500	3150
315 L	2	2200	1540	3850	2695
	4	2200	1540	3800	2660
	6	2500	1750	4600	3220
	8	3000	2100	5500	3850
355 S-M	2	1600	2000	1800	1600
	4	4200	4100	5000	5000
	6	5000	4000	6500	6000
	8	5500	3850	8000	7000
355 L	2	1400	1200	1600	1500
	4	4000	3500	4500	4000
	6	4500	4000	6000	5000
	8	5000	3500	7000	6500

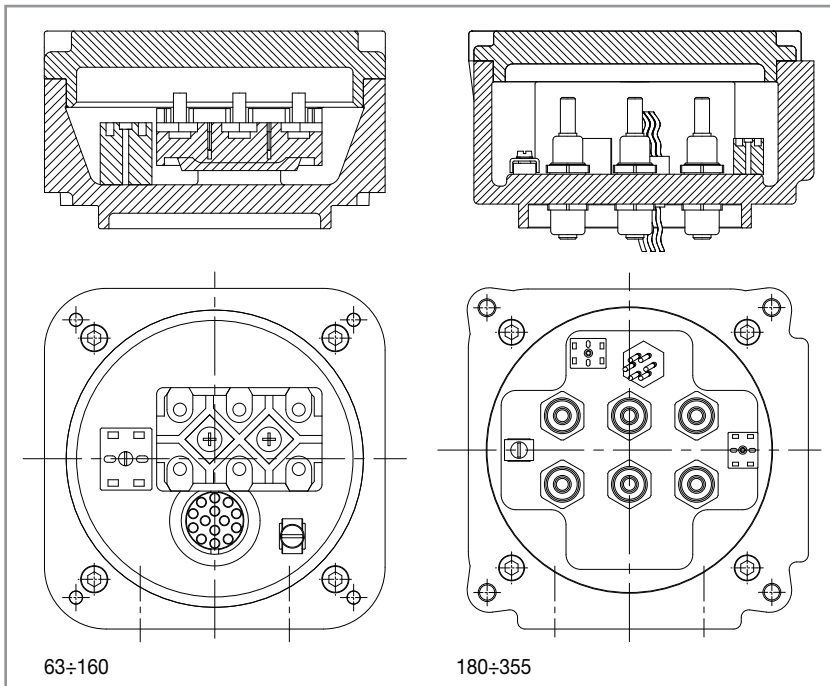
## 2.9 TERMINAL BOX DESIGN

The standard design has four basic versions:

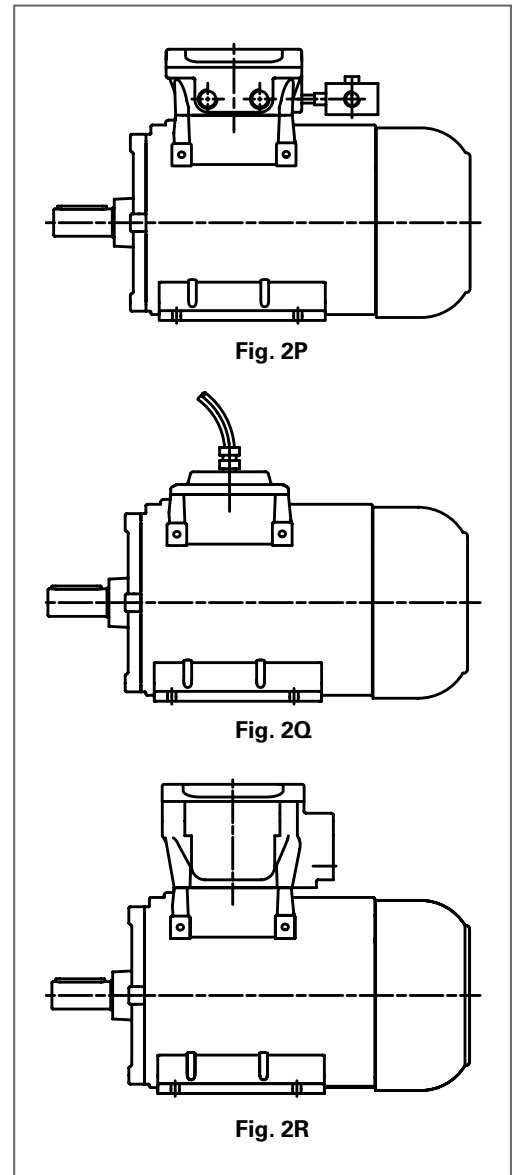
- Ex db IIB
- Ex db IIC
- Ex eb IIB
- Ex eb IIC

On request we can supply:

- Additional terminal box for auxiliary terminals (Fig. 2P)
- Motors without terminal box and with leads (Fig. 2Q)
- Bigger terminal box with capacitor for single phase motors (Fig. 2R).

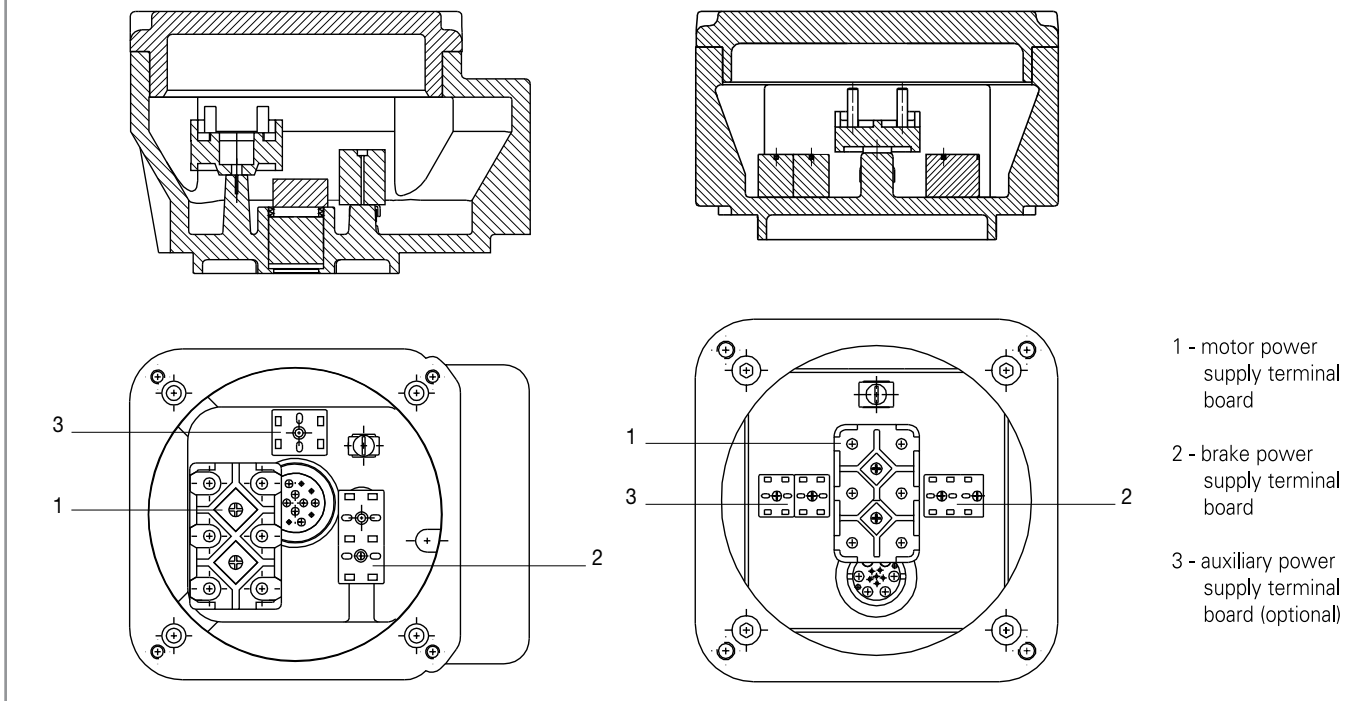


**Fig. 2O** - Standard motor version terminal box Ex db, group IIB/ IIC(front)



Series DB - DC, HB - HC (63÷112) motors

Series DB - DC, HB - HC (132÷160) motors



**Fig. 2S** - Motor with brake terminal box

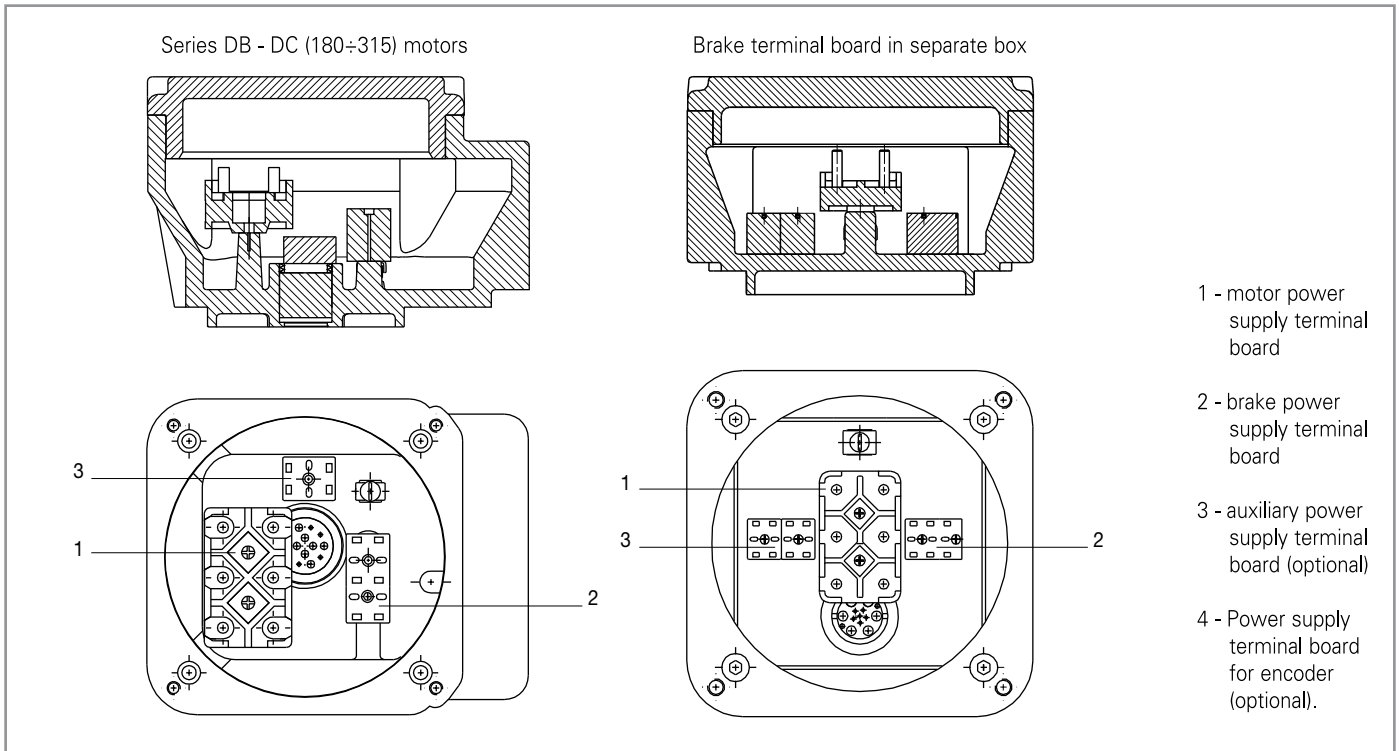


Fig. 2T - Motor with brake terminal box

## 2.10 POSITION OF TERMINAL BOX AND TERMINALS

The terminal box is usually located on top and can be turned through  $4 \times 90^\circ$  (Fig. 2U). For a horizontal mounted motor, the cable entry is normally located on the right side (looking at the driving-end).

Cable entry:

- Standard position: 1
- Special positions upon request: 2, 3, 4.

### Terminals and earthing terminal

There are a maximum number of 6 power terminals in the terminal box. The type of monitoring device depends on the number of possible additional terminals in the main terminal box.

PTC thermistors can be connected to two additional terminals. Two terminals are also necessary for connecting the anticondensation heater.

For PT 100 (RTD) thermistors, 3 or 4 terminals are necessary depending on the type chosen.

An earthing terminal is located in the terminal box and another earthing terminal is located on motor frame.

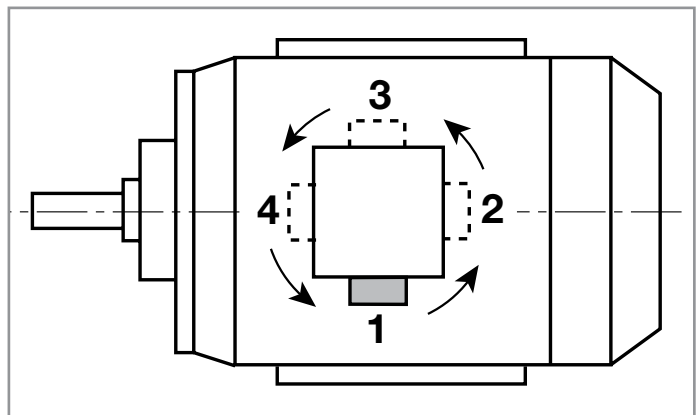


Fig. 2U - Positioning of the cable entry, plan view

## 2.11 CABLE-ENTRIES

As standard, the motors are delivered with one or two threaded cable entries for flameproof packing glands.

Ex db eb motors can be also provided with Ex eb packing glands.

Motors fitted with thermodetectors or heaters are always provided with additional cable entry.

Mains connection cable entries				
Frame size	Mains power supply	Power supply from an inverter	Conical threading upon request*	
			ANSI B 2.1	UNI 6125
63 ÷ 112	1 x M25	1 x M25 + 1 x M20	NPT 3/4"	Gk 3/4"
132 ÷ 160	2 x M32	1 x M32 + 1 x M20	NPT 1"	Gk 1"
180 ÷ 250	2 x M40	1 x M40 + 1 x M20	NPT 1.1/4"	Gk 1.1/4"
280 ÷ 315	2 x M63	1 x M63 + 1 x M20	NPT 2"	Gk 2"
355	2 x M75	1 x M75 + 1 x M20	NPT 2.1/2"	Gk 2.1/2"
Auxiliaries cable entries				
63 ÷ 355	—	1 x M20	NPT 1/2"	Gk 1/2"

\* Other threads available upon request

# 3. ELECTRICAL DESIGN

## 3.1 STANDARD OPERATING CONDITIONS

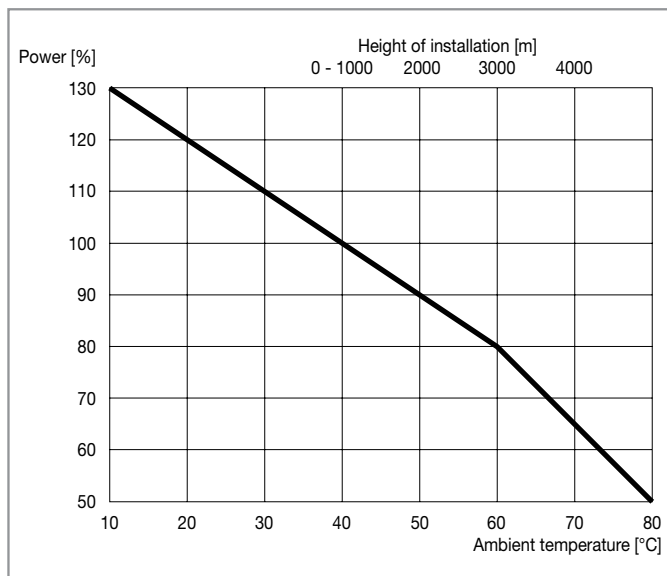
### Output

The rated outputs and operating characteristics given in the performance data according to IEC<sup>®</sup>\* 60034-1 refer to:

- Continuous duty (S1)
- Frequency of 50Hz
- Voltage 400V (230V for single phase)
- Standard ambient temperature of -20/ +40°C
- Maximum height of installation of 1000m above sea level

Premium Series (IE3, IE4) motors can operate at rated output up to 60°C without derating.

Motors can also be operated in ambient temperatures up to 80°C and at altitudes up to 4000m above sea level. In these cases, the rated output given in the tables must be reduced in accordance with table 3A or a larger motor has to be chosen.



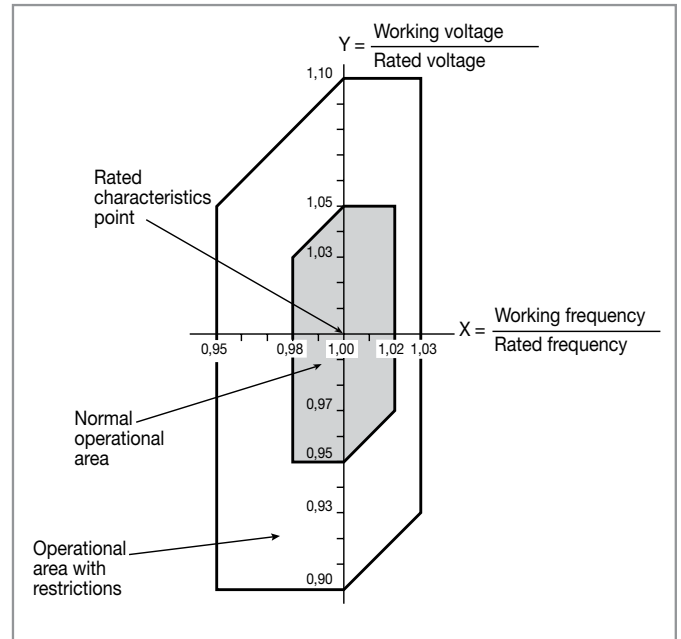
**Table 3A** - Power variation of standard motors in case of coolant temperature different from 40°C or height of installation over 1000m above sea-level

The rated data does not need to be changed, if at altitudes in excess of 1000m above sea level, the ambient temperature is reduced according to the following table:

Altitude of installation [m]	Maximum ambient temperature[°C]
0 to 1000	40
1000 to 2000	30
2000 to 3000	19
3000 to 4000	9

### Voltage and Frequency

The motors as standard are built to run at the voltage and frequency with the tolerances indicated in figure 3A.



**Figure 3A**

The motors can run with the variations envisaged in normal operational areas at a voltage of  $\pm 5\%$  and frequency of  $\pm 2\%$ .

Furthermore, the motors can be used in the operational area with restrictions (variations in voltage of  $\pm 10\%$  and frequency of  $\pm 3\%$ ) as long as the indications given by norm 60034-1 are complied with.

### Torque

The motors are fitted with squirrel-cage rotors suitable for direct-on-line starting. The resulting starting and maximum torques, expressed as a multiple of the rated torques are given in the performance data.

A deviation in the voltage from the rated value changes the torques as an approximate function of the square of the voltages.

Normally two-speed motors have a nominal torque that is roughly the same for both speeds.

A version is also available with quadratic torque, for centrifugal machines (fans, pumps). In this case, the torque at the lower speed is roughly half that available at the higher speed.

### Rated current

In the performance data the rated currents are only indicated for a rated voltage of 400V.

For other voltages the rated currents are inversely proportional to the voltages:

$$\frac{U}{U'} = \frac{I'}{I}$$

This results in:

$$I' = \frac{U \cdot I}{U'}$$

\*IEC is a trademark of International Electrotechnical Commission



### Speed

The rated speeds shown in the performance data are valid for 50Hz and the rated speed equals synchronous speed less slip. The following speeds result from the number of poles and the mains frequencies of 50 and 60Hz:

### Direction of rotation

Pole number	No-load speed at	
	50Hz [1/min]	60Hz [1/min]
2	3000	3600
4	1500	1800
6	1000	1200
8	750	900
10	600	720
12	500	600
16	375	450

The motors can be operated in both directions of rotation. If the phases are connected in the sequence L1, L2, L3 to the terminals U1, V1, W1, the motor turns clockwise. The direction of rotation can be reversed by interchanging any two phases.

**NOTE:** Regarding electro-magnetic compatibility, Low voltage induction motors, if installed correctly and connected to the power supply, respect all immunity and emission limits as set out in the regulations relating to electro-magnetic compatibility (EMC "Generic Standard" for industrial environments).

In the case of supply by means of electronic impulse devices (inverters, soft starters etc.), all verifications and any modifications, necessary to ensure that emission and immunity limits, as stated within the regulations, are respected, are the responsibility of the installer.

### Tolerances

According to IEC<sup>®</sup>\* 60034-1 the electrical data stated in the tables are subject to the following tolerances:

Efficiency	
P <sub>n</sub> ≤ 50 kW:	- 0.15 (1-η)
P <sub>n</sub> > 50 kW:	- 0.10 (1η)
Power factor: (minimum 0.02 - maximum 0.07)	$\frac{-1 - \cos \phi}{6}$
Slip at rated load operating temperature:	± 20% of rated slip
Locked rotor torque (starting torque):	- 15% + 25%
Maximum torque:	- 10%.
Current with locked rotor:	20% (no lower limit).

\*IEC is a trademark of International Electrotechnical Commission

## 3.2 EFFICIENCY AND POWER FACTOR AT PARTIAL LOAD

The efficiency and power factor values shown in the performance data refer to rated output at 50Hz.

## 3.3 INSULATION AND TEMPERATURE RISE

### Insulation

The components of the insulation system were selected so as to ensure good protection against chemically aggressive gases, vapours, dust, oil and air humidity. All materials used for insulating the winding and winding ends correspond to insulating classes F or H according to IEC 60085:

- Enamel-insulated copper wires with temperature index 200 (class H);
- Insulating sheet on polyester base (class F);
- Impregnation with fenolic resins modified with polyester resins (class H);

### Temperature rise

Standard single-speed motors in continuous service (excluding 315M) have temperature rises that are within the limits for class B. Motors with higher output and pole-changing motors normally have temperature rise within class F limit.

Insulation class	Limit temperature [°C]
B	130
F	155
H	180

**Table 3B** - Limit temperature for insulating material according IEC 60085

Insulation class	Max temperature rise [K]
B	80
F	105
H	125

**Table 3C** - Temperature rise limit for rotating machines according IEC 60034-1

According to Normative IEC 60034-1, the values shown in the table above may be up to 10°C higher, with a feeding current variance of ± 5%.

### 3.4 DUTY TYPES

In compliance with IEC<sup>®</sup>\* 60034-1 the following duty-types are distinguished:

<b>Duty-type S1</b>	continuous running duty. Constant load operation.
<b>Duty-type S2</b>	Short-time duty.
	Operating times of 10, 30, 60, and 90 minutes are recommended.
	After each operating period the motor remains de-energized until the winding has cooled down to the ambient temperature.

Duty-type where start-ups DO NOT INFLUENCE winding over-heating:

<b>Duty-type S3</b>	intermittent periodic duty.
	Where starting does not influence the temperature. Duty cycle 10 minutes unless otherwise agreed upon.
	For the cyclic duration factor the values 15, 25, 40, and 60% are recommended.
<b>Duty-type S6</b>	continuous operation periodic duty.
	Duty cycle 10 minutes unless otherwise agreed upon.
	For the cyclic duration factor the value 15, 25, 40, and 60% are recommended.

Duty-types where starting and braking have a corresponding INFLUENCE on the temperature rise of the winding:

<b>Duty-type S4</b>	intermittent periodic duty with starting. Intermittent periodical operation with identical cycles.
---------------------	---

For S4 duty-type the following details must be given after this code:

- Intermittence ratio;
- The number of starts per hour;
- Moment of inertia of the motor;
- Moment of inertia of the load.

<b>Duty-type S9</b>	duty with non-periodical load and speed variations. Typical operation for motors powered by frequency converters. Constant load operation. CEMP <sup>®</sup> certification cover also duty-types S5, S7, S8.
---------------------	--

Most of the real duty-type conditions represent a combination of duty-types as mentioned under 1. and 2. In order to exactly determine a suitable motor, details of all the operating conditions are required.

N.B.: The output ratings stated in the "Performance data" (Chapter 4.) apply to duty-type S1.

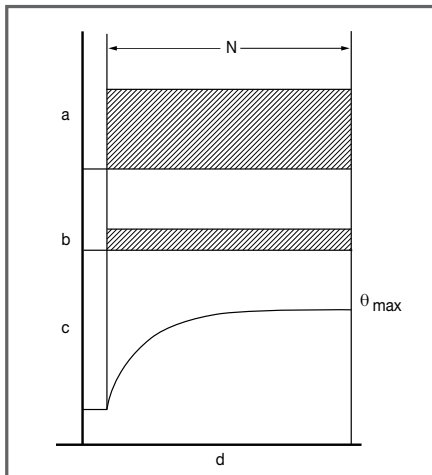


Fig. 3B - Duty type S1

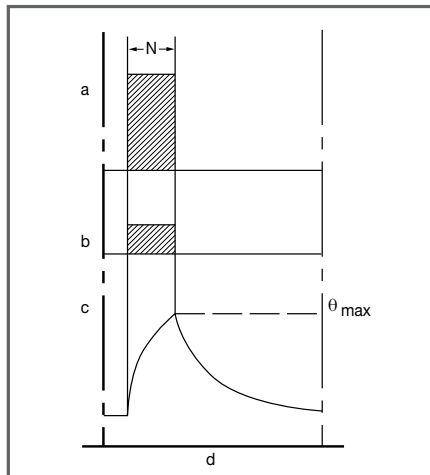


Fig. 3C - Duty type S2

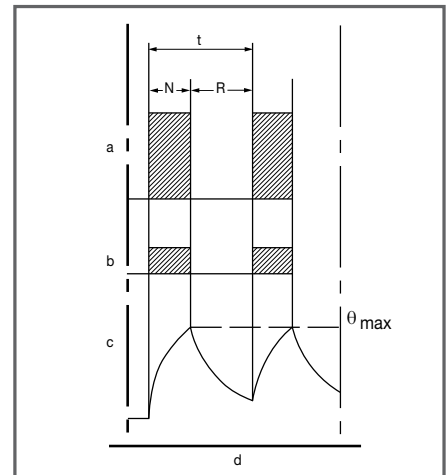


Fig. 3D - Duty type S3

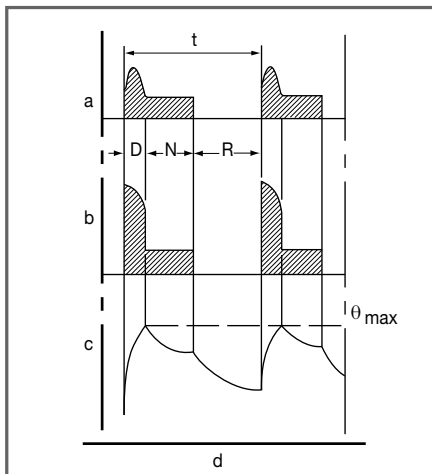


Fig. 3E - Duty type S4

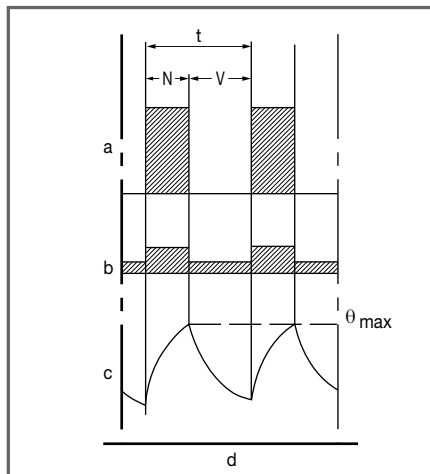


Fig. 3G - Duty type S6

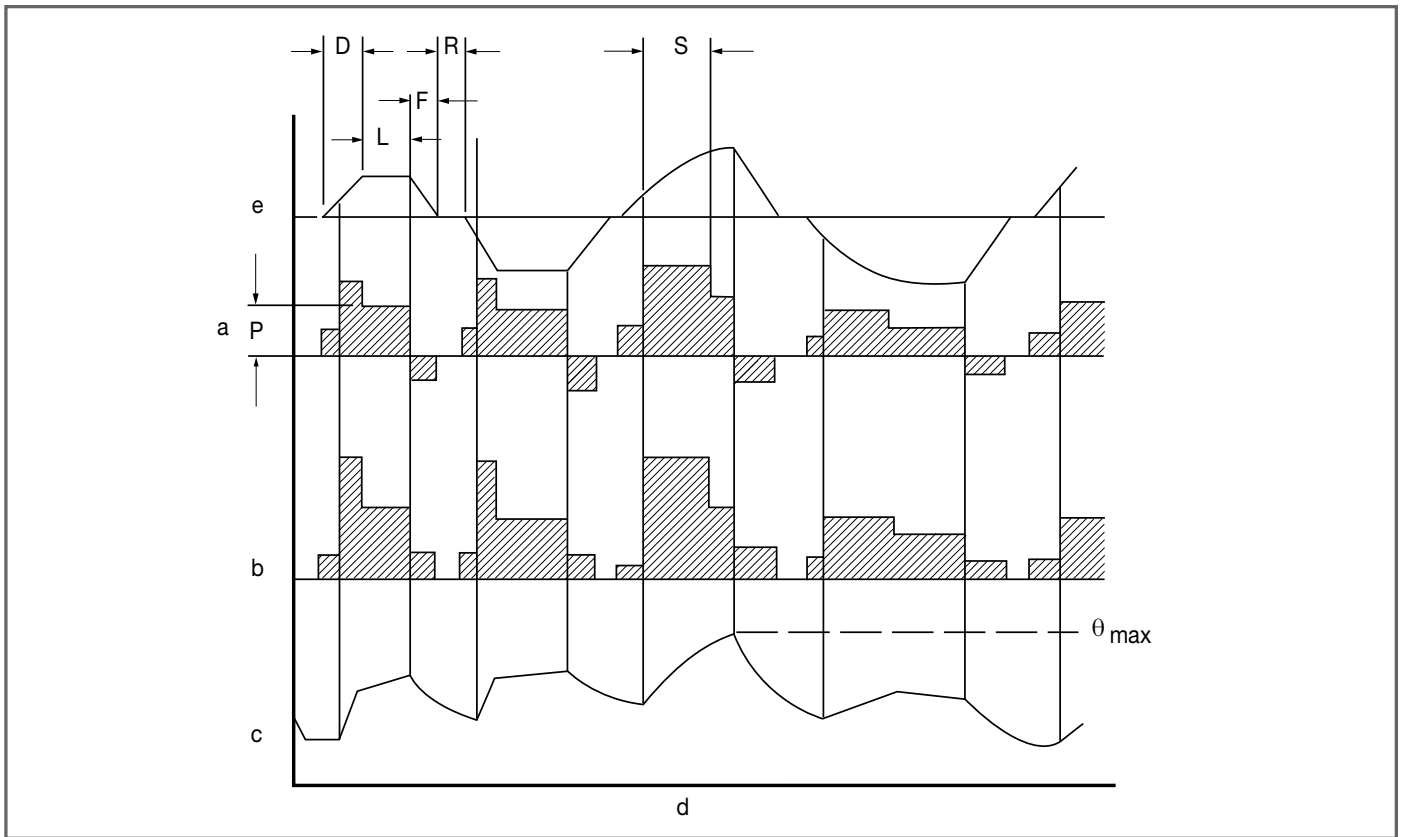


Fig. 3L - Duty type S9

Table 3D - Simbology

a	Load
b	Electrical losses
c	Temperature
d	Time
e	Speed
t	Cycle length
D	Start-up or acceleration time
F, F <sub>1</sub> , F <sub>2</sub>	Electrical braking time
N, N <sub>1</sub> , N <sub>2</sub> , N <sub>3</sub>	Constant load operating time
L	Variable load operating time
V	No-load operating time
R	Rest time
S	Overload operating time
P	Full load
$\theta_{max}$	Maximum temperature reached during cycle

# 3.5 CONNECTING DIAGRAMS

## 3.5.1 THREE-PHASE MOTORS

Single-speed motors are normally pre-arranged to be connected in star or delta method.

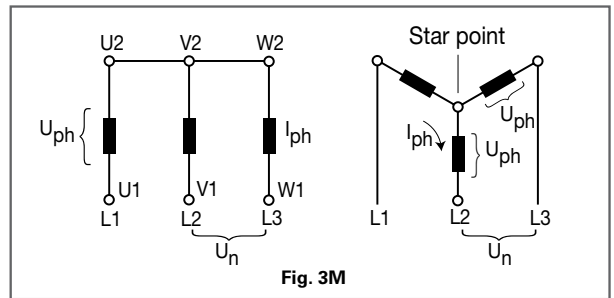
### Star connection

Connecting together the W2, U2, V2 terminals (star point) and connecting to the mains the U1, V1, W1 terminals a star connection is obtained. The phase current  $I_{ph}$  and the phase voltage  $U_{ph}$  are the following:

$$I_{ph} = I_n$$

$$U_{ph} = U_n / \sqrt{3}$$

where  $I_n$  the line current and  $U_n$  is the line voltage.

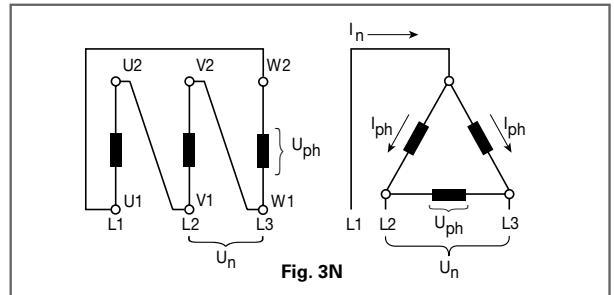


### Delta connection

Connecting the end of each winding to the beginning of the next winding a delta connection is obtained. The phase current  $I_{ph}$  and the phase voltage  $U_{ph}$  are the following:

$$I_{ph} = I_n \sqrt{3}$$

$$U_{ph} = U_n$$

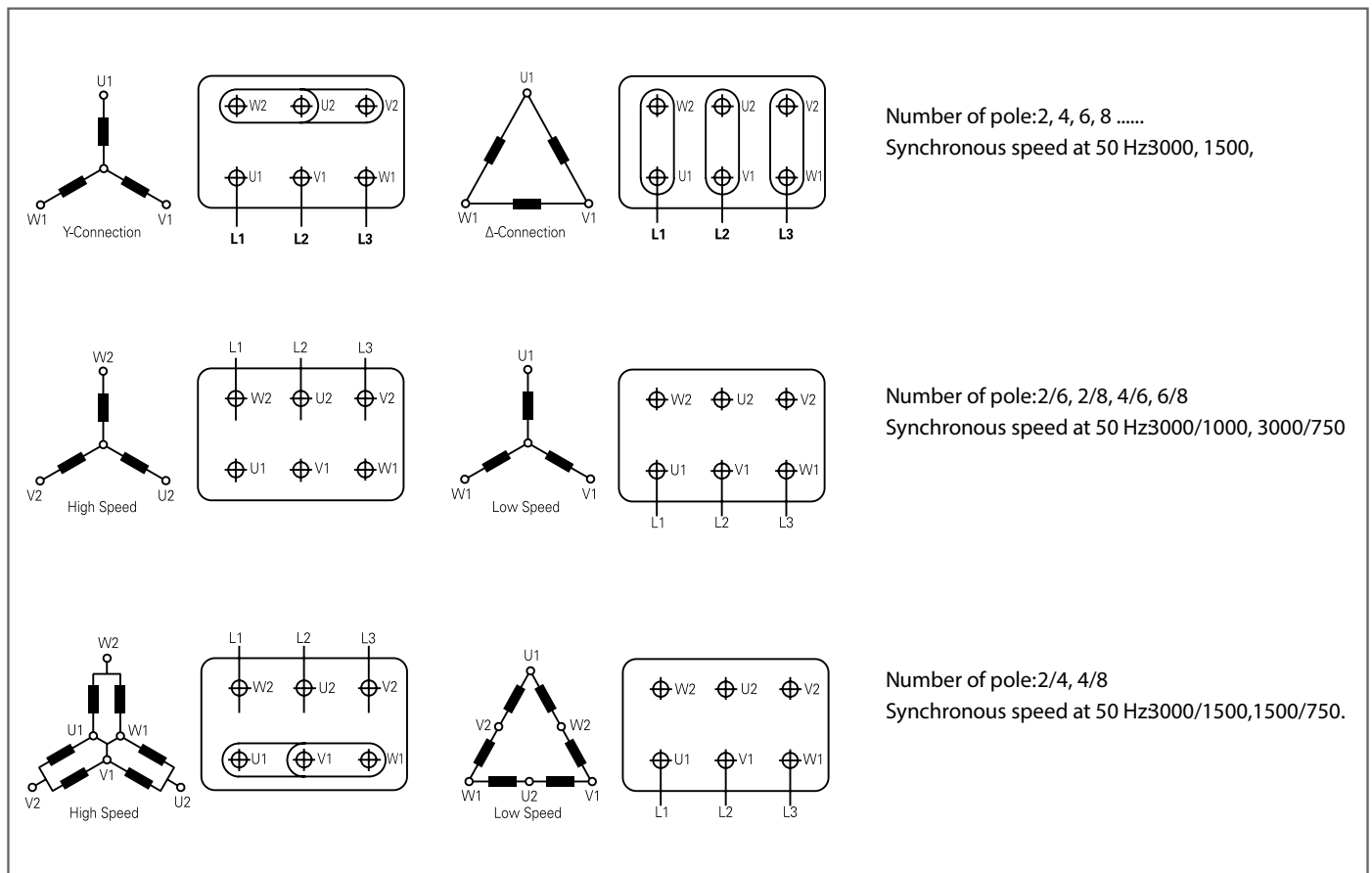


### Star - Delta starting

The star-delta starting is an easy way to reduce the starting current and starting torque. Motors can be started with the star-delta starting method whenever the supply voltage correspond to the rated voltage of the motors in delta connections.

### Two speed motors

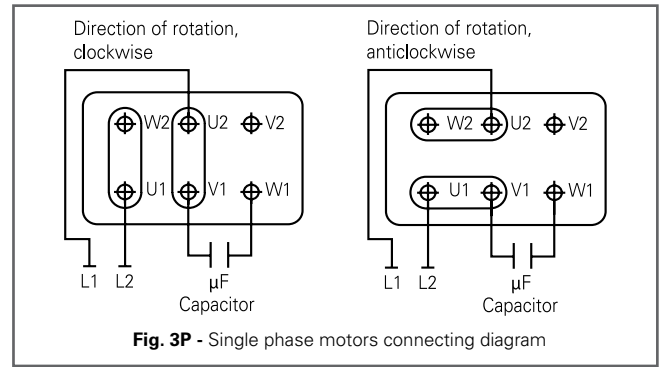
Standard two speed motors are designed for only one rated voltage and for direct starting. When the speed ratio is 1/2 the standard motors have one winding (Dahlander connection). For other speed ratios the motors have two different windings.



### 3.5.2 SINGLE PHASE MOTORS

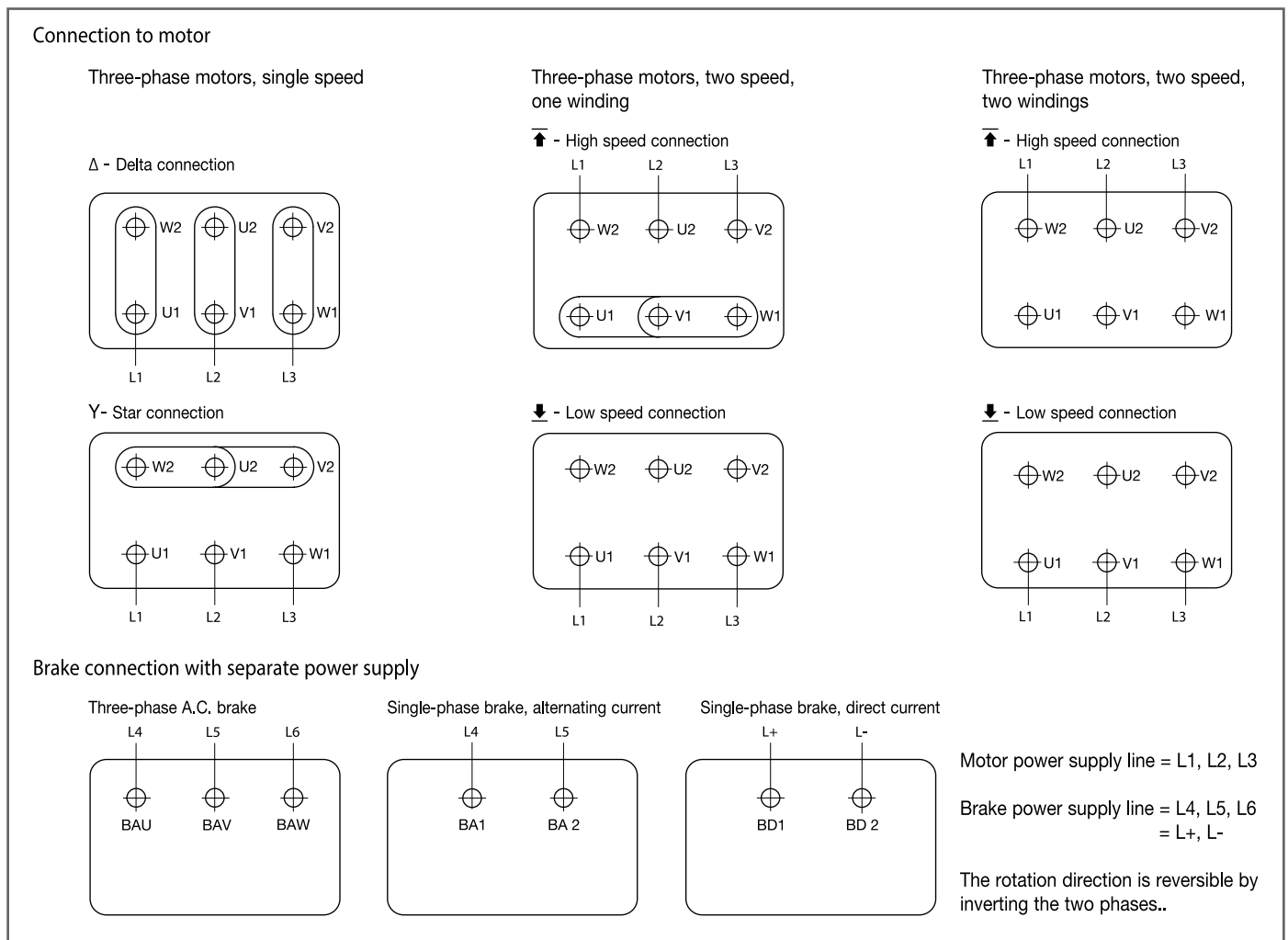
Single phase motors are designed for only one rated voltage.

They have two windings (starting and main winding) which have to be connected to the capacitor supplied with the motor. The sense of rotation can be reversed according to the connecting diagram.



### 3.6 BRAKE CONNECTION DIAGRAMS

Other connection diagrams between motor and brake are available, including a single power supply for motor and brake, or power supply on the same terminal board.



**Fig. 3Q** - Motor and brake connection diagrams diagram

### 3.7 HOURLY START-UPS ALLOWED (BRAKING: N° PER HOUR)

For motors with intermittent service, (S4) the start-ups per hour allowed depend on the service time and load characteristics, of which inertia is particularly influential. In general, as inertia increases the number of start-ups reduces.

The data given in the column for the "Braking: n° per hour" in section "4. Nominal data" in this catalogue relate to operation with loads that have an inertia 1,5 times that of the motor.

### 3.8 ADDITIONAL TERMINALS MARKING (IEC®\*60034-8)

Motors having accessories are supplied with auxiliary terminal boards which bear the marking shown in table 3G.

Marking	No. terminals	Additional terminal for:
TP1 - TP2 (warning)	2	Thermistor PTC (*)
TP3 - TP4 (switch off)	2	
R1 - R2 - R3 (I sensor)	3	Thermistor PT 100 with 3 wires
R4 - R5 - R6 (II sensor)	3	
R7 - R8 - R9 (III sensor)	3	
R11 - R12 - R13 (DE)	3	Thermistor PT 100 on bearing
R21 - R22 - R23 (NDE)	3	
TB1 - TB2 (warning)	2	Normally closed bi-metallic switch (**)
TB3 - TB4 (switch off)	2	
TB8 - TB9 (switch off)	2	Normally closed brake bi-metallic switch (**)
TM1 - TM2 (warning)	2	Normally open bi-metallic switch (**)
TM3 - TM4 (switch off)	2	
HE1- HE2	2	Space heaters
U1 - U2	2	Single phase forced ventilation
U - V - W	2	Three phase forced ventilation
Colours according manufacturer diagram	9	Encoder
CA1 - CA2	2	Capacitor
PE	1	Earth cable

(\*) U rated = 6V - max 30V - (\*\*) U rated = 250V

### 3.9 PROTECTION DEVICES

In order to protect the winding of a three-phase induction motor against thermal overloads, resulting in example from overloading and operation with only two phases, one of the following devices can be provided:

#### Bimetallic type device:

it consists of 2 motor protectors connected in series. The contact is normally closed; the disc opens when the windings temperature reaches limits dangerous for the insulation system. On request, normally open device are available.

#### PTC temperature sensor (thermistors):

it consists of 3 sensors connected in series embedded in stator windings. Once it reaches the operating temperature, this device quickly changes the resistance; it must be connected to a suitable releasing device (supplied only on request).

#### PT 100 (RTD) thermometric resistors (from size 132 and above).

The resistance value of this device varies according to the windings temperature. They are particularly suitable for a continuous survey of the windings temperature. For a good survey, at least two sets of PT 100 are requested; they must be connected to their proper monitoring equipment (supplied only on request).

PTC and PT 100 also offer reliable protection for operating modes other than continuous operation, e. g. short-time operation, switching operation, longtime start-up as well as for reduced cooling air flow rates and high ambient temperatures.

Motors for operation with frequency converter are always supplied with PTC thermistor temperature detectors. Above devices have their proper terminal block located inside main box. Upon request also available with separate terminal box.

### 3.10 FREQUENCY CONVERTER DRIVEN MOTORS

Cemp® VFD motors are certified for use with all types of variable speed drives, following inverter nameplate and Safety Instructions.

Chapter 4.8 lists the electrical data in different working conditions.

When using a squirrel cage motor with a frequency converter, the following points must be taken into account in addition to the general selection criteria:

<p>The voltage (or current) fed by the frequency converter is not purely sinusoidal. As a result it may increase the losses, vibration, and noise of the motor. Furthermore, a change in the distribution of the losses may affect the motor temperature balance.</p> <p>In every case, the motor must be correctly sized according to the instructions supplied with the selected frequency converter and with our technical data.</p>
<p>In a frequency converter drive the actual operating speed of the motor may deviate considerably from its rated speed.</p> <p>For higher speeds it must be ensured that the highest permissible speed of rotation of the motor, or the critical speed of the entire equipment, is not exceeded. In addition, bearing lubrication and any ventilation noise suppression arrangements will require special attention.</p>
<p>The torque values shown in this catalogue for motors with constant torque at frequencies over 60Hz can be stably supplied only if the motor has a delta connection.</p> <p>For example, to stably achieve these values from a 230/400V 50Hz winding motor with a 400V 50Hz mains voltage supply, the motor must have a delta connection and, consequently, the inverter must be configured so that at 50Hz it supplies a voltage of 230V.</p> <p>Vice-versa, with a star connection, the values listed can be supplied only for very short periods.</p>
<p>Operating periods at a speed above 3600 1/min must never exceed 10% of the entire work cycle of the motor to ensure the bearings last accordingly.</p>
<p>If the rated voltage is 500V or if there is a long feeding cable between the motor and the frequency converter, the insulation of the motor must be reinforced because of the occurring voltage peaks.</p>

A correct earthing of the motor and the driven equipment is also important to avoid bearing currents and voltages.

The features of motors for use in constant torque and those for use in quadratic torque are indicated in section 4.8. Section 4.8.1 and 4.8.2 contains graphs showing loading curves for the use of variable torque motors. The reference torque value (Mn) is the value indicated in the tables in section 4.1.

# 4. PERFORMANCE DATA

## 4.1 THREE-PHASE MOTORS, 1 SPEED, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.1		Three-phase motors			1	Speed		3000			rpm			Brake						
Motor type	Rated output	Speed		Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Torque		Power	Braking: n° per hour	Total inertia	
		P <sub>n</sub> [kW]	n [1/min]								I <sub>n</sub> [A]	η [%]			cosφ	M <sub>n</sub> [Nm]				I <sub>d</sub> /I <sub>n</sub>
											Lw	Lp								
63 A 2	0.18	2900	0.80	67.0	0.49	0.59	5.0	6.00	6.30	60	52	0.0001	16	22	3	4	40	240	0.00015	
63 B 2	0.25	2858	0.85	70.1	0.60	0.84	4.7	4.30	3.70	60	52	0.0001	16	22	3	4	40	240	0.00015	
71 A 2	0.37	2770	0.95	69.0	0.83	1.27	4.2	2.60	2.70	66	58	0.0004	19	29	6	9	50	240	0.00082	
71 B 2	0.55	2830	1.35	74.9	0.79	1.86	5.3	2.40	2.70	66	58	0.0004	19	29	6	9	50	240	0.00082	
80 A 2	0.75	2800	1.84	74.5	0.79	2.56	4.9	2.58	2.90	70	62	0.0006	26	36	12	17	60	240	0.00140	
80 B 2	1.10	2845	2.68	77.0	0.77	3.69	5.3	3.00	2.90	70	62	0.0008	26	36	12	17	60	240	0.00160	
90 S 2	1.50	2845	3.26	79.0	0.84	5.04	5.4	2.60	2.50	77	69	0.0012	33	52	25	35	140	240	0.00230	
90 L 2	2.20	2820	4.53	80.5	0.87	7.44	6.0	2.37	2.95	77	69	0.0015	33	52	25	35	140	240	0.00260	
100 LA 2	3.00	2910	6.64	82.5	0.79	9.85	7.5	3.20	3.40	80	72	0.0029	46	62	34	48	180	240	0.00422	
112 M 2	4.00	2900	8.00	84.2	0.86	13.17	6.8	2.00	2.50	80	72	0.0074	65	100	50	70	250	240	0.00959	
132 SA 2	5.50	2905	10.90	85.0	0.86	18.07	6.5	2.80	2.90	81	73	0.0124	95	124	60	90	400	236	0.01648	
132 SB 2	7.50	2925	14.80	86.0	0.85	24.48	6.4	2.51	3.00	83	75	0.0150	95	124	60	90	400	236	0.01908	
132 MB 2	9.20	2934	17.30	88.1	0.87	29.95	7.5	2.80	3.00	83	75	0.0178	105	134	60	90	400	236	0.02188	
132 ML 2	11.00	2930	21.20	89.3	0.84	35.85	6.6	2.80	3.09	83	75	0.0216	105	134	60	90	400	236	0.02568	
160 MA 2	11.00	2930	20.00	89.0	0.89	35.85	6.6	2.50	2.80	84	76	0.0360	180	217	90	130	480	136	0.04101	
160 MB 2	15.00	2950	26.80	89.7	0.90	48.56	7.0	2.90	3.00	84	76	0.0463	180	217	90	130	480	136	0.05131	
160 L 2	18.50	2930	33.00	89.8	0.90	60.30	7.0	2.80	3.00	84	76	0.0534	195	230	90	130	480	136	0.05841	
180 M 2	22.00	2945	39.00	90.6	0.90	71.35	7.5	2.80	2.70	83	74	0.0818	230	-	-	-	-	-	-	
200 LA 2	30.00	2975	54.00	91.6	0.88	96.29	8.5	3.50	2.70	87	77	0.1625	285	-	-	-	-	-	-	
200 LB 2	37.00	2975	65.00	91.8	0.90	118.72	7.9	2.80	2.50	87	77	0.1947	305	-	-	-	-	-	-	
225 M 2	45.00	2975	79.00	92.3	0.89	144.42	9.0	2.60	3.00	89	79	0.2902	385	-	-	-	-	-	-	
250 M 2	55.00	2980	95.00	92.5	0.90	176.24	7.5	2.50	2.80	90	79	0.4197	505	-	-	-	-	-	-	
280 S 2	75.00	2982	134.00	93.2	0.87	240.11	7.5	2.70	3.30	88	76	0.5200	842	-	-	-	-	-	-	
280 M 2	90.00	2985	160.00	93.0	0.88	287.93	9.0	3.10	3.80	88	76	0.6300	881	-	-	-	-	-	-	
315 S 2	110.00	2980	191.40	93.3	0.89	352.40	8.3	3.00	3.30	90	76	0.7000	932	-	-	-	-	-	-	
315 M 2	132.00	2970	228.00	93.0	0.90	424.00	7.9	2.50	3.30	90	76	0.7500	948	-	-	-	-	-	-	
315 LA 2	132.00	2984	222.00	94.0	0.92	422.47	7.0	2.00	2.30	99	85	1.8800	1340	-	-	-	-	-	-	
315 LB 2	160.00	2984	268.50	94.5	0.91	512.21	7.0	1.65	2.00	99	85	2.2500	1430	-	-	-	-	-	-	
315 LC 2	200.00	2980	336.00	94.5	0.91	640.72	7.3	1.70	2.00	99	85	2.7900	1550	-	-	-	-	-	-	

► I<sub>n</sub> = I<sub>n</sub> ·  $\frac{400}{U}$  (I<sub>n</sub> = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$



# 4. PERFORMANCE DATA

## 4.1 THREE-PHASE MOTORS, 1 SPEED, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.1 Three-phase motors		1		Speed		1500		rpm		Brake									
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia
										[dB(A)]	J▼				[Nm]	[VA/W]			
	P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>	Lw	Lp	[kgm <sup>2</sup> ]	m [kg]	m [kg]	S1	S4	[VA/W]	[max n.]	[kgm <sup>2</sup> ]
63 A 4	0.12	1400	0.62	57.60	0.50	0.82	4.5	3.6	3.80	52	44	0.0002	16	22	3	4	40	240	0.00025
63 B 4	0.18	1340	0.67	61.50	0.62	1.28	4.2	2.3	2.53	52	44	0.0002	16	22	3	4	40	240	0.00025
71 A 4	0.25	1372	0.80	60.00	0.74	1.72	3.0	2.2	2.60	56	48	0.0006	19	29	6	9	50	240	0.00102
71 B 4	0.37	1390	1.10	69.00	0.72	2.53	3.5	2.2	2.76	56	48	0.0009	19	29	6	9	50	240	0.00132
80 A 4	0.55	1380	1.60	69.00	0.71	3.86	4.0	2.3	2.50	59	51	0.0009	26	36	12	17	60	240	0.00170
80 B 4	0.75	1390	2.06	73.00	0.72	5.15	4.0	2.3	2.60	59	51	0.0013	26	36	12	17	60	240	0.00210
90 S 4	1.10	1420	2.80	76.30	0.74	7.38	5.0	2.5	3.00	62	54	0.0020	33	52	25	35	140	240	0.00310
90 L 4	1.50	1400	3.54	77.50	0.79	10.22	5.0	2.3	2.50	62	54	0.0026	33	52	25	35	140	240	0.00370
100 LA 4	2.20	1427	5.15	80.50	0.77	14.72	5.0	2.5	2.60	63	55	0.0043	46	62	34	48	180	240	0.00562
100 LB 4	3.00	1436	7.07	81.70	0.75	19.95	4.8	2.4	3.10	63	55	0.0053	46	62	34	48	180	240	0.00662
112 M 4	4.00	1440	9.01	83.60	0.76	26.49	7.0	2.9	3.20	68	60	0.0103	65	100	50	70	250	240	0.01249
132 SB 4	5.50	1455	11.90	87.00	0.77	36.11	6.3	2.4	2.80	72	64	0.0250	95	134	60	90	400	240	0.02908
132 MB 4	7.50	1460	17.20	86.30	0.73	49.05	5.8	2.7	3.40	75	67	0.0324	95	134	60	90	400	240	0.03648
132 ML 4	8.80	1455	18.50	87.00	0.79	57.77	6.8	2.5	3.51	75	67	0.0405	105	134	60	90	400	240	0.04458
160 MB 4	11.00	1465	22.90	89.00	0.78	71.66	6.2	2.5	3.00	77	69	0.0627	180	217	90	130	480	240	0.06771
160 L 4	15.00	1470	31.40	89.50	0.77	97.42	5.9	2.5	2.99	77	69	0.0801	195	217	90	130	480	240	0.08511
180 M 4	18.50	1470	39.00	89.80	0.76	120.23	6.0	3.2	3.00	79	70	0.1236	230	420	300	400	140	150	0.13560
180 L 4	22.00	1470	44.00	91.00	0.79	142.90	7.0	2.3	2.50	79	70	0.1493	245	435	300	400	140	150	0.16130
200 LB 4	30.00	1470	54.00	91.20	0.88	194.91	6.5	2.5	2.90	82	72	0.2456	305	495	300	400	140	150	0.25760
225 S 4	37.00	1480	69.00	91.70	0.84	238.68	7.1	2.7	3.00	84	73	0.3737	360	710	600	800	140	150	0.38570
225 M 4	45.00	1480	85.00	92.50	0.83	290.30	6.2	2.4	2.80	84	73	0.4479	385	750	600	800	140	150	0.45990
250 M 4	55.00	1485	97.00	92.90	0.88	353.77	7.2	2.9	2.90	86	75	0.7673	540	835	600	800	140	100	0.77930
280 S 4	75.00	1480	136.00	93.00	0.86	483.95	6.3	2.2	2.40	82	70	0.9500	875	1170	600	800	140	100	0.96200
280 M 4	90.00	1485	163.00	93.00	0.86	578.00	7.3	3.0	3.10	82	70	1.1200	901	1196	600	800	140	100	1.13200
315 S 4	110.00	1488	198.50	94.00	0.85	706.40	8.3	3.2	3.49	85	71	1.2700	971	1266	600	800	140	100	1.34200
315 LA 4	132.00	1488	240.50	94.10	0.84	847.01	7.2	1.9	1.90	90	76	3.7200	1190	1485	600	800	140	100	3.79200
315 LB 4	160.00	1488	286.50	94.00	0.86	1026.88	7.1	2.0	2.10	90	76	4.1100	1455	1750	600	800	140	100	4.18200
315 LC 4	200.00	1494	364.00	95.00	0.84	1278.43	8.8	2.0	2.10	90	76	5.2100	1640	1935	600	800	140	100	5.28200

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.1 THREE-PHASE MOTORS, 1 SPEED, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.1 Three-phase motors		1		Speed		1000		rpm			Brake											
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia			
										[dB(A)]					[Nm]					[VA/W]	[max n.]	[kgm <sup>2</sup> ]
										Lw	Lp				J▼	m						
P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>	[dB(A)]	[dB(A)]	[kgm <sup>2</sup> ]	m [kg]	m [kg]	S1	S4	[VA/W]	[max n.]	[kgm <sup>2</sup> ]				
63 B 6	0.09	850	0.65	38.00	0.52	0.99	2.0	2.3	2.20	48	40	0.0002	16	22	3	4	40	240	0.00025			
71 A 6	0.18	945	0.92	55.00	0.51	1.82	3.7	3.7	3.70	50	42	0.0007	19	29	6	9	50	240	0.00112			
71 B 6	0.26	918	1.00	60.00	0.63	2.71	3.4	2.6	2.60	50	42	0.0010	19	29	6	9	50	240	0.00142			
80 A 6	0.37	930	1.60	58.00	0.58	3.80	3.1	2.9	3.20	53	45	0.0022	26	36	12	17	60	240	0.00300			
80 B 6	0.55	930	1.80	70.00	0.65	5.79	2.8	2.0	2.10	53	45	0.0027	26	36	12	17	60	240	0.00350			
90 S 6	0.75	910	2.20	70.00	0.71	7.85	3.0	1.8	2.10	54	46	0.0034	33	52	25	35	140	240	0.00450			
90 L 6	1.10	935	3.35	73.00	0.65	11.21	3.4	2.0	2.15	54	46	0.0049	33	52	25	35	140	240	0.00600			
100 LB 6	1.50	950	3.80	76.00	0.75	15.11	4.2	2.0	2.30	63	55	0.0088	46	62	34	48	180	240	0.01012			
112 M 6	2.20	960	6.11	80.00	0.65	21.84	5.2	2.3	2.09	65	57	0.0172	65	100	50	70	250	240	0.01939			
132 SB 6	3.00	950	7.50	80.00	0.72	30.16	5.8	1.5	1.68	68	60	0.0323	95	134	60	90	400	240	0.03638			
132 MB 6	4.00	970	9.50	81.40	0.75	39.38	6.1	1.7	1.90	68	60	0.0395	95	134	60	90	400	240	0.04358			
132 ML 6	5.50	960	12.30	84.00	0.77	54.69	4.7	1.8	2.00	68	60	0.0506	105	134	60	90	400	240	0.05468			
160 MB 6	7.50	950	15.70	85.00	0.81	75.33	4.8	2.1	2.14	72	64	0.0919	180	217	90	130	480	240	0.09691			
160 L 6	11.00	950	21.50	87.00	0.85	110.57	6.2	1.7	2.00	72	64	0.1218	195	217	90	130	480	240	0.12681			
180 L 6	15.00	960	29.00	88.00	0.86	149.20	5.3	2.1	2.73	76	67	0.2263	245	435	300	400	140	150	0.23830			
200 LA 6	18.50	975	38.25	90.30	0.77	181.21	5.9	1.6	2.10	79	69	0.2986	295	490	300	400	140	150	0.31060			
200 LB 6	22.00	980	45.00	90.50	0.78	214.35	6.0	1.6	1.60	79	69	0.3064	305	515	300	400	140	150	0.31840			
225 M 6	30.00	985	61.20	91.00	0.78	290.86	5.8	2.0	2.50	81	70	0.7617	385	750	600	800	140	150	0.77370			
250 M 6	37.00	990	73.35	91.80	0.79	356.91	6.7	2.0	2.41	81	70	1.0475	520	813	600	800	140	150	1.05950			
250 ML 6	45.00	988	93.60	93.00	0.75	434.60	8.6	3.0	1.90	81	70	1.2300	590	905	600	800	140	150	1.24200			
280 S 6	45.00	982	90.50	89.00	0.80	436.29	4.9	2.5	2.80	77	65	1.1400	858	1153	600	800	140	150	1.15200			
280 M 6	55.00	980	109.00	91.00	0.81	535.00	4.7	2.3	2.40	77	65	1.3600	894	1189	600	800	140	150	1.37200			
315 S 6	75.00	990	151.80	93.20	0.77	722.51	6.1	2.2	2.40	79	65	1.6300	974	1269	600	800	140	150	1.84200			
315 LA 6	90.00	992	171.80	93.00	0.82	865.31	6.8	1.7	1.85	84	70	5.7300	1370	1665	600	800	140	150	5.94200			
315 LB 6	110.00	992	184.50	94.00	0.91	1058.91	8.6	1.2	1.70	84	70	6.9400	1450	1745	600	800	140	150	7.15200			
315 LC 6	132.00	995	243.00	94.00	0.83	1264.00	5.3	2.1	2.10	84	70	8.4500	1520	1815	600	800	140	150	8.66200			

$\blacktriangleright I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\blacktriangledown J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.1 THREE-PHASE MOTORS, 1 SPEED, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.1 Three-phase motors		1		Speed		750		rpm		Brake									
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia
	P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>	[dB(A)]		J▼ [kgm <sup>2</sup> ]	m [kg]	m [kg]	[Nm]		[VA/W]	[max n.]	[kgm <sup>2</sup> ]
										Lw	Lp				S1	S4			
63 B 8	0.05	590	0.44	27.00	0.60	0.79	1.60	1.6	1.8	47	39	0.0002	16	22	3	4	40	240	0.00025
71 B 8	0.12	600	0.57	54.00	0.75	2.54	2.10	1.3	1.5	48	40	0.0010	19	29	6	9	50	240	0.00142
80 A 8	0.18	707	1.00	51.00	0.51	2.43	3.10	1.9	2.0	49	41	0.0022	26	36	12	17	60	240	0.00300
80 B 8	0.25	690	1.00	61.00	0.60	3.53	3.30	1.4	1.7	49	41	0.0027	26	36	12	17	60	240	0.00350
90 S 8	0.37	680	1.30	75.00	0.55	5.20	2.20	1.5	1.8	53	45	0.0034	33	52	25	35	140	240	0.00450
90 L 8	0.55	680	1.90	80.00	0.52	7.73	2.10	1.5	1.8	53	45	49.0000	33	52	25	35	140	240	0.00600
100 LA 8	0.75	700	2.85	67.50	0.57	10.20	2.60	2.0	2.2	60	52	0.0088	46	62	34	48	180	240	0.01012
100 LB 8	1.10	675	3.10	75.00	0.68	15.50	2.70	1.8	2.2	60	52	0.0088	46	62	34	48	180	240	0.01012
112 M 8	1.50	720	4.40	76.00	0.65	20.00	4.10	1.9	2.2	62	54	0.0172	65	100	50	70	250	240	0.01939
132 SB 8	2.20	720	6.50	75.00	0.66	29.20	4.00	1.8	2.3	66	58	0.0323	95	134	60	90	400	240	0.03638
132 MB 8	3.00	720	8.50	82.00	0.63	40.25	3.90	1.7	2.3	66	58	0.0506	105	134	60	90	400	240	0.05468
160 MA 8	4.00	718	9.70	85.00	0.70	53.20	4.50	2.3	2.6	70	62	0.0919	180	217	90	130	480	240	0.09691
160 MB 8	5.50	725	14.00	76.00	0.77	73.00	3.90	2.2	2.5	70	62	0.0919	180	217	90	130	480	240	0.12681
160 L 8	7.50	720	18.00	80.00	0.77	99.50	4.20	2.4	2.8	70	62	0.1218	195	217	90	130	480	240	0.15671
180 L 8	11.00	720	23.00	87.40	0.79	146.40	5.70	2.2	2.4	73	64	0.2791	245	435	300	400	140	150	0.29110
200 LB 8	15.00	735	35.00	89.00	0.70	196.00	5.30	1.6	2.1	75	65	0.4595	305	495	300	400	140	150	0.47150
225 S 8	18.50	735	42.25	88.00	0.72	240.33	5.80	2.4	2.7	79	68	0.6337	360	710	600	800	140	150	0.64570
225 M 8	22.00	730	46.00	88.00	0.79	288.00	5.00	2.1	2.3	79	68	0.7617	385	750	600	800	140	150	0.77370
250 M 8	30.00	740	61.00	94.00	0.76	386.90	6.20	1.8	2.2	79	68	1.2961	550	840	600	800	140	150	1.30810
280 S 8	37.00	730	71.00	90.00	0.86	492.30	5.50	1.9	2.5	72	60	1.5100	875	1170	600	800	140	150	1.52200
280 M 8	45.00	739	83.00	94.00	0.83	581.53	5.30	1.4	1.9	72	60	1.7900	901	1196	600	800	140	150	1.80200
315 S 8	55.00	742	115.00	93.00	0.74	707.88	8.70	2.7	2.9	75	61	1.9900	965	1260	600	800	140	150	2.19200
315 LA 8	75.00	740	117.10	93.20	0.77	709.53	6.60	1.7	2.0	77	63	5.7300	1330	1625	600	800	140	150	5.94200
315 LB 8	90.00	744	164.50	95.00	0.84	1164.00	6.40	1.7	2.5	77	63	6.9400	1470	1765	600	800	140	150	7.15200
315 LC 8	110.00	743	202.00	94.00	0.84	1414.00	6.40	1.7	2.7	77	63	8.4500	1590	1885	600	800	140	150	8.66200

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\nabla J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.2 THREE-PHASE MOTORS, 1 SPEED IE2 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.2 Three-phase motors IE2		1		Speed		3000		rpm		Brake														
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia					
										[dB(A)]					[kgm <sup>2</sup> ]	[kg]				[Nm]		[VA/W]	[max n.]	[kgm <sup>2</sup> ]
										Lw	Lp									S1	S4			
P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>			J	m	m	S1	S4									
63 A 2	0.18	2900	0.78	67.4	0.49	0.59	5.1	4.8	4.8	60	52	0.0001	16	22	3	4	40	240	0.00015					
63 B 2	0.25	2858	0.93	64.8	0.60	0.84	4.3	4.3	4.5	60	52	0.0001	16	22	3	4	40	240	0.00015					
71 A 2	0.37	2872	1.04	69.5	0.74	1.23	4.7	2.5	2.7	66	58	0.0004	19	29	6	9	50	240	0.00082					
71 B 2	0.55	2856	1.39	74.1	0.77	1.84	5.9	3.6	3.7	66	58	0.0004	19	29	6	9	50	240	0.00082					
80 A 2	0.75	2847	1.80	77.4	0.78	2.52	5.7	2.4	2.6	70	62	0.0006	26	36	12	17	60	240	0.00140					
80 B 2	1.10	2830	2.50	79.6	0.80	3.71	5.8	3.7	2.5	70	62	0.0008	26	36	12	17	60	240	0.00160					
90 S 2	1.50	2880	3.30	81.3	0.81	4.97	6.4	2.7	2.6	77	69	0.0012	33	52	25	35	140	240	0.00230					
90 L 2	2.20	2880	4.80	83.2	0.80	7.29	7.1	3.2	4.0	77	69	0.0015	33	52	25	35	140	240	0.00260					
100 LA 2	3.00	2905	6.45	84.6	0.79	9.85	7.8	3.2	3.4	80	72	0.0029	46	62	34	48	180	240	0.00422					
112 M 2	4.00	2900	7.75	85.8	0.87	13.16	7.6	2.7	3.4	80	72	0.0074	65	100	50	70	250	240	0.00959					
132 SA 2	5.50	2920	10.55	87.0	0.87	17.98	7.2	2.8	2.9	81	73	0.0124	95	124	60	90	400	236	0.01648					
132 MB 2	7.50	2920	14.45	88.1	0.85	24.51	7.3	3.0	3.6	83	75	0.0150	95	124	60	90	400	236	0.01908					
160 MA 2	11.00	2935	19.90	89.4	0.89	35.79	6.9	3.4	3.8	84	76	0.0360	180	217	90	130	480	136	0.04101					
160 MB 2	15.00	2945	26.65	90.3	0.90	48.62	7.6	3.4	3.5	84	76	0.0463	180	217	90	130	480	136	0.05131					
160 L 2	18.50	2930	32.30	90.9	0.91	60.24	5.5	3.0	3.2	84	76	0.0534	195	230	90	130	480	136	0.05841					
180 M 2	22.00	2952	38.30	91.3	0.90	71.15	9.2	3.0	2.9	83	74	0.0818	230	-	-	-	-	-	-					
200 LA 2	30.00	2970	51.25	92.0	0.92	96.42	9.3	3.7	3.0	87	77	0.1625	285	-	-	-	-	-	-					
200 LB 2	37.00	2960	62.50	92.5	0.93	119.30	9.4	2.2	2.0	87	77	0.1947	305	-	-	-	-	-	-					
225 M 2	45.00	2973	76.95	92.9	0.91	144.57	8.1	2.1	2.3	89	79	0.2902	385	-	-	-	-	-	-					
250 M 2	55.00	2975	95.20	93.2	0.90	176.64	8.6	2.5	2.8	90	79	0.4197	505	-	-	-	-	-	-					
280 S 2	75.00	2978	128.90	93.8	0.90	240.49	8.0	2.3	2.5	88	76	0.5200	842	-	-	-	-	-	-					
280 M 2	90.00	2984	157.70	94.1	0.88	287.93	8.1	3.1	3.3	88	76	0.6300	881	-	-	-	-	-	-					
315 S 2	110.00	2980	189.10	94.3	0.89	352.50	6.7	1.8	2.0	90	76	0.7000	932	-	-	-	-	-	-					
315 LA 2	132.00	2983	218.90	94.6	0.92	422.44	7.2	2.0	2.2	99	85	1.8800	1340	-	-	-	-	-	-					
315 LB 2	160.00	2984	267.70	94.8	0.91	516.06	7.0	1.7	2.1	99	85	2.2500	1430	-	-	-	-	-	-					
315 LC 2	200.00	2980	333.70	95.0	0.91	640.70	7.5	1.7	1.9	99	85	2.7900	1550	-	-	-	-	-	-					

►  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at U' Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.2 THREE-PHASE MOTORS, 1 SPEED IE2 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.2 Three-phase motors IE2		1		Speed		1500		rpm		Brake									
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia
										[dB(A)]					[Nm]	[VA/W]			
										Lw	Lp								
$P_n$ [kW]	$n$ [1/min]	$I_n$ [A]	$\eta$ [%]	$\cos\phi$	$M_n$ [Nm]	$I_a/I_n$	$M_a/M_n$	$M_m/M_n$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]	$m$ [kg]	S1	S4	[max n.]	[kgm <sup>2</sup> ]				
63 A 4	0.12	1360	0.67	59.1	0.44	0.84	1.8	3.7	3.8	52	44	0.0002	16	22	3	4	40	240	0.00025
63 B 4	0.18	1331	0.64	64.7	0.63	1.29	1.5	2.1	2.3	52	44	0.0002	16	22	3	4	40	240	0.00025
71 A 4	0.25	1413	0.74	70.1	0.71	1.69	2.7	2.3	2.4	56	48	0.0006	19	29	6	9	50	240	0.00102
71 B 4	0.37	1385	1.01	72.7	0.73	2.55	3.9	2.4	2.4	56	48	0.0009	19	29	6	9	50	240	0.00132
80 A 4	0.55	1448	1.78	77.1	0.58	3.63	10.3	3.8	4.1	59	51	0.0009	26	36	12	17	60	240	0.00170
80 B 4	0.75	1430	2.05	79.6	0.67	5.01	5.4	3.0	3.2	59	51	0.0013	26	36	12	17	60	240	0.00210
90 S 4	1.10	1430	2.70	81.4	0.73	7.34	5.8	3.3	3.6	62	54	0.0020	33	52	25	35	140	240	0.00310
90 L 4	1.50	1430	3.75	82.8	0.72	10.02	6.4	3.7	4.4	62	54	0.0026	33	52	25	35	140	240	0.00370
100 LA 4	2.20	1450	5.20	84.3	0.72	14.47	7.1	2.5	3.1	63	55	0.0043	46	62	34	48	180	240	0.00562
100 LB 4	3.00	1450	6.70	85.5	0.76	19.98	6.6	3.0	3.3	63	55	0.0053	46	-	-	-	-	-	-
112 M 4	4.00	1435	8.80	86.6	0.76	26.35	7.4	3.5	4.0	68	60	0.0103	65	100	50	70	250	240	0.01249
132 SB 4	5.50	1450	11.70	87.7	0.78	36.37	5.1	2.2	2.7	72	64	0.0250	95	134	60	90	400	240	0.02908
132 MB 4	7.50	1444	14.65	88.7	0.83	49.59	5.9	3.1	3.4	75	67	0.0324	95	134	60	90	400	240	0.03648
160 MB 4	11.00	1444	23.10	89.8	0.77	71.57	6.0	2.3	3.0	77	69	0.0627	180	217	90	130	480	240	0.06771
160 L 4	15.00	1468	30.50	90.6	0.79	97.63	6.6	2.7	3.0	77	69	0.0801	195	217	90	130	480	240	0.08511
180 M 4	18.50	1465	36.65	91.2	0.80	120.17	7.3	3.1	3.6	79	70	0.1236	230	420	300	400	140	150	0.13560
180 L 4	22.00	1470	42.20	91.6	0.82	142.89	8.4	3.5	4.4	79	70	0.1493	245	435	300	400	140	150	0.16130
200 LB 4	30.00	1470	53.30	92.3	0.88	194.44	7.7	1.8	2.5	82	72	0.2456	305	495	300	400	140	150	0.25760
225 S 4	37.00	1472	66.40	92.7	0.87	239.79	6.0	2.0	2.4	84	73	0.3737	360	710	600	800	140	150	0.38570
225 M 4	45.00	1474	80.60	93.1	0.87	290.87	6.8	2.1	2.5	84	73	0.4479	385	750	600	800	140	150	0.45990
250 M 4	55.00	1475	96.50	93.5	0.88	353.69	7.3	2.9	2.7	86	75	0.7673	540	835	600	800	140	100	0.77930
280 S 4	75.00	1485	134.90	94.0	0.85	483.80	6.5	2.7	2.9	82	70	0.9500	875	1170	600	800	140	100	0.96200
280 M 4	90.00	1480	160.40	94.2	0.86	577.60	7.5	3.0	3.5	82	70	1.1200	901	1196	600	800	140	100	1.13200
315 S 4	110.00	1487	198.00	94.5	0.85	706.40	8.3	3.2	3.6	85	71	1.2700	971	1266	600	800	140	100	1.34200
315 LA 4	132.00	1488	239.00	94.7	0.84	847.01	7.2	1.9	2.2	90	76	3.7200	1190	1485	600	800	140	100	3.79200
315 LB 4	160.00	1488	283.00	94.9	0.86	1026.88	7.1	2.0	2.0	90	76	4.1100	1455	1750	600	800	140	100	4.18200
315 LC 4	200.00	1494	361.00	95.1	0.84	1278.43	8.8	2.0	2.2	90	76	5.2100	1640	1935	600	800	140	100	5.28200

$\blacktriangleright I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\blacktriangledown J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.2 THREE-PHASE MOTORS, 1 SPEED IE2 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.2 Three-phase motors IE2		1		Speed		1000		rpm		Brake									
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia
										[dB(A)]					[Nm]	[VA/W]			
										Lw	Lp								
$P_n$ [kW]	$n$ [1/min]	$I_n$ [A]	$\eta$ [%]	$\cos\phi$	$M_n$ [Nm]	$I_a/I_n$	$M_a/M_n$	$M_m/M_n$	$J$ [kgm <sup>2</sup> ]	$m$ [kg]	$m$ [kg]	$S_1$	$S_4$	[max n.]	[kgm <sup>2</sup> ]				
71 A 6	0.18	933	0.81	56.6	0.56	1.84	2.4	2.7	2.8	50	42	0.0007	19	29	6	9	50	240	0.00112
71 B 6	0.26	926	0.85	61.6	0.72	2.68	2.7	2.3	2.5	50	42	0.0010	19	29	6	9	50	240	0.00142
80 A 6	0.37	930	1.36	67.6	0.58	3.80	5.0	2.9	3.2	53	45	0.0022	26	36	12	17	60	240	0.00300
80 B 6	0.55	955	1.47	73.1	0.74	5.50	6.2	2.2	2.5	53	45	0.0027	26	36	12	17	60	240	0.00350
90 S 6	0.75	955	2.38	75.9	0.60	7.50	5.0	2.5	2.8	54	46	0.0034	33	52	25	35	140	240	0.00450
90 L 6	1.10	920	2.95	78.1	0.69	11.41	3.4	2.0	2.3	54	46	0.0049	33	52	25	35	140	240	0.00600
100 LB 6	1.50	948	3.85	79.8	0.71	15.11	4.2	2.0	2.2	63	55	0.0088	46	62	34	48	180	240	0.01012
112 M 6	2.20	964	5.60	81.8	0.69	21.79	6.1	2.4	2.8	65	67	0.0172	65	100	50	70	250	240	0.01939
132 SB 6	3.00	960	7.32	83.3	0.71	29.84	5.8	2.0	2.2	68	60	0.0323	95	134	60	90	400	240	0.03638
132 MB 6	4.00	960	9.10	84.6	0.72	39.67	5.7	2.0	2.2	68	60	0.0395	95	134	60	90	400	240	0.04358
132 ML 6	5.50	968	13.25	86.0	0.70	54.27	6.0	2.9	3.2	68	60	0.0506	105	134	60	90	400	240	0.05468
160 MB 6	7.50	970	16.20	87.2	0.77	73.94	6.5	3.0	3.3	72	64	0.0919	180	217	90	130	480	240	0.09691
160 L 6	11.00	965	22.95	88.7	0.78	108.86	6.5	2.3	2.5	72	64	0.1218	195	217	90	130	480	240	0.12681
180 L 6	15.00	975	31.45	89.7	0.77	146.85	7.2	2.5	3.0	76	67	0.2263	245	435	300	400	140	150	0.23830
200 LA 6	18.50	980	39.38	90.4	0.75	180.28	6.5	1.8	1.9	79	69	0.2986	295	490	300	400	140	150	0.31060
200 LB 6	22.00	985	47.85	90.9	0.73	213.30	7.5	2.3	2.6	79	69	0.3064	305	515	300	400	140	150	0.31840
225 M 6	30.00	985	62.96	91.7	0.75	290.86	7.0	2.8	3.2	81	70	0.7617	385	750	600	800	140	150	0.77370
250 M 6	37.00	985	71.10	92.2	0.82	358.43	7.0	2.0	2.4	81	70	1.0475	520	813	600	800	140	150	1.05950
280 S 6	45.00	982	87.58	92.7	0.80	437.63	4.9	2.5	2.8	77	65	1.1400	858	1153	600	800	140	150	1.15200
280 M 6	55.00	985	109.32	93.1	0.78	533.25	5.2	2.3	2.4	77	65	1.3600	894	1189	600	800	140	150	1.37200
315 S 6	75.00	990	150.04	93.7	0.77	723.48	6.1	2.2	2.4	79	65	1.6300	865	1160	600	800	140	150	1.84200
315 LA 6	90.00	992	172.74	94.0	0.80	866.43	6.8	1.7	1.9	84	70	5.7300	1370	1665	600	800	140	150	5.94200
315 LB 6	110.00	992	185.02	94.3	0.91	1058.97	8.6	1.2	1.7	84	70	6.9400	1450	1745	600	800	140	150	7.15200
315 LC 6	132.00	995	236.94	94.6	0.85	1266.93	6.3	1.9	2.0	84	70	8.4500	1520	1815	600	800	140	150	8.66200

►  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.2 THREE-PHASE MOTORS, 1 SPEED IE2 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.2 Three-phase motors IE2		1		Speed		750		rpm		Brake															
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia						
										[dB(A)]					[kgm <sup>2</sup> ]	[kg]				[kg]	[Nm]		[VA/W]	[max n.]	[kgm <sup>2</sup> ]
										Lw	Lp										S1	S4			
71 B 8	0.12	600	0.58	39.8	0.75	2.54	2.1	1.3	1.5	48	40	0.0010	19	29	6	9	50	240	0.00142						
80 A 8	0.18	705	1.09	45.9	0.52	2.63	3.0	1.9	2.1	49	41	0.0022	26	36	12	17	60	240	0.00300						
80 B 8	0.25	694	1.21	50.6	0.59	3.44	2.7	1.4	1.5	49	41	0.0027	26	36	12	17	60	240	0.00350						
90 S 8	0.37	662	1.51	56.1	0.63	5.34	2.0	1.3	1.4	53	45	0.0034	33	52	25	35	140	240	0.00450						
90 L 8	0.55	670	1.86	61.7	0.69	7.84	2.1	1.5	1.6	53	45	0.0049	33	52	25	35	140	240	0.00600						
100 LA 8	0.75	720	2.92	66.2	0.56	9.90	3.4	2.0	2.0	60	52	0.0088	46	62	34	48	180	240	0.01012						
100 LB 8	1.10	675	3.30	70.8	0.68	15.50	2.5	1.8	1.8	60	52	0.0088	46	62	34	48	180	240	0.01012						
112 M 8	1.50	717	4.79	74.1	0.61	19.98	3.9	1.8	1.8	62	54	0.0172	65	100	50	70	250	240	0.01939						
132 SB 8	2.20	720	6.20	77.6	0.66	29.20	4.2	1.8	2.1	66	58	0.0323	95	134	60	90	400	240	0.03638						
132 MB 8	3.00	720	8.73	80.0	0.62	39.82	3.8	1.7	1.8	66	58	0.0506	105	134	60	90	400	240	0.05468						
160 MA 8	4.00	718	10.07	81.9	0.70	53.20	4.4	2.3	2.4	70	62	0.0919	180	217	90	130	480	240	0.09691						
160 MB 8	5.50	710	13.34	83.8	0.71	73.94	5.0	1.9	2.0	70	62	0.0919	180	217	90	130	480	240	0.12681						
160 L 8	7.50	720	16.48	85.3	0.77	99.50	4.6	2.4	2.8	70	62	0.1218	195	217	90	130	480	240	0.15671						
180 L 8	11.00	718	23.13	86.9	0.79	146.32	4.8	2.2	2.3	73	64	0.2791	245	435	300	400	140	150	0.29110						
200 LB 8	15.00	738	37.28	88.0	0.66	194.23	7.1	2.4	2.4	75	65	0.4595	305	495	300	400	140	150	0.47150						
225 S 8	18.50	730	38.15	88.6	0.79	288.00	6.0	2.1	2.1	79	68	0.6337	360	710	600	800	140	150	0.64570						
225 M 8	22.00	736	50.91	89.1	0.70	285.56	7.2	2.1	2.1	79	68	0.7617	385	750	600	800	140	150	0.77370						
250 M 8	30.00	740	63.45	89.8	0.76	386.90	6.0	1.8	1.9	79	68	1.2961	550	840	600	800	140	150	1.30810						
280 S 8	37.00	730	68.77	90.3	0.86	492.30	5.7	1.9	1.9	72	60	1.5100	875	1170	600	800	140	150	1.52200						
280 M 8	45.00	735	88.41	90.7	0.81	584.56	5.3	1.4	1.5	72	60	1.7900	901	1196	600	800	140	150	1.80200						
315 S 8	55.00	742	114.79	91.0	0.76	712.00	8.7	2.7	2.8	75	61	1.9900	965	1260	600	800	140	150	2.19200						
315 LA 8	75.00	743	145.90	91.6	0.81	964.00	7.5	1.9	2.0	77	63	5.7300	1330	1625	600	800	140	150	5.94200						
315 LB 8	90.00	744	168.28	91.9	0.84	1164.00	6.2	1.7	1.7	77	63	6.9400	1470	1765	600	800	140	150	7.15200						
315 LC 8	110.00	742	202.37	92.3	0.85	1415.67	8.6	1.7	1.8	77	63	8.4500	1590	1885	600	800	140	150	8.66200						

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\nabla J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.3 THREE-PHASE MOTORS, 1 SPEED IE3 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.3 Three-phase motors IE3			1		Speed		3000				rpm		Brake												
Motor type	Frame	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque	Power	Braking: n° per hour	Total inertia						
											[dB(A)]									m	m	[Nm]	[VA/W]	[max n.]	[kgm <sup>2</sup> ]
											Lw	Lp													
		P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>															
63 A 2	-	0.18	2880	0.72	65.9	0.55	0.60	3.9	4.2	4.5	60	52	0.0001	16	22	3	40	240	0.00015						
63 B 2	-	0.25	2858	0.86	70.1	0.60	0.84	4.7	4.3	3.7	60	52	0.0001	16	22	3	40	240	0.00015						
71 A 2	-	0.37	2849	0.92	73.8	0.79	1.24	4.8	3.2	3.3	66	58	0.0004	19	29	6	50	240	0.00082						
71 B 2	-	0.55	2808	1.22	77.8	0.83	1.87	5.3	3.1	3.5	66	58	0.0004	19	29	6	50	240	0.00082						
80 MA 2	Short	0.75	2865	1.59	81.4	0.83	2.50	7.0	2.7	3.4	73	65	0.0010	26	41	17	30	180	0.00114						
80 MB 2	Short	1.10	2861	2.31	83.0	0.83	3.67	7.6	3.5	3.5	73	65	0.0012	28	43	17	30	180	0.00134						
90 S 2	Short	1.50	2870	3.04	84.8	0.84	4.99	7.8	2.0	3.6	76	68	0.0017	36	54	35	50	180	0.00205						
90 SL 2	Short	2.20	2866	4.33	86.2	0.85	7.33	8.4	2.9	3.6	76	68	0.0021	40	58	35	50	180	0.00245						
100 LA 2	Short	3.00	2879	5.73	87.2	0.87	9.96	8.4	3.6	3.9	78	70	0.0031	51	74	55	60	180	0.00366						
112 M 2	Short	4.00	2903	7.27	88.1	0.90	13.20	8.4	2.1	3.5	81	73	0.0081	61	83	55	60	180	0.00866						
132 SA 2	Short	5.50	2924	10.20	89.2	0.87	18.00	8.1	2.4	3.5	84	75	0.0142	112	156	130	75	180	0.02012						
132 SB 2	Short	7.50	2920	13.50	90.1	0.89	24.50	8.2	2.5	3.5	84	75	0.0169	121	165	130	75	180	0.02282						
160 MB 2	Short	11.00	2951	19.90	91.2	0.87	35.60	7.9	2.3	3.6	84	76	0.0553	194	293	280	80	180	0.06268						
160 MC 2	Short	15.00	2944	26.40	91.9	0.89	48.70	8.2	2.2	3.5	84	76	0.0689	210	309	280	80	180	0.07628						
160 LA 2	Long	18.50	2944	32.00	92.4	0.90	60.00	8.2	2.4	3.5	84	76	0.0808	245	344	280	80	180	0.08818						
<b>160 LB 2</b>	<b>Long</b>	<b>22.00</b>	<b>2963</b>	<b>38.7</b>	<b>92.7</b>	<b>0.88</b>	<b>70.90</b>	<b>7.8</b>	<b>2.1</b>	<b>3.4</b>	<b>84</b>	<b>76</b>	<b>0.0808</b>	<b>245</b>	<b>344</b>	<b>280</b>	<b>80</b>	<b>180</b>	<b>0.08818</b>						
180 M 2	Short	22.00	2963	38.7	92.7	0.88	70.90	7.8	2.1	3.4	81	72	0.1265	306	402	280	80	180	0.13388						
<b>180 L 2</b>	<b>Long</b>	<b>30.00</b>	<b>2973</b>	<b>54.3</b>	<b>93.3</b>	<b>0.85</b>	<b>96.40</b>	<b>7.5</b>	<b>2.1</b>	<b>3.3</b>	<b>81</b>	<b>72</b>	<b>0.1265</b>	<b>306</b>	<b>402</b>	<b>280</b>	<b>80</b>	<b>180</b>	<b>0.13388</b>						
200 LA 2	Short	30.00	2973	54.30	93.3	0.85	96.40	7.5	2.1	3.3	89	79	0.2245	403	563	600	130	180	0.24504						
200 LB 2	Short	37.00	2973	65.50	93.7	0.87	119.00	7.4	2.1	3.1	89	79	0.2541	434	594	600	130	180	0.27464						
<b>200 LC 2</b>	<b>Long</b>	<b>45.00</b>	<b>2976</b>	<b>77.9</b>	<b>94.0</b>	<b>0.89</b>	<b>144.00</b>	<b>7.2</b>	<b>1.7</b>	<b>3.1</b>	<b>89</b>	<b>79</b>	<b>0.2541</b>	<b>434</b>	<b>594</b>	<b>600</b>	<b>130</b>	<b>180</b>	<b>0.27464</b>						
225 SM 2	Short	45.00	2976	77.9	94.0	0.89	144.00	7.2	1.7	3.1	89	79	0.3641	491	653	600	130	180	0.38464						
<b>225 MB 2</b>	<b>Long</b>	<b>55.00</b>	<b>2981</b>	<b>93.3</b>	<b>94.3</b>	<b>0.90</b>	<b>176.00</b>	<b>7.5</b>	<b>1.8</b>	<b>3.2</b>	<b>89</b>	<b>79</b>	<b>0.3641</b>	<b>491</b>	<b>653</b>	<b>600</b>	<b>130</b>	<b>180</b>	<b>0.38464</b>						
250 MA 2	Long	55.00	2981	93.30	94.3	0.90	176.00	7.5	1.8	3.2	87	77	0.6229	644	799	600	130	180	0.80360						
<b>250 MB 2</b>	<b>Long</b>	<b>75.00</b>	<b>2982</b>	<b>126.0</b>	<b>94.8</b>	<b>0.90</b>	<b>240.00</b>	<b>7.5</b>	<b>1.8</b>	<b>3.2</b>	<b>87</b>	<b>77</b>	<b>0.6229</b>	<b>644</b>	<b>799</b>	<b>600</b>	<b>130</b>	<b>180</b>	<b>0.80360</b>						
280 S 2	Short	75.00	2982	126.0	94.8	0.90	240.00	7.5	1.8	3.2	90	79	1.0493	1049	-	-	-	-	-						
280 SM 2	Short	90.00	2981	151.0	95.0	0.91	288.00	7.3	1.8	3.0	90	79	1.1238	1072	-	-	-	-	-						
<b>280 MB 2</b>	<b>Long</b>	<b>110.00</b>	<b>2983</b>	<b>186.0</b>	<b>95.3</b>	<b>0.89</b>	<b>352.00</b>	<b>6.9</b>	<b>1.7</b>	<b>3.0</b>	<b>90</b>	<b>79</b>	<b>1.1238</b>	<b>1072</b>	-	-	-	-	-						
315 S 2	Short	110.00	2983	186.00	95.3	0.89	352.00	6.9	1.7	3.0	95	84	1.9059	1433	-	-	-	-	-						
315 MB 2	Short	132.00	2983	224.00	95.5	0.89	423.00	7.1	1.8	3.1	95	84	2.0265	1496	-	-	-	-	-						
315 ML 2	Short	160.00	2983	270.00	95.7	0.89	513.00	7.1	1.8	3.1	95	84	2.2091	1716	-	-	-	-	-						
315 LC 2	Long	200.00	2980	339.00	95.8	0.89	641.00	7.1	1.9	3.1	95	84	2.4519	1816	-	-	-	-	-						
355 M 2	Short	250.00	2983	420.00	95.8	0.90	801.00	6.8	1.7	2.8	96	85	3.8130	1980	-	-	-	-	-						
355 ML 2	Short	315.00	2984	526.00	95.8	0.90	1009.00	6.9	1.8	2.8	96	85	4.4076	2230	-	-	-	-	-						
355 LC 2	Long	355.00	2981	595.00	95.8	0.90	1138.00	7.9	2.2	3.2	96	85	4.4075	2440	-	-	-	-	-						
355 LD 2	Long	375.00	2980	626.00	95.8	0.90	1202.00	7.8	2.2	3.1	96	85	4.4075	2440	-	-	-	-	-						

► I'ₙ = Iₙ ·  $\frac{400}{U'}$  (I'ₙ = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$



# 4. PERFORMANCE DATA

## 4.3 THREE-PHASE MOTORS, 1 SPEED IE3 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.3 Three-phase motors IE3			1		Speed			1500			rpm			Brake					
Motor type	Frame	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque	Power	Braking: n° per hour	Total inertia
											[dB(A)]	J▼							
		P <sub>n</sub> [kW]	n [1/min]	I <sub>n</sub> [A]	η [%]	cosφ	M <sub>n</sub> [Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>	M <sub>m</sub> /M <sub>n</sub>	Lw	Lp	J▼ [kgm²]	m [kg]	m [kg]	[Nm]	[VA/W]	[max n.]	[kgm²]
63 B 4	-	0.18	1334	0.59	69.9	0.63	1.29	2.6	2.1	2.3	52	44	0.0002	16	22	3	40	240	0.00025
71 A 4	-	0.25	1405	0.73	73.5	0.69	1.70	4.7	3.0	3.6	56	48	0.0006	19	29	6	50	240	0.00102
71 B 4	-	0.37	1408	1.15	77.3	0.60	2.51	4.6	1.1	1.4	56	48	0.0009	19	29	6	50	240	0.00132
80 MA 4	-	0.55	1434	1.27	83.6	0.75	3.66	5.4	2.4	2.7	62	56	0.0009	26	41	17	30	240	0.00104
80 MB 4	Long	0.75	1428	1.70	82.9	0.77	5.02	6.3	2.8	2.8	62	56	0.0018	33	48	17	30	240	0.00194
90 S 4	Short	1.10	1444	2.42	84.5	0.78	7.28	7.2	3.0	3.4	67	61	0.0031	39	57	35	50	240	0.00345
90 L 4	Long	1.50	1441	3.23	85.6	0.78	9.95	7.4	3.2	3.5	67	61	0.0037	45	63	35	50	240	0.00405
100 LA 4	Short	2.20	1457	4.51	86.9	0.81	14.40	8.0	2.7	3.2	69	62	0.0096	54	77	55	60	240	0.01016
100 LB 4	Long	3.00	1455	5.97	87.8	0.83	19.70	8.1	2.9	3.3	69	62	0.0109	61	84	55	60	240	0.01146
112 MB 4	Long	4.00	1451	7.94	88.7	0.82	26.30	8.0	2.7	3.1	70	62	0.0174	76	99	55	60	240	0.01796
132 S 4	Long	5.50	1463	10.80	89.6	0.82	35.90	6.9	2.0	2.8	73	65	0.0363	136	180	130	75	240	0.04222
132 M 4	Long	7.50	1462	14.40	90.4	0.83	49.00	6.8	2.1	2.7	73	65	0.0428	145	189	130	75	240	0.04872
<b>132 ML 4</b>	<b>Long</b>	<b>11.00</b>	<b>1476</b>	<b>20.70</b>	<b>91.4</b>	<b>0.84</b>	<b>71.20</b>	<b>7.3</b>	<b>2.4</b>	<b>3.2</b>	<b>73</b>	<b>65</b>	<b>0.0428</b>	<b>145</b>	<b>189</b>	<b>130</b>	<b>75</b>	<b>240</b>	<b>0.04872</b>
160 MB 4	Short	11.00	1476	20.70	91.4	0.84	71.20	7.3	2.4	3.2	74	66	0.1080	216	315	280	80	240	0.11538
160 LA 4	Long	15.00	1472	27.80	92.1	0.85	97.40	7.5	2.5	3.2	74	66	0.1368	258	357	280	80	240	0.14418
<b>160 LB 4</b>	<b>Long</b>	<b>18.50</b>	<b>1477</b>	<b>35.00</b>	<b>92.6</b>	<b>0.83</b>	<b>120.00</b>	<b>7.1</b>	<b>2.2</b>	<b>3.1</b>	<b>74</b>	<b>66</b>	<b>0.1487</b>	<b>258</b>	<b>357</b>	<b>280</b>	<b>80</b>	<b>240</b>	<b>0.15608</b>
180 M 4	Short	18.50	1477	35.0	92.6	0.83	120.00	7.1	2.2	3.1	76	67	0.1794	307	403	280	80	240	0.18678
180 LA 4	Long	22.00	1474	41.6	93.0	0.82	143.00	7.5	2.4	3.3	76	67	0.2041	351	541	280	80	240	0.21148
<b>180 LB 4</b>	<b>Long</b>	<b>30.00</b>	<b>1482</b>	<b>54.20</b>	<b>93.6</b>	<b>0.85</b>	<b>193.00</b>	<b>8.0</b>	<b>2.2</b>	<b>3.1</b>	<b>76</b>	<b>67</b>	<b>0.2041</b>	<b>351</b>	<b>541</b>	<b>280</b>	<b>80</b>	<b>240</b>	<b>0.21148</b>
200 LA 4	Short	30.00	1482	54.2	93.6	0.85	193.00	8.0	2.2	3.1	76	67	0.4379	430	590	600	130	240	0.45844
<b>200 LB 4</b>	<b>Long</b>	<b>37.00</b>	<b>1483</b>	<b>67.20</b>	<b>93.9</b>	<b>0.85</b>	<b>238.00</b>	<b>7.1</b>	<b>2.2</b>	<b>2.8</b>	<b>76</b>	<b>67</b>	<b>0.4379</b>	<b>430</b>	<b>590</b>	<b>600</b>	<b>130</b>	<b>240</b>	<b>0.45844</b>
225 S 4	Short	37.00	1483	67.2	93.9	0.85	238.00	7.1	2.2	2.8	79	68	0.5911	468	630	600	130	240	0.61164
225 SM 4	Short	45.00	1484	80.7	94.2	0.85	290.00	7.5	2.4	2.9	79	68	0.6745	514	676	600	130	240	0.69504
<b>225 M 4</b>	<b>Long</b>	<b>55.00</b>	<b>1488</b>	<b>97.70</b>	<b>94.6</b>	<b>0.86</b>	<b>353.00</b>	<b>7.1</b>	<b>2.0</b>	<b>3.1</b>	<b>79</b>	<b>68</b>	<b>0.6745</b>	<b>514</b>	<b>676</b>	<b>600</b>	<b>130</b>	<b>240</b>	<b>0.69504</b>
250 MA 4	Long	55.00	1488	97.7	94.6	0.86	353.00	7.1	2.0	3.1	83	72	1.4025	686	841	600	130	240	1.58320
<b>250 MB 4</b>	<b>Long</b>	<b>75.00</b>	<b>1489</b>	<b>130.00</b>	<b>95.0</b>	<b>0.87</b>	<b>481.00</b>	<b>6.3</b>	<b>2.1</b>	<b>2.5</b>	<b>83</b>	<b>72</b>	<b>1.4025</b>	<b>686</b>	<b>841</b>	<b>600</b>	<b>130</b>	<b>240</b>	<b>1.58320</b>
280 S 4	Long	75.00	1489	130.0	95.0	0.87	481.00	6.3	2.1	2.5	87	75	2.1833	1166	-	-	-	-	-
280 MA 4	Long	90.00	1489	155.0	95.2	0.88	578.00	6.1	2.0	2.4	87	75	2.3954	1250	-	-	-	-	-
<b>280 MB 4</b>	<b>Long</b>	<b>110.00</b>	<b>1489</b>	<b>194.00</b>	<b>95.5</b>	<b>0.86</b>	<b>706.00</b>	<b>7.1</b>	<b>2.0</b>	<b>3.1</b>	<b>87</b>	<b>75</b>	<b>2.3954</b>	<b>1250</b>	-	-	-	-	-
315 S 4	Short	110.00	1489	194.0	95.5	0.86	706.00	7.1	2.0	3.1	86	72	2.9187	1382	-	-	-	-	-
315 MB 4	Short	132.00	1489	231.0	95.6	0.86	847.00	7.3	2.1	3.1	86	72	3.3145	1484	-	-	-	-	-
315 LA 4	Long	160.00	1489	275.0	95.9	0.88	1027.00	7.3	2.2	3.1	86	72	3.9566	1807	-	-	-	-	-
315 LC 4	Long	200.00	1489	345.0	96.0	0.87	1283.00	7.2	2.2	3.0	86	72	4.4667	1877	-	-	-	-	-
355 M 4	Short	250.00	1491	424.0	96.0	0.89	1602.00	7.1	1.9	2.5	94	79	7.7973	2120	-	-	-	-	-
355 LB 4	Long	315.00	1491	529.0	96.0	0.90	2019.00	7.1	1.9	2.4	94	79	9.6454	2410	-	-	-	-	-
355 LC 4	Long	355.00	1491	598.0	96.0	0.89	2275.00	7.2	2.0	2.3	94	79	10.3940	2490	-	-	-	-	-
355 LD 4	Long	375.00	1489	630.0	96.0	0.90	2406.00	6.8	1.9	2.2	94	79	10.0240	2490	-	-	-	-	-

►  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.3 THREE-PHASE MOTORS, 1 SPEED IE3 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.3 Three-phase motors IE3		1	Speed	1000	rpm							Brake							
Motor type	Frame	Rated output $P_n$ [kW]	Speed $n$ [1/min]	Current $I_n$ [A]	Efficiency $\eta$ [%]	Power factor $\cos\phi$	Torque $M_n$ [Nm]	Starting current $I_a/I_n$	Starting torque $M_a/M_n$	Max. torque $M_m/M_n$	Noise level		Moment of inertia $J$ [kgm <sup>2</sup> ]	Mass $m$ [kg]	Mass $m$ [kg]	Torque [Nm]	Power [VA/W]	Braking: $n^\circ$ per hour	Total inertia [kgm <sup>2</sup> ]
											[dB(A)]	[dB(A)]							
71 A 6	-	0.18	947	0.80	63.9	0.53	1.82	3.5	3.6	3.6	50	42	0.0007	19	29	6	50	240	0.00112
71 B 6	-	0.25	920	0.84	68.6	0.62	2.60	3.9	2.6	2.6	50	42	0.0010	19	29	6	50	240	0.00142
80 A 6	-	0.37	965	1.13	73.5	0.64	3.66	3.7	2.2	2.4	53	45	0.0022	26	36	12	60	240	0.00300
80 B 6	-	0.55	955	1.39	77.2	0.74	5.50	4.4	2.2	2.3	53	45	0.0027	26	36	12	60	240	0.00350
90 LA 6	Long	0.75	946	2.00	78.9	0.69	7.58	5.6	2.7	3.4	68	60	0.0032	41	59	35	50	240	0.00355
90 LB 6	Long	1.10	941	2.84	81.0	0.69	11.20	5.4	3.2	3.2	68	60	0.0040	43	61	35	50	240	0.00435
100 L 6	Short	1.50	966	3.62	82.5	0.72	14.80	6.6	2.6	3.1	70	62	0.0127	51	74	55	60	240	0.01305
112 M 6	Short	2.20	958	5.04	84.3	0.75	21.90	6.5	2.7	3.0	70	62	0.0148	66	88	55	60	240	0.01536
132 SA 6	Short	3.00	970	6.60	85.6	0.77	29.60	5.6	1.9	2.4	73	65	0.0358	106	150	130	75	240	0.04172
132 MA 6	Long	4.00	973	8.68	86.8	0.77	39.30	6.0	2.1	2.6	73	65	0.0450	129	173	130	75	240	0.05092
132 MB 6	Long	5.50	973	11.80	88.0	0.77	54.00	6.2	2.2	2.7	73	65	0.0536	142	186	130	75	240	0.05952
160 M 6	Short	7.50	976	14.90	89.1	0.82	73.40	5.6	1.8	2.4	75	67	0.1374	203	302	280	80	240	0.14478
160 LB 6	Long	11.00	977	21.90	90.3	0.80	108.00	6.1	2.1	2.7	75	67	0.1907	251	350	280	80	240	0.19808
180 LA 6	Long	15.00	982	30.30	91.2	0.78	146.00	6.9	2.4	2.9	80	71	0.2874	353	543	280	80	240	0.29478
200 LA 6	Short	18.50	984	36.60	91.7	0.80	180.00	6.3	2.1	2.6	80	71	0.5182	410	570	600	130	240	0.53874
200 LB 6	Short	22.00	985	43.00	92.2	0.80	213.00	6.1	2.1	2.5	80	71	0.6079	429	589	600	130	240	0.62844
225 SM 6	Short	30.00	987	55.90	92.9	0.83	290.00	6.8	2.1	2.8	79	70	0.8966	505	667	600	130	240	0.91714
250 MA 6	Long	37.00	987	68.40	93.3	0.84	358.00	6.6	2.2	2.7	81	71	1.5698	642	797	600	130	240	1.75050
<b>250 MB 6</b>	<b>Long</b>	<b>45.00</b>	<b>989</b>	<b>84.10</b>	<b>93.7</b>	<b>0.82</b>	<b>435.00</b>	<b>6.0</b>	<b>1.7</b>	<b>2.5</b>	<b>81</b>	<b>71</b>	<b>1.5698</b>	<b>642</b>	<b>797</b>	<b>600</b>	<b>130</b>	<b>240</b>	<b>1.75050</b>
280 S 6	Short	45.00	989	84.10	93.7	0.82	435.00	6.0	1.7	2.5	83	72	2.1714	925	-	-	-	-	-
280 MA 6	Short	55.00	989	101.00	94.1	0.84	531.00	6.0	1.8	2.4	83	72	2.3543	990	-	-	-	-	-
<b>280 MB 6</b>	<b>Long</b>	<b>75.00</b>	<b>989</b>	<b>139.00</b>	<b>94.6</b>	<b>0.82</b>	<b>725.00</b>	<b>6.0</b>	<b>1.8</b>	<b>2.4</b>	<b>83</b>	<b>72</b>	<b>2.3543</b>	<b>990</b>	-	-	-	-	-
315 S 6	Short	75.00	989	139.00	94.6	0.82	725.00	6.0	1.8	2.4	83	70	3.2215	1282	-	-	-	-	-
315 MA 6	Short	90.00	990	168.00	95.0	0.82	869.00	6.1	1.9	2.4	83	70	3.7478	1374	-	-	-	-	-
315 LA 6	Short	110.00	990	203.00	95.3	0.82	1062.00	6.4	2.0	2.5	83	70	4.5367	1525	-	-	-	-	-
315 LC 6	Long	132.00	990	244.00	95.5	0.82	1274.00	6.5	2.1	2.5	83	70	5.1945	1788	-	-	-	-	-
355 MA 6	Short	160.00	992	287.00	95.8	0.84	1541.00	6.6	2.0	2.7	90	75	8.2873	2015	-	-	-	-	-
355 MB 6	Short	200.00	992	359.00	95.8	0.84	1926.00	6.8	2.1	2.7	90	75	9.3705	2155	-	-	-	-	-
355 LB 6	Long	250.00	992	446.00	95.8	0.84	2408.00	6.9	2.0	2.7	90	75	11.1050	2440	-	-	-	-	-
355 LC 6	Long	280.00	992	500.00	95.8	0.84	2695.00	6.8	2.1	2.7	90	75	14.6350	2570	-	-	-	-	-
355 LD 6	Long	315.00	992	562.00	95.8	0.84	3032.00	6.8	2.1	2.7	90	75	16.0071	2690	-	-	-	-	-

$\blacktriangleright I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\blacktriangledown J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.3 THREE-PHASE MOTORS, 1 SPEED IE3 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.3 Three-phase motors IE3		1	Speed	750	rpm						Brake								
Motor type	Frame	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cosφ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>a</sub> /I <sub>n</sub>	Starting torque M <sub>a</sub> /M <sub>n</sub>	Max. torque M <sub>m</sub> /M <sub>n</sub>	Noise level		Moment of inertia J▼ [kgm <sup>2</sup> ]	Mass m [kg]	Mass m [kg]	Torque [Nm]	Power [VA/W]	Braking: n° per hour [max n.]	Total inertia [kgm <sup>2</sup> ]
											Lw	Lp							
100 LA 8	Long	0.75	721	2.06	75.0	0.70	9.90	5.1	1.9	2.7	56	52	0.0149	51	74	55	60	240	0.01525
100 LB 8	Long	1.10	719	2.88	77.7	0.71	14.90	5.0	1.9	2.6	56	52	0.0172	53	76	55	60	240	0.01755
112 M 8	Long	1.50	710	3.74	79.7	0.73	20.10	5.0	1.8	2.3	62	56	0.0200	66	89	55	60	240	0.02056
132 S 8	Short	2.20	725	5.38	81.9	0.72	29.50	5.0	1.8	2.3	64	58	0.0453	106	150	130	75	240	0.05122
132 M 8	Long	3.00	725	7.19	83.6	0.72	39.40	5.0	1.8	2.3	64	58	0.0577	129	173	130	75	240	0.06362
160 MB 8	Short	4.00	730	9.45	85.0	0.72	53.80	5.3	1.7	2.3	65	59	0.1312	203	302	280	80	240	0.13858
160 MC 8	Long	5.50	730	12.60	86.5	0.73	73.40	5.3	1.7	2.3	65	59	0.1674	223	322	280	80	240	0.17478
160 L 8	Long	7.50	728	16.70	87.8	0.74	98.00	5.4	1.8	2.2	65	59	0.2040	251	350	280	80	240	0.21138
180 LA 8	Long	11.00	730	23.70	89.3	0.75	147.00	6.4	1.7	2.6	66	60	0.3337	353	543	280	80	240	0.34108
200 LA 8	Long	15.00	739	32.90	90.4	0.73	193.00	5.5	1.9	2.5	67	61	0.7327	429	589	600	130	240	0.75324
225 S 8	Short	18.50	738	37.10	91.1	0.79	241.00	5.2	1.7	2.2	67	61	0.8781	468	630	600	130	240	0.89864
225 MA 8	Long	22.00	738	43.40	91.5	0.80	290.00	5.2	1.7	2.2	67	61	1.0453	514	676	600	130	240	1.06584
250 MA 8	Long	30.00	739	58.00	92.4	0.81	386.00	5.3	1.8	2.2	70	63	2.1617	642	797	600	130	240	2.34240
280 S 8	Short	37.00	742	71.90	92.9	0.80	480.00	5.8	1.8	2.2	72	64	3.2584	925	-	-	-	-	-
280 M 8	Long	45.00	742	87.40	93.5	0.80	576.00	5.6	1.8	2.2	72	64	3.5326	990	-	-	-	-	-
315 SA 8	Short	55.00	742	115.00	92.5	0.75	720.00	5.2	1.7	2.2	75	64	3.7895	1282	-	-	-	-	-
315 SB 8	Short	75.00	743	154.00	93.1	0.75	960.00	5.3	1.8	2.2	75	64	4.8296	1374	-	-	-	-	-
315 SC 8	Long	90.00	743	184.00	93.4	0.76	1151.00	5.4	1.9	2.2	75	64	5.6618	1525	-	-	-	-	-
355 MA8	Short	110.00	743	205.64	93.7	0.82	1439.37	6.1	1.4	2.4	76	65	8.0510	1788	-	-	-	-	-
355 MB8	Short	132.00	742	241.58	94.0	0.84	1679.41	5.9	1.4	2.3	76	65	8.4710	2015	-	-	-	-	-
355 MC8	Short	150.00	742	273.62	94.2	0.84	1919.75	5.9	1.4	2.3	76	65	10.1630	2155	-	-	-	-	-
355 MD8	Short	160.00	742	292.24	94.3	0.84	2444.37	6.2	1.5	2.3	76	65	10.8260	2184	-	-	-	-	-
355 LA8	Long	185.00	742	334.79	94.5	0.84	2399.34	6.1	1.5	2.3	76	65	12.3810	2440	-	-	-	-	-
355 LB8	Long	200.00	742	361.13	94.6	0.85	2590.61	6.3	1.6	2.4	76	65	13.4910	2490	-	-	-	-	-
355 LC8	Long	220.00	743	396.77	94.6	0.85	2877.96	6.5	1.6	2.4	76	65	15.0450	2490	-	-	-	-	-

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.4 THREE-PHASE MOTORS, 1 SPEED IE4 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.4 Three-phase motors IE4		1		Speed		3000		rpm		Brake									
Motor type	Rated output $P_n$ [kW]	Speed $n$ [1/min]	Current $I_n$ [A]	Efficiency $\eta$ [%]	Power factor $\cos\phi$	Torque $M_n$ [Nm]	Starting current $I_a/I_n$	Starting torque $M_a/M_n$	Max. torque $M_m/M_n$	Noise level [dB(A)]		Moment of inertia $J$ [kgm <sup>2</sup> ]	Mass $m$ [kg]	Mass $m$ [kg]	Torque [Nm]		Power [VA/W]	Braking: $n^\circ$ per hour [max n.]	Total inertia [kgm <sup>2</sup> ]
										Lw	Lp				S1	S4			
80 MC 2	0.75	2885	1.60	83.5	0.84	2.47	7.2	3.5	3.9	73	65	0.0017	36	51	17	30	180	0.00184	
80 MCX 2	1.10	2891	2.20	85.2	0.84	3.70	7.8	4.1	4.0	73	65	0.0019	38	53	17	30	180	0.00204	
90 SL 2	1.50	2907	3.00	86.5	0.83	4.89	8.7	4.3	4.4	76	68	0.0031	51	70	35	50	180	0.00345	
90 LX 2	2.20	2902	4.20	88.0	0.86	7.36	9.1	4.6	4.4	76	68	0.0035	55	74	35	50	180	0.00385	
100 LBX 2	3.00	2917	5.60	89.1	0.88	9.76	10.2	4.6	5.0	78	70	0.0084	63	86	55	60	180	0.00896	
112 ML 2	4.00	2932	7.10	90.0	0.91	13.35	9.9	3.3	4.6	81	73	0.0150	117	23	55	60	180	0.01556	
132 MAX 2	5.50	2945	10.00	90.9	0.88	18.14	8.6	2.9	4.3	84	75	0.0553	194	238	130	75	180	0.06122	
132 M 2	7.50	2943	13.30	91.7	0.89	24.20	8.8	3.1	4.3	84	75	0.0560	205	249	130	75	180	0.06192	
160 LAX 2	11.00	2960	19.40	92.6	0.89	36.08	8.8	2.8	4.3	84	76	0.0689	210	309	280	80	180	0.07628	
160 LBX 2	15.00	2961	26.10	93.3	0.89	48.10	9.2	3.0	3.4	84	76	0.0808	245	344	280	80	180	0.08818	
160 LCX 2	18.50	2958	31.80	93.7	0.90	60.18	8.8	3.0	4.2	84	76	0.0854	268	367	280	80	180	0.09278	
180 LX 2	22.00	2963	38.10	94.0	0.89	72.10	7.4	2.2	3.6	81	72	0.1340	315	411	280	80	180	0.14138	
200 LBX 2	30.00	2974	52.70	94.5	0.87	95.79	7.2	2.1	3.6	89	79	0.2541	434	594	600	130	180	0.02054	
200 LCX 2	37.00	2973	64.50	94.8	0.88	119.75	7.4	2.2	3.6	89	79	0.2670	464	624	600	130	180	0.02054	
225 M 2	45.00	2981	80.90	95.0	0.85	143.35	8.7	2.6	4.4	89	79	0.3800	504	666	600	130	180	0.02054	
250 MBX 2	55.00	2981	94.00	95.3	0.89	179.17	7.9	2.3	3.9	87	77	0.6450	672	827	600	130	180	0.82570	
280 SMX 2	75.00	2984	127.10	95.6	0.90	238.68	8.0	2.3	3.9	90	79	1.1238	1072	-	-	-	-	-	
280 MA 2	90.00	2982	150.30	95.8	0.91	286.53	7.5	2.2	3.6	90	79	1.1580	1164	-	-	-	-	-	
315 MAX 2	110.00	2983	188.20	96.0	0.88	358.07	6.9	2.0	3.5	95	84	2.2091	1716	-	-	-	-	-	
315 LAX 2	132.00	2984	225.60	96.2	0.88	416.66	7.1	2.1	3.6	95	84	2.4519	1816	-	-	-	-	-	
315 LAY 2	160.00	2984	272.50	96.3	0.89	513.11	7.1	2.1	3.5	95	84	3.8130	1980	-	-	-	-	-	
315 LDX 2	200.00	2984	338.20	96.5	0.89	644.38	7.0	2.2	3.5	95	84	3.9400	2042	-	-	-	-	-	

$\blacktriangleright I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\blacktriangledown J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.4 THREE-PHASE MOTORS, 1 SPEED IE4 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.4 Three-phase motors IE4		1		Speed		1500		rpm		Brake									
Motor type	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cosφ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>a</sub> /I <sub>n</sub>	Starting torque M <sub>a</sub> /M <sub>n</sub>	Max. torque M <sub>m</sub> /M <sub>n</sub>	Noise level [dB(A)]		Moment of inertia J▼ [kgm <sup>2</sup> ]	Mass m [kg]	Mass	Torque [Nm]		Power [VA/W]	Braking: n° per hour [max n.]	Total inertia [kgm <sup>2</sup> ]
										Lw	Lp				S1	S4			
80 MCY 4	0.75	1447	1.70	85.7	0.74	4.94	6.3	2.9	3.2	62	56	0.0019	35	50	17	30	240	0.00203	
90 LAX 4	1.10	1451	2.40	87.2	0.77	7.36	7.1	3.0	3.6	67	61	0.0037	45	63	35	50	240	0.00405	
90 LB 4	1.50	1457	3.40	88.2	0.73	9.78	8.1	3.8	4.2	67	61	0.0039	47	66	35	50	240	0.00424	
100 LBX 4	2.20	1462	4.60	89.5	0.77	14.60	8.0	3.0	3.7	69	62	0.0109	61	84	55	60	240	0.01146	
100 LC 4	3.00	1466	6.20	90.4	0.77	19.44	9.2	3.7	4.3	69	62	0.0114	64	87	55	60	240	0.01201	
112 MLX 4	4.00	1462	7.80	91.1	0.81	26.79	9.3	3.7	4.2	70	62	0.0183	80	102	55	60	240	0.01883	
132 MX 4	5.50	1470	11.00	91.9	0.79	36.36	6.9	2.5	3.1	73	65	0.0428	145	189	130	75	240	0.04872	
132 MBX 4	7.50	1472	15.20	92.6	0.77	48.42	7.5	3.0	3.4	73	65	0.0449	153	197	130	75	240	0.05086	
160 LAX 4	11.00	1479	21.30	93.3	0.80	72.22	8.2	3.1	4.0	74	66	0.1368	258	357	280	80	240	0.14418	
160 LBX 4	15.00	1479	28.10	93.9	0.82	96.28	8.5	3.2	4.1	74	66	0.1436	271	369	280	80	240	0.15102	
180 LX 4	18.50	1479	34.20	94.2	0.83	120.41	7.6	2.6	3.6	76	67	0.1530	284	380	280	80	240	0.16038	
180 LBX 4	22.00	1481	42.00	94.5	0.80	144.27	8.2	3.0	4.0	76	67	0.2143	369	559	280	80	240	0.22169	
200 LB 4	30.00	1485	55.00	94.9	0.83	191.79	9.2	3.3	4.1	76	67	0.2143	369	529	600	130	240	0.23485	
225 SMX 4	37.00	1486	67.60	95.2	0.83	239.59	8.4	2.9	3.7	79	68	0.6745	514	676	600	130	240	0.69504	
225 MB 4	45.00	1486	82.00	95.4	0.83	287.64	8.4	3.0	3.6	79	68	0.7082	540	702	600	130	240	0.72877	
250 MBX 4	55.00	1489	98.80	95.7	0.84	358.82	8.0	2.5	3.9	83	72	0.7082	540	695	600	130	240	0.88893	
280 SM 4	75.00	1491	131.10	96.0	0.86	477.76	6.8	2.5	3.0	87	75	2.3954	1250	-	-	-	-	-	
280 MBX 4	90.00	1490	155.40	96.1	0.87	573.48	6.6	2.5	2.8	87	75	2.5152	1313	-	-	-	-	-	
315 MAX 4	110.00	1491	196.30	96.3	0.84	716.54	8.1	2.6	3.9	86	72	2.5152	1313	-	-	-	-	-	
315 LAX 4	132.00	1490	229.80	96.4	0.86	836.24	7.8	2.5	3.6	86	72	3.4802	1558	-	-	-	-	-	
315 LB 4	160.00	1490	274.80	96.6	0.87	1027.33	7.9	2.5	3.6	86	72	4.1544	1897	-	-	-	-	-	
315 LDX 4	200.00	1489	339.20	96.7	0.88	1291.17	7.2	2.3	3.3	86	72	4.6900	1971	-	-	-	-	-	

► I<sub>n</sub> = I<sub>n</sub> ·  $\frac{400}{U}$  (I<sub>n</sub> = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.4 THREE-PHASE MOTORS, 1 SPEED IE4 RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.4 Three-phase motors IE4		1		Speed		1000		rpm		Brake											
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. torque	Noise level		Moment of inertia	Mass	Mass	Torque		Power	Braking: n° per hour	Total inertia		
										[dB(A)]					[kgm <sup>2</sup> ]	[kg]				[Nm]	[VA/W]
										Lw	Lp										
90 LAX 6	0.75	949	1.90	82.7	0.69	7.53	5.3	3.0	3.2	68	60	0.0040	43	61	35	50	240	0.00435			
90 LX 6	1.10	948	2.70	84.5	0.69	11.27	5.5	3.2	3.3	68	60	0.0042	45	64	35	50	240	0.00455			
100 LBX 6	1.50	972	3.40	85.9	0.75	14.64	6.9	2.4	3.3	70	62	0.0133	54	77	55	60	240	0.01369			
112 ML 6	2.20	969	5.10	87.4	0.71	22.07	7.6	3.3	3.7	70	62	0.0155	69	91	55	60	240	0.01610			
132 SB 6	3.00	976	6.50	88.6	0.75	29.22	6.1	2.1	2.7	73	65	0.0376	112	156	130	75	240	0.04351			
132 M 6	4.00	978	8.70	89.5	0.74	40.12	6.6	2.4	3.0	73	65	0.0473	136	180	130	75	240	0.05317			
132 ML 6	5.50	979	12.00	90.5	0.73	54.64	7.1	2.7	3.3	73	65	0.0563	149	193	130	75	240	0.06220			
160 LBY 6	7.50	981	15.20	91.3	0.78	72.60	6.4	2.2	3.0	75	67	0.1443	213	312	280	80	240	0.15165			
160 LCX 6	11.00	984	22.60	92.3	0.76	108.63	7.7	3.1	3.5	75	67	0.2002	264	362	280	80	240	0.20762			
180 LBX 6	15.00	987	30.70	92.9	0.76	144.41	7.8	2.9	3.5	80	71	0.3018	371	561	280	80	240	0.30915			
200 LBX 6	18.50	986	36.20	93.4	0.79	180.57	6.5	2.3	2.8	80	71	0.5441	431	591	600	130	240	0.56465			
200 LCX 6	22.00	986	42.40	93.7	0.80	216.70	6.5	2.2	2.7	80	71	0.6383	450	610	600	130	240	0.65884			
225 MB 6	30.00	989	56.70	94.2	0.81	287.95	8.0	2.7	3.5	79	70	0.9414	530	692	600	130	240	0.96197			
250 MBX 6	37.00	988	69.80	94.5	0.81	360.30	7.3	2.7	3.2	81	71	1.6483	674	829	600	130	240	1.82899			
280 SM 6	45.00	981	83.60	94.8	0.82	431.31	7.1	2.3	3.0	83	72	1.6483	674	-	-	-	-	-			
280 MBX 6	55.00	991	100.60	95.1	0.83	539.18	7.2	2.3	3.0	83	72	2.3543	990	-	-	-	-	-			
315 MAX 6	75.00	991	140.10	95.4	0.81	718.58	5.9	1.9	2.5	83	70	2.4720	1040	-	-	-	-	-			
315 MB 6	90.00	992	169.90	95.6	0.80	861.91	6.1	2.1	2.6	83	70	3.9352	1443	-	-	-	-	-			
315 LB 6	110.00	992	202.10	95.8	0.82	1077.21	6.2	2.2	2.6	83	70	4.7635	1601	-	-	-	-	-			
315 LDX 6	132.00	992	248.10	96.0	0.80	1256.03	6.6	2.4	2.8	83	70	5.4542	1877	-	-	-	-	-			

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\nabla J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.5 THREE-PHASE MOTORS, 2 SPEEDS, RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR GENERAL PURPOSE (CONSTANT TORQUE)

4.5 Three-phase motors		2 Speed		3000 1500 rpm		For general purpose - 1 winding Dahlander						Brake							
Motor type	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cos φ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>s</sub> /I <sub>n</sub>	Starting torque M <sub>s</sub> /M <sub>n</sub>	Noise level [dB(A)]		Moment of inertia J [kgm <sup>2</sup> ]	Mass m [kg]	Mass m [kg]		Torque [Nm]		Power [VA/W]	Braking: n° per hour [max n.]	Total inertia [kgm <sup>2</sup> ]
									L <sub>w</sub>	L <sub>p</sub>			S1	S4					
63 B 24	0.20	2740	0.52	68	0.83	0.7	3.5	1.9	60	52	0.0002	16	22	3	4	40	240	0.00015	
	0.15	1310	0.59	49	0.74	1.1	2.2	1.6											
71 A 24	0.30	2820	0.86	71	0.71	1.0	3.7	1.7	66	58	0.0006	19	29	6	9	50	240	0.00082	
	0.20	1360	0.76	54	0.70	1.4	3.8	1.5											
71 B 24	0.45	2805	1.26	62	0.83	1.5	4.6	2.5	66	58	0.0009	19	29	6	9	50	240	0.00082	
	0.30	1420	1.20	59	0.63	2.0	3.4	2.3											
80 A 24	0.60	2800	1.60	68	0.87	2.1	4.9	2.8	70	62	0.0009	26	36	12	17	60	240	0.00140	
	0.45	1400	1.20	69	0.84	3.1	4.7	2.3											
80 B 24	0.80	2800	2.10	64	0.85	2.7	4.4	1.8	70	62	0.0013	26	36	12	17	60	240	0.00160	
	0.60	1400	1.70	72	0.71	4.1	4.1	1.7											
90 S 24	1.25	2780	2.90	65	0.96	4.3	5.5	2.0	77	69	0.0020	33	52	25	35	140	240	0.00230	
	0.90	1380	2.40	64	0.85	6.2	4.6	1.8											
90 L 24	1.60	2850	3.70	71	0.90	5.4	5.1	2.4	77	69	0.0026	33	52	25	35	140	240	0.00260	
	1.20	1410	3.10	73	0.77	8.1	4.5	2.3											
100 M 24	2.35	2780	5.40	70	0.90	8.1	6.5	2.4	80	72	0.0043	46	62	34	48	180	240	0.00562	
	1.85	1400	4.50	72	0.82	12.6	5.4	2.1											
100 L 24	3.00	2880	7.30	73	0.77	10.0	6.6	2.6	80	72	0.0053	46	62	34	48	180	240	0.00662	
	2.40	1420	5.70	79	0.77	16.1	5.2	2.4											
112 M 24	4.00	2860	8.60	84	0.80	13.4	7.0	2.3	80	72	0.0103	65	100	50	70	250	240	0.00959	
	3.30	1450	6.80	65	0.80	21.7	6.2	2.2											
132 S 24	5.90	2880	11.50	80	0.93	19.6	7.2	2.2	83	75	0.0150	95	124	60	90	400	236	0.01648	
	4.80	1430	10.00	81	0.85	32.1	6.4	2.1											
132 MB 24	7.50	2880	14.50	88	0.85	24.9	8.9	2.2	83	75	0.0178	95	134	60	90	400	236	0.02188	
	5.50	1430	13.50	73	0.80	36.8	7.2	2.1											
132 L 24	8.00	2890	19.00	72	0.85	26.5	7.5	2.3	83	75	0.0216	105	134	60	90	400	236	0.02578	
	6.00	1440	17.00	63	0.80	39.3	6.3	2.2											
160 M 24	11.00	2940	22.00	80	0.90	35.7	7.3	2.3	84	76	0.0627	180	217	90	130	480	136	0.04101	
	8.80	1440	22.00	78	0.74	58.4	6.5	2.1											
160 L 24	15.00	2945	29.50	77	0.95	48.6	7.5	2.4	84	76	0.0801	195	230	90	130	480	136	0.05841	
	12.00	1450	28.50	81	0.75	79.0	6.6	2.3											
180 M 24	18.50	2930	36.00	82	0.90	60.3	6.4	2.1	83	74	0.1270	230							
	15.00	1460	29.50	83	0.88	98.1	5.6	2.0											
180 L 24	22.00	2960	42.60	89	0.84	71.2	6.6	2.2	83	74	0.1488	245							
	18.50	1465	38.00	90	0.78	121.1	5.8	2.1											
200 LB 24	30.00	2970	54.60	90	0.88	97.3	7.7	2.2	87	77	0.2436	315							
	24.00	1480	44.60	93	0.84	156.5	3.9	2.5											
225 S 24	33.00	2955	66.00	80	0.90	106.6	6.8	2.2	89	79	0.3762	355							
	30.00	1475	55.00	91	0.87	194.2	6.2	2.1											
225 M 24	40.00	2965	77.00	82	0.92	128.8	6.8	2.2	89	79	0.4451	380							
	37.00	1480	69.00	88	0.88	238.7	6.2	2.2											
250 M 24	50.00	2970	92.00	88	0.89	160.8	6.9	2.1	90	79	0.4611	450							
	45.00	1475	84.00	89	0.87	291.3	6.4	2.3											
280 S 24	66.00	2950	123.30	91	0.85	200.7	9.4	2.8	88	76	0.5200	875							
	52.00	1480	102.80	85	0.86	238.8	8.2	2.7											
280 M 24	79.00	2950	145.90	91	0.86	242.8	9.2	2.8	88	76	0.6300	901							
	60.00	1480	122.90	84	0.84	290.4	8.0	2.6											
315 S 24	90.00	2955	166.10	89	0.88	323.2	9.4	2.9	90	76	0.7000	971							
	70.00	1485	133.80	90	0.84	334.4	8.0	2.9											
315 M 24	95.00	2965	173.30	89	0.89	347.9	9.5	2.9	90	76	0.7500	984							
	75.00	1485	140.10	91	0.85	353.7	8.1	2.8											
315 LA 24	○	○	○	○	○	○	○	○	○	○	○	○							
315 LB 24	○	○	○	○	○	○	○	○	○	○	○	○							
315 LC 24	○	○	○	○	○	○	○	○	○	○	○	○							
355 24	○	○	○	○	○	○	○	○	○	○	○	○							

○ Data not indicated is supplied on request

$$I'_n = I_n \cdot \frac{400}{U'} \quad (I'_n = \text{current at } U' \text{ Volt}); \quad \nabla J = \frac{PD^2}{4}$$

# 4. PERFORMANCE DATA

## 4.5 THREE-PHASE MOTORS, 2 SPEEDS, RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR GENERAL PURPOSE (CONSTANT TORQUE)

4.5 Three-phase motors		2		Speed		1500 750		rpm		For general purpose - 1 winding Dahlander			Brake						
Motor type	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cos φ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>s</sub> /I <sub>n</sub>	Starting torque M <sub>s</sub> /M <sub>n</sub>	Noise level [dB(A)]		Moment of inertia J▼ [kgm <sup>2</sup> ]	Mass m [kg]	Mass		Torque		Power [VA/W]	Braking: n° per hour [max n.]	Total inertia [kgm <sup>2</sup> ]
									Lw	Lp			m	m	S1	S4			
71 A 48	0.17	1330	0.57	74	0.58	1.2	3.2	1.5	56	48	0.0007	19	29	3	9	50	240	0.00102	
	0.09	670	0.48	48	0.57	1.3	2.4	1.4											
71 B 48	0.20	1400	0.71	68	0.80	1.4	5.6	2.1	56	48	0.0010	19	29	3	9	50	240	0.00132	
	0.10	700	0.67	35	0.52	1.4	3.0	3.0											
80 A 48	0.30	1400	0.90	67	0.72	2.1	4.3	2.0	59	51	0.0022	26	36	6	17	60	240	0.00170	
	0.15	710	1.05	42	0.48	2.0	2.7	1.7											
80 B 48	0.40	1400	0.95	71	0.86	2.7	4.2	1.8	59	51	0.0027	26	36	6	17	60	240	0.00210	
	0.20	710	1.12	48	0.54	2.7	1.3	2.6											
90 S 48	0.60	1380	1.60	64	0.84	4.1	3.0	2.4	62	54	0.0034	33	52	12	35	140	240	0.00310	
	0.30	700	1.70	47	0.54	4.1	2.1	2.1											
90 L 48	0.90	1370	2.00	74	0.90	6.4	4.0	1.8	62	54	0.0049	33	52	12	35	140	240	0.00370	
	0.45	710	1.80	65	0.60	6.1	2.9	1.6											
100 LA 48	1.25	1400	3.20	81	0.70	8.5	3.8	2.0	63	55	0.0088	46	62	25	48	180	240	0.00562	
	0.60	700	3.00	61	0.47	8.2	3.0	1.8											
100 LB 48	1.60	1445	3.60	73	0.88	10.6	4.8	1.9	63	55	0.0088	46	62	25	48	180	240	0.00662	
	0.80	700	4.00	59	0.49	10.9	3.7	1.6											
112 M 48	2.55	1420	5.40	78	0.90	17.2	5.1	1.8	68	60	0.0172	65	100	34	70	250	240	0.01249	
	1.25	710	4.90	66	0.61	16.8	4.1	2.5											
132 S 48	3.30	1430	7.20	77	0.86	22.5	5.0	1.7	72	64	0.0323	95	134	50	90	400	240	0.02908	
	1.85	720	8.30	58	0.56	24.5	3.6	1.6											
132 MB 48	4.80	1410	10.50	77	0.86	32.5	5.3	1.8	75	67	0.0506	95	134	50	90	400	240	0.03648	
	2.40	700	8.10	68	0.63	32.0	4.9	1.7											
132 L 48	5.50	1450	11.00	87	0.83	36.2	5.6	1.8	75	67	0.0506	105	134	50	90	400	240	0.04458	
	3.00	720	13.50	72	0.45	40.0	4.6	1.8											
160 M 48	7.50	1450	16.00	82	0.82	49.4	5.8	1.9	77	69	0.0919	180	217	60	130	480	240	0.06771	
	4.80	730	15.00	83	0.56	62.8	4.8	1.7											
160 L 48	10.00	1440	21.00	76	0.91	66.3	6.9	1.8	77	69	0.1218	195	217	60	130	480	240	0.08511	
	6.60	710	22.00	73	0.59	88.8	2.8	1.8											
180 M 48	13.00	1474	26.50	81	0.87	84.1	6.6	2.0	79	70	0.2067	230	435	90	400	140	150	0.13560	
	8.10	735	22.50	85	0.61	105.2	5.3	2.0											
180 L 48	16.00	1472	33.00	82	0.86	103.8	8.3	2.5	79	70	0.2067	245	435	90	400	140	150	0.16130	
	9.90	735	27.00	88	0.60	128.6	6.2	2.5											
200 LB 48	20.00	1480	37.30	91	0.85	129.0	7.3	2.8	82	72	0.2436	315	495	300	400	140	150	0.25760	
	13.00	730	39.00	86	0.56	170.2	4.6	2.9											
225 S 48	25.00	1460	47.50	82	0.93	163.5	6.5	2.1	84	73	0.3762	355	710	600	800	140	150	0.38570	
	17.00	720	44.50	79	0.70	225.5	5.2	1.9											
225 M 48	30.00	1485	57.30	90	0.84	193.6	7.7	2.0	84	73	0.4451	380	750	600	800	140	150	0.45990	
	20.00	735	61.00	88	0.54	261.0	4.5	1.5											
250 M 48	40.00	1480	73.00	91	0.88	258.4	6.4	2.2	86	75	0.4611	450	835	600	800	140	100	0.77930	
	26.00	735	67.50	91	0.62	336.8	5.5	2.0											
280 S 48	59.00	1485	110.00	91	0.86	380.1	9.0	2.4	82	70	0.9500	875	○	○	○	○	○	○	
	34.00	740	101.00	90	0.55	448.5	4.5	1.9											
280 M 48	71.00	1480	132.00	92	0.85	456.3	5.5	1.8	82	70	1.1200	901	○	○	○	○	○	○	
	41.00	740	105.00	90	0.62	524.8	3.7	1.4											
315 S 48	80.00	1485	152.90	90	0.84	514.5	5.4	1.9	85	71	1.2700	971	○	○	○	○	○	○	
	47.00	735	116.90	88	0.66	610.7	3.8	1.5											
315 M 48	85.00	1480	158.80	91	0.85	548.5	4.9	1.8	85	71	1.3300	984	○	○	○	○	○	○	
	50.00	735	123.00	89	0.66	649.7	3.8	1.4											
315 LA 48	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
315 LB 48	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
315 LC 48	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
355 48	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ Data not indicated is supplied on request

► I'ₙ = Iₙ ·  $\frac{400}{U'}$  (I'ₙ = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$



# 4. PERFORMANCE DATA

4.5 THREE-PHASE MOTORS, 2 SPEEDS, RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR GENERAL PURPOSE (CONSTANT TORQUE)

4.5 Three-phase motors		2		Speed		1500 1000		rpm		For general purpose - 1 winding Dahlander							
Motor type	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cos φ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>s</sub> /I <sub>n</sub>	Starting torque M <sub>s</sub> /M <sub>n</sub>	Noise level [dB(A)]		Moment of inertia J ▼ [kgm <sup>2</sup> ]		Mass m [kg]				
									L <sub>w</sub>	L <sub>p</sub>							
71 B 46	0.20	1420	0.76	60	0.63	1.3	4.5	1.4	56	48	0.0010	19					
	0.10	900	0.57	50	0.51	1.1	4.2	1.4									
80 A 46	0.40	1360	1.00	80	0.72	2.8	3.5	1.5	59	51	0.0027	26					
	0.20	900	0.86	56	0.60	2.1	2.9	1.4									
80 B 46	0.50	1380	1.40	70	0.73	3.4	3.7	1.5	59	51	0.0027	26					
	0.30	910	0.95	68	0.67	3.2	3.1	1.5									
90 S 46	0.65	1400	2.00	63	0.75	4.4	2.0	1.6	62	54	0.0034	33					
	0.45	910	1.70	55	0.70	4.7	1.9	1.4									
90 L 46	0.95	1455	2.70	80	0.65	6.4	5.6	1.6	62	54	0.0049	33					
	0.60	920	1.60	71	0.78	6.3	3.7	1.5									
100 LA 46	1.40	1400	3.80	70	0.76	9.5	5.8	1.8	63	55	0.0088	46					
	0.90	930	2.90	64	0.70	9.2	4.2	1.6									
100 L 46	1.85	1415	4.20	77	0.84	12.7	4.5	1.8	63	55	0.0088	46					
	1.10	900	3.05	71	0.73	11.5	3.0	1.6									
112 M 46	2.40	1420	5.20	79	0.84	16.1	6.6	1.8	68	60	0.0172	65					
	1.60	920	4.20	71	0.78	16.6	4.4	1.6									
132 S 46	3.00	1475	8.30	83	0.65	20.0	6.0	2.0	72	64	0.0323	95					
	2.00	960	5.50	75	0.71	19.7	4.0	1.5									
132 MA 46	4.00	1460	9.40	79	0.78	26.2	6.2	2.0	75	67	0.0395	95					
	2.60	960	8.40	72	0.62	25.9	4.6	1.8									
132 MB 46	4.40	1450	10.50	76	0.80	29.0	6.4	2.0	75	67	0.0506	105					
	3.00	950	8.90	79	0.62	30.2	4.5	1.8									
132 L 46	5.15	1470	12.00	83	0.75	33.5	6.9	1.9	75	67	0.0506	105					
	3.30	965	9.50	79	0.64	32.7	4.8	1.7									
160 M 46	6.60	1460	14.50	79	0.84	43.2	6.8	2.0	77	69	0.0919	180					
	4.40	960	10.50	87	0.70	43.8	4.6	1.9									
160 L 46	8.80	1460	18.50	78	0.88	57.6	7.0	2.0	77	69	0.1218	195					
	5.90	970	13.50	88	0.72	58.1	5.0	1.9									
180 M 46	11.00	1470	21.50	88	0.84	71.5	6.6	2.0	79	70	0.2067	230					
	7.50	980	18.50	84	0.70	73.1	5.2	1.9									
180 L 46	13.00	1475	25.00	88	0.85	84.2	8.9	2.3	79	70	0.2067	245					
	8.80	980	20.50	86	0.72	85.7	8.5	3.8									
200 LA 46	16.00	1480	33.50	82	0.84	103.2	6.7	2.1	82	72	0.2986	295					
	11.00	985	24.50	80	0.81	106.6	5.4	1.9									
200 LB 46	18.50	1485	40.10	88	0.76	119.0	9.8	2.2	82	72	0.3503	315					
	13.00	985	28.70	90	0.73	126.0	8.9	3.2									
225 S 46	22.00	1485	42.50	89	0.84	141.8	8.1	2.6	84	73	0.6965	355					
	15.00	995	33.50	88	0.74	144.4	5.5	3.6									
225 M 46	26.00	1480	48.40	91	0.85	167.7	7.1	2.6	84	73	0.6965	380					
	16.50	990	33.90	90	0.74	159.2	5.4	3.6									
250 M 46	30.00	1480	55.90	90	0.87	195.2	5.0	1.2	86	75	0.7216	450					
	20.00	990	41.30	90	0.78	193.5	4.9	1.4									
280 S 46	56.00	1480	109.80	91	0.81	361.4	8.1	2.9	82	70	0.9500	875					
	34.00	985	78.30	86	0.73	329.6	6.4	2.8									
280 M 46	65.00	1480	124.50	92	0.82	419.4	8.2	2.8	82	70	1.1200	901					
	40.00	985	89.60	86	0.75	387.8	6.2	2.9									
315 S 46	75.00	1485	147.00	91	0.81	482.3	8.3	2.9	85	71	1.2700	971					
	46.00	990	103.30	87	0.74	443.7	6.4	3.0									
315 M 46	80.00	1488	145.00	96	0.84	518.0	6.9	2.0	85	71	1.3300	984					
	50.00	990	104.40	93	0.74	482.6	5.0	2.2									
315 LA 46	○	○	○	○	○	○	○	○	○	○	○	○					
315 LB 46	○	○	○	○	○	○	○	○	○	○	○	○					
315 LC 46	○	○	○	○	○	○	○	○	○	○	○	○					
355 46	○	○	○	○	○	○	○	○	○	○	○	○					

○ Data not indicated is supplied on request

▷ I'ₙ = Iₙ ·  $\frac{400}{U'}$  (I'ₙ = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$

# 4. PERFORMANCE DATA

4.5 THREE-PHASE MOTORS, 2 SPEEDS, RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR GENERAL PURPOSE (CONSTANT TORQUE)

4.5 Three-phase motors		2		Speed		1000 750		rpm		For general purpose - 1 winding Dahlander						
Motor type	Rated output P <sub>n</sub> [kW]	Speed n [1/min]	Current I <sub>n</sub> [A]	Efficiency η [%]	Power factor cos φ	Torque M <sub>n</sub> [Nm]	Starting current I <sub>s</sub> /I <sub>n</sub>	Starting torque M <sub>s</sub> /M <sub>n</sub>	Noise level [dB(A)]		Moment of inertia J [kgm <sup>2</sup> ]	Mass m [kg]				
									Lw	Lp						
71 B 68	0.12	960	0.73	45	0.55	1.2	3.0	2.4	50	42	0.0010	19				
	0.08	670	0.48	32	0.77	1.2	1.4	1.0								
80 A 68	0.15	930	0.67	46	0.70	1.5	4.0	1.5	53	45	0.0027	26				
	0.13	690	0.62	51	0.59	1.8	3.2	1.4								
80 B 68	0.25	920	1.00	51	0.71	2.6	2.8	1.6	53	45	0.0027	26				
	0.15	680	0.81	46	0.58	2.1	2.6	1.3								
90 S 68	0.35	910	1.30	53	0.74	3.7	3.2	1.4	54	46	0.0034	33				
	0.25	640	1.00	59	0.61	3.7	2.2	1.4								
90 L 68	0.60	920	2.12	53	0.72	6.2	3.2	1.5	54	46	0.0049	33				
	0.30	690	1.55	41	0.58	4.1	2.6	1.7								
100 LA 68	0.80	920	2.30	66	0.76	8.3	1.7	1.5	63	55	0.0088	46				
	0.55	700	1.90	67	0.62	7.5	1.8	1.5								
100 LB 68	1.00	920	3.30	54	0.82	10.4	3.0	1.1	63	55	0.0088	46				
	0.65	680	2.55	50	0.74	9.1	2.6	1.4								
112 M 68	1.50	960	4.10	74	0.71	14.9	1.0	1.7	65	57	0.0172	65				
	1.00	710	3.20	65	0.69	13.4	1.2	1.6								
132 S 68	1.85	960	5.20	73	0.70	18.4	4.1	1.6	68	60	0.0323	95				
	1.30	715	4.20	68	0.66	17.4	4.0	1.7								
132 MA 68	2.55	965	6.80	75	0.72	25.2	4.2	1.8	68	60	0.0395	95				
	1.85	720	5.80	68	0.68	24.5	4.1	1.8								
132 MB 68	3.00	970	7.40	79	0.74	29.5	5.4	1.9	68	60	0.0506	105				
	2.00	730	6.00	73	0.66	26.2	3.9	1.8								
160 M 68	4.00	980	10.80	84	0.65	39.6	6.0	2.3	72	64	0.0919	180				
	2.80	730	9.50	77	0.56	36.7	4.8	2.7								
160 L 68	5.50	985	14.60	86	0.64	53.5	7.7	2.5	72	64	0.1218	195				
	4.00	732	11.60	81	0.63	52.9	5.6	2.3								
180 M 68	6.50	970	15.00	83	0.75	64.0	4.1	1.7	76	67	0.2067	230				
	5.00	720	12.50	77	0.75	66.3	4.3	1.8								
180 L 68	8.00	965	17.50	85	0.78	79.2	4.4	1.8	76	67	0.2067	245				
	6.00	715	15.00	78	0.74	80.1	4.2	1.9								
200 LA 68	9.90	970	21.00	85	0.80	97.5	4.6	1.7	79	69	0.2986	295				
	7.50	710	18.00	80	0.75	100.9	4.3	1.7								
200 LB 68	12.00	990	33.40	88	0.59	115.8	7.0	2.4	79	69	0.3503	315				
	8.80	736	22.20	87	0.66	114.3	4.9	1.7								
225 S 68	15.00	970	32.50	82	0.81	147.7	4.8	1.8	81	70	0.6965	355				
	11.00	720	24.50	83	0.78	145.9	4.7	1.8								
225 M 68	17.00	975	37.00	81	0.82	166.5	4.9	1.8	81	70	0.6965	380				
	13.00	725	30.50	80	0.77	171.2	4.6	1.9								
250 M 68	22.00	980	48.50	82	0.80	214.4	4.7	1.9	81	70	0.7216	450				
	16.00	730	37.00	82	0.76	209.3	4.5	1.8								
280 S 68	37.00	990	80.30	90	0.74	356.9	7.3	3.1	77	65	1.1400	858				
	25.00	740	57.00	88	0.72	322.6	5.3	2.7								
280 M 68	44.00	995	97.00	91	0.72	422.3	7.5	3.0	77	65	1.3600	894				
	30.00	740	70.40	88	0.70	387.2	5.2	2.7								
315 S 68	52.00	990	112.80	90	0.74	501.6	7.9	3.4	79	65	1.6300	965				
	36.00	745	81.20	89	0.72	461.5	5.4	2.9								
315 M 68	60.00	995	132.30	91	0.72	575.9	7.8	3.3	79	65	1.8300	997				
	40.00	743	91.80	90	0.70	514.1	5.3	2.9								
315 LA 68	○	○	○	○	○	○	○	○	○	○	○	○				
315 LB 68	○	○	○	○	○	○	○	○	○	○	○	○				
315 LC 68	○	○	○	○	○	○	○	○	○	○	○	○				
355 68	○	○	○	○	○	○	○	○	○	○	○	○				

○ Data not indicated is supplied on request

▷ I'ₙ = Iₙ ·  $\frac{400}{U'}$  (I'ₙ = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.6 THREE-PHASE MOTORS, 2 SPEEDS RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR CENTRIFUGAL MACHINES (QUADRATIC TORQUE)

4.6 Three-phase motors		2		Speed		3000 1500		rpm		For centrifugal machines - 1 winding Dahlander						
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Noise level		Moment of inertia	Mass				
									[kW]	[1/min]			[A]	[%]	cos $\phi$	[Nm]
									Lw	Lp	[kgm <sup>2</sup> ]	[kg]				
63 B 24	0.24	2800	0.86	55	0.75	0.8	4.1	3.0	60	52	0.0001	16				
	0.07	1340	0.34	43	0.71	0.5	2.1	1.9								
71 A 24	0.37	2750	1.00	74	0.72	1.3	3.6	2.0	66	58	0.0004	19				
	0.09	1380	0.27	69	0.70	0.6	2.9	2.0								
71 B 24	0.50	2810	1.50	67	0.72	1.7	2.5	1.8	66	58	0.0004	19				
	0.14	1380	0.42	72	0.70	1.0	4.5	2.0								
80 A 24	0.75	2820	1.90	70	0.80	2.5	4.0	1.7	70	62	0.0006	26				
	0.18	1400	0.48	70	0.76	1.2	3.6	2.1								
80 B 24	0.11	2800	2.60	75	0.82	3.8	4.2	1.8	70	62	0.0008	26				
	0.25	1380	0.71	66	0.76	1.7	3.7	2.0								
90 S 24	1.50	2780	3.20	81	0.84	5.2	5.8	1.9	77	69	0.0012	33				
	0.37	1400	1.00	68	0.78	2.5	4.1	2.1								
90 L 24	2.00	2760	4.30	77	0.88	7.0	4.3	1.9	77	69	0.0015	33				
	0.51	1380	1.30	68	0.82	3.5	3.2	2.1								
100 M 24	2.60	2810	5.60	75	0.89	8.8	7.7	2.2	80	72	0.0029	46				
	0.62	1410	1.60	69	0.81	4.2	7.0	2.0								
100 L 24	3.30	2870	7.70	78	0.80	11.0	5.6	2.2	80	72	0.0029	46				
	0.75	1480	2.20	57	0.85	4.8	5.1	2.0								
112 M 24	4.41	2930	8.90	81	0.88	14.4	7.9	2.5	80	72	0.0074	65				
	1.10	1450	2.30	82	0.83	7.2	6.9	2.7								
132 S 24	6.50	2910	12.50	83	0.90	21.3	6.2	2.1	83	75	0.0150	95				
	2.00	1450	4.80	75	0.80	13.2	6.0	1.9								
132 M 24	8.50	2945	16.70	89	0.82	27.6	8.8	3.4	83	75	0.0178	95				
	2.50	1460	5.50	88	0.74	16.4	5.9	2.8								
132 L 24	9.20	2910	17.50	90	0.84	30.2	6.9	2.3	83	75	0.0216	105				
	2.80	1440	5.70	87	0.82	18.6	6.6	2.2								
160 M 24	12.00	2955	21.50	89	0.90	38.7	8.1	2.1	84	76	0.0360	180				
	3.00	1470	6.45	84	0.81	19.6	4.9	2.5								
160 L 24	16.00	2945	29.60	87	0.90	51.6	7.0	2.5	84	76	0.0534	195				
	4.40	1455	8.90	87	0.82	29.0	5.3	2.6								
180 M 24	18.00	2965	37.00	79	0.89	58.0	8.4	2.6	83	74	0.0750	230				
	5.00	1465	11.40	75	0.85	32.6	7.1	2.3								
180 L 24	24.00	2960	44.50	90	0.87	77.4	9.7	3.3	83	74	0.0750	245				
	6.00	1480	11.80	89	0.83	39.0	9.6	3.1								
200 LB 24	30.00	2970	51.20	92	0.92	96.5	7.2	2.0	87	77	0.1449	315				
	8.00	1480	15.60	88	0.86	52.2	7.2	1.9								
225 S 24	37.00	2960	68.00	86	0.91	119.4	7.3	2.1	89	79	0.1714	355				
	9.20	1460	21.00	74	0.86	60.2	7.0	2.0								
225 M 24	44.00	2970	78.00	91	0.90	141.5	9.0	2.6	89	79	0.2656	380				
	11.50	1480	21.80	91	0.84	74.3	8.4	2.4								
250 M 24	51.00	2970	93.00	89	0.89	164.0	6.5	2.2	90	79	0.2809	450				
	13.50	1475	26.50	87	0.85	87.4	6.2	1.8								
280 S 24	70.00	2960	130.80	91	0.85	225.8	9.4	2.8	88	76	0.5200	875				
	25.00	1480	49.40	85	0.86	161.3	8.2	2.7								
280 M 24	86.00	2960	158.80	91	0.86	277.5	9.2	2.8	88	76	0.6300	901				
	31.00	1480	63.50	84	0.84	200.0	8.0	2.6								
315 S 24	100.00	2965	181.50	91	0.87	322.1	9.4	2.9	90	76	0.7000	971				
	36.00	1485	75.50	83	0.83	231.5	8.0	2.9								
315 M 24	110.00	2970	196.30	92	0.88	353.7	9.5	2.9	90	76	0.7500	948				
	40.00	1485	83.90	84	0.82	257.2	8.1	2.8								
315 LA 24	○	○	○	○	○	○	○	○	○	○	○	○				
315 LB 24	○	○	○	○	○	○	○	○	○	○	○	○				
315 LC 24	○	○	○	○	○	○	○	○	○	○	○	○				
355 24	○	○	○	○	○	○	○	○	○	○	○	○				

○ Data not indicated is supplied on request

$$\blacktriangleright I'_n = I_n \cdot \frac{400}{U'} \quad (I'_n = \text{current at } U' \text{ Volt}); \quad \blacktriangledown J = \frac{PD^2}{4}$$

# 4. PERFORMANCE DATA

4.6 THREE-PHASE MOTORS, 2 SPEEDS RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR CENTRIFUGAL MACHINES (QUADRATIC TORQUE)

4.6 Three-phase motors		2		Speed		1500 750		rpm		For centrifugal machines - 1 winding Dahlander								
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Noise level	Moment of inertia	Mass							
												$P_n$ [kW]	$n$ [1/min]	$I_n$ [A]	$\eta$ [%]	$\cos\phi$	$M_n$ [Nm]	$I_s/I_n$
71 A 48	0.20	1420	0.82	50	0.71	1.4	3.5	1.7	56 48	0.0009	19							
	0.05	700	0.39	32	0.59	0.7	1.8	1.4										
71 B 48	0.30	1390	0.95	58	0.78	2.1	3.7	1.8	56 48	0.0009	19							
	0.07	680	0.44	34	0.70	1.0	1.8	1.6										
80 A 48	0.45	1410	1.40	66	0.70	3.0	2.9	2.0	59 51	0.0013	26							
	0.10	700	0.48	44	0.69	1.4	4.4	1.8										
80 B 48	0.65	1420	1.67	70	0.80	4.4	4.3	1.8	59 51	0.0013	26							
	0.14	695	0.69	47	0.63	1.9	2.5	2.0										
90 S 48	0.90	1420	2.15	76	0.80	6.1	4.3	1.8	62 54	0.0020	33							
	0.22	700	0.85	61	0.61	3.0	2.4	1.5										
90 L 48	1.20	1440	3.25	77	0.70	8.0	4.3	2.0	62 54	0.0026	33							
	0.30	700	1.50	56	0.52	4.1	3.7	1.8										
100 M 48	1.90	1410	4.70	74	0.79	13.0	4.3	1.8	63 55	0.0053	46							
	0.44	700	1.90	58	0.58	6.2	2.4	1.6										
100 L 48	2.20	1405	5.30	73	0.82	15.0	4.8	2.3	63 55	0.0053	46							
	0.55	695	2.00	63	0.64	7.6	2.8	1.9										
112 M 48	3.00	1440	6.50	80	0.85	20.2	5.1	1.7	68 60	0.0103	65							
	0.75	710	2.50	67	0.66	10.1	2.9	1.5										
132 S 48	4.41	1445	9.30	86	0.80	29.3	5.5	2.2	72 64	0.0250	95							
	1.10	710	3.90	74	0.56	15.0	2.9	1.7										
132 M 48	5.90	1455	12.00	86	0.83	38.7	5.3	2.0	75 67	0.0324	95							
	1.50	715	4.80	76	0.59	20.0	2.7	1.6										
132 L 48	7.50	1440	16.00	83	0.82	49.8	6.9	2.0	75 67	0.0405	105							
	1.85	710	6.20	72	0.60	25.0	4.5	1.8										
160 M 48	8.80	1470	18.00	89	0.80	57.7	7.0	2.1	77 69	0.0627	180							
	2.50	730	7.75	82	0.58	33.1	4.0	1.8										
160 L 48	12.00	1470	25.10	89	0.77	77.7	5.9	2.1	77 69	0.0801	195							
	3.20	715	10.50	79	0.56	42.5	3.1	2.0										
180 M 48	16.00	1480	36.00	89	0.72	103.3	7.8	3.3	79 70	0.1270	230							
	4.00	735	13.80	83	0.51	52.0	4.0	2.3										
180 L 48	22.00	1470	45.00	89	0.80	143.0	6.7	2.6	79 70	0.1488	245							
	5.50	732	17.20	82	0.56	71.8	3.2	1.9										
200 LB 48	26.00	1480	49.40	92	0.83	168.2	9.1	3.4	82 72	0.2436	315							
	6.00	735	15.60	91	0.61	78.2	4.5	2.6										
225 S 48	32.00	1470	65.00	92	0.77	207.9	6.5	3.6	84 73	0.3762	355							
	8.10	725	21.00	91	0.62	106.8	5.5	2.8										
225 M 48	37.00	1475	67.00	92	0.87	236.6	6.9	2.8	84 73	0.4451	380							
	9.20	730	22.00	90	0.67	120.0	4.6	2.4										
250 M 48	45.00	1475	87.00	94	0.80	291.3	5.8	2.4	86 75	0.4611	450							
	11.00	730	27.90	91	0.63	143.3	5.0	2.2										
280 S 48	69.00	1480	128.90	91	0.85	445.2	5.4	1.9	82 70	0.9500	875							
	20.00	720	49.80	88	0.66	265.3	3.8	1.5										
280 M 48	83.00	1480	155.10	91	0.85	535.6	5.5	1.8	82 70	1.1200	901							
	25.00	720	63.90	87	0.65	331.6	3.7	1.4										
315 S 48	94.00	1485	173.70	92	0.85	604.5	5.4	1.9	85 71	1.2700	971							
	28.00	725	70.50	87	0.66	368.8	3.8	1.5										
315 M 48	100.00	1485	182.60	92	0.86	643.1	4.9	1.8	85 71	1.3300	984							
	30.00	725	75.80	88	0.65	395.2	3.8	1.4										
315 LA 48	○	○	○	○	○	○	○	○	○ ○	○	○							
315 LB 48	○	○	○	○	○	○	○	○	○ ○	○	○							
315 LC 48	○	○	○	○	○	○	○	○	○ ○	○	○							
355 48	○	○	○	○	○	○	○	○	○ ○	○	○							

○ Data not indicated is supplied on request

▶  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $\blacktriangledown J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.6 THREE-PHASE MOTORS, 2 SPEEDS RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR CENTRIFUGAL MACHINES (QUADRATIC TORQUE)

4.6 Three-phase motors		2		Speed		1500 1000		rpm		For centrifugal machines - 2 windings							
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Noise level		Moment of inertia	Mass					
									[kW]	n [1/min]			$I_n$ [A]	$\eta$ [%]	$\cos\varphi$	$M_n$ [Nm]	$I_s/I_n$
									Lw	Lp							
71 B 46	0.30	1390	0.95	56	0.82	2.1	2.9	1.2	56	48	0.0009	19					
	0.10	905	0.45	46	0.76	1.1	2.0	1.1									
80 A 46	0.44	1430	1.40	65	0.70	2.9	3.0	1.6	59	51	0.0013	26					
	0.13	930	0.49	55	0.70	1.3	7.8	1.2									
80 B 46	0.59	1430	1.60	74	0.72	4.0	4.0	1.7	59	51	0.0013	26					
	0.18	950	0.67	56	0.69	1.8	3.6	1.9									
90 S 46	0.90	1440	2.95	68	0.66	5.9	4.1	2.5	62	54	0.0020	33					
	0.30	970	2.20	41	0.49	2.9	2.4	2.7									
90 L 46	1.15	1395	3.20	70	0.77	8.3	3.9	2.2	62	54	0.0026	33					
	0.40	920	1.65	51	0.69	4.2	2.5	2.0									
100 LA 46	1.80	1430	4.10	79	0.80	12.0	5.2	2.0	63	55	0.0053	46					
	0.60	955	1.90	70	0.65	6.0	4.0	1.7									
100 LB 46	2.20	1425	4.70	80	0.85	14.7	5.0	1.9	63	55	0.0053	46					
	0.70	950	2.10	73	0.66	7.0	3.8	1.6									
112 M 46	3.00	1455	6.90	76	0.83	19.7	5.0	1.9	68	60	0.0103	65					
	0.90	960	2.30	75	0.75	9.0	4.3	1.8									
132 S 46	4.00	1460	9.50	79	0.77	26.2	6.5	2.0	72	64	0.0250	95					
	1.20	980	4.60	68	0.55	11.7	5.2	1.7									
132 MA 46	4.80	1455	11.50	75	0.80	31.5	6.9	1.9	75	67	0.0324	95					
	1.40	965	5.10	68	0.58	13.9	5.4	1.8									
132 MB 46	5.50	1460	13.00	76	0.80	36.0	5.7	1.9	75	67	0.0324	105					
	1.70	960	6.50	63	0.60	16.9	4.9	2.0									
132 L 46	6.60	1470	15.50	88	0.70	42.9	6.9	1.8	75	67	0.0405	105					
	2.00	980	8.00	76	0.49	20.0	5.4	1.8									
160 M 46	7.50	1470	15.35	86	0.82	48.9	7.1	2.1	77	69	0.0627	180					
	2.50	985	6.67	83	0.66	24.4	6.2	2.2									
160 L 46	11.00	1460	23.00	82	0.84	71.9	7.1	2.2	77	69	0.0801	195					
	3.30	980	9.50	71	0.71	32.2	6.2	2.3									
180 M 46	15.00	1450	31.50	81	0.85	98.8	6.9	1.8	79	70	0.1270	230					
	5.20	960	21.00	85	0.57	51.7	6.0	1.6									
180 L 46	18.50	1450	36.00	84	0.88	121.8	7.0	7.0	79	70	0.1488	245					
	6.25	965	22.00	66	0.62	61.8	6.2	6.2									
200 LA 46	21.00	1460	41.00	85	0.87	137.4	6.9	2.0	82	72	0.2436	295					
	7.50	970	16.50	82	0.80	73.8	6.5	1.9									
200 LB 46	26.00	1465	48.50	89	0.87	169.5	6.4	1.8	82	72	0.2436	315					
	8.80	970	24.50	83	0.63	86.6	6.8	2.1									
225 S 46	31.00	1470	58.00	88	0.88	201.4	6.5	2.2	84	73	0.3762	355					
	11.00	975	23.00	82	0.84	107.7	6.0	2.1									
225 M 46	36.00	1475	70.00	88	0.84	233.0	4.9	2.2	84	73	0.4451	380					
	12.00	990	30.00	86	0.68	117.0	6.1	2.0									
250 M 46	38.00	1485	72.66	89	0.85	244.5	5.6	1.9	86	75	0.4611	450					
	14.00	985	28.89	85	0.83	136.0	5.4	1.9									
280 S 46	65.00	1480	123.00	92	0.83	419.4	8.1	2.9	82	70	0.9500	875					
	25.00	980	63.60	86	0.66	243.6	6.4	2.8									
280 M 46	80.00	1485	145.20	96	0.84	518.0	8.2	2.8	82	70	1.1200	901					
	30.00	995	76.30	91	0.63	291.6	6.2	2.9									
315 S 46	90.00	1485	170.30	92	0.83	578.8	8.3	2.9	85	71	1.2700	971					
	35.00	985	89.40	87	0.65	339.3	6.4	3.0									
315 M 46	95.00	1485	179.80	92	0.83	610.9	8.2	2.8	85	71	1.3300	984					
	37.00	990	92.10	88	0.66	356.9	6.4	3.0									
315 LA 46	○	○	○	○	○	○	○	○	○	○	○	○					
315 LB 46	○	○	○	○	○	○	○	○	○	○	○	○					
315 LC 46	○	○	○	○	○	○	○	○	○	○	○	○					
355 46	○	○	○	○	○	○	○	○	○	○	○	○					

○ Data not indicated is supplied on request

▷  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

4.6 THREE-PHASE MOTORS, 2 SPEEDS RATED DATA AT 400V 50HZ DIRECT ON LINE START, FOR CENTRIFUGAL MACHINES (QUADRATIC TORQUE)

4.6 Three-phase motors		2 Speed		1000 750 rpm		For centrifugal machines - 2 windings											
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Noise level		Moment of inertia	Mass					
									[kW]	[1/min]							
	P <sub>n</sub>	n	I <sub>p</sub>	$\eta$	cos $\phi$	M <sub>n</sub>	I <sub>s</sub> /I <sub>n</sub>	M <sub>t</sub> /M <sub>n</sub>	L <sub>w</sub>	L <sub>p</sub>	J	m					
80 A 68	0.33	930	1.15	59	0.68	3.4	3.2	1.8	53	45	0.0027	26					
	0.09	700	0.64	33	0.51	1.2	2.0	1.4									
80 B 68	0.40	930	1.20	61	0.76	4.1	2.9	1.7	53	45	0.0027	26					
	0.12	680	0.65	44	0.63	1.7	2.0	1.8									
90 S 68	0.48	895	1.54	52	0.89	5.3	2.2	1.6	54	46	0.0034	33					
	0.19	705	0.82	52	0.65	2.6	2.7	3.3									
90 L 68	0.66	925	2.10	63	0.72	6.9	2.6	2.0	54	46	0.0049	33					
	0.25	700	1.25	46	0.65	3.4	2.0	3.0									
100 LA 68	0.88	960	2.90	66	0.66	8.8	4.1	1.8	63	55	0.0088	46					
	0.37	715	1.80	47	0.63	4.9	3.6	1.7									
100 L 68	1.10	930	3.25	68	0.75	11.6	3.2	2.2	63	55	0.0088	46					
	0.44	720	2.20	55	0.55	5.9	2.9	2.9									
112 M 68	1.50	970	4.60	74	0.64	14.8	4.2	2.0	65	57	0.0172	65					
	0.75	725	3.30	60	0.54	9.9	3.4	2.6									
132 S 68	2.20	975	6.00	79	0.67	21.6	4.5	2.2	68	60	0.0323	95					
	0.88	730	3.50	67	0.54	11.6	3.8	1.7									
132 MA 68	3.00	960	7.00	76	0.81	29.8	4.9	2.0	68	60	0.0395	95					
	1.20	730	4.80	59	0.61	15.7	3.9	2.0									
132 MB 68	3.70	965	8.90	79	0.76	36.6	5.1	2.2	68	60	0.0506	105					
	1.50	715	5.00	64	0.68	20.0	3.9	2.1									
160 M 68	5.50	980	12.50	87	0.73	53.6	5.6	2.2	72	64	0.0919	180					
	2.50	730	6.80	83	0.64	32.7	4.3	2.3									
160 L 68	7.50	970	17.40	83	0.75	73.9	5.8	1.8	72	64	0.1218	195					
	4.00	728	11.60	78	0.64	52.8	4.0	2.3									
180 M 68	9.00	965	20.00	83	0.78	89.1	5.8	2.3	76	67	0.2067	230					
	4.50	725	11.00	80	0.74	59.3	4.3	2.2									
180 L 68	10.00	960	23.50	79	0.78	99.5	5.6	2.1	76	67	0.2067	245					
	5.20	720	13.00	80	0.72	69.0	4.1	2.0									
200 LA 68	13.00	970	29.50	81	0.79	128.0	5.3	2.0	79	69	0.2986	295					
	6.50	720	15.50	82	0.74	86.2	4.7	2.1									
200 LB 68	16.00	970	36.00	80	0.80	157.5	5.2	1.9	79	69	0.3503	315					
	8.10	725	21.00	72	0.77	106.7	4.6	2.0									
225 S 68	20.00	980	41.00	88	0.80	194.9	5.0	2.3	81	70	0.6965	355					
	10.00	730	24.50	76	0.78	130.8	4.9	2.2									
225 M 68	23.00	988	46.40	91	0.79	223.9	5.0	1.9	81	70	0.6965	380					
	11.00	737	25.20	89	0.72	144.8	4.2	1.7									
250 M 68	26.00	980	53.00	89	0.80	253.3	4.8	1.8	81	70	0.7216	450					
	13.00	730	31.50	75	0.80	170.1	4.5	1.7									
280 S 68	40.00	985	81.40	91	0.78	387.8	7.3	3.1	77	65	1.1400	875					
	16.00	740	38.20	84	0.72	206.5	5.3	2.7									
280 M 68	48.00	990	99.50	90	0.68	464.5	7.5	3.0	77	65	1.3600	901					
	20.00	740	53.40	86	0.63	258.0	5.2	2.7									
315 S 68	58.00	990	119.60	91	0.77	559.5	7.9	3.4	79	65	1.6300	971					
	24.00	742	56.90	87	0.70	308.9	5.4	2.9									
315 M 68	65.00	995	130.90	92	0.78	623.9	7.8	3.3	79	65	1.8300	884					
	27.00	740	62.30	87	0.72	348.4	5.3	2.9									
315 LA 68	○	○	○	○	○	○	○	○	○	○	○	○					
315 LB 68	○	○	○	○	○	○	○	○	○	○	○	○					
315 LC 68	○	○	○	○	○	○	○	○	○	○	○	○					
355 68	○	○	○	○	○	○	○	○	○	○	○	○					

○ Data not indicated is supplied on request

▷ I'ₙ = Iₙ ·  $\frac{400}{U'}$  (I'ₙ = current at U' Volt); ▼ J =  $\frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.7 SINGLE-PHASE MOTORS, 1 SPEED, RATED DATA AT 230V 50HZ DIRECT ON LINE START

4.7		Single-phase motors		1		Speed		1500 rpm											
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Capacitor	Noise level		Moment of inertia	Mass						
										[kW]	[1/min]			[A]	[%]	cosφ	[Nm]	I <sub>a</sub> /I <sub>n</sub>	M <sub>a</sub> /M <sub>n</sub>
63 A 2	0.10	2750	1.30	35	0.95	0.3	3.3	0.6	6.3	60	52	0.0001	16						
63 B 2	0.15	2750	1.30	53	0.95	0.5	3.8	0.6	8.0	60	52	0.0001	16						
71 A 2	0.20	2800	2.60	48	0.92	0.7	3.6	0.7	10.0	66	58	0.0004	19						
71 B 2	0.40	2730	2.90	63	0.95	1.4	2.7	0.7	12.5	66	58	0.0004	19						
80 A 2	0.55	2720	5.40	53	0.82	1.9	2.5	0.6	16.0	70	62	0.0006	26						
80 B 2	0.75	2790	5.30	63	0.97	2.6	4.5	0.8	20.0	70	62	0.0008	26						
90 S 2	1.10	2750	7.80	63	0.97	3.8	4.4	0.7	45.0	77	69	0.0012	33						
90 L 2	1.50	2800	8.90	74	0.98	5.1	4.9	0.7	60.0	77	69	0.0015	33						
100 LA 2	2.20	2800	15.50	65	0.95	7.5	5.0	0.6	60.0	80	72	0.0029	46						
100 LB 2	3.00	2800	18.00	74	0.98	10.2	5.0	0.6	80.0	80	72	0.0036	46						
63 A 4	0.09	1360	1.10	39	0.90	0.6	3.2	0.6	6.3	52	44	0.0002	16						
63 B 4	0.13	1350	1.30	55	0.90	1.1	3.0	0.6	8.0	52	44	0.0002	16						
71 A 4	0.15	1380	1.70	42	0.90	1.0	3.2	0.7	10.0	56	48	0.0006	19						
71 B 4	0.25	1380	2.30	48	0.97	1.7	3.4	0.7	12.5	56	48	0.0009	19						
80 A 4	0.35	1410	3.30	49	0.96	2.4	3.8	0.7	20.0	59	51	0.0009	26						
80 B 4	0.45	1420	4.30	53	0.85	3.0	3.8	0.8	25.0	59	51	0.0013	26						
80 L 4	0.55	1420	4.90	56	0.87	3.7	3.9	0.7	20.0	59	51	0.0014	26						
90 S 4	0.75	1420	5.90	56	0.97	5.2	2.1	1.0	30.0	62	54	0.0020	33						
90 L 4	1.10	1430	7.20	73	0.91	7.3	4.0	0.6	35.0	62	54	0.0026	33						
100 LA 4	1.30	1370	8.10	72	0.98	9.0	3.2	0.5	35.0	63	55	0.0043	46						
100 LB 4	1.60	1400	10.00	71	0.98	11.1	2.6	0.5	40.0	63	55	0.0053	46						
71 A 6	0.10	900	1.50	36	0.80	1.1	2.6	0.5	8.0	50	42	0.0007	19						
71 B 6	0.15	850	1.40	50	0.93	1.7	2.8	0.5	10.0	50	42	0.0010	19						
80 A 6	0.20	910	2.70	40	0.81	2.1	2.9	0.6	16.0	53	45	0.0022	26						
80 B 6	0.30	930	3.00	53	0.82	3.1	3.0	0.6	25.0	53	45	0.0027	26						
90 S 6	0.55	920	4.30	63	0.88	5.7	3.0	0.6	30.0	54	46	0.0034	33						
90 L 6	0.75	910	6.10	60	0.88	7.9	3.1	0.7	35.0	54	46	0.0049	33						
100 LB 6	1.10	920	8.00	65	0.92	11.4	3.2	0.7	75.0	63	55	0.0088	46						

$I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt);  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

4.8 THREE-PHASE MOTORS WITH BRAKE, 1 OR 2 SPEEDS, FOR HOIST APPLICATIONS, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.8 Three-phase motors with brake		1 Speed		1000 rpm		Duty type		IC410 S4 40%		For hoist applications		Brake				
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Max. Torque	Noise Level	Mass	Torque		Power	Braking: n° per hour	Total inertia
												[kV]	[1/min]			
71 A 6	0.18	945	0.92	55.0	0.51	1.82	3.7	3.7	3.7	42	29	3	9	50	240	0.00112
71 B 6	0.26	918	1.00	60.0	0.63	2.71	3.4	2.6	2.6	42	29	3	9	50	240	0.00142
80 A 6	0.37	930	1.60	58.0	0.58	3.80	3.1	2.9	3.2	45	36	6	17	60	240	0.00300
80 B 6	0.55	930	1.80	70.0	0.65	5.79	2.8	2.0	2.1	45	36	6	17	60	240	0.00350
90 S 6	0.75	950	2.39	73.0	0.62	7.52	4.0	3.0	3.3	46	52	12	35	140	240	0.00450
90 L 6	1.10	935	3.35	73.0	0.65	11.21	3.4	2.0	2.2	46	52	12	35	140	240	0.00600
100 LB 6	1.50	950	3.80	76.0	0.75	15.11	4.2	2.0	2.3	55	62	25	48	180	240	0.01012
112 M 6	2.20	960	6.11	80.0	0.65	21.84	5.2	2.3	2.1	57	100	34	70	250	240	0.01939
132 SB 6	3.00	975	9.34	82.0	0.56	29.40	6.4	3.3	3.5	60	134	50	90	400	240	0.03638
132 MB 6	4.00	970	9.84	86.0	0.69	39.38	6.0	2.0	2.5	60	134	50	90	400	240	0.04358
132 ML 6	5.50	960	15.56	74.0	0.69	54.90	5.5	2.7	3.0	60	134	50	90	400	240	0.05468
160 MB 6	7.50	950	15.70	85.0	0.81	75.33	4.8	2.1	2.1	64	217	60	130	480	240	0.09661
160 L 6	11.00	965	25.60	89.0	0.70	109.20	5.0	2.5	2.9	64	217	60	130	480	240	0.12681
180 L 6	15.00	984	33.41	93.0	0.70	145.70	7.7	3.0	3.5	67	435	90	400	140	150	0.23830
200 LA 6	18.50	980	41.70	90.2	0.71	180.28	7.2	2.5	3.7	69	490	300	400	140	150	0.31060
200 LB 6	22.00	985	49.90	90.4	0.70	212.97	7.3	2.8	4.4	69	515	300	400	140	150	0.31840
225 M 6	30.00	985	61.00	91.7	0.78	290.86	5.8	2.0	2.5	70	750	600	800	140	150	0.77370
250 M 6	37.00	990	72.00	94.0	0.70	358.00	5.2	2.0	2.4	70	815	600	800	140	150	1.05950
250 ML 6	45.00	988	93.60	93.0	0.75	434.60	8.6	3.0	1.9	70	905	600	800	140	150	1.24200
280 S 6	45.00	982	90.50	89.0	0.80	436.29	4.9	2.5	2.8	65	1153	600	800	140	150	1.15200
280 M 6	55.00	980	109.00	91.0	0.81	535.00	4.7	2.3	2.4	65	1189	600	800	140	150	1.37200
315 S 6	75.00	990	151.80	93.2	0.77	722.51	6.1	2.2	2.4	65	1269	600	800	140	150	1.84200

● Higher number of start-ups by request

►  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$



# 4. PERFORMANCE DATA

## 4.8 THREE-PHASE MOTORS WITH BRAKE, 1 OR 2 SPEEDS, FOR HOIST APPLICATIONS, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.8 Three-phase motors with brake		2 Speed		3000 rpm		Duty type		IC410 S4 40%		For hoist applications		Brake				
Motor type	Rated output $P_n$ [kW]	Speed $n$ [1/min]	Current $I_n$ [A]	Efficiency $\eta$ [%]	Power factor $\cos\phi$	Torque $M_n$ [Nm]	Starting current $I_a/I_n$	Starting torque $M_a/M_n$	Noise Level [dB(A)] $L_p$	Mass $m$ [kg]	Torque [Nm]		Power [VA/W]	Braking: $n^\circ$ per hour •	Total inertia [kgm <sup>2</sup> ]	
											S1	S4				
71 B 28	0.36	2860	1.10	60.6	0.82	1.20	3.5	2.0	58	29	6	9	50	240	0.00082	
	0.06	670	0.60	21.0	0.68	0.86	1.5	1.4			12	17				
80 A 28	0.55	2935	1.32	77.0	0.78	1.79	6.4	2.4	62	36	12	17	60	240	0.00140	
	0.12	688	0.85	45.0	0.45	1.77	1.6	1.3			12	17				
80 B 28	0.66	2840	1.48	78.0	0.82	2.22	6.1	2.1	62	36	12	17	60	240	0.00160	
	0.17	660	1.02	47.0	0.51	2.46	1.5	1.2			12	17				
90 S 28	0.90	2845	2.45	58.0	0.91	3.02	4.8	2.9	69	52	25	35	140	240	0.00230	
	0.22	680	1.35	36.0	0.65	3.09	2.1	2.8			25	35				
90 L 28	1.10	2968	4.10	60.3	0.64	3.54	6.2	3.2	69	52	25	35	140	240	0.00260	
	0.30	722	1.40	57.6	0.54	3.97	2.2	2.1			25	35				
100 LA 28	1.30	2960	3.40	71.1	0.78	4.19	8.6	3.7	72	62	34	48	180	240	0.00422	
	0.33	735	2.58	48.0	0.39	4.29	2.9	3.6			34	48				
100 L 28	1.50	2930	4.00	70.0	0.78	4.89	6.1	2.5	72	62	34	48	180	240	0.00662	
	0.37	725	3.00	47.0	0.38	4.87	2.4	3.7			34	48				
112 M 28	2.60	2950	5.50	86.0	0.81	8.42	8.3	2.6	72	100	50	70	250	240	0.00959	
	0.70	720	2.70	69.0	0.55	9.28	3.1	2.5			50	70				
132 S 28	4.00	2950	6.80	83.0	0.91	12.95	8.5	2.7	75	134	60	90	400	236	0.01648	
	1.00	720	4.20	63.0	0.60	13.26	3.3	2.3			60	90				
132 M 28	5.00	2960	10.77	77.0	0.87	16.13	8.1	2.8	75	134	60	90	400	236	0.02188	
	1.25	720	4.73	72.0	0.53	16.58	3.1	1.6			60	90				
132 L 28	6.00	2950	14.42	78.0	0.77	19.42	7.2	3.0	75	134	60	90	400	236	0.02568	
	1.50	710	7.34	59.0	0.50	20.18	2.4	1.7			60	90				

• Higher number of start-ups by request

•  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

4.8 THREE-PHASE MOTORS WITH BRAKE, 1 OR 2 SPEEDS, FOR HOIST APPLICATIONS, RATED DATA AT 400V 50HZ DIRECT ON LINE START

4.8 Three-phase motors with brake		2	Speed	1500 500	rpm	Duty type	IC410 S4 40%	For hoist applications	Brake						
Motor type	Rated output	Speed	Current	Efficiency	Power factor	Torque	Starting current	Starting torque	Noise Level	Mass	Torque		Power	Braking: n° per hour	Total inertia
	$P_n$ [kW]	n [1/min]	$I_n$ [A]	$\eta$ [%]	$\cos\phi$	$M_n$ [Nm]	$I_a/I_n$	$M_a/M_n$	[dB(A)] Lp	m [kg]	[Nm]		[VA/W]	[max n.] ●	[kgm <sup>2</sup> ]
											S1	S4			
90 S 412	0.55 0.18	1450 432	1.50 1.10	69.6 34.7	0.76 0.70	3.62 3.98	4.0 2.0	1.6 1.6	○	52	25	35	140	240	0.00310
90 L 412	0.75 0.25	1455 440	2.25 1.35	69.0 45.0	0.70 0.60	4.92 5.43	4.5 2.0	2.0 1.8	○	52	25	35	140	240	0.00370
100 LA 412	1.10 0.37	1473 478	4.80 3.65	56.3 31.3	0.59 0.47	7.13 7.39	4.8 1.6	3.4 2.5	○	62	34	48	180	240	0.00562
100 LB 412	1.50 0.50	1455 455	4.83 3.00	64.0 40.9	0.70 0.59	9.85 10.49	4.6 1.8	2.3 1.8	○	62	34	48	180	240	0.00662
112 M 412	1.80 0.60	1475 470	7.05 3.85	61.3 44.0	0.60 0.51	11.65 12.19	6.3 2.2	2.9 1.7	○	100	50	70	250	240	0.01249
132 S 412	2.20 0.73	1484 470	7.25 4.60	77.0 50.0	0.57 0.46	14.16 14.83	6.5 1.7	3.7 1.8	○	134	60	90	400	240	0.02908
132 M 412	3.50 1.17	1480 485	10.20 10.56	84.0 41.0	0.59 0.39	22.58 23.04	9.4 1.3	2.9 2.4	○	134	60	90	400	240	0.03648
132 L 412	4.00 1.33	1484 479	10.60 9.87	84.0 54.0	0.65 0.36	25.74 26.52	6.8 1.9	2.8 2.5	○	134	60	90	400	240	0.04458
160 M 412	5.50 1.83	1470 485	12.60 10.91	77.0 55.0	0.82 0.44	35.73 36.03	5.8 2.3	2.1 2.1	○	217	90	130	480	240	0.06771
160 L 412	7.50 2.50	1480 483	16.98 14.34	85.0 68.0	0.75 0.37	48.40 49.43	5.7 2.0	2.5 2.1	○	217	90	130	480	240	0.08511
180 M 412	9.00 3.00	1485 485	20.98 17.62	86.0 63.0	0.72 0.39	57.9 59.1	8.1 2.0	3.7 2.1	70	435	300	400	140	150	0.13560
180 L 412	11.60 3.87	1480 480	24.80 23.98	92.5 61.3	0.73 0.38	74.8 77.0	8.3 1.9	3.5 2.5	70	435	300	400	140	150	0.16130
200 LA 412	13.00 4.33	1490 493	27.00 20.57	89.1 74.1	0.78 0.41	83.3 83.9	11.4 3.6	2.5 2.4	72	515	300	400	140	150	0.25760
200 LB 412	16.00 5.33	1490 491	36.34 27.78	89.5 71.0	0.71 0.39	102.5 103.7	10.0 3.8	2.8 2.7	72	515	300	400	140	150	0.25760
225 S 412	18.00 6.00	1475 485	38.90 22.30	90.0 78.0	0.64 0.50	116.4 119.6	11.6 1.9	3.8 2.7	73	750	600	800	140	150	0.38570
225 M 412	20.00 6.67	1470 480	42.53 22.99	91.0 79.0	0.75 0.53	129.9 132.7	10.6 1.7	3.4 2.7	73	750	600	800	140	150	0.45990
250 M 412	29.00 9.50	1490 495	51.01 33.77	92.2 84.6	0.89 0.48	185.9 183.3	10.5 4.8	2.8 2.3	75	905	600	800	140	100	0.77930
250 ML 412	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
280 S 412	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
280 M 412	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
315 S 412	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

- Data not indicated is supplied on request
- Higher number of start-ups by request

▶  $I'_n = I_n \cdot \frac{400}{U'}$  ( $I'_n$  = current at  $U'$  Volt); ▼  $J = \frac{PD^2}{4}$

# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

### 4.9 Motors energized by inverter

Ventilation		IC 411									IC 411/ IC 416*						IC 416			IC 411
400 V, 50Hz [1/min] 3000		[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 10 ÷ 50 range 1 ÷ 5 [1/min] 600 ÷ 3000			[Hz] 25 ÷ 50 range 1 ÷ 2 [1/min] 1500 ÷ 3000			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000
Motor type	Mains connection	Constant torque			Constant torque			Constant torque			Constant torque - Weakened flux			Constant torque - Constant flux Δ connection			Constant torque - Forced Ventilation			Quadratic torque*
Ex db - Ex db eb	P <sub>n</sub> [kW] I <sub>n</sub> [A]	P [kW] M [Nm] I [A]	M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW]					
<b>63 B 2</b>	0.25 0.85	0.02-0.16 0.54 0.53		0.04-0.18 0.61 0.60	0.11-0.22 0.76 0.74	0.13-0.23 0.46 0.44	0.21-0.36 0.70 1.18	— — —	0.25											
<b>71 A B 2</b>	0.37 1.10 0.55 1.40	0.02-0.24 0.81 0.71 0.04-0.35 1.19 0.91		0.05-0.27 0.91 0.80 0.08-0.40 1.34 1.02	0.16-0.33 1.12 0.99 0.24-0.49 1.65 1.26	0.20-0.35 0.68 0.60 0.30-0.51 1.00 0.76	0.30-0.53 1.04 1.60 0.45-0.79 1.53 2.02	— — — — — —	0.37 0.55											
<b>80 A B 2</b>	0.75 1.90 1.10 2.60	0.05-0.48 1.6 1.29 0.07-0.70 2.38 1.67		0.11-0.54 1.84 1.45 0.16-0.79 2.67 1.88	0.33-0.67 2.2 1.80 0.49-0.98 3.31 2.32	0.40-0.70 1.37 1.08 0.59-1.03 1.99 1.40	0.62-1.07 2.10 2.89 0.90-1.57 3.05 3.73	— — — — — —	0.75 1.10											
<b>90 S L 2</b>	1.50 3.10 2.20 4.80	0.10-0.96 3.19 1.99 0.14-1.41 4.77 3.08		0.22-1.08 3.59 2.24 0.32-1.58 5.36 3.47	0.67-1.34 4.45 2.78 0.98-1.96 6.64 4.29	0.81-1.40 2.68 1.67 1.18-2.06 4.00 2.59	1.23-2.14 4.10 4.45 1.81-3.15 6.12 6.88	— — — — — —	1.50 2.20											
<b>100 LA 2</b>	3.00 7.30	0.19-1.92 6.41 4.67		0.43-2.16 7.21 5.26	1.34-2.67 8.93 6.51	1.61-2.80 5.38 3.92	2.47-4.29 8.23 10.44	0.27-2.70 9.02 6.57	3.00											
						[Hz] 50 ÷ 70 ★ range 10 ÷ 14 [1/min] 3000 ÷ 4200	[Hz] 50 ÷ 70 ★ range 10 ÷ 14 [1/min] 3000 ÷ 4200													
<b>112 M 2</b>	4.00 8.70	0.30-2.60 8.40 5.60		0.60-2.90 9.50 6.30	1.80-3.60 11.70 7.80	3.00-4.10 9.80 6.50	3.90-5.40 12.80 14.90	0.40-3.60 11.90 7.90	4.00											
<b>132 SA 2</b>	5.50 12.00	0.40-3.50 11.60 7.40		0.80-4.00 13.10 8.30	2.50-4.90 16.20 10.30	4.10-5.70 13.50 8.60	5.30-7.50 17.60 19.50	0.50-5.00 16.40 10.40	5.50											
<b>132 SB 2</b>	7.50 15.00	0.50-4.80 15.80 9.60		1.10-5.40 17.70 10.80	3.30-6.70 21.90 13.40	5.60-7.80 18.20 11.10	7.30-10.20 23.90 25.30	0.70-6.8 22.20 13.50	7.50											
<b>132 MB 2</b>	9.20 18.00	0.60-5.90 19.40 11.50		1.30-6.60 21.80 13.00	4.10-8.20 27.00 16.10	6.80-9.50 22.40 13.40	8.90-12.50 29.40 30.40	0.80-8.30 27.30 16.20	9.20											
<b>160 MA 2</b>	11.00 20.60	0.70-7.00 23.00 13.10		1.60-7.90 25.80 14.80	4.90-9.80 32.00 18.30	8.10-11.40 26.50 15.20	10.70-14.90 34.80 34.60	1.00-9.90 32.3 18.50	11.00											
<b>160 MB 2</b>	15.00 26.80	1.00-9.60 31.10 16.90		2.20-10.80 35.00 19.00	6.70-13.40 43.30 23.60	11.10-15.50 36.00 19.60	14.60-20.40 47.20 44.60	1.40-13.50 3.80 23.80	15.00											
<b>160 L 2</b>	18.50 32.80	1.20-11.80 38.40 20.90		2.70-13.30 43.20 23.50	8.20-16.50 53.50 29.00	13.70-19.20 44.40 24.10	17.90-25.10 58.20 55.00	1.70-16.70 54.00 29.30	18.50											
						[Hz] 50 ÷ 60 ★ range 10 ÷ 12 [1/min] 3000 ÷ 3600	[Hz] 50 ÷ 60 ★ range 10 ÷ 12 [1/min] 3000 ÷ 3600													
<b>180 M 2</b>	22.00 40.00	1.40-14.10 46.00 25.40		3.20-15.80 51.00 28.50	9.80-19.60 63.00 35.30	19.80-23.80 64.00 35.70	22.00-26.40 71.00 68.90	2.00-19.80 64.00 35.70	22.00											
<b>200 LA 2</b>	30.00 55.00	1.90-19.20 62.00 35.20		4.30-21.60 69.00 39.60	13.40-26.70 86.00 49.00	27.00-32.40 87.00 49.50	30.00-36.00 96.00 95.70	2.70-27.00 87.00 49.50	30.00											
<b>200 LB 2</b>	37.00 67.00	2.40-23.70 76.00 42.40		5.30-26.60 86.00 47.70	16.50-33.00 106.00 59.00	33.30-40.00 107.00 59.60	37.00-44.40 119.00 115.20	3.30-33.30 107.00 59.60	37.00											
<b>225 M 2</b>	45.00 82.00	2.90-28.80 92.00 52.00		6.50-32.40 104.00 58.50	20.00-40.10 129.00 72.30	40.50-48.60 130.00 73.10	42.70-51.30 137.00 134.20	4.10-40.50 130.00 73.10	45.00											
<b>250 M 2</b>	55.00 98.00	3.50-35.20 113.00 62.80		7.90-39.60 127.00 70.60	24.50-49.00 157.00 87.40	49.50-59.40 159.00 88.30	52.20-62.70 168.00 162.10	5.00-49.50 159.00 88.30	55.00											
<b>280 S 2</b>	75.00 132.00	4.60-46.40 149.00 81.00		10.10-50.70 163.00 88.50	31.70-63.40 203.00 110.70	63.70-76.50 204.00 111.30	67.50-81.00 216.00 205.00	6.40-63.70 204.00 111.30	73.50											
<b>280 M 2</b>	90.00 165.00	5.60-55.60 178.00 101.40		12.20-60.80 195.00 110.90	38.00-76.10 244.00 138.70	76.50-91.80 245.00 139.40	81.00-97.20 259.00 256.70	7.70-76.50 245.00 139.40	87.30											
<b>315 S 2</b>	110.00 139.00	6.80-68.00 218.00 118.50		14.90-74.40 238.00 129.60	46.50-91.00 298.00 162.10	93.50-112.20 300.00 163.00	99.00-118.80 317.00 300.10	9.40-93.50 300.00 163.00	105.60											
<b>315 LA 2</b>	132.00 222.00	8.20-81.60 262.00 140.70		17.90-89.20 287.00 153.90	55.80-111.60 359.00 192.40	112.20-134.60 361.00 193.40	118.80-142.50 382.00 356.20	11.20-112.20 361.00 193.40	124.10											
<b>315 LB 2</b>	160.00 269.00	9.90-98.90 317.00 166.00		21.60-108.20 346.00 181.50	67.60-135.30 433.00 227.00	136.00-163.20 435.00 228.20	144.00-172.80 461.00 420.30	13.60-136.00 435.00 228.20	147.20											
<b>315 LC 2</b>	200.00 332.00	12.40-123.60 396.00 206.00		27.00-135.20 433.00 225.30	84.50-169.10 541.00 281.70	170.00-204.00 544.00 283.20	180.00-216.00 576.00 521.50	17.00-170.00 544.00 283.00	180.00											

For 355 motors and for IE3 motors, data is supplied during the offer phase.

Rounded values

• Values refer to 50Hz ★ Higher frequency upon request ◆ To reduce noise level, IC 416 is advisable (available from frame size 100)

# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

### 4.9 Motors energized by inverter

Ventilation		IC 411						IC 411/ IC 416*						IC 416			IC 411			
400 V, 50Hz [1/min] 3000		[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 10 ÷ 50 range 1 ÷ 5 [1/min] 600 ÷ 3000			[Hz] 25 ÷ 50 range 1 ÷ 2 [1/min] 1500 ÷ 3000			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000
Motor type	Mains connection	Constant torque			Constant torque			Constant torque			Constant torque - Weakened flux			Constant torque - Constant flux Δ connection			Constant torque - Forced Ventilation			Quadratic torque*
Ex db - Ex db eb	P <sub>n</sub> [kW] I <sub>n</sub> [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW] M [Nm] I [A]	P [kW]				
<b>63 A 4</b>	0.12 0.62	0.01-0.08 0.53 0.34	0.02-0.09 0.60 0.38	0.05-0.11 0.74 0.48	0.06-0.11 0.45 0.29	0.10-0.17 0.68 0.76	— — —	0.12												
<b>63 B 4</b>	0.18 0.67	0.01-0.12 0.82 0.44	0.03-0.13 0.92 0.49	0.08-0.16 1.14 0.61	0.10-0.17 0.69 0.37	0.15-0.26 1.05 0.97	— — —	0.18												
<b>71 A 4</b>	0.25 0.80	0.02-0.16 1.11 0.49	0.04-0.18 1.25 0.56	0.11-0.22 1.55 0.69	0.13-0.23 0.93 0.41	0.21-0.36 1.43 1.10	— — —	0.25												
<b>71 B 4</b>	0.37* 1.10	0.02-0.24 1.63 0.69	0.05-0.27 1.83 0.77	0.16-0.33 2.26 0.96	0.20-0.35 1.37 0.58	0.30-0.53 2.09 1.54	— — —	0.37												
<b>80 A 4</b>	0.55 1.60	0.04-0.35 2.44 1.04	0.08-0.40 2.74 1.17	0.24-0.49 3.39 1.44	0.30-0.51 2.04 0.87	0.45-0.79 3.13 2.32	— — —	0.55												
<b>80 B 4</b>	0.75 2.00	0.05-0.48 3.27 1.29	0.11-0.54 3.68 1.45	0.33-0.67 4.56 1.79	0.40-0.70 2.75 1.08	0.62-1.07 4.21 2.87	— — —	0.75												
<b>90 S 4</b>	1.10 2.80	0.07-0.70 4.80 1.75	0.16-0.79 5.40 1.97	0.49-0.98 6.69 2.43	0.59-1.03 4.03 1.47	0.90-1.57 6.17 3.91	— — —	1.10												
<b>90 L 4</b>	1.50 3.60	0.10-0.96 6.46 2.31	0.22-1.08 7.26 2.60	0.67-1.34 8.99 3.21	0.81-1.40 5.42 1.94	1.23-2.14 8.29 5.15	— — —	1.50												
<b>100 LA 4</b>	2.20 5.25	0.14-1.41 9.42 3.34	0.32-1.58 10.60 3.76	0.98-1.96 13.12 4.65	1.18-2.06 7.91 2.80	1.81-3.15 12.10 7.46	0.20-1.98 13.25 4.70	2.20												
<b>100 LB 4</b>	3.00 6.83	0.19-1.92 12.77 4.34	0.43-2.16 14.36 4.88	1.34-2.67 17.78 6.04	1.61-2.80 10.71 3.64	2.47-4.29 16.40 9.68	0.27-2.70 17.96 6.10	3.00												
<b>112 M 4</b>	4.00 8.20	0.30-2.60 17.00 5.10	0.60-2.90 19.10 5.80	1.80-3.60 23.60 7.20	2.20-3.70 14.30 4.30	3.30-5.70 21.80 11.50	0.40-3.60 23.90 7.20	4.00												
<b>132 SB 4</b>	5.50 11.60	0.40-3.50 23.10 7.40	0.80-4.00 26.00 8.30	2.50-4.90 32.20 10.30	3.00-5.10 19.40 6.20	4.50-7.90 29.70 16.50	0.50-5.00 32.50 10.40	5.50												
<b>132 MB 4</b>	7.50 16.50	0.50-4.80 31.60 10.50	1.10-5.40 35.60 11.80	3.30-6.70 44.00 14.60	4.00-7.00 26.50 8.80	6.20-10.70 40.60 23.30	0.70-6.80 44.50 14.70	7.50												
<b>132 ML 4</b>	8.80 18.50	0.60-5.60 37.00 11.80	1.30-6.30 41.60 13.30	3.90-7.80 51.50 16.50	4.70-8.20 31.00 9.90	7.20-12.60 47.50 26.40	0.80-7.90 52.00 16.60	8.80												
<b>160 MB 4</b>	11.00 23.00	0.70-7.00 45.70 14.60	1.60-7.90 51.50 16.50	4.90-9.80 63.70 20.40	5.90-10.30 38.40 12.30	9.00-15.70 58.70 32.70	1.00-9.90 64.30 20.60	11.00												
<b>160 L 4</b>	15.00 30.00	1.00-9.60 62.40 19.10	2.20-10.80 70.20 21.50	6.70-13.40 86.80 26.70	8.10-14.00 52.30 16.10	12.30-21.50 80.10 42.80	1.40-13.50 87.70 26.90	15.00												
<b>180 M 4</b>	18.50 39.00	1.20-11.80 77.00 25.00	2.70-13.30 87.00 28.20	8.20-16.50 107.00 34.90	9.90-17.30 65.00 21.00	15.20-26.50 99.00 55.90	1.70-16.70 108.00 35.20	18.50												
<b>180 L 4</b>	22.00 44.00	1.40-14.10 92.00 28.30	3.20-15.80 103.00 31.90	9.80-19.60 127.00 39.40	11.80-20.60 77.00 23.80	18.10-31.50 118.00 63.30	2.00-19.80 129.00 39.80	22.00												
<b>200 LB 4</b>	30.00 54.00	1.90-19.20 124.00 34.30	4.30-21.60 140.00 38.60	13.40-26.70 173.00 47.80	16.10-28.00 104.00 28.80	24.70-42.90 160.00 76.60	2.70-27.00 175.00 48.30	30.00												
<b>225 S 4</b>	37.00 70.00	2.40-23.70 153.00 44.60	5.30-26.60 172.00 50.20	16.50-33.00 213.00 62.20	19.90-34.60 128.00 37.50	28.90-50.30 186.00 94.70	3.30-33.30 215.00 62.80	37.00												
<b>225 M 4</b>	45.00 82.00	2.90-28.80 186.00 52.70	6.50-32.40 209.00 59.30	20.00-40.10 259.00 73.40	24.20-42.00 156.00 44.20	35.10-61.10 227.00 111.90	4.10-40.50 261.00 74.10	45.00												
<b>250 M 4</b>	55.00 96.00	3.50-35.20 226.00 61.40	7.90-39.60 255.00 69.10	24.50-49.00 315.00 85.50	29.50-51.40 190.00 51.50	42.90-74.70 276.00 130.30	5.00-49.50 318.00 86.40	55.00												
<b>280 S 4</b>	75.00 136.00	4.80-48.00 310.00 86.60	10.50-52.50 339.00 94.70	32.20-64.50 416.00 116.40	33.70-58.70 218.00 60.90	58.60-101.90 378.00 183.80	6.60-66.00 426.00 119.10	75.00												
<b>280 M 4</b>	90.00 163.00	5.80-57.60 370.00 103.90	12.60-63.00 405.00 113.70	38.70-77.40 498.00 139.70	40.50-70.50 261.00 73.10	70.30-122.30 452.00 220.50	7.90-79.20 509.00 142.90	90.00												
<b>315 S 4</b>	110.00 199.00	7.00-70.40 453.00 127.20	15.40-77.00 495.00 139.10	47.30-94.60 608.00 170.90	49.50-86.10 318.00 89.40	85.90-149.40 552.00 269.80	9.70-96.80 623.00 174.80	110.00												
<b>315 LA 4</b>	132.00 239.00	8.50-84.50 543.00 154.20	18.50-92.40 594.00 168.70	56.80-113.50 730.00 207.20	59.40-103.30 382.00 108.40	103.10-179.30 663.00 327.30	11.60-116.10 747.00 212.10	132.00												
<b>315 LB 4</b>	160.00 282.00	10.20-102.40 657.00 179.90	22.40-112.00 719.00 196.80	68.80-137.60 883.00 241.80	72.00-125.30 462.00 126.50	124.90-217.40 802.00 381.80	14.10-140.80 904.00 247.40	160.00												
<b>315 LC 4</b>	200.00 354.00	12.80-128.00 822.00 225.60	28.00-140.00 899.00 246.80	86.00-172.00 1104.00 303.20	90.00-156.60 578.00 158.60	156.20-271.70 1002.00 478.80	17.60-176.00 1130.00 310.20	200.00												

For 355 motors and for IE3 motors, data is supplied during the offer phase.

Rounded values

- Values refer to 50Hz

# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

Ventilation		IC 411						IC 411/ IC 416*						IC 416			IC 411			
400 V, 50Hz [1/min] 3000		[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 10 ÷ 50 range 1 ÷ 5 [1/min] 600 ÷ 3000			[Hz] 25 ÷ 50 range 1 ÷ 2 [1/min] 1500 ÷ 3000			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000
Motor type	Mains connection	Constant torque			Constant torque			Constant torque			Constant torque - Weakened flux			Constant torque - Constant flux Δ connection			Constant torque - Forced Ventilation			Quadratic torque*
Ex db - Ex db eb	P <sub>n</sub> [kW] I <sub>n</sub> [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]
<b>63 B 6</b>	0.09 0.65	0.01-0.06	0.65	0.42	0.01-0.06	0.73	0.47	0.04-0.08	0.90	0.59	0.05-0.08	0.54	0.35	0.07-0.13	0.83	0.94	—	—	—	0.09
<b>71 A 6</b>	0.18 0.92	0.01-0.12	1.18	0.70	0.03-0.13	1.33	0.79	0.08-0.16	1.65	0.97	0.10-0.17	0.99	0.59	0.15-0.26	1.52	1.56	—	—	—	0.18
<b>71 B 6</b>	0.26 1.00	0.02-0.17	1.73	0.64	0.04-0.19	1.95	0.71	0.12-0.23	2.41	0.88	0.14-0.24	1.45	0.53	0.21-0.37	2.22	1.42	—	—	—	0.26
<b>80 A 6</b>	0.37 1.60	0.02-0.24	2.43	1.02	0.05-0.27	2.74	1.14	0.16-0.33	3.39	1.41	0.20-0.35	2.04	0.85	0.30-0.53	3.12	2.27	—	—	—	0.37
<b>80 B 6</b>	0.55 1.80	0.04-0.35	3.61	1.12	0.08-0.40	4.07	1.26	0.24-0.49	5.03	1.55	0.30-0.51	3.03	0.94	0.45-0.79	4.64	2.49	—	—	—	0.55
<b>90 S 6</b>	0.75 2.20	0.05-0.48	5.04	1.39	0.11-0.54	5.67	1.57	0.33-0.67	7.01	1.94	0.40-0.70	4.23	1.17	0.62-1.07	6.47	3.11	—	—	—	0.75
<b>90 L 6</b>	1.10 3.20	0.07-0.70	7.19	2.00	0.16-0.79	8.09	2.25	0.49-0.98	10.01	2.79	0.59-1.03	6.03	1.68	0.90-1.57	9.24	4.47	—	—	—	1.10
<b>100 LB 6</b>	1.50 3.80	0.10-0.96	9.65	2.43	0.22-1.07	10.86	2.73	0.67-1.34	13.44	3.38	0.81-1.40	8.10	2.04	1.23-2.14	12.39	5.43	0.13-1.35	13.57	3.42	1.50
<b>112 M 6</b>	2.20 6.20	0.10-1.40	14.00	3.90	0.30-1.60	15.80	4.40	1.00-2.00	19.50	5.40	1.20-2.10	11.80	3.30	1.80-3.20	18.00	8.70	0.20-2.00	19.70	5.50	2.20
<b>132 S 6</b>	3.00 8.50	0.20-1.90	19.30	5.40	0.40-2.20	21.70	6.10	1.30-2.70	26.90	7.60	1.60-2.80	16.20	4.60	2.50-4.30	24.80	12.10	0.30-2.70	27.20	7.60	3.00
<b>132 M 6</b>	4.00 9.50	0.30-2.60	25.20	6.10	0.60-2.90	28.40	6.80	1.80-3.60	35.10	8.50	2.20-3.70	21.20	5.10	3.30-5.70	32.40	13.60	0.40-3.60	35.40	8.60	4.00
<b>132 ML 6</b>	5.50 12.00	0.40-3.50	35.00	7.70	0.80-4.00	39.40	8.60	2.50-4.90	48.80	10.70	3.00-5.10	29.40	6.40	4.50-7.90	45.00	17.10	0.50-5.00	49.20	10.80	5.50
<b>160 MB 6</b>	7.50 16.00	0.50-4.80	48.30	10.20	1.10-5.40	54.30	11.50	3.30-6.70	67.20	14.20	4.00-7.00	40.50	8.50	6.20-10.70	62.00	22.70	0.70-6.80	67.90	14.30	7.50
<b>160 L 6</b>	11.00 23.00	0.70-7.00	70.80	14.80	1.60-7.90	79.60	16.60	4.90-9.80	98.50	20.50	5.90-10.30	59.40	12.40	9.00-15.70	91.00	33.00	1.00-9.90	99.50	20.80	11.00
<b>180 L 6</b>	15.00 29.00	1.00-9.60	96.00	18.30	2.20-10.80	107.00	20.60	6.70-13.40	133.00	25.50	8.10-14.00	80.00	15.40	12.30-21.50	123.00	40.90	1.40-13.50	134.00	25.70	15.00
<b>200 LA 6</b>	18.50 38.00	1.20-11.80	116.00	24.40	2.70-13.30	130.00	27.40	8.20-16.50	161.00	34.00	9.90-17.30	97.00	20.50	15.20-26.50	149.00	54.50	1.70-16.70	163.00	34.30	18.50
<b>200 LB 6</b>	22.00 44.00	1.40-14.10	137.00	28.30	3.20-15.80	154.00	31.90	9.80-19.60	191.00	39.40	11.80-20.60	115.00	23.80	18.10-31.50	176.00	63.30	2.00-18.80	193.00	39.80	22.00
<b>225 M 6</b>	30.00 61.00	1.90-19.20	186.00	38.60	4.30-21.60	209.00	43.40	13.40-26.70	259.00	53.80	16.10-28.00	156.00	32.40	23.40-40.80	227.00	81.90	2.70-27.00	262.00	54.30	30.00
<b>250 M 6</b>	37.00 72.00	2.40-23.70	228.00	46.00	5.30-26.60	257.00	51.80	16.50-33.00	318.00	64.10	19.90-34.60	192.00	38.60	28.90-50.30	279.00	97.70	3.30-33.30	321.00	64.70	37.00
<b>280 S 6</b>	45.00 90.50	2.90-28.80	280.00	58.40	6.30-31.50	306.00	63.80	19.40-38.70	376.00	78.40	20.30-35.20	197.00	41.00	35.10-61.10	342.00	123.90	4.00-39.60	385.00	80.30	45.00
<b>280 M 6</b>	55.00 109.00	3.50-35.20	343.00	68.90	7.70-38.50	375.00	75.40	23.70-47.30	461.00*	92.60	24.70-43.10	241.00	48.50	43.00-74.70	419.00	146.20	4.80-48.40	472.00	94.80	55.00
<b>315 S 6</b>	75.00 147.20	4.80-48.00	463.00	93.30	10.50-52.50	506.00	102.00	32.20-64.50	22.00	125.30	33.70-58.70	326.00	65.60	58.60-101.90	565.00	197.90	6.60-66.00	637.00	128.30	75.00
<b>315 LA 6</b>	90.00 167.60	5.80-57.60	558.00	111.90	12.60-63.00	611.00	122.40	38.70-77.40	750.00	150.40	40.50-70.50	393.00	78.70	70.30-122.30	681.00	237.50	7.90-79.20	768.00	153.90	90.00
<b>315 LB 6</b>	110.00 205.00	7.00-70.40	676.00	130.20	15.40-77.00	740.00	142.40	47.30-94.60	909.00	175.00	49.50-86.10	476.00	91.60	85.90-149.40	825.00	276.30	9.70-96.80	930.00	179.00	110.00
<b>315 LC 6</b>	132.00 243.00	8.50-84.50	811.00	156.30	18.50-92.40	887.00	170.90	56.80-113.50	1090.00	210.00	59.40-103.30	570.00*	109.90	103.10-179.30	989.00	331.60	11.60-116.10	1115.00	214.90	132.00

For 355 motors and for IE3 motors, data is supplied during the offer phase.

Rounded values

● Values refer to 50Hz

# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

Ventilation		IC 411									IC 411/ IC 416*						IC 416			IC 411
	400 V, 50Hz [1/min] 3000	[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 10 ÷ 50 range 1 ÷ 5 [1/min] 600 ÷ 3000			[Hz] 25 ÷ 50 range 1 ÷ 2 [1/min] 1500 ÷ 3000			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 50 ÷ 87 range 10 ÷ 17 [1/min] 3000 ÷ 5200			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000			[Hz] 5 ÷ 50 range 1 ÷ 10 [1/min] 300 ÷ 3000
Motor type	Mains connection	Constant torque			Constant torque			Constant torque			Constant torque - Weakened flux			Constant torque - Constant flux Δ connection			Constant torque - Forced Ventilation			Quadratic torque*
Ex db - Ex db eb	P <sub>n</sub> [kW] I <sub>n</sub> [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]	M [Nm]	I [A]	P [kW]
<b>63 B 8</b>	0.05 0.44	0.003-0.03	0.52	0.29	0.01-0.04	0.58	0.32	0.02-0.04	0.72	0.40	0.03-0.05	0.43	0.24	0.04-0.07	0.67	0.64	—	—	—	0.05
<b>71 B 8</b>	0.15 0.57	0.01-0.10	1.53	0.34	0.02-0.11	1.72	0.38	0.07-0.13	2.13	0.48	0.08-0.14	1.28	0.29	0.12-0.21	1.96	0.76	—	—	—	0.15
<b>80 A 8</b>	0.18 0.97	0.01-0.12	1.56	0.58	0.03-0.13	1.76	0.65	0.08-0.16	2.17	0.81	0.10-0.17	1.31	0.49	0.15-0.26	2.00	1.30	—	—	—	0.18
<b>80 B 8</b>	0.25 1.00	0.02-0.16	2.21	0.63	0.04-0.18	2.49	0.71	0.11-0.22	3.08	0.88	0.13-0.23	1.86	0.53	0.21-0.36	2.84	1.41	—	—	—	0.25
<b>90 S 8</b>	0.37 1.30	0.02-0.24	3.33	0.83	0.05-0.27	3.74	0.93	0.16-0.33	4.63	1.15	0.20-0.35	2.79	0.70	0.30-0.53	4.27	1.85	—	—	—	0.37
<b>90 L 8</b>	0.55 1.90	0.04-0.35	4.94	1.22	0.08-0.40	5.56	1.37	0.24-0.49	6.88	1.70	0.30-0.51	4.15	1.02	0.45-0.79	6.35	2.73	—	—	—	0.55
<b>100 LA 8</b>	0.75 2.90	0.05-0.48	6.37	1.85	0.11-0.54	7.16	2.08	0.33-0.67	8.86	2.57	0.40-0.70	5.34	1.55	0.62-1.07	8.18	4.12	0.07-0.67	8.95	2.60	0.75
<b>100 LB 8</b>	1.10 3.10	0.07-0.70	9.96	1.99	0.16-0.79	11.21	2.24	0.49-0.98	13.87	2.77	0.59-1.03	8.36	1.67	0.90-1.57	12.79	4.45	0.10-0.99	14.01	2.80	1.10
<b>112 M 8</b>	1.50 4.40	0.10-1.00	12.70	2.80	0.20-1.10	14.30	3.20	0.70-1.30	17.70	3.90	0.80-1.40	10.70	2.40	1.20-2.10	16.40	6.30	0.10-1.40	17.90	3.90	1.50
<b>132 SB 8</b>	2.20 6.50	0.10-1.40	18.70	4.10	0.30-1.60	21.00	4.60	1.00-2.00	26.00	5.70	1.20-2.10	15.70	3.40	1.80-3.20	24.00	9.20	0.20-2.00	26.30	5.80	2.20
<b>132 ML 8</b>	3.00 8.50	0.20-1.90	25.50	5.40	0.40-2.20	28.70	6.00	1.30-2.70	35.50	7.50	1.60-2.80	21.40	4.50	2.50-4.30*	32.70	12.00	0.30-2.70	35.80	7.50	3.00
<b>160 MA 8</b>	4.00 9.70	0.30-2.60	34.10	6.20	0.60-2.90	38.30	7.00	1.80-3.60	47.40	8.60	2.20-3.70	28.60	5.20	3.30-5.70	43.70	3.90	0.40-3.60	47.90	8.70	4.00
<b>160 MB 8</b>	5.50 14.00	0.40-3.50	46.40	8.70	0.80-4.00	52.20	9.80	2.50-4.90	64.60	12.10	3.00-5.10	38.90	7.30	4.50-7.90	59.60	19.40	0.50-5.00	65.20	12.20	5.50
<b>160 L 8</b>	7.50 18.00	0.50-4.80	63.70*	11.20	1.10-5.40	71.60	12.70	3.30-6.70	88.60	15.70	4.00-7.00	53.40	9.40	6.20-10.70	81.80	25.10	0.70-6.80	89.50	15.80	7.50
<b>180 L 8</b>	11.00 23.00	0.70-7.00	93.00	14.80	1.60-7.90	105.00	16.60	4.90-9.80	130.00	20.60	5.90-10.30	78.00	12.40	9.00-15.70	120.00	33.00	1.00-9.90	131.00	20.80	11.00
<b>200 LB 8</b>	15.00 35.00	0.70-7.00	125.00	22.20	2.20-10.80	140.00	25.00	6.70-13.40	174.00	31.00	8.10-14.00	105.00	18.70	12.30-21.50	160.00	49.7	1.40-13.50	175.00	31.30	15.00
<b>225 S 8</b>	18.50 42.25	1.20-11.80	155.00	24.60	2.70-13.30	174.00	27.70	8.20-16.50	213.00	34.20	9.90-17.30	130.00	20.60	14.40-25.10	189.00	52.20	1.70-16.70	218.00	34.60	18.50
<b>225 M 8</b>	22.00 46.00	1.40-14.10	184.00	29.20	3.20-15.80	207.00	32.90	9.80-19.60	256.00	40.70	11.80-20.60	155.00	24.50	17.20-29.90	225.00	62.00	2.00-19.80	259.00	41.10	22.00
<b>250 M 8</b>	30.00 61.00	1.90-19.20	248.00	38.80	4.30-21.60	279.00	43.60	13.40-26.70	345.00	54.00	16.10-28.00	208.00	32.50	23.40-40.80	302.00	82.30	2.70-27.00	348.00	54.50	30.00
<b>280 S 8</b>	37.00 71.00	2.40-23.70	310.00	44.20	5.20-25.90	339.00	48.30	15.90-31.80	416.00	59.30	16.70-29.00	218.00	31.00	28.90-50.30	378.00	93.70	3.30-32.60	426.00	60.70	37.00
<b>280 M 8</b>	45.00 83.00	2.90-28.80	372.00	53.30	6.30-31.50	407.00	58.30	19.40-38.70	500.00	71.60	20.30-35.20	262.00	37.50	35.10-61.10	454.00	113.00	4.00-39.60	512.00	73.20	45.00
<b>315 S 8</b>	55.00 113.50	3.50-35.20	453.00	71.90	7.70-38.50	496.00	78.60	23.70-47.30	609.00	96.60	24.70-43.10	319.00	50.50	42.90-74.70	553.00	152.50	4.80-48.40	623.00	98.80	55.00
<b>315 LA 8</b>	75.00 136.60	4.80-48.00	624.00	90.80	10.50-52.50	682.00	99.40	32.20-64.50	838.00	122.10	33.70-58.70	439.00	63.90	58.60-101.90	761.00	192.70	6.60-66.00	858.00	124.90	75.00
<b>315 LB 8</b>	90.00 164.50	5.80-57.60	739.00	104.20	12.60-63.00	809.00	113.90	38.70-77.40	994.00	140.00	40.50-70.50	520.00	73.20	70.30-122.30	902.00	221.00	7.90-79.20	1017.00	143.20	90.00
<b>315 LC 8</b>	110.00 102.00	7.00-70.40	905.00	128.70	15.40-77.00	990.00	140.70	47.30-94.60	1216.00	172.90	49.50-86.10	636.00	90.50	85.90-149.40	1104.00	273.00	9.70-96.80	1244.00	176.90	110.00

For 355 motors and for IE3 motors, data is supplied during the offer phase.

Rounded values

- Values refer to 50Hz

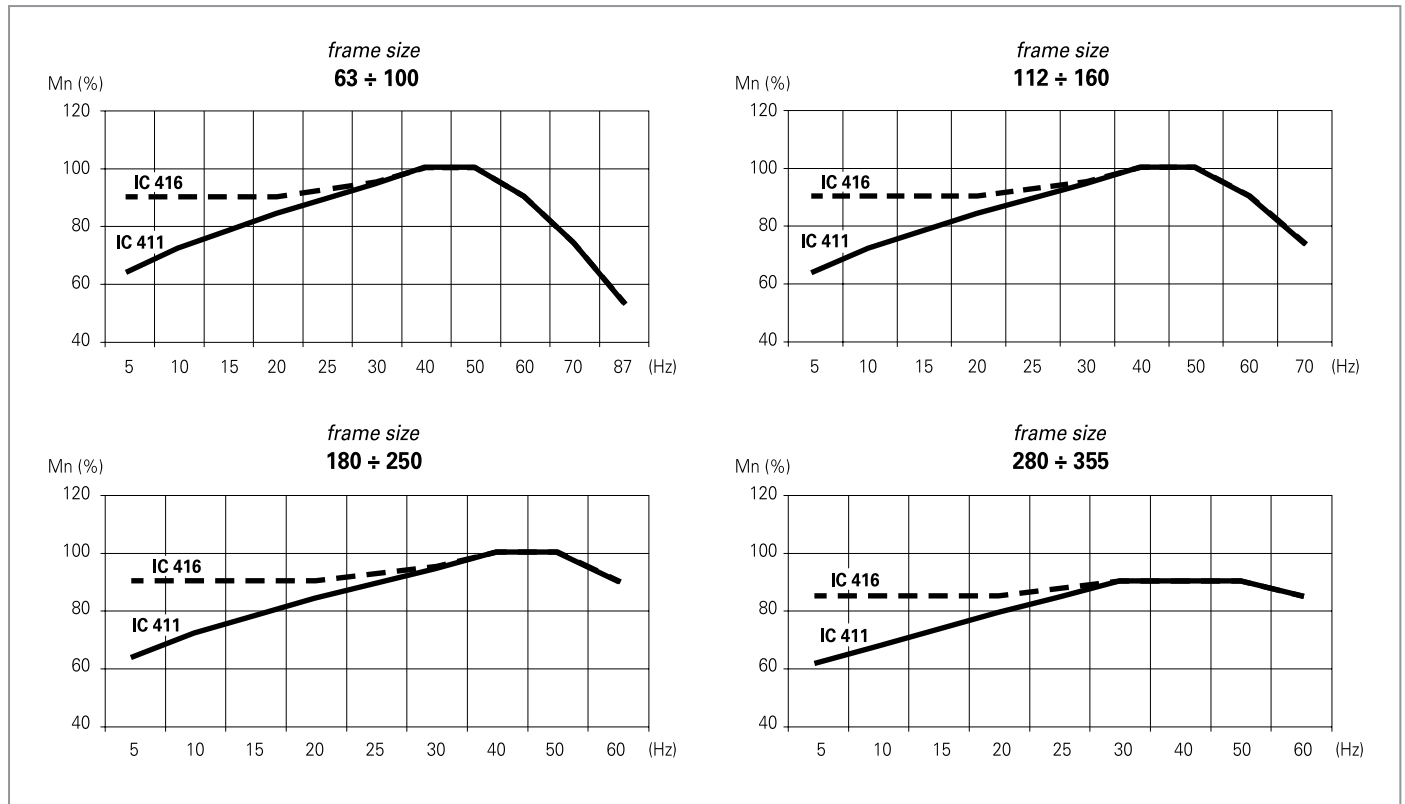
# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

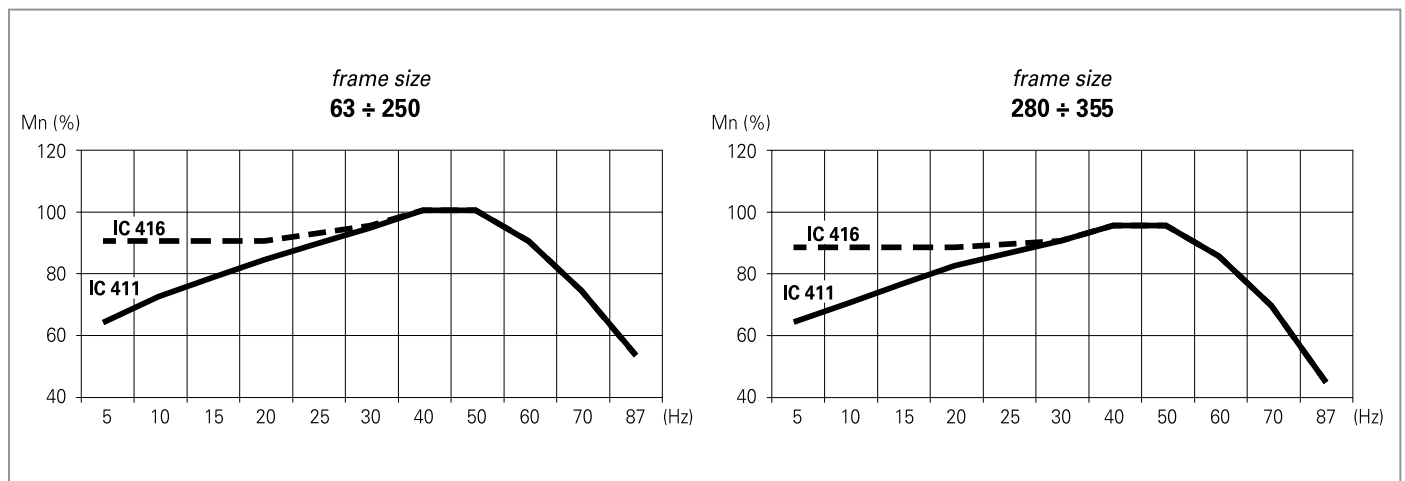
### 4.9.1 MOTORS ENERGIZED BY INVERTER - LOAD CAPACITY CURVES

### VARIABLE TORQUE - WEAKENED FLUX

#### 2 pole



#### 4 - 6 - 8 pole



Mn (%)	(Hz)	IC 411	IC 416
Torque	Frequency	Self-ventilated	Forced ventilation (available from frame size 100)

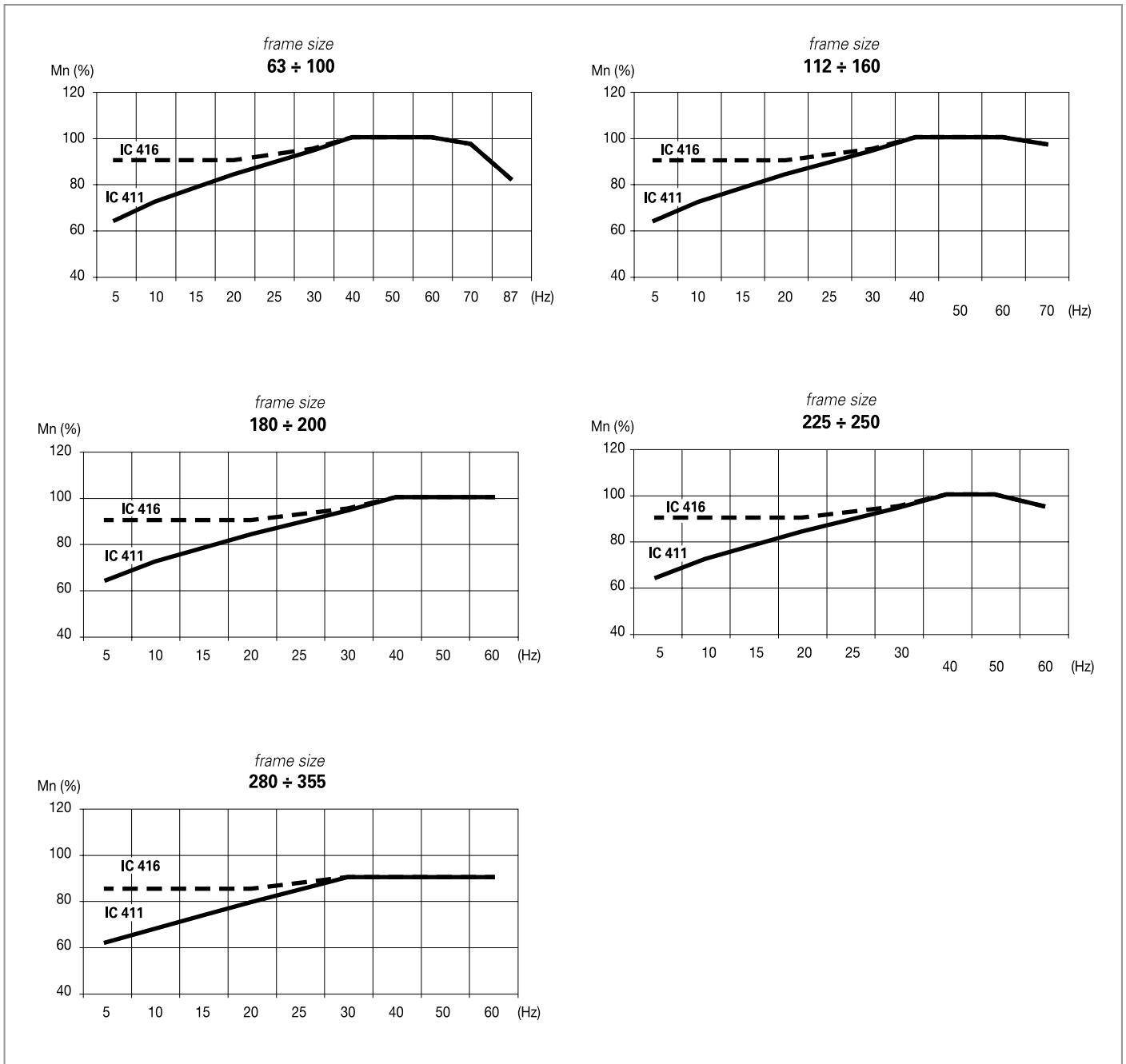
# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

### 4.9.1 MOTORS ENERGIZED BY INVERTER - LOAD CAPACITY CURVES

### VARIABLE TORQUE - WEAKENED FLUX

2 pole



**NOTE:**

In the constant torque operating mode, the usable torque value is the lowest value of the chosen range of operation. The reference torque value (Mn) is the value indicated in the tables in section 4.1.



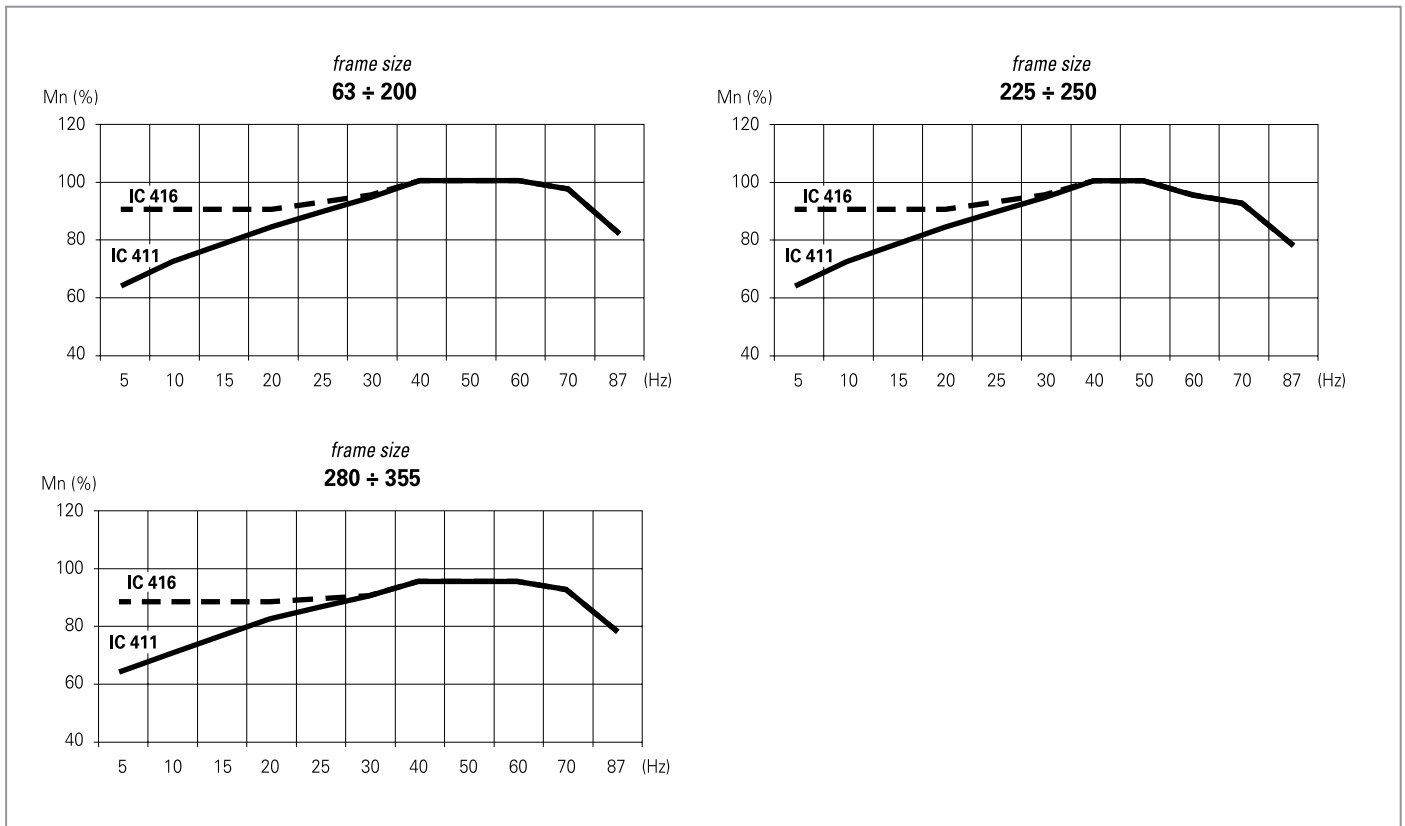
# 4. PERFORMANCE DATA

## 4.9 MOTORS ENERGIZED BY INVERTER

### 4.9.1 MOTORS ENERGIZED BY INVERTER - LOAD CAPACITY CURVES

### VARIABLE TORQUE - CONSTANT FLUX

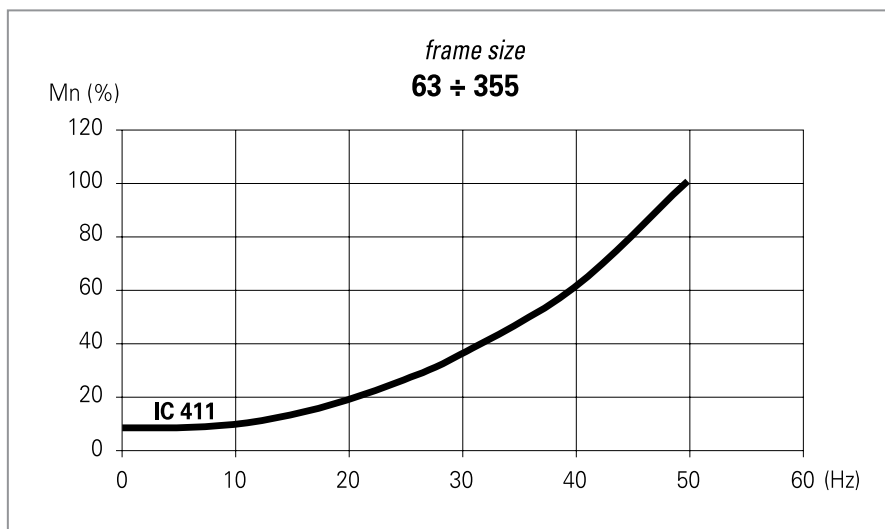
4 - 6 - 8 pole



### 4.9.1 MOTORS ENERGIZED BY INVERTER - LOAD CAPACITY CURVES

### QUADRATIC TORQUE

4 - 6 - 8 pole



**NOTE:** See page 70 - 71.

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.1 MOUNTING ARRANGEMENTS

The most commonly used mounting arrangements are shown in the table 5A. Other mounting arrangements are available on request.

Standard motors ordered in basic mounting arrangements (universal mounting arrangements)

IM B3, IM B5 or IM B14 can also be operated in the following different mounting positions:

- IM B3 in IM B6, IM B7, IM B8, IM V5 or IM V6,
- IM B5 in IM V1 or IM V3,
- IM B14 in IM V18 or IM V19.

According to the safety standard for electrical machines, foreign objects must be prevented from falling into the fan cover. Motors for vertical arrangement with shaft end down are fitted with a protective hood over the fan cowl.

63+355		Foot-mounted motor					
CEI 2-14	B3	V5	V6	B6	B7	B8	
IEC EN 60034-7 code I	IM B3	IM V5	IM V6	IM B6	IM B7	IM B8	
IEC EN 60034-7 code II	IM 1001	IM 1011	IM 1031	IM 1051	IM 1061	IM 1071	

63+355		Flange-mounted motor: large flange, clearance fixing holes		
CEI 2-14	B5	V1	V3	
IEC EN 60034-7 code I	IM B5	IM V1	IM V3	
IEC EN 60034-7 code II	IM 3001	IM 3011	IM 3031	

63+132		Flange-mounted motor: small flange, tapped fixing holes		
CEI 2-14	B14	V18	V19	
IEC EN 60034-7 code I	IM B14	IM V18	IM V19	
IEC EN 60034-7 code II	IM 3601	IM 3611	IM 3631	

63+355		Foot and flange-mounted motor: large flange, clearance fixing holes					
CEI 2-14	B3/B5	V5/V1	V6/V3	B6/B5	B7/B5	B8/B5	
IEC EN 60034-7 code I	IM B35	IM V15	IM V36	IM 2051	IM 2061	IM 2071	
IEC EN 60034-7 code II	IM 2001	IM 2011	IM 2031				

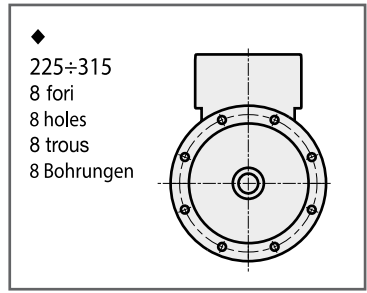
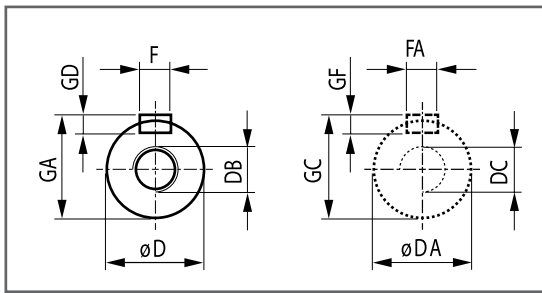
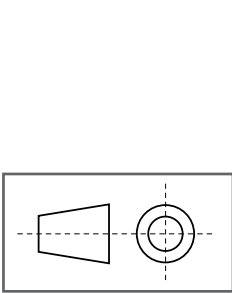
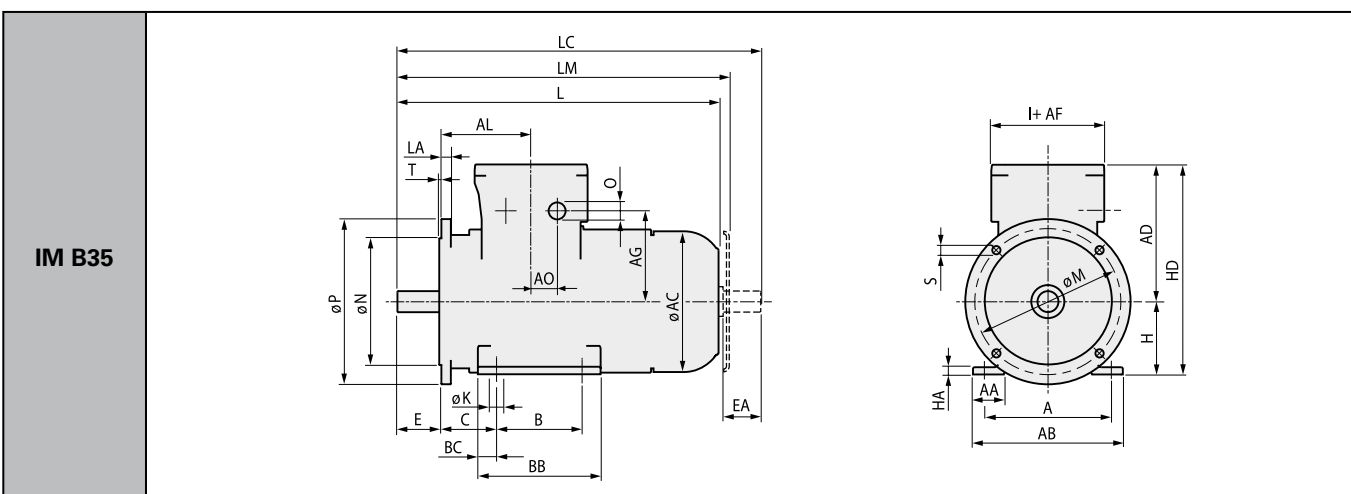
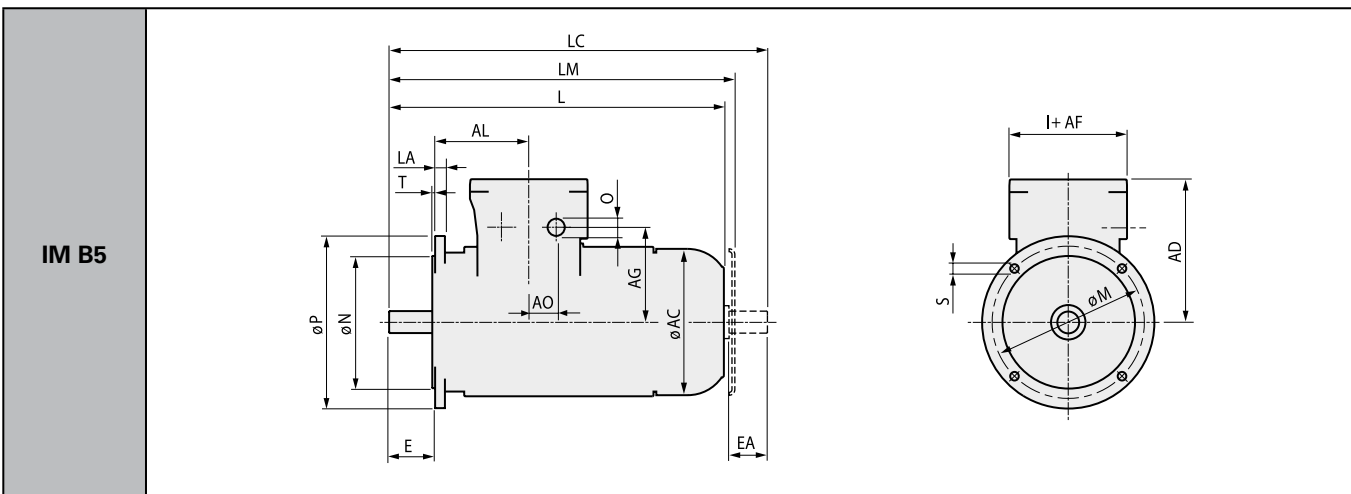
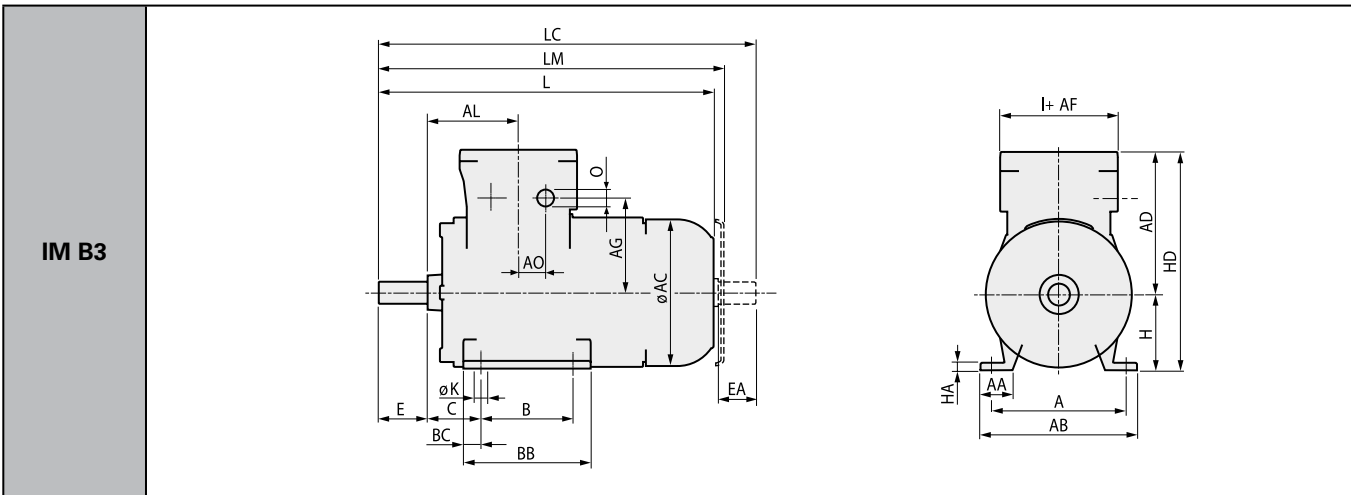
  

63+132		Foot and flange-mounted motor: with small flange, tapped fixing holes					
CEI 2-14	B3/B14	V5/V18	V6/V19	B6/B14	B7/B14	B8/B14	
IEC EN 60034-7 code I	IM B34	IM 2111	IM 2131	IM 2151	IM 2161	IM 2171	
IEC EN 60034-7 code II	IM 2101						

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

### 63÷315/ IM B3/ IM B5/ IM B35



## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

IE1 / IE2																	
Type	A	AA	AB	∅ AC	AD	∇ AF	AL	B	BC	BB	C	H <sub>0.5</sub> <sup>0</sup>	HA	HD	∅ K	∅ L	LC
63	100	25	125	123	145	139	95	80	9.5	105	40	63	6	208	7	247	275.5
71	112	32	140	140	155	139	106	90	11.0	112	45	71	7	226	7	276	311.0
80	125	40	160	158	165	139	142	100	15.0	130	50	80	8	245	9	327	372.5
90S	140	45	175	178	175	139	125	100	14.0	157	56	90	9	265	9	390	441.0
90L	140	45	175	178	175	139	125	125	14.0	157	56	90	9	265	9	390	441.0
100	160	45	200	196	185	139	125	140	15.0	170	63	100	10	285	12	430	490.5
112	190	45	235	223	206	139	138	140	17.0	175	70	112	12	318	12	475	543.5
132S	216	56	272	258	260	205	163	140	22.0	222	89	132	13	392	12	505	590.0
132M-I	216	56	272	258	260	205	163	178	22.0	222	89	132	13	392	12	580	665.0
160M	254	64	318	310	290	205	166	210	25.0	305	108	160	15	450	14	693	811.0
160L	254	64	318	310	290	205	166	254	25.0	305	108	160	15	450	14	693	811.0
180M	279	71	350	359	326	242	223	241	25.0	340	121	180	17	506	14	814	923.5
180L	279	71	350	359	326	242	223	279	25.0	340	121	180	17	506	14	814	923.5
200	318	75	393	395	346	242	230	305	27.0	360	133	200	18	546	18	867	985.0
225S	356	78	431	445	371	242	240	286	38.0	380	149	225	20	596	18	945	1090.0
225M2	356	78	431	445	371	242	240	311	38.0	380	149	225	20	596	18	915	1030.0
225M 4-8	356	78	431	445	371	242	240	311	38.0	380	149	225	20	596	24	945	1090.0
250M2	406	95	500	467	396	242	221	349	33.0	415	168	250	22	646	24	963	1110.0
250M 4-8	406	95	500	467	396	242	221	349	33.0	415	168	250	22	646	25	963	1110.0
280 S2	457	90	540	558	548	320	316	368	80.0	550	190	280	41	828	25	1119	1272.0
280 S 4-8	457	90	540	558	548	320	316	368	80.0	550	190	280	41	828	25	1119	1272.0
280 M2	457	90	540	558	548	320	316	419	80.0	550	190	280	41	828	25	1119	1272.0
280 M 4-8	457	90	540	558	548	320	316	419	80.0	550	216	280	41	828	25	1119	1272.0
315 S2	508	110	590	558	548	320	316	406	68.5	560	216	315	41	863	27	1269	1420.0
315 S 4-8	508	110	590	558	548	320	316	406	68.5	560	216	315	41	863	27	1299	1480.0
315M2	508	110	590	558	548	320	316	457	68.5	560	216	315	41	863	27	1269	1420.0
315 M 4-8	508	110	590	558	548	320	316	457	68.5	560	216	315	41	863	27	1299	1480.0
315 L2	508	100	590	626	612	320	330	457	68.5	560	216	315	41	927	28	1407	1560.0
315 L 4-8	508	100	590	626	612	320	330	457	68.5	610	216	315	41	927	28	1437	1620.0
Type	* LM	AO	IEC** 60423 n. x O	AG	∅ D ∅ DA	E EA	F FA	GA GC	GD GF	DB DC	LA	∅ M	∅ N	∅ P	◆ S	T	
63	275	24	1 x M25	100	11j6	23	4	12.5	4	M4	6.5	115	95j6	140	10	3.0	
71	305	24	1 x M25	110	14j6	30	5	16.0	5	M5	6.5	130	110j6	160	10	3.5	
80	356	24	1 x M25	120	19j6	40	6	21.5	6	M6	11.0	165	130j6	200	12	3.5	
90 S	418	24	1 x M25	130	24j6	50	8	27.0	7	M8	12.0	165	130j6	200	12	3.5	
90 L	418	24	1 x M25	130	24j6	50	8	27.0	7	M8	12.0	165	130j6	200	12	3.5	
100	458	24	1 x M25	140	28j6	60	8	31.0	7	M10	14.0	215	180j6	250	15	4.0	
112	503	24	1 x M25	161	28j6	60	8	31.0	7	M10	16.0	215	180j6	250	15	4.0	
132 S	550	35	2 x M32	185	38k6	80	10	41.0	8	M12	17.0	265	230j6	300	15	4.0	
132 M-L	625	35	2 x M32	185	38k6	80	10	41.0	8	M12	17.0	265	230j6	300	15	4.0	
160 M	738	35	2 x M32	215	42k6	110	12	45.0	8	M16	18.0	300	250h6	350	18	5.0	
160 L	738	35	2 x M32	215	42k6	110	12	45.0	8	M16	18.0	300	250h6	350	18	5.0	
180 M	860	38	2 x M40	266	48k6	110	14	52.0	9	M16	20.0	300	250h6	350	18	5.0	
180 L	860	38	2 x M40	266	48k6	110	14	52.0	9	M16	20.0	300	250h6	350	18	5.0	
200	913	38	2 x M40	286	55m6	110	16	59.0	10	M20	20.0	350	300h6	400	18	5.0	
225 S	991	38	2 x M40	311	60m6	140	18	64.0	11	M20	22.0	400	350h6	450	18	5.0	
225 M 2	991	38	2 x M40	311	55m6	110	16	59.0	10	M20	22.0	400	350h6	450	18	5.0	
225 M 4-8	991	38	2 x M40	311	60m6	140	18	64.0	11	M20	22.0	400	350h6	450	18	5.0	
250 M 2	1006	38	2 x M40	336	60m6	140	18	64.0	11	M20	22.0	500	450h6	550	18	5.0	
250 M 4-8	1006	38	2 x M40	336	65m6	140	18	69.0	11	M20	22.0	500	450h6	550	18	5.0	
280 S 2	1215	56	2 x M63	410	65m6	140	18	69.0	11	M20	18.0	500	450h6	550	18	5.0	
280 S 4-8	1215	56	2 x M63	410	75m6	140	20	79.5	12	M20	18.0	500	450h6	550	18	5.0	
280 M 2	1215	56	2 x M63	410	65m6	140	18	69.0	11	M20	18.0	500	450h6	550	18	5.0	
280 M 4-8	1215	56	2 x M63	410	75m6	140	20	79.5	12	M20	18.0	500	450h6	550	18	5.0	
315 S 2	1365	56	2 x M63	410	65m6	140	18	69.0	11	M20	22.0	600	550h6	660	22	6.0	
315 S 4-8	1395	56	2 x M63	410	80m6	170	22	85.0	14	M20	22.0	600	550h6	660	22	6.0	
315 M 2	1365	56	2 x M63	410	65m6	140	18	69.0	11	M20	22.0	600	550h6	660	22	6.0	
315 M 4-8	1395	56	2 x M63	410	80m6	170	22	85.0	14	M20	22.0	600	550h6	660	22	6.0	
315 L 2	1503	56	2 x M63	474	65m6	140	18	69.0	11	M20	22.0	600	550h6	660	24	6.0	
315 L 4-8	1533	56	2 x M63	474	80m6	170	22	85.0	14	M20	22.0	600	550h6	660	24	6.0	

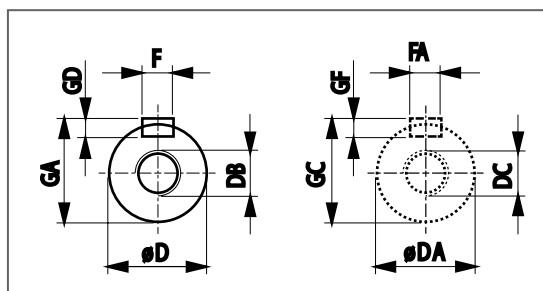
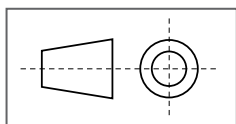
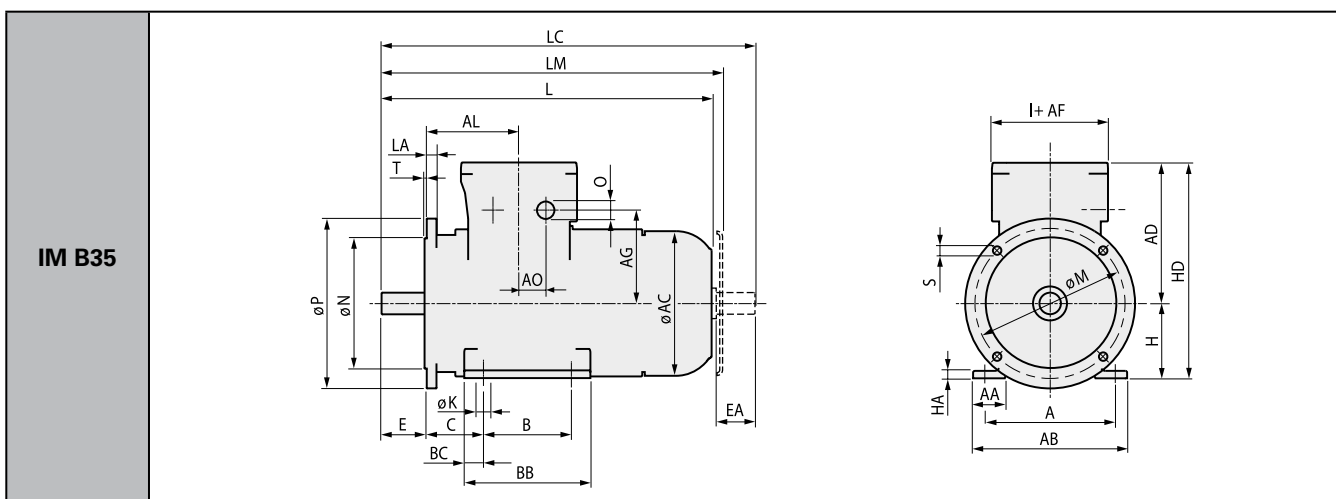
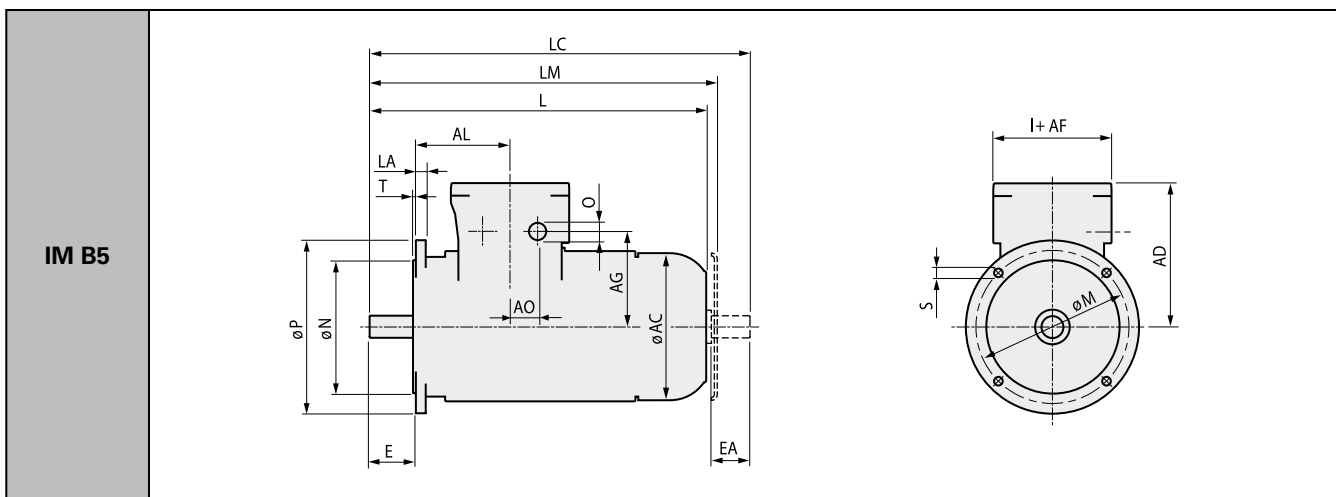
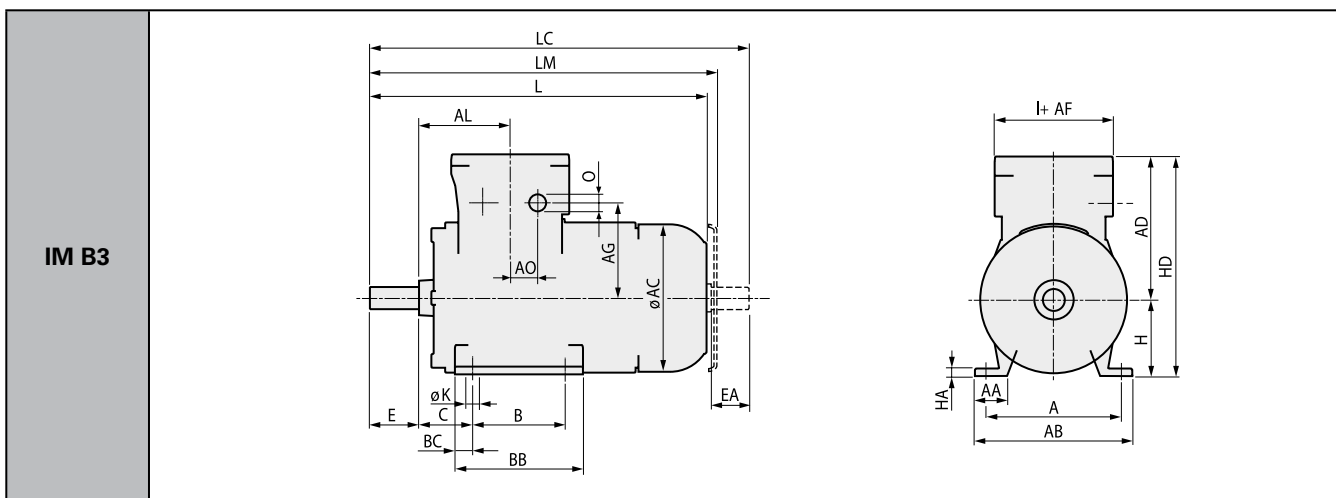
◆ see page 68

▷ \* ⊥ ▶ see page 73

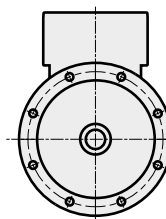
# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

80÷355/ IM B3/ IM B5/ IM B35



- ◆ 225÷315
- 8 fori
- 8 holes
- 8 trous
- 8 Bohrungen



## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

IE3

Type	A	AA	AB	ø AC	AD	∇AF	AL	B	BC	BB	C	H <sub>0.5</sub>	HA	HD	ø K	$\frac{D}{L}$	LC
80 S	125	40	160	182	180	139	116	100	12.0	125	50	80	9	261	9	320	365.5
80 L	125	40	160	182	180	139	116	100	12.0	125	50	80	9	261	9	350	400.5
90 S	140	45	175	199	185	139	121	100	12.0	150	56	90	10	275	9	372	422.5
90 L	140	45	175	199	185	139	121	125	12.0	180	56	90	10	275	9	432	482.5
100 S	160	45	200	229	200	139	125	140	15.0	170	63	100	12	300	12	431	491.5
100 L	160	45	200	229	200	139	125	140	15.0	170	63	100	12	300	12	472	532.5
112 S	190	45	235	256	215	139	137	140	13.0	170	70	112	12	327	12	461	526.5
112 L	190	45	235	256	215	139	137	140	13.0	170	70	112	12	327	12	521	606.5
132 S	216	56	272	295	287	205	192	140	15.0	184	89	132	13	419	12	558	643.5
132 L	216	56	272	295	287	205	192	178	15.0	222	89	132	13	419	12	643	728.0
160 S	254	64	318	353	318	205	210	210	20.0	250	108	160	17	478	14	735	853.0
160 L	254	64	318	353	318	205	210	254	20.0	294	108	160	17	478	14	785	933.0
180 S	279	71	350	399	366	242	277	241	17.0	302	121	180	18	546	14	824	933.5
180 L	279	71	350	399	366	242	277	279	17.0	340	121	180	18	546	14	898	1007.5
200 S	318	75	393	446	386	242	280	305	27.0	360	133	200	20	586	18	882	985.0
200 L	318	75	393	446	386	242	280	305	27.0	360	133	200	20	586	18	947	1060.0
225 S 2	356	78	431	491	404	242	284	286	34.5	360	149	225	22	629	18	896	1011.0
225 S 4-8	356	78	431	491	404	242	284	286	34.5	360	149	225	22	629	18	926	1071.0
225 M 2	356	78	431	491	404	242	284	311	34.5	380	149	225	22	629	18	950	1065.0
225 M 4-8	356	78	431	491	404	242	284	311	34.5	380	149	225	22	629	18	980	1125.0
250 M 2	406	95	500	542	431	242	300	349	33.0	415	168	250	30	681	24	1044	1197.0
250 M 4-8	406	95	500	542	431	242	300	349	33.0	415	168	250	30	681	24	1044	1197.0
280 S 2	457	90	540	595	619	320	384	368	52.0	550	190	280	41	899	25	1213	1389.0
280 S 4-8	457	90	540	595	619	320	384	368	52.0	550	190	280	41	899	25	1213	1389.0
280 M 2	457	90	540	595	619	320	384	419	52.0	550	190	280	41	899	25	1313	1489.0
280 M 4-8	457	90	540	595	619	320	384	419	52.0	550	190	280	41	899	25	1313	1489.0
315 S 2	508	110	590	654	653	320	429	406	68.5	594	216	315	45	968	27	1324	1475.0
315 S 4-8	508	110	590	654	653	320	429	406	68.5	594	216	315	45	968	27	1354	1535.0
315 M 2	508	110	590	654	653	320	429	457	68.5	594	216	315	45	968	27	1324	1475.0
315 M 4-8	508	110	590	654	653	320	429	457	68.5	594	216	315	45	968	27	1354	1535.0
315 L 2	508	100	590	654	653	410	429	508	68.5	645	216	315	45	968	28	1494	1647.0
315 L 4-8	508	100	590	654	653	410	429	508	68.5	645	216	315	45	968	28	1524	1707.0
355 M 2	610	150	760	735	693	410	429	560	80.0	739	254	355	50	1048	28	1554	1704.0
355 M 4-8	610	150	760	735	693	410	429	560	80.0	739	254	355	50	1048	28	1624	1844.0
355 L 2	610	150	760	735	693	410	429	630	80.0	889	254	355	50	1048	28	1704	1854.0
355 L 4-8	610	150	760	735	693	410	429	630	80.0	889	254	355	50	1048	28	1774	1994.0
Type	* LM	AO	IEC®* 60423 n. x O	AG	ø D ø DA	E EA	F FA	GA GC	GD GF	DB DC	LA	ø M	ø N	ø P	◆ S	T	
80 S	349	24	1 x M25	136	19j6	40	6	21.5	6	M6	8	165	130j6	200	12	3.5	
80 L	383	24	1 x M25	136	19j6	40	6	21.5	6	M6	8	165	130j6	200	12	3.5	
90 S	399	24	1 x M25	185	24j6	50	8	27.0	7	M8	8	165	130j6	200	12	3.5	
90 L	459	24	1 x M25	185	24j6	50	8	27.0	7	M10	8	165	130j6	200	12	3.5	
100 S	459	24	1 x M25	155	28j6	60	8	31.0	7	M10	14	215	180j6	250	15	4.0	
100 L	500	24	1 x M25	155	28j6	60	8	31.0	7	M10	14	215	180j6	250	15	4.0	
112 S	486	24	1 x M25	170	28j6	60	8	31.0	7	M10	12	215	180j6	250	15	4.0	
112 L	583	24	1 x M25	170	28j6	60	8	31.0	7	M12	12	215	180j6	250	15	4.0	
132 S	603	35	2 x M32	212	38k6	80	10	41.0	8	M12	14	265	230j6	300	15	4.0	
132 L	688	35	2 x M32	212	38k6	80	10	41.0	8	M16	14	265	230j6	300	15	4.0	
160 S	780	35	2 x M32	243	42k6	110	12	45.0	8	M16	18	300	250h6	350	18	5.0	
160 L	861	35	2 x M32	243	42k6	110	12	45.0	8	M16	18	300	250h6	350	18	5.0	
180 S	870	38	2 x M40	306	48k6	110	14	52.0	9	M16	16	300	250h6	350	18	5.0	
180 L	944	38	2 x M40	306	48k6	110	14	52.0	9	M20	16	300	250h6	350	18	5.0	
200 S	913	38	2 x M40	326	55m6	110	16	59.0	10	M20	16	350	300h6	400	18	5.0	
200 L	1018	38	2 x M40	326	55m6	110	16	59.0	10	M20	16	350	300h6	400	18	5.0	
225 S	942	38	2 x M40	344	60m6	140	18	64.0	11	M20	18	400	350h6	450	18	5.0	
225 S 4-8	1002	38	2 x M40	344	60m6	140	18	64.0	11	M20	18	400	350h6	450	18	5.0	
225 M 2	996	38	2 x M40	344	55m6	110	16	59.0	10	M20	18	400	350h6	450	18	5.0	
225 M 4-8	1023	38	2 x M40	344	60m6	140	18	64.0	11	M20	18	400	350h6	450	18	5.0	
250 M 2	1093	38	2 x M40	371	60m6	140	18	64.0	11	M20	18	500	450h6	550	18	5.0	
250 M 4-8	1146	38	2 x M40	371	65m6	140	18	69.0	11	M20	18	500	450h6	550	18	5.0	
280 S 2	1332	56	2 x M63	481	65m6	140	18	69.0	11	M20	18	500	450h6	550	18	5.0	
280 S 4-8	1332	56	2 x M63	481	75m6	140	20	79.5	12	M20	18	500	450h6	550	18	5.0	
280 M 2	1432	56	2 x M63	481	65m6	140	18	69.0	11	M20	18	500	450h6	550	18	5.0	
280 M 4-8	1432	56	2 x M63	481	75m6	140	20	79.5	12	M20	18	500	450h6	550	18	5.0	
315 S 2	1420	56	2 x M63	498	65m6	140	18	69.0	11	M20	22	600	550h6	660	22	6.0	
315 S 4-8	1450	56	2 x M63	498	80m6	170	22	85.0	14	M20	22	600	550h6	660	22	6.0	
315 M 2	1420	56	2 x M63	498	65m6	140	18	69.0	11	M20	22	600	550h6	660	22	6.0	
315 M 4-8	1450	56	2 x M63	498	80m6	170	22	85.0	14	M20	22	600	550h6	660	22	6.0	
315 L 2	1590	56	2 x M63	498	65m6	140	18	69.0	11	M20	22	600	550h6	660	24	6.0	
315 L 4-8	1634	56	2 x M63	498	80m6	170	22	85.0	14	M20	22	600	550h6	660	24	6.0	
355 M 2	1654	65	2 x M75	538	70m6	140	20	74.5	12	M20	25	740	680h6	800	24	6.0	
355 M 4-8	1724	65	2 x M75	538	100m6	210	28	106.0	16	M24	25	740	680h6	800	24	6.0	
355 L 2	1804	65	2 x M75	538	70m6	140	20	74.5	12	M20	25	740	680h6	800	24	6.0	
355 L 4-8	1874	65	2 x M75	538	100m6	210	28	106.0	16	M24	25	740	680h6	800	24	6.0	

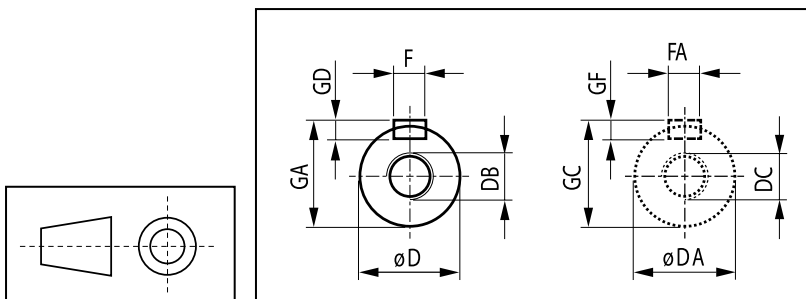
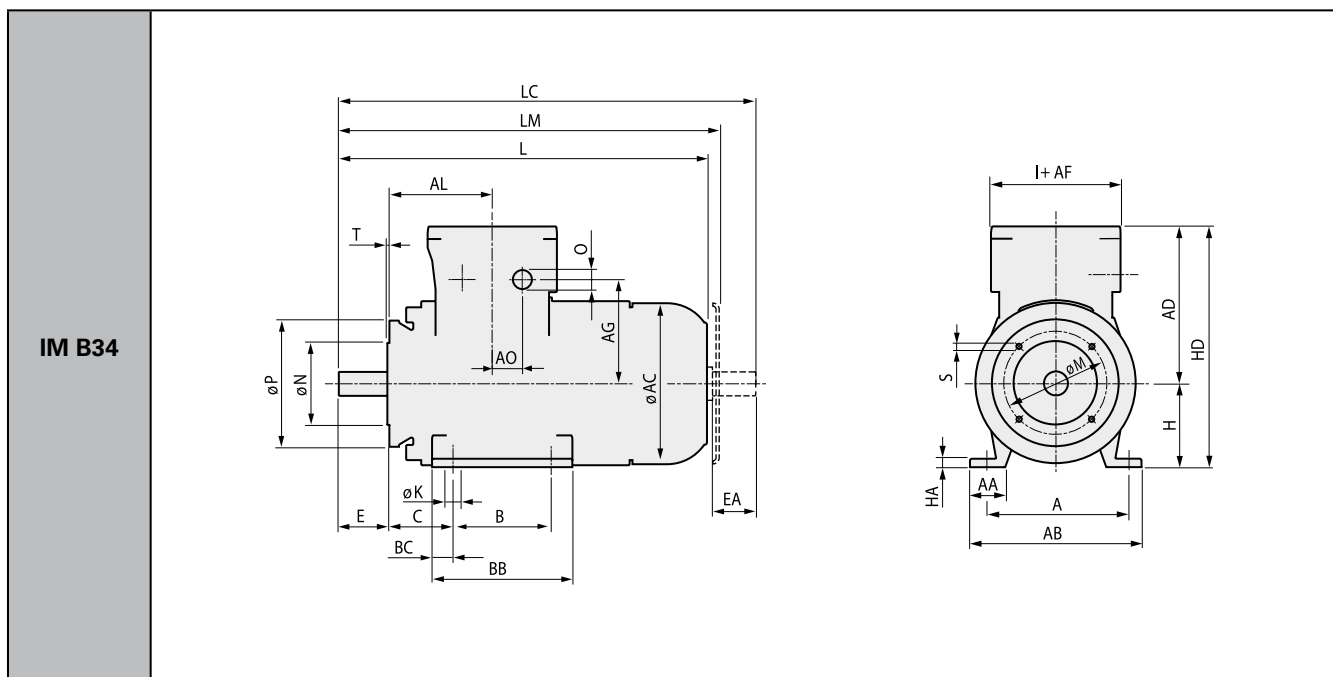
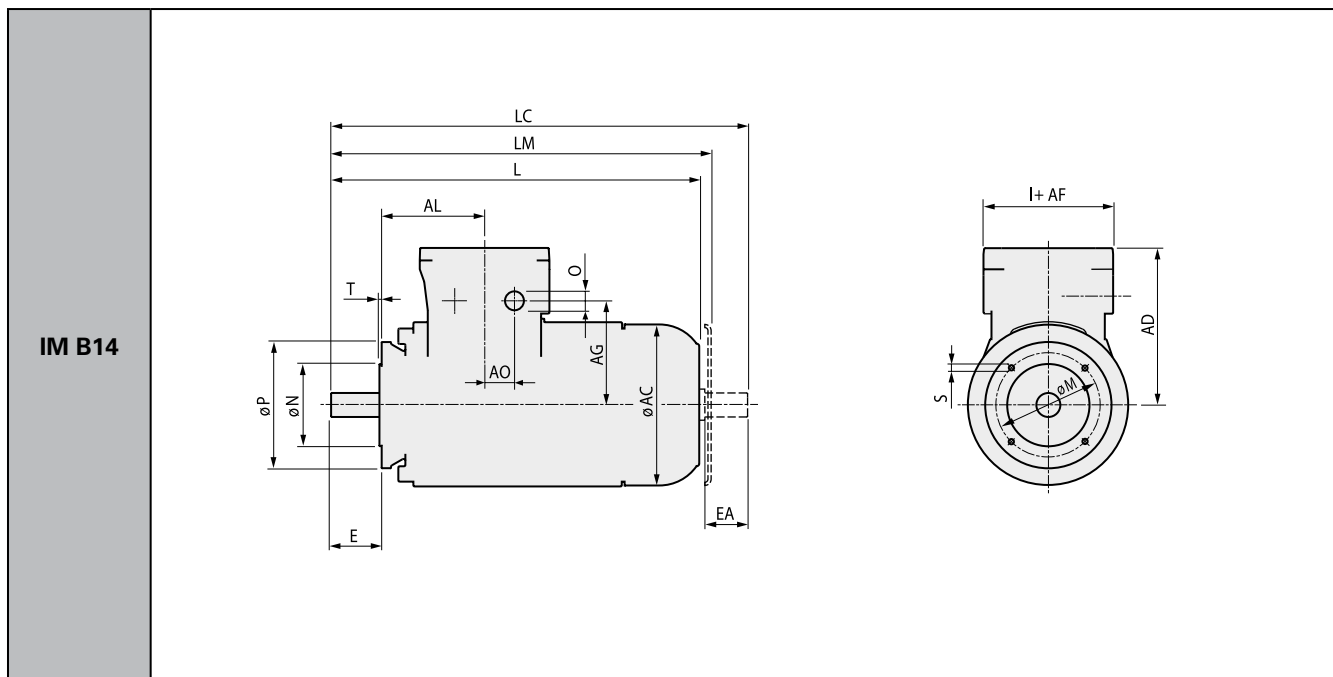
◆ see page 68

▶ \* ⚡ ▶ see page 73

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

63÷160/ IM B14/ IM B34



## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

IE1 / IE2																	
Type	A	AA	AB	∅ AC	AD	∇ AF	AL	B	BC	BB	C	H <sub>0.5</sub> <sup>0</sup>	HA	HD	∅ K	$\frac{D}{L}$	LC
63	100	25	125	123	145	139	95	80	9.5	105	40	63	6	208	7	247	275.5
71	112	32	140	140	155	139	106	90	11.0	112	45	71	7	226	7	276	311.0
80	125	40	160	158	165	139	142	100	15.0	130	50	80	8	245	9	327	372.5
90 S	140	45	175	178	175	139	125	100	14.0	157	56	90	9	265	9	390	441.0
90 L	140	45	175	178	175	139	125	125	14.0	157	56	90	9	265	9	390	441.0
100	160	45	200	196	185	139	125	140	15.0	170	63	100	10	285	12	430	490.5
112	190	45	235	223	206	139	138	140	17.0	175	70	112	12	318	12	475	543.5
132 S	216	56	272	258	260	205	163	140	22.0	222	89	132	13	392	12	505	590.0
132 M-L	216	56	272	258	260	205	163	178	22.0	222	89	132	13	392	12	580	665.0
160 M	254	64	318	310	290	205	166	210	25.0	305	108	160	15	450	14	693	811.0
160 L	254	64	318	310	290	205	166	254	25.0	305	108	160	15	450	14	693	811.0
Type	* LM	AO	IEC <sup>®</sup> * 60423 n. x O	AG	∅ D ∅ DA	E EA	F FA	GA GC	GD GF	DB DC	∅ M	∅ N	∅ P	◆ S	T		
63	275	24	1 x M25	100	11j6	23	4	12.5	4	M4	75	60j6	90	M5	2.5		
71	305	24	1 x M25	110	14j6	30	5	16.0	5	M5	85	70j6	105	M6	2.5		
80	356	24	1 x M25	120	19j6	40	6	21.5	6	M6	100	80j6	120	M6	3.0		
90 S	418	24	1 x M25	130	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0		
90 L	418	24	1 x M25	130	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0		
100	458	24	1 x M25	140	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
112	503	24	1 x M25	161	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
132 S	550	35	2 x M32	185	38k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5		
132 M-L	625	35	2 x M32	185	42k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5		
160 M	738	35	2 x M32	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0		
160 L	738	35	2 x M32	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0		

### Tolerances allowed

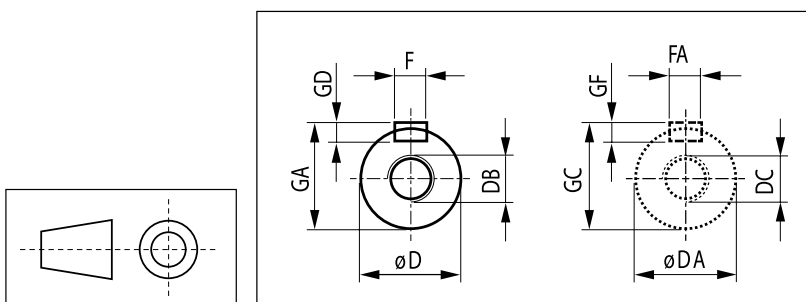
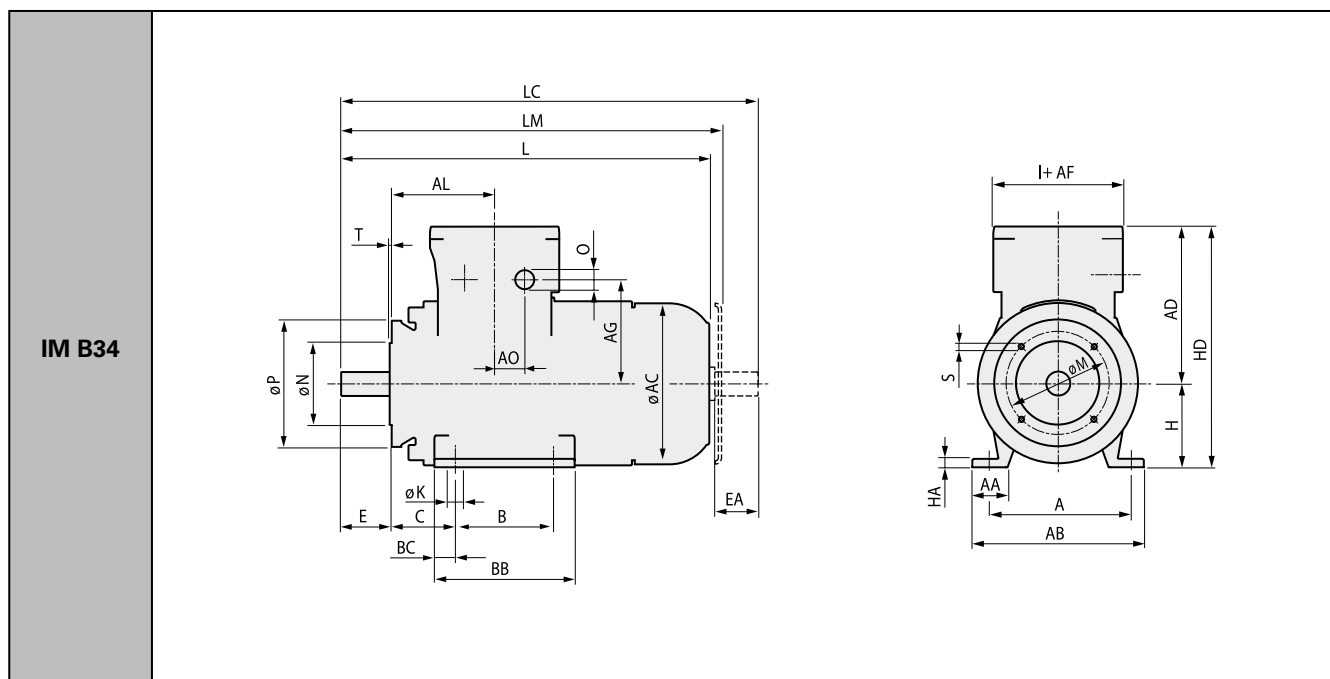
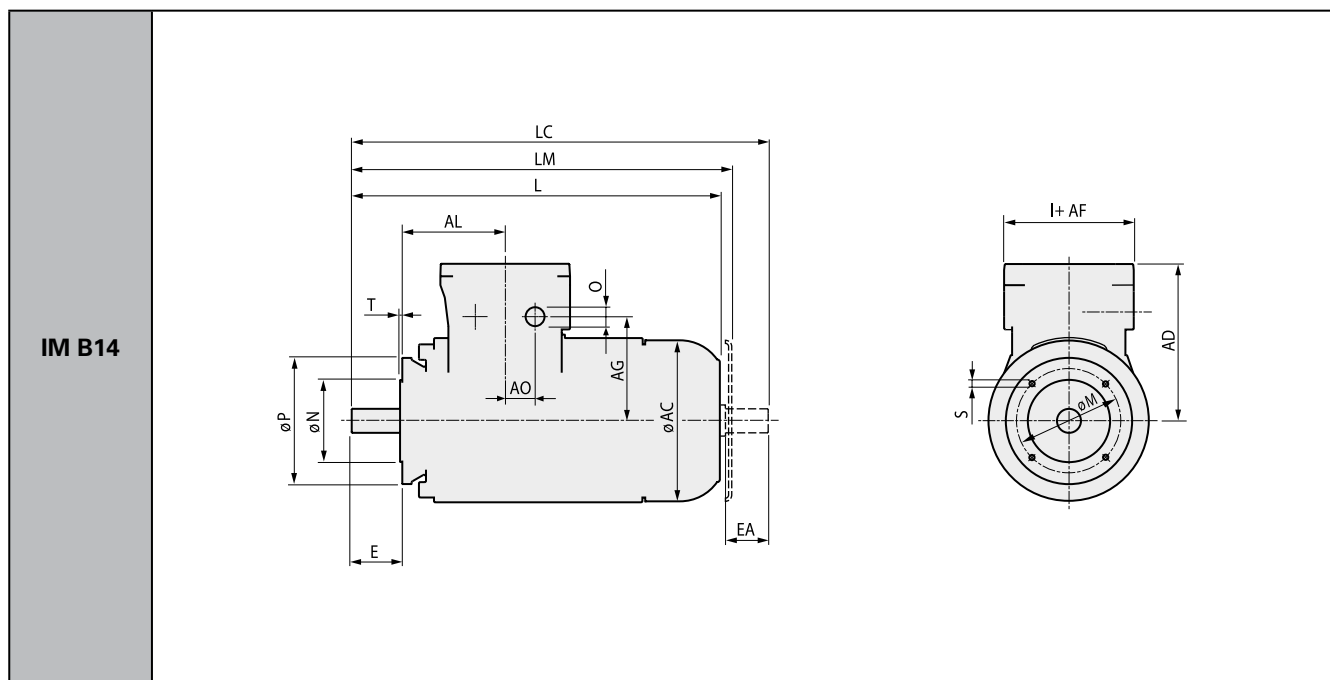
- ▶ The distance L of the motors for mining applications corresponds to the distance LM of explosion-proof motors for surfaces
- \* Rain canopy: only when vertical shaft-down mounting
- ∇ 1 in the terminal box, 1 on the frame
- ▶ 280 and 315 L fixed feet. Removable feet available on request with different dimensions



# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

80÷160/ IM B14/ IM B34



## 5.2 OVERALL DIMENSIONS OF STANDARD AND MINING VERSION MOTORS

IE3																	
Type	A	AA	AB	∅ AC	AD	∠ AF	AL	B	BC	BB	C	H <sub>0.5</sub> <sup>0</sup>	HA	HD	∅ K	$\frac{D}{L}$	LC
80 S	125	40	160	182	180	139	116	100	12	125	50	80	9	261	9	320	365.5
80 L	125	40	160	182	180	139	116	100	12	150	50	80	9	261	9	355	400.5
90 S	140	45	175	199	185	139	121	100	12	180	56	90	10	275	9	371	422.5
90 L	140	45	175	199	185	139	121	125	12	170	56	90	10	275	9	431	482.5
100 S	160	45	200	229	200	139	125	140	15	170	63	100	12	300	12	431	491.5
100 L	160	45	200	229	200	139	125	140	15	170	63	100	12	300	12	472	532.5
112 S	190	45	235	256	215	139	137	140	13	170	70	112	12	327	12	458	526.5
112 L	190	45	235	256	215	139	137	140	13	184	70	112	12	327	12	538	606.5
132 S	216	56	272	295	287	205	192	140	15	222	89	132	13	419	12	558	643.5
132 L	216	56	272	295	287	205	192	178	15	250	89	132	13	419	12	643	728.0
160 S	254	64	318	352	318	205	210	210	20	294	108	160	17	478	14	735	853.0
160 L	254	64	318	352	318	205	210	254	20	305	108	160	17	478	14	815	933.0
Type	* LM	AO	IEC** 60423 n. x O	AG	∅ D ∅ DA	E EA	F FA	GA GC	GD GF	DB DC	∅ M	∅ N	∅ P	◆ S	T		
80 S	349	24	1 x M25	136	136	40	6	21.5	6	M6	100	80j6	120	M6	3.0		
80 L	383	24	1 x M25	136	136	40	6	21.5	6	M6	100	80j6	120	M6	3.0		
90 S	399	24	1 x M25	185	185	50	8	27.0	7	M8	115	95j6	140	M8	3.0		
90 L	459	24	1 x M25	185	185	50	8	27.0	7	M8	115	95j6	140	M8	3.0		
100 S	459	24	1 x M25	155	155	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
100 L	500	24	1 x M25	155	155	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
112 S	486	24	1 x M25	170	170	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
112 L	583	24	1 x M25	170	170	60	8	31.0	7	M10	130	110j6	160	M8	3.5		
132 S	603	35	2 x M32	212	212	80	10	41.0	8	M12	165	130j6	200	M10	3.5		
132 L	688	35	2 x M32	212	212	80	10	41.0	8	M12	165	130j6	200	M10	3.5		
160 S	780	35	2 x M32	243	243	110	12	45.0	8	M16	215	180j6	250	M12	4.0		
160 L	861	35	2 x M32	243	243	110	12	45.0	8	M16	215	180j6	250	M12	4.0		

### Tolerances allowed

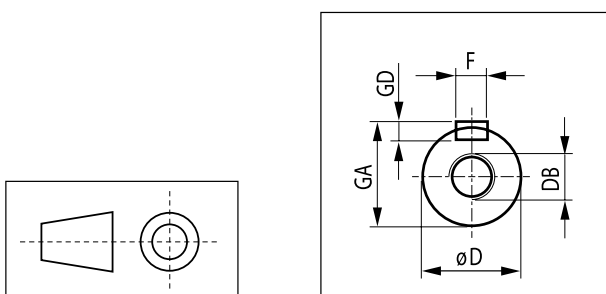
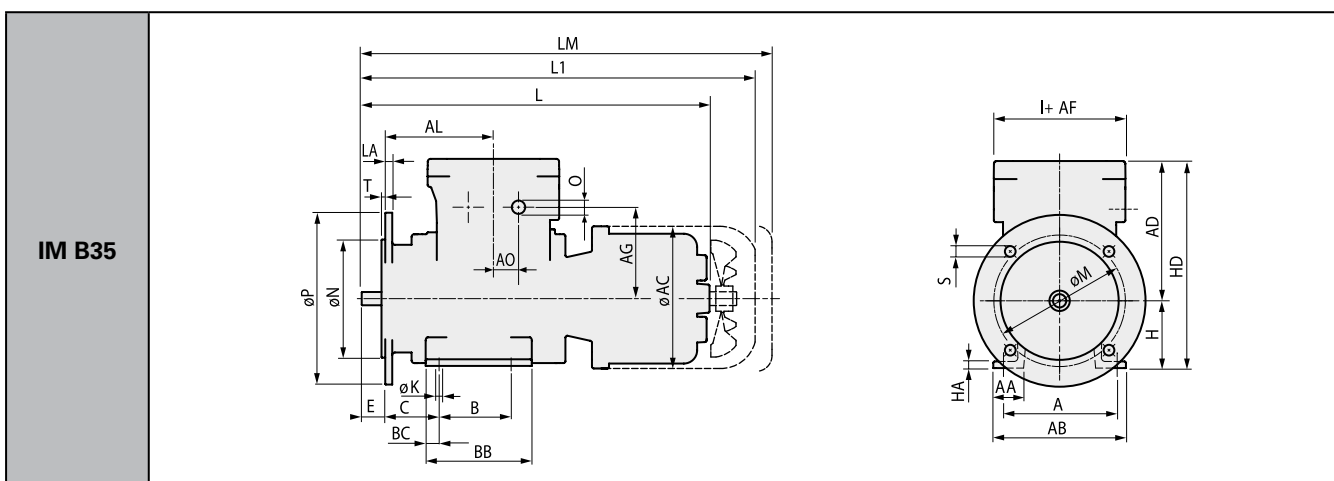
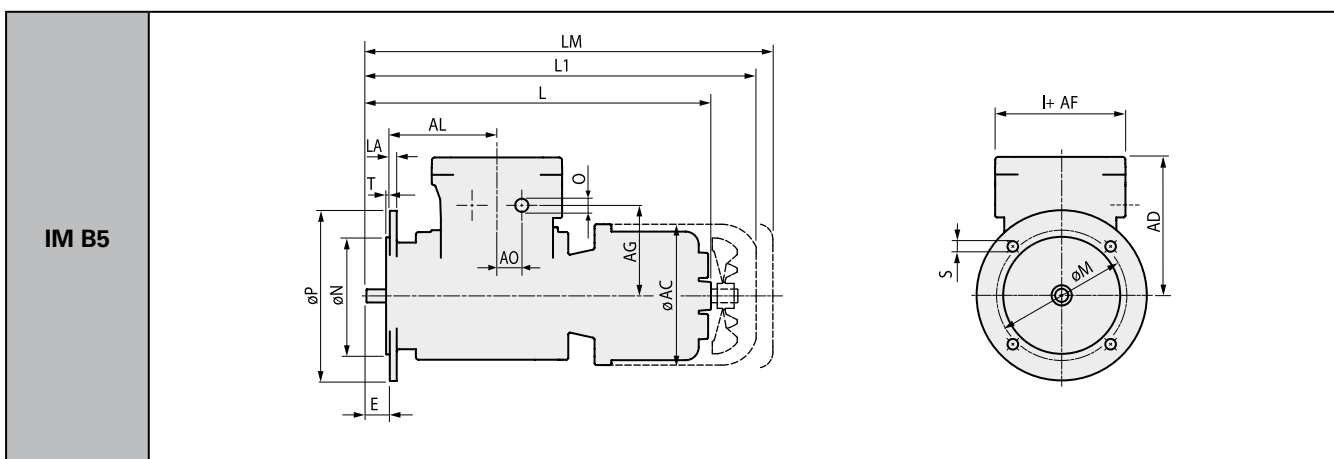
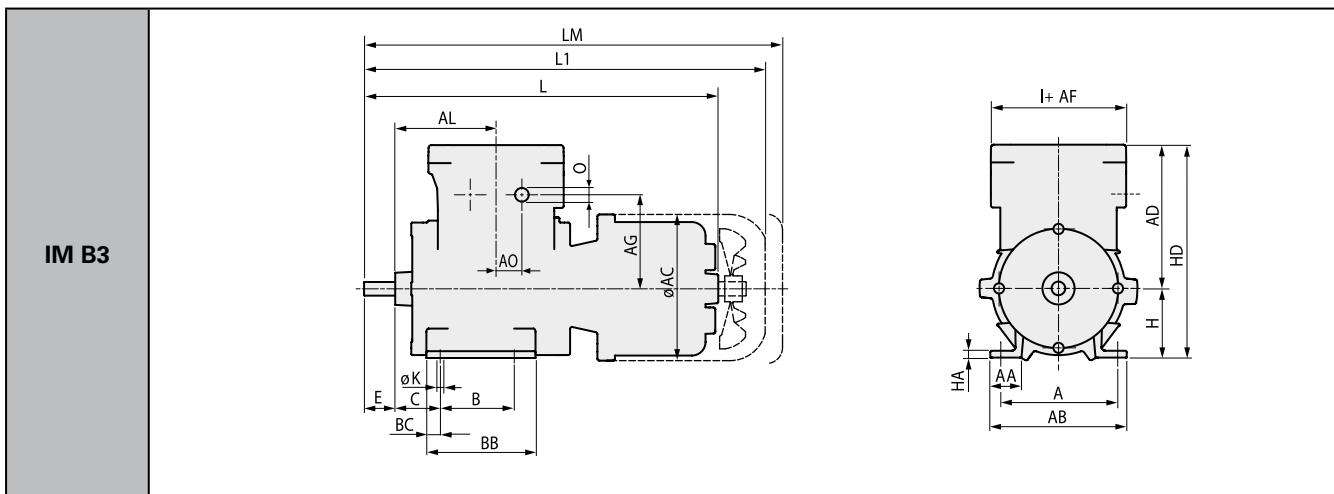
- ▶ The distance L of the motors for mining applications corresponds to the distance LM of explosion-proof motors for surfaces
- \* Rain canopy: only when vertical shaft-down mounting
- ⊥ 1 in the terminal box, 1 on the frame
- ▶ 280 and 315 L fixed feet. Removable feet available on request with different dimensions

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

80÷160/ IM B14/ IM B34

63÷160 71÷160 IM B3 IM B5 IM B35



### 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

Type	A	AA	AB	∅ AC	AD	∅ AF	IM B5 AL	IM B3- B35 AL	B	BC	BB	C	H <sub>0.5</sub> <sup>o</sup>	HA	HD	∅ K	● L	▼ L1
63	100	25	125	134	176	145	95	95	80	9.5	105	40	63	6	239	7	310	
71	112	32	140	165	186	145	106	106	90	11.0	112	45	71	7	257	7	365	410
80	125	40	160	183	196	145	142	142	100	15.0	130	50	80	8	276	9	423	478
90 S	140	45	175	208	206	145	125	125	100	14.0	157	56	90	9	296	9	502	557
90 L	140	45	175	208	206	145	125	125	125	14.0	157	56	90	9	296	9	502	557
100	160	45	200	234	216	145	125	125	140	15.0	170	63	100	10	316	12	537	595
112	190	45	235	259	237	145	228	138	140	17.0	175	70	112	12	349	12	609	668
132 S	216	56	272	311	260	205	193	163	140	22.0	222	89	132	13	392	12	650	722
132 M-L	216	56	272	311	260	205	268	163	178	22.0	222	89	132	13	392	12	725	797
160 M	254	64	318	348	290	205	311	166	210	25.0	305	108	160	15	450	14	823	901
160 L	254	64	318	348	290	205	311	166	254	25.0	305	108	160	15	450	14	823	901
Type	*▼ LM	AO	IEC** 60423 n. x O	AG	∅ D	E	F	GA	GD	DBC	∅ M	∅ N	∅ P	S	T			
63		26	1xM25 1xM20	96	11j6	23	4	12.5	4	M4	75	60j6	90	M5	2.5			
71	438	26	1xM25 1xM20	106	14j6	30	5	16.0	5	M5	85	70j6	105	M6	2.5			
80	507	26	1xM25 1xM20	116	19j6	40	6	21.5	6	M6	100	80j6	120	M6	3.0			
90 S	585	26	1xM25 1xM20	126	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0			
90 L	585	26	1xM25 1xM20	126	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0			
100	624	26	1xM25 1xM20	136	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5			
112	697	26	1xM25 1xM20	157	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5			
132 S	767	35	2xM32 1xM20	185	38k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5			
132 M-L	842	35	2xM32 1xM20	185	38k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5			
160 M	946	35	2xM32 1xM20	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0			
160 L	946	35	2xM32 1xM20	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0			

Tolerances allowed

● Version DB, DC

▼ Version HB, HC

⊥ 1 in the terminal box, 1 on the frame

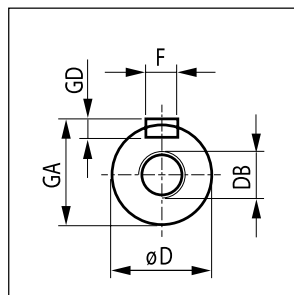
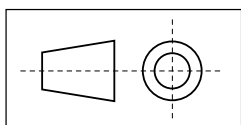
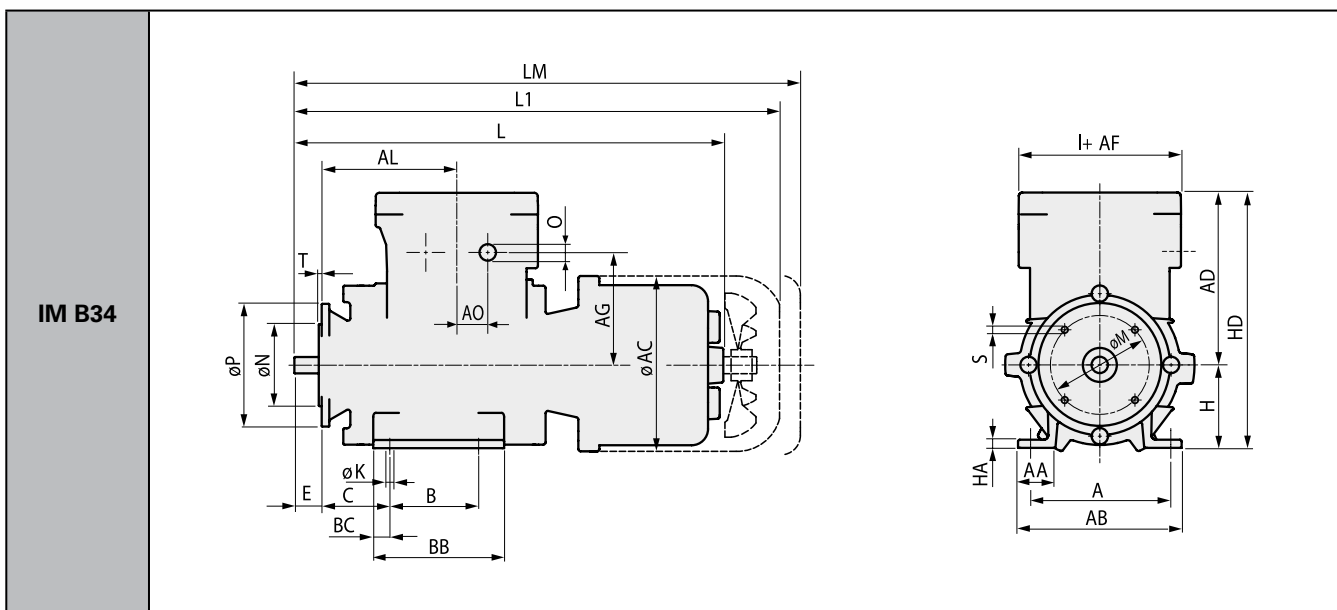
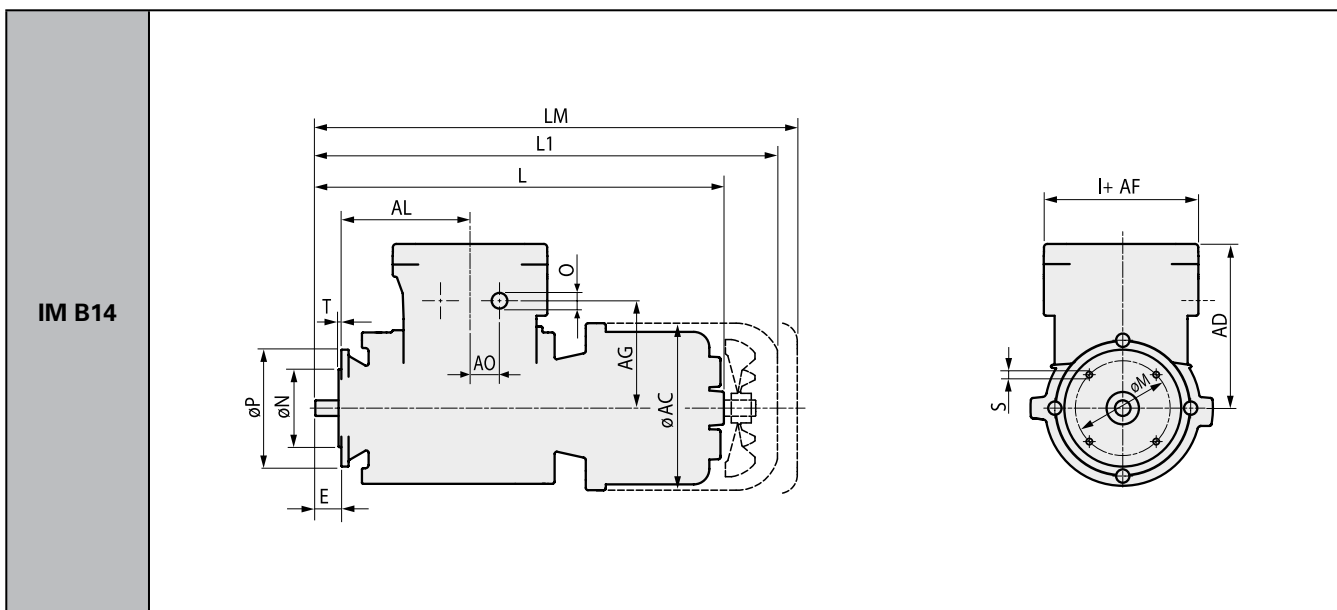
\* Rain cover: normally found only on self-ventilating motors (IC411) for vertical assembly, shaft at the bottom

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

DB DC HB HC

63÷160 71÷160 IM B14 IM B34



## 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

Type	A	AA	AB	ø AC	AD	AF	IM B14 AL	IM B3- B34 AL	B	BC	BB	C	H <sub>0.5</sub> <sup>0</sup>	HA	HD	ø K	● L	▼ L1
63	100	25	125	134	176	145	95	95	80	9.5	105	40	63	6	239	7	310	
71	112	32	140	165	186	145	106	106	90	11.0	112	45	71	7	257	7	365	410
80	125	40	160	183	196	145	142	142	100	15.0	130	50	80	8	276	9	423	478
90 S	140	45	175	208	206	145	125	125	100	14.0	157	56	90	9	296	9	502	557
90 L	140	45	175	208	206	145	125	125	125	14.0	157	56	90	9	296	9	502	557
100	160	45	200	234	216	145	125	125	140	15.0	170	63	100	10	316	12	537	595
112	190	45	235	259	237	145	228	138	140	17.0	175	70	112	12	349	12	609	668
132 S	216	56	272	311	260	205	193	163	140	22.0	222	89	132	13	392	12	650	722
132 M-L	216	56	272	311	260	205	268	163	178	22.0	222	89	132	13	392	12	725	797
160 M	254	64	318	348	290	205	311	166	210	25.0	305	108	160	15	450	14	823	901
160 L	254	64	318	348	290	205	311	166	254	25.0	305	108	160	15	450	14	823	901
Type	*▼ LM	AO	IEC** 60423 n. x O	AG	ø D	E	F	GA	GD	DBC	ø M	ø N	ø P	S	T			
63		26	1xM25 1xM20	96	11j6	23	4	12.5	4	M4	75	60j6	90	M5	2.5			
71	438	26	1xM25 1xM20	106	14j6	30	5	16.0	5	M5	85	70j6	105	M6	2.5			
80	507	26	1xM25 1xM20	116	19j6	40	6	21.5	6	M6	100	80j6	120	M6	3.0			
90 S	585	26	1xM25 1xM20	126	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0			
90 L	585	26	1xM25 1xM20	126	24j6	50	8	27.0	7	M8	115	95j6	140	M8	3.0			
100	624	26	1xM25 1xM20	136	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5			
112	697	26	1xM25 1xM20	157	28j6	60	8	31.0	7	M10	130	110j6	160	M8	3.5			
132 S	767	35	2xM32 1xM20	185	38k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5			
132 M-L	842	35	2xM32 1xM20	185	38k6	80	10	41.0	8	M12	165	130j6	200	M10	3.5			
160 M	946	35	2xM32 1xM20	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0			
160 L	946	35	2xM32 1xM20	215	42k6	110	12	45.0	8	M16	215	180h6	250	M12	4.0			

Tolerances allowed

● Version DB, DC

▼ Version HB, HC

⊥ 1 in the terminal box, 1 on the frame

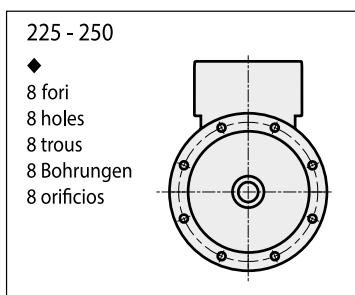
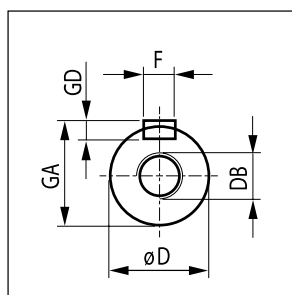
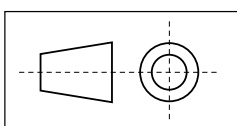
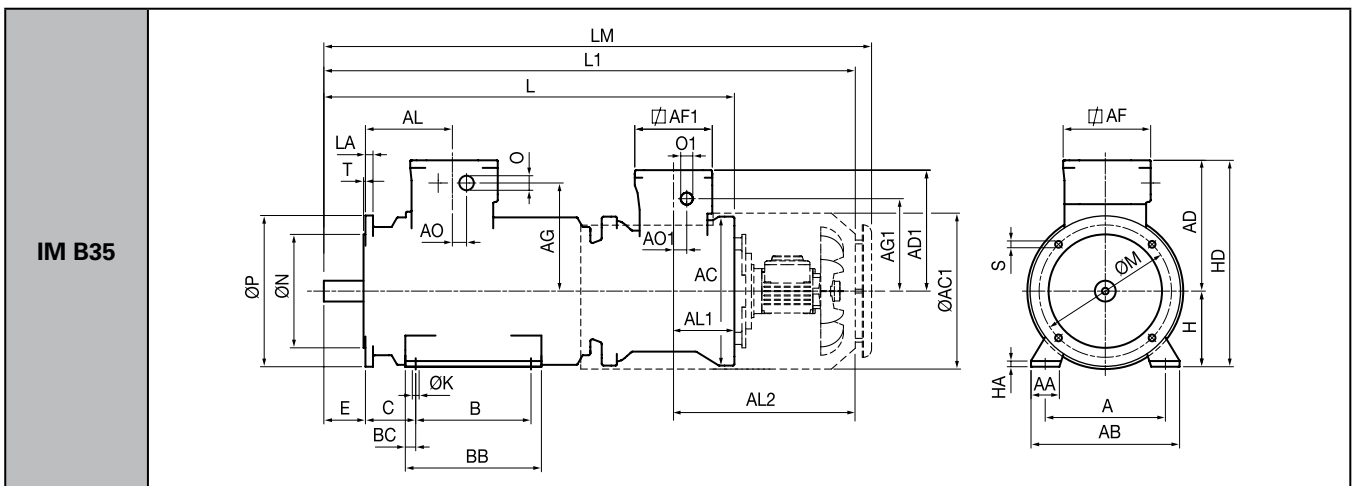
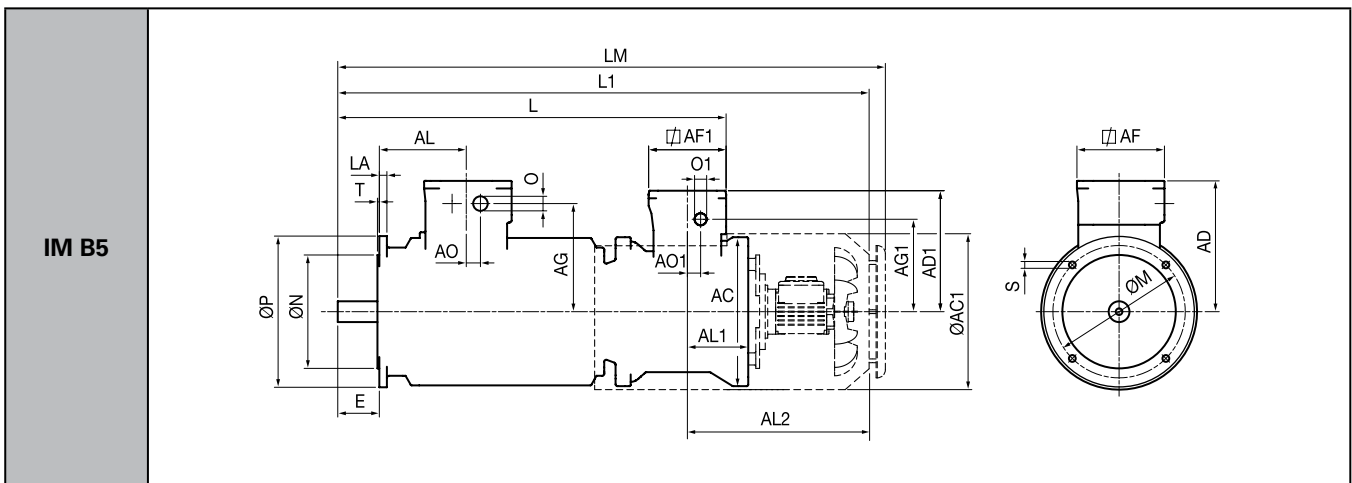
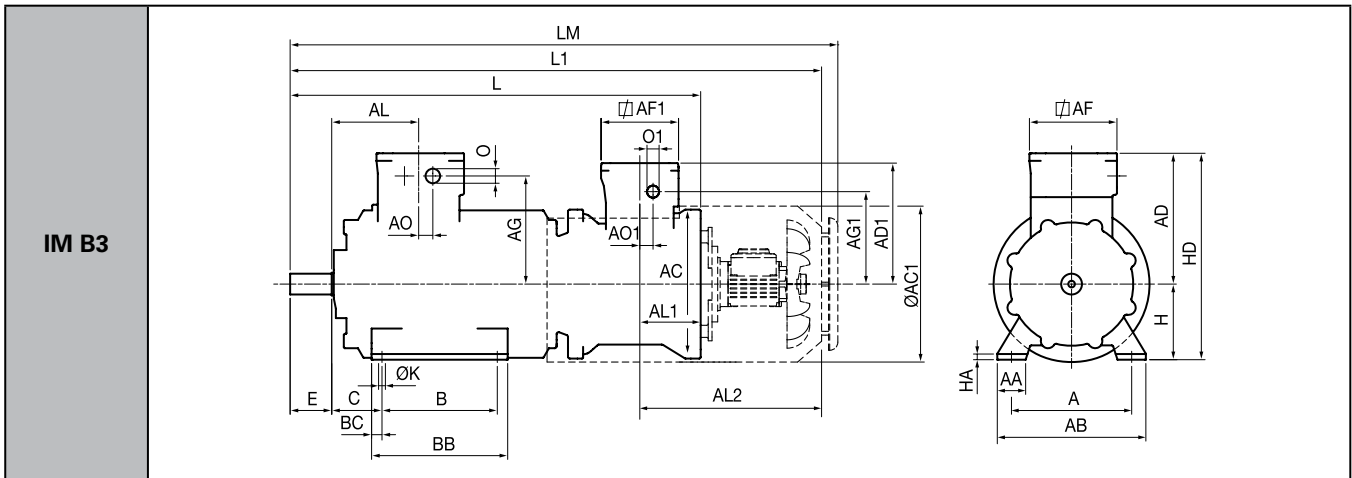
\* Rain cover: normally found only on self-ventilating motors (IC411) for vertical assembly, shaft at the bottom

# 5. OVERALL DIMENSIONS AND MOUNTING ARRANGEMENTS

## 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

DB DC

180+315 IM B3 IM B5 IM B35



### 5.3 OVERALL DIMENSIONS OF MOTORS WITH BRAKES

Type	A	AA	AB	∅ AC	AC1	AD	AD1	∅ AF	∅ AF1	AL	AL1	AL2	B	BC	BB	C	H <sub>0.5</sub> <sup>0</sup>	HA	HD	∅ K	L
180 M	279	71	350	394	412	326	320	242	205	223	162	482	241	25.0	340	121	180	17	506	14	1055
180 L	279	71	350	394	412	326	320	242	205	223	162	482	279	25.0	340	121	180	17	506	14	1055
200	318	75	393	394	412	346	320	242	205	230	162	481	305	27.0	360	133	200	18	546	18	1086
225 S	356	78	431	394	467	371	320	242	205	240	162	506	286	38.0	380	149	225	20	596	18	1156
225 M 4-8	356	78	431	394	467	371	320	242	205	240	162	506	311	38.0	380	149	225	20	596	18	1156
250 M 4-8	406	95	500	394	467	396	320	242	205	221	162	507	349	33.0	415	168	250	22	646	24	1157
280 S 4-8	457	90	540	394	558	548	320	320	205	316	162	618	368	80.0	550	190	280	41	828	25	1265
280 M 4-8	457	90	540	394	558	548	320	320	205	316	162	618	419	80.0	550	190	280	41	828	25	1265
315 S 4-8	508	110	590	394	558	548	320	320	205	316	162	618	406	68.5	560	216	315	41	863	27	1445
315 M 4-8	508	110	590	394	558	548	320	320	205	316	162	618	457	68.5	560	216	315	41	863	27	1445
Type	L1	LM	AO	AO1	IEC®* 60423 n. x O	IEC 60423 n. x O1	AG	AG1	∅ D	E	F	GA	GD	DB	LA	∅ M	∅ N	∅ P	S	T	
180 M	1376	1419	38	35	2xM40	1xM25	266	245	48k6	110	14	52.0	9	M16	20	300	250h6	350	18	5	
180 L	1376	1419	38	35	2xM40	1xM25	266	245	48k6	110	14	52.0	9	M16	20	300	250h6	350	18	5	
200	1412	1455	38	35	2xM40	1xM25	286	245	55m6	110	16	59.0	10	M20	20	350	300h6	400	18	5	
225 S	1501	1544	38	35	2xM40	1xM25	311	245	60m6	140	18	64.0	11	M20	22	400	350h6	450	18	5	
225 M 4-8	1501	1544	38	35	2xM40	1xM25	311	245	60m6	140	18	64.0	11	M20	22	400	350h6	450	18	5	
250 M 4-8	1503	1546	38	35	2xM40	1xM25	336	245	65m6	140	18	69.0	11	M20	22	500	450h6	550	18	5	
280 S 4-8	1721	1817	56	35	2xM63	1xM25	410	245	75m6	140	20	79.5	12	M20	18	500	450h6	550	18	5	
280 M 4-8	1721	1817	56	35	2xM63	1xM25	410	245	75m6	140	20	79.5	12	M20	18	500	450h6	550	18	5	
315 S 4-8	1901	1997	56	35	2xM63	1xM25	410	245	80m6	170	22	85.0	14	M20	22	600	550h6	660	22	6	
315 M 4-8	1901	1997	56	35	2xM63	1xM25	410	245	80m6	170	22	85.0	14	M20	22	600	550h6	660	22	6	

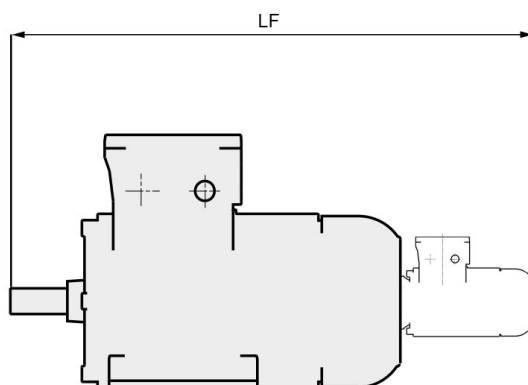
Tolerances allowed

⊥ 1 in the motor terminal box, 1 on the motor frame and 1 in the brake terminal box

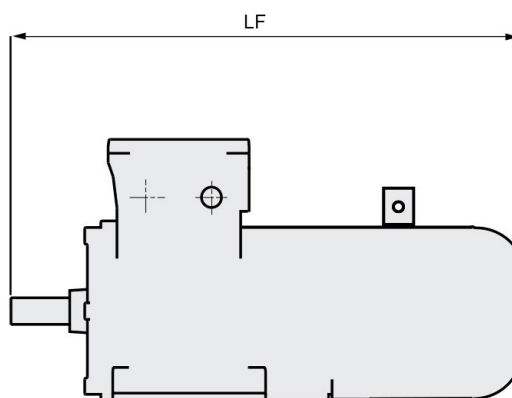


## 5.4 OVERALL DIMENSIONS OF IC416 MOTORS

90÷250 IE1/IE2 - 90÷315 IE3/IE4



280÷315L IE1/IE2 - 355 IE3/IE4



For the other dimensions please refer to chapters 5.2 and 5.3.

## 5.4 OVERALL DIMENSIONS OF IC416 MOTORS

IE1 - IE2	
Type	LF
63	NA
71	NA
80	NA
90 S	583
90 L	583
100	622
112	671
132 S	697
132 M-L	772
160 M	878
160 L	878
180 M	1037
180 L	1037
200	1052
225 S	1129
225 M 2	1090
225 M 4-8	1129
250 M 2	1146
250 M 4-8	1146
280 S 2	1359
280 S 4-8	1359
280 M 2	1359
280 M 4-8	1359
315 S 2	1509
315 S 4-8	1539
315 M 2	1509
315 M 4-8	1539
315 L 2	1715
315 L 4-8	1745

IE3 - IE4	
Type	LF
80 S	NA
80 L	NA
90 S	565
90 L	625
100 S	617
100 L	658
112 S	645
112 L	705
132 S	742
132 L	827
160 S	918
160 L	968
180 S	1007
180 L	1081
200 S	1065
200 L	1130
225 S 2	1083
225 S 4-8	1113
225 M 2	1138
225 M 4-8	1168
250 M 2	1233
250 M 4-8	1233
280 S 2	1456
280 S 4-8	1456
280 M 2	1556
280 M 4-8	1556
315 S 2	1567
315S4-8	1597
315 M 2	1567
315 M 4-8	1597
315 L 2	1737
315 L 4-8	1767
355 M 2	1863
355 M 4-8	1933
355 L 2	2013
355 L 4-8	2083

## 6. SPARE PARTS

### STANDARD AND MINING APPLICATION MOTORS

<b>1</b>	End cap - front
<b>(2)</b>	Grease nipple - front
<b>3</b>	Front bearing
<b>4</b>	Terminal box
<b>(5)</b>	Auxiliary connections
<b>6</b>	Terminal box lid
<b>7</b>	Terminal board
<b>8</b>	Cable nipple
<b>9</b>	Rotor
<b>10</b>	Wound stator
<b>11</b>	Frame
<b>12</b>	Endshield - rear
<b>(13)</b>	Grease sealing ring - rear
<b>(14)</b>	Grease nipple - rear
<b>15</b>	End cap - rear
<b>16</b>	Fan cover (cowl)
<b>17</b>	Shaft
<b>18</b>	Sealing ring - front
<b>(19)</b>	Grease sealing ring - front
<b>20</b>	Endshield - front
<b>21</b>	Pre loading springs
<b>22</b>	Inner bearing cap - front

<b>(23)</b>	Feet
<b>24</b>	Inner bearing cap - rear
<b>25</b>	Rear bearing
<b>26</b>	Sealing ring - rear
<b>27</b>	Cooling fan
<b>(28)</b>	Rain cap
<b>29</b>	NDE shield brake holder
<b>30</b>	Brake enclosure
<b>38</b>	Brake shield
<b>39</b>	Brake cover enclosure
<b>40</b>	Brake terminal box cover
<b>41</b>	Brake terminal box
<b>42</b>	Brake terminal board
<b>43</b>	Cable nipple brake
<b>44</b>	Forced ventilation motor support
<b>45</b>	Forced ventilation motor
<b>52</b>	Plate
<b>53</b>	Electrical earth screw
<b>54</b>	Separation base
<b>55</b>	Brake

(...) = when provided

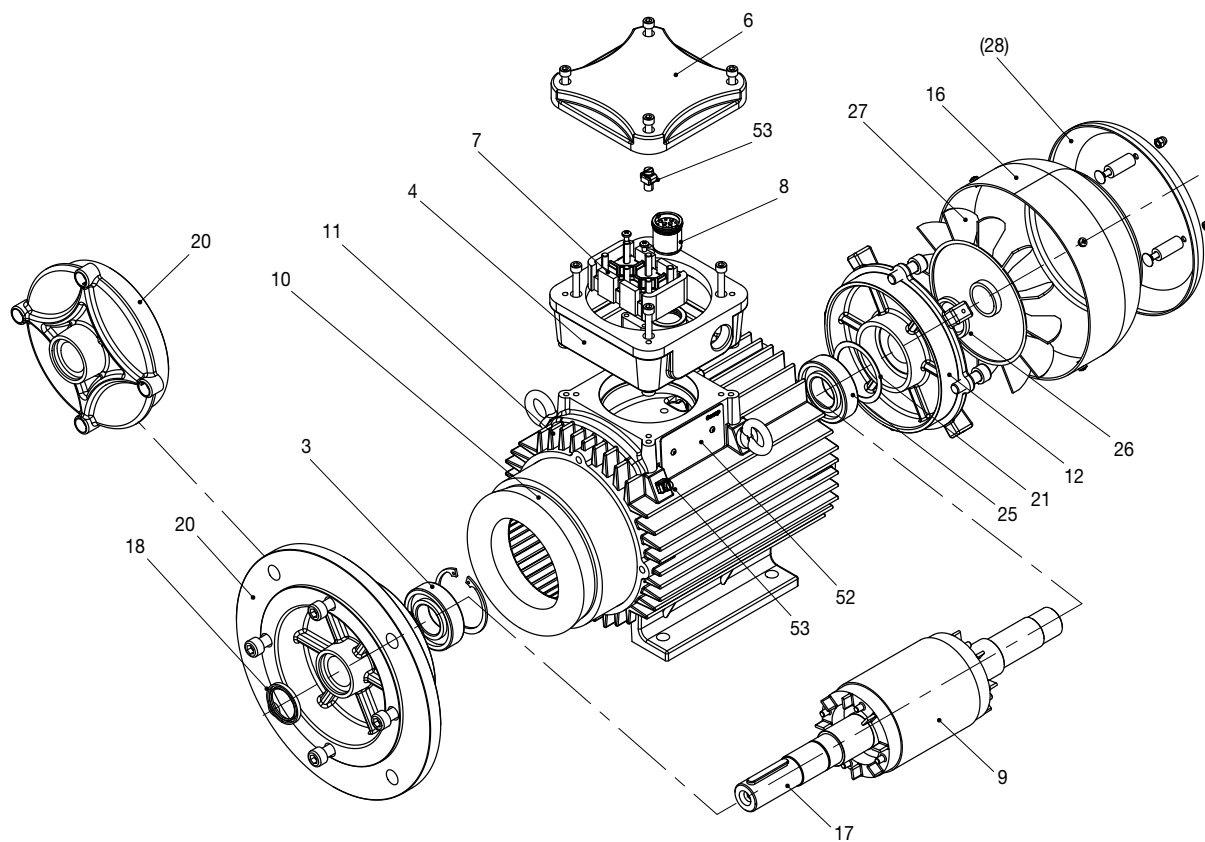
N.B.: the fan cap (16) in the motors for mining applications is welded to the rain cover (28)

On Premium Series (IE3, IE4) frame size 132 the standard version is without grease nipples and without end caps. The version with grease nipples and with end caps is available on request.

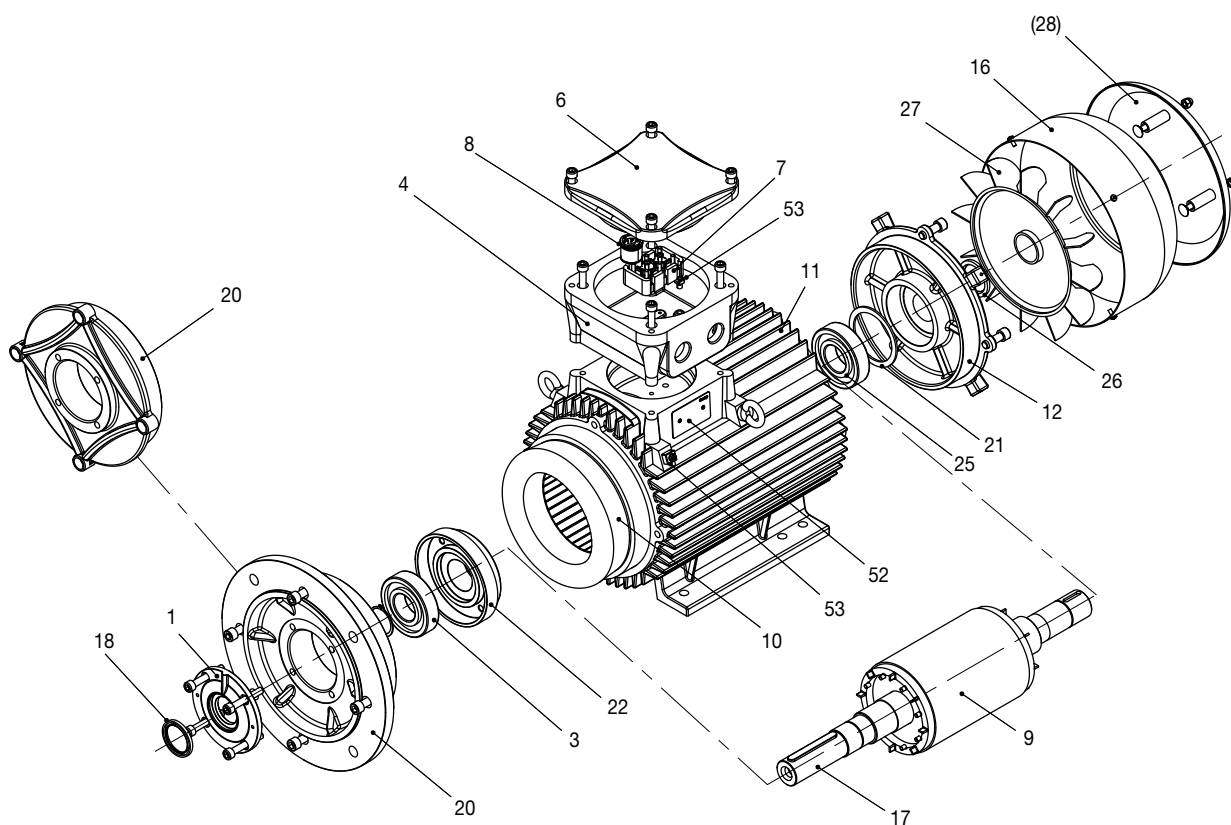
# 6. SPARE PARTS

## STANDARD AND MINING APPLICATION MOTORS

63÷132 IE1, IE2  
80÷132 IE3



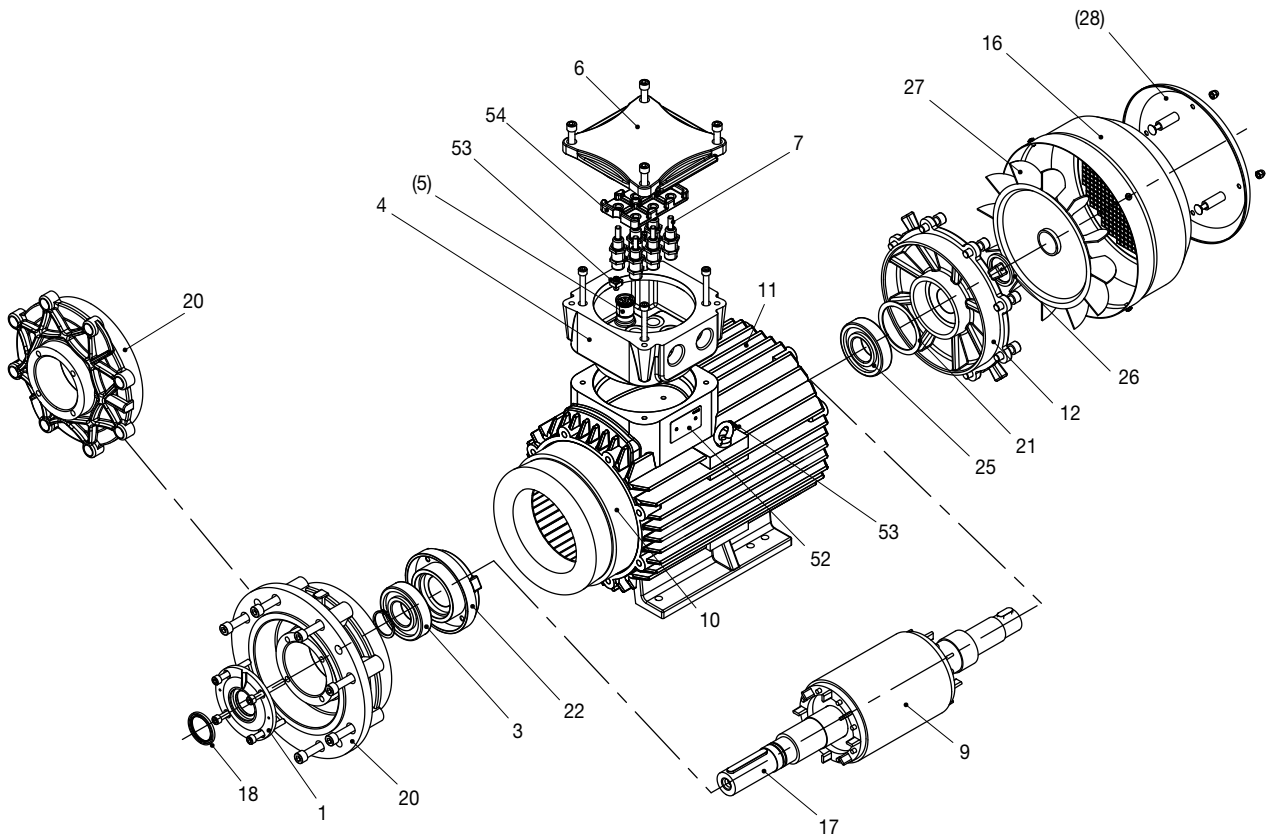
160 IE1, IE2



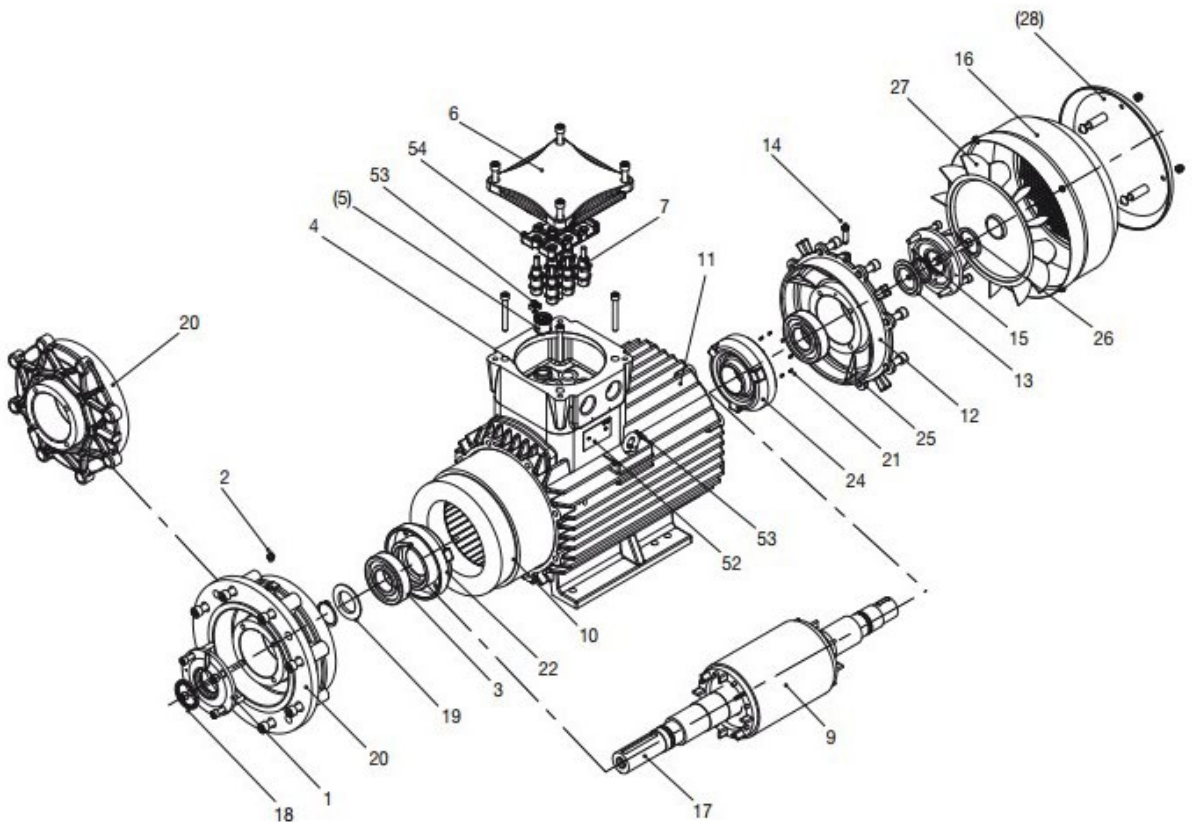
# 6. SPARE PARTS

## STANDARD AND MINING APPLICATION MOTORS

180+250 IE1, IE2



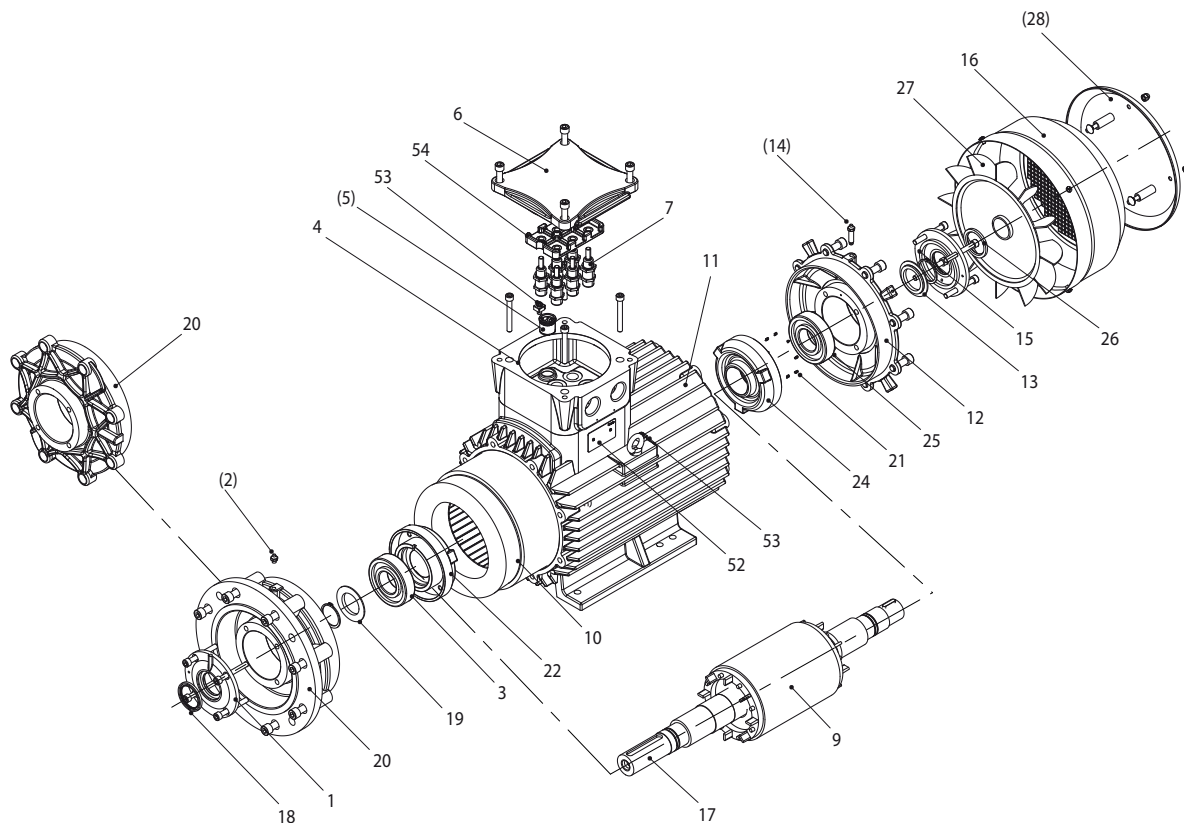
180+250 IE1, IE2 WITH GREASE NIPPLES



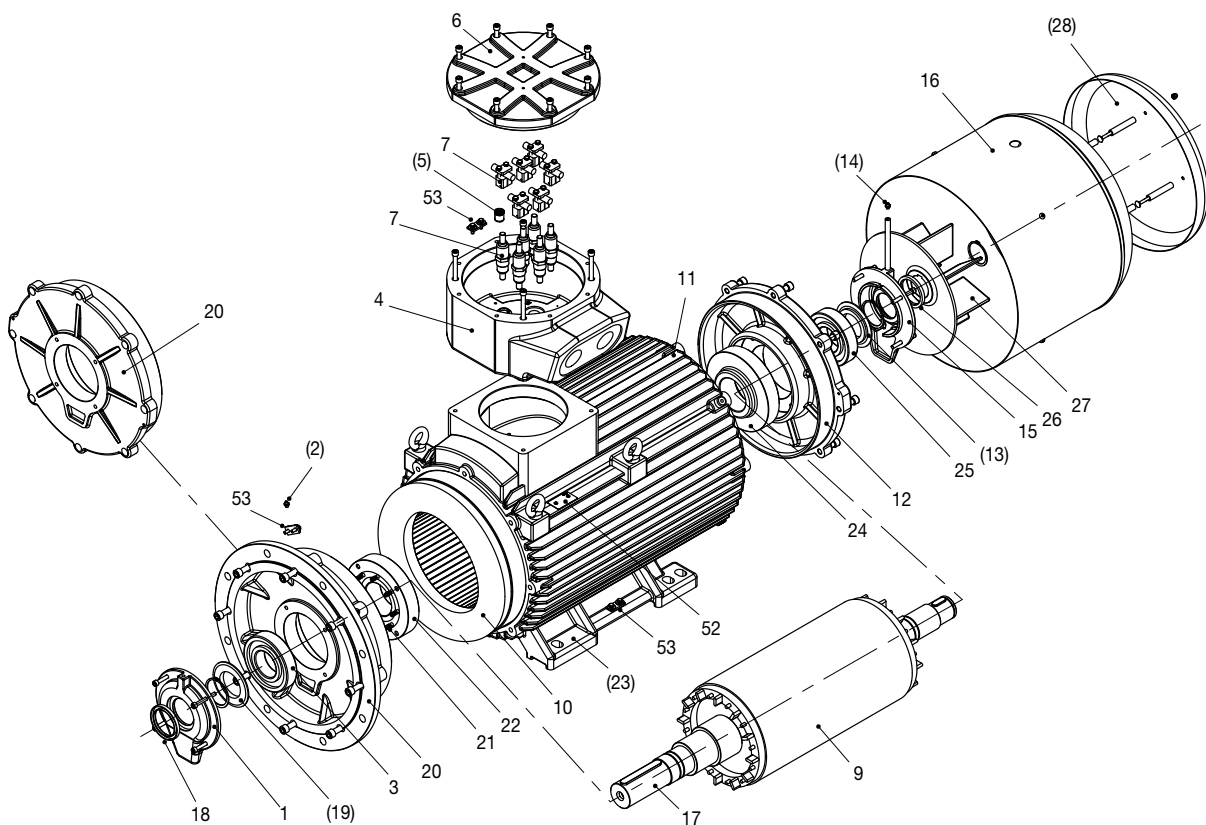
# 6. SPARE PARTS

## STANDARD AND MINING APPLICATION MOTORS

132+250 IE3

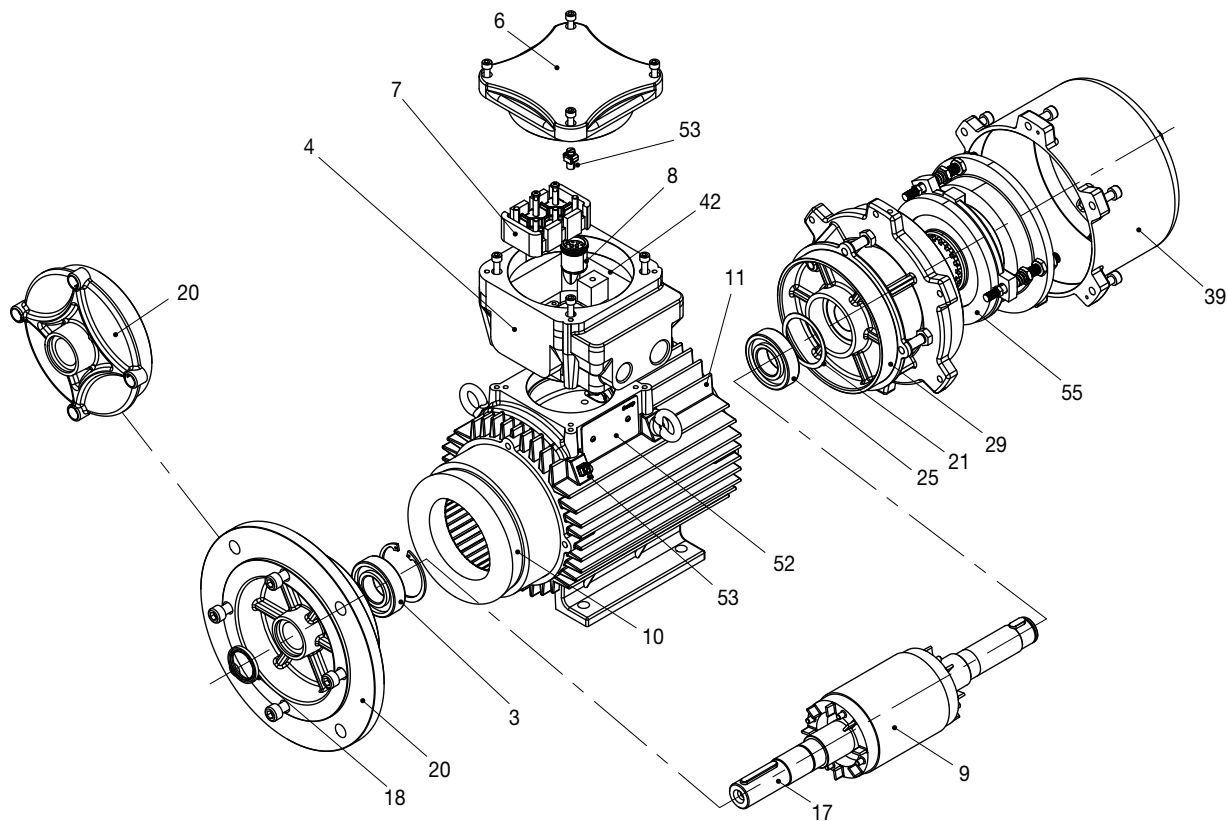


280+355 IE1, IE2, IE3

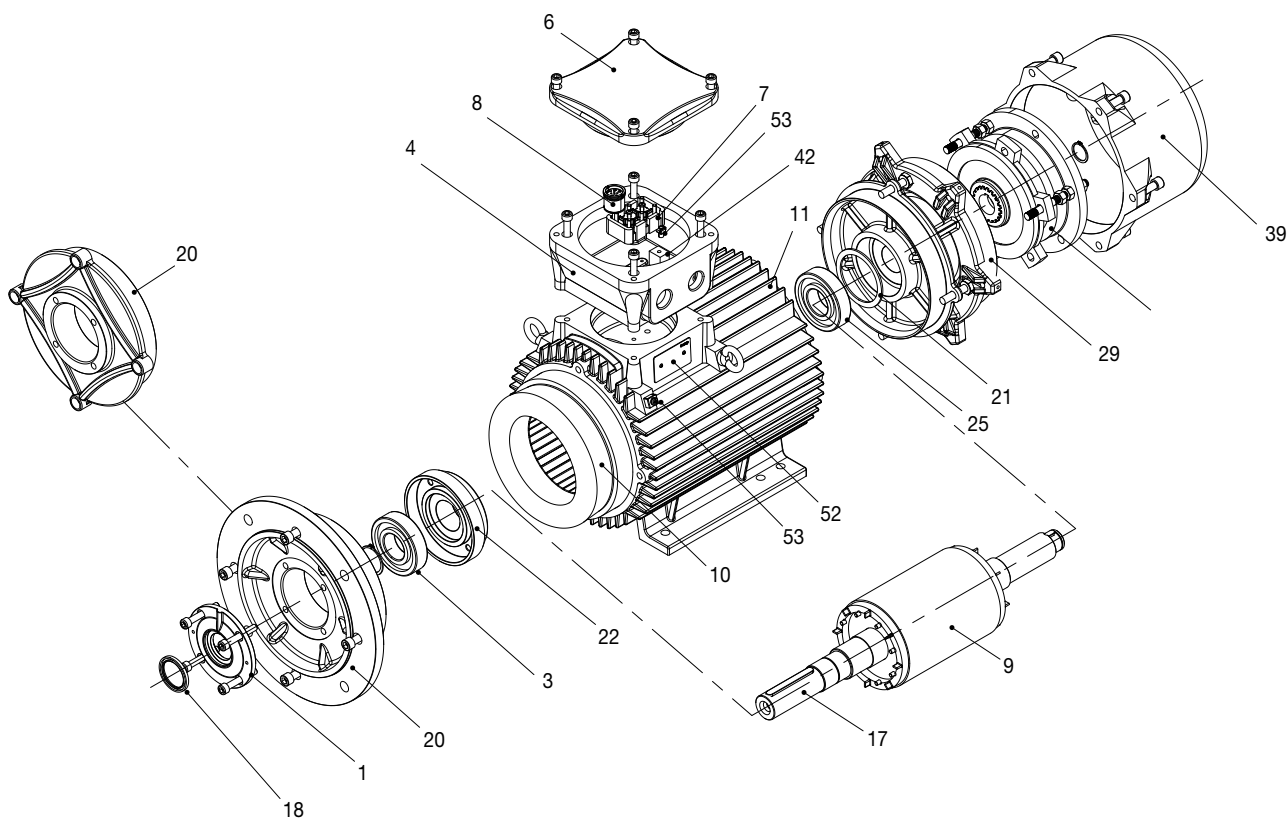


## 6. SPARE PARTS MOTORS WITH BRAKES

63+132



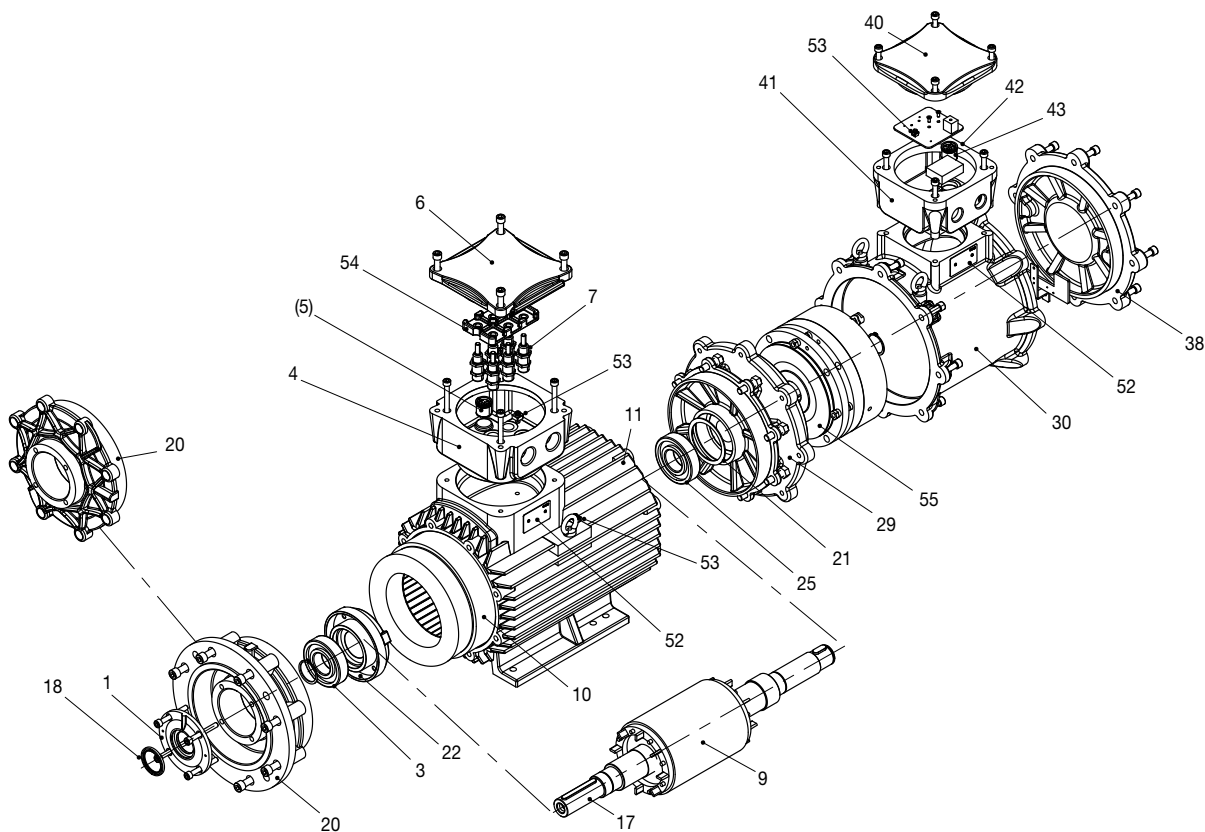
160



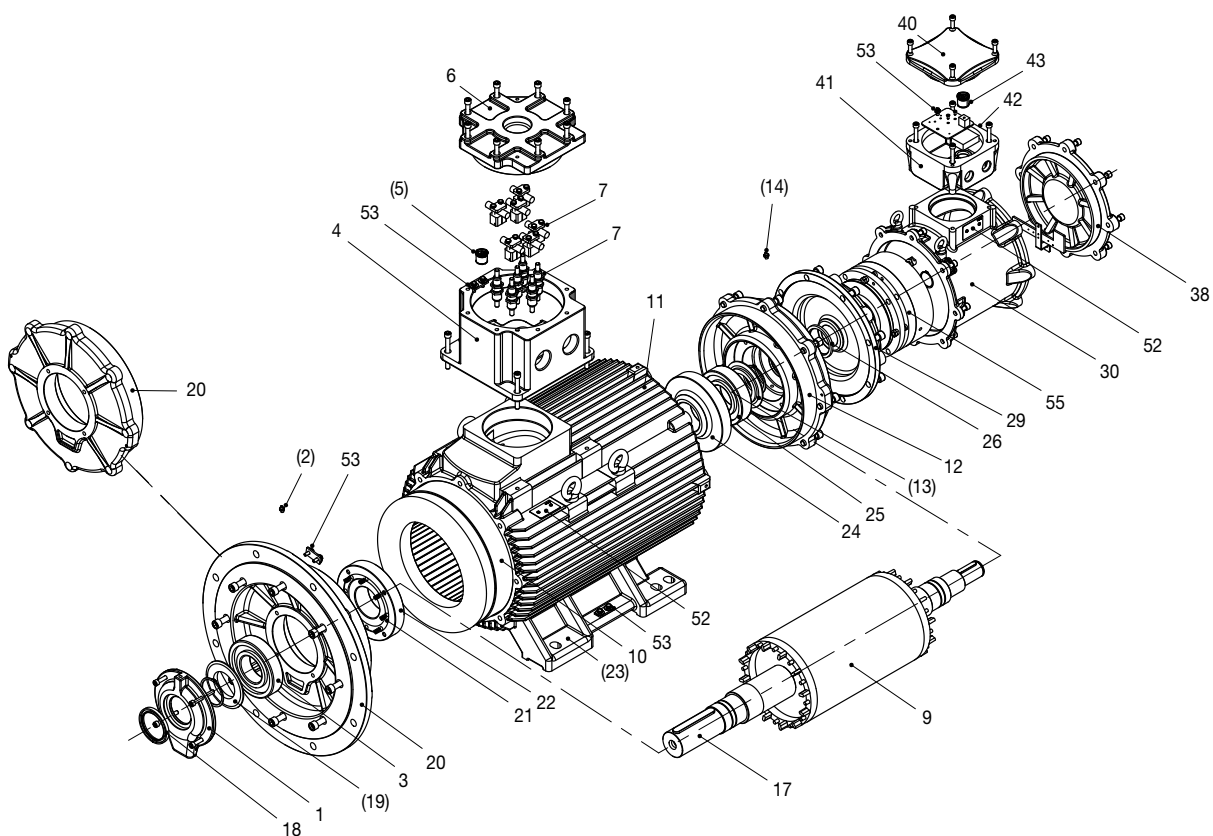
# 6. SPARE PARTS

## MOTORS WITH VENTILATED BRAKES

180÷250



280÷315

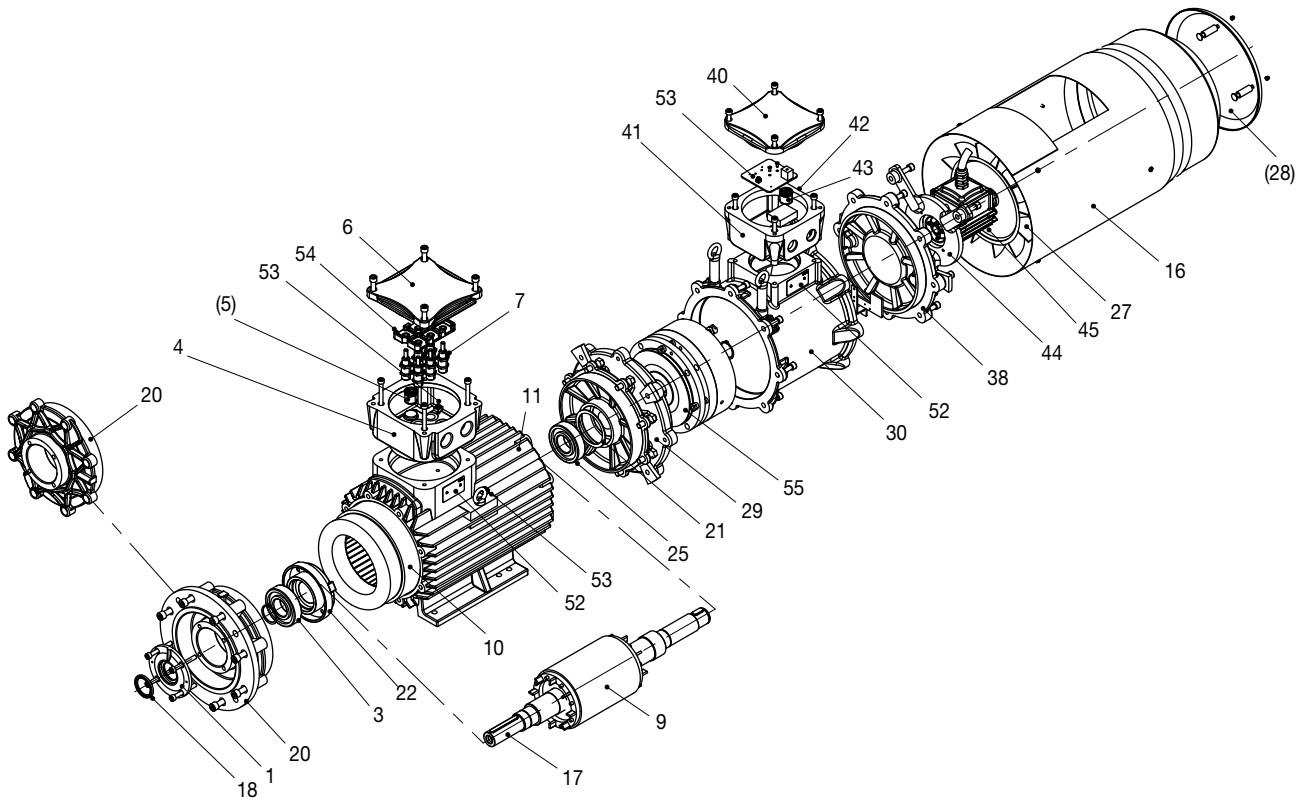




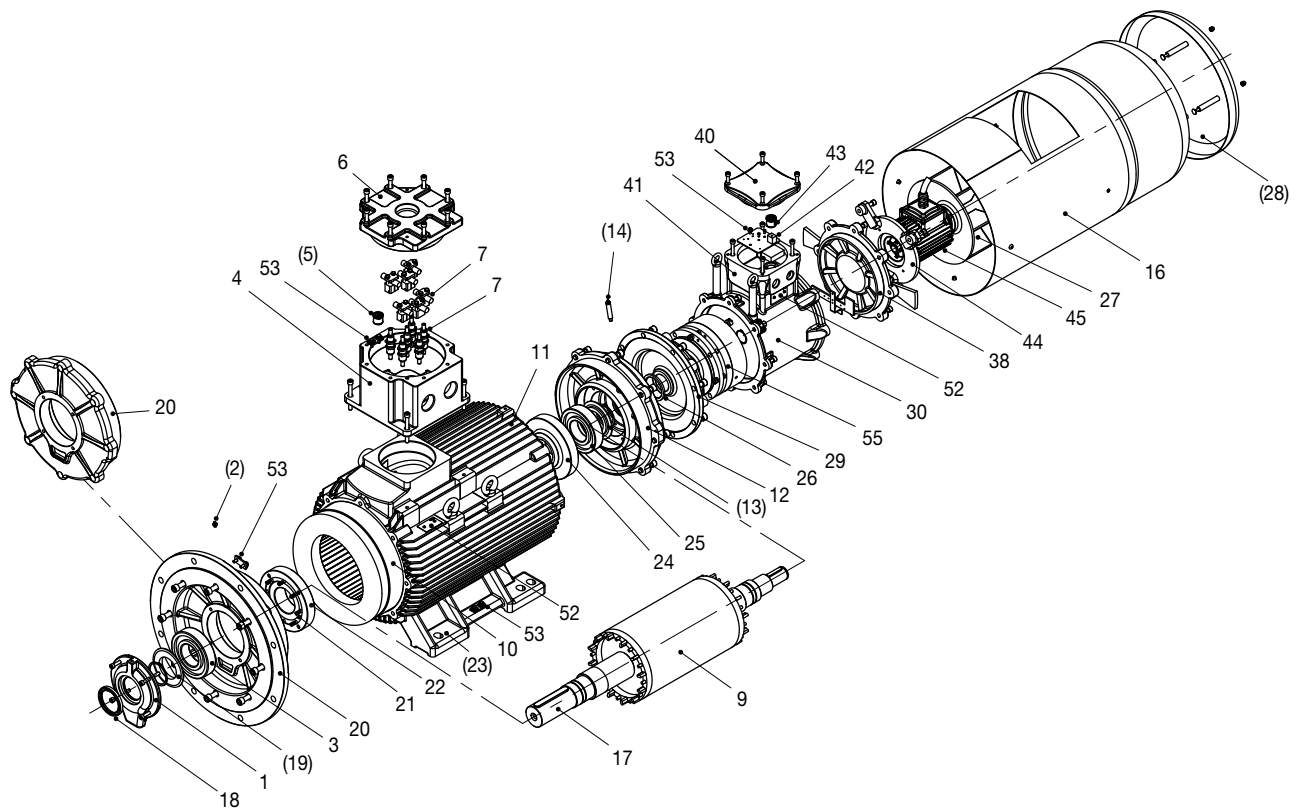
# 6. SPARE PARTS

## MOTORS WITH VENTILATED BRAKES

180÷250



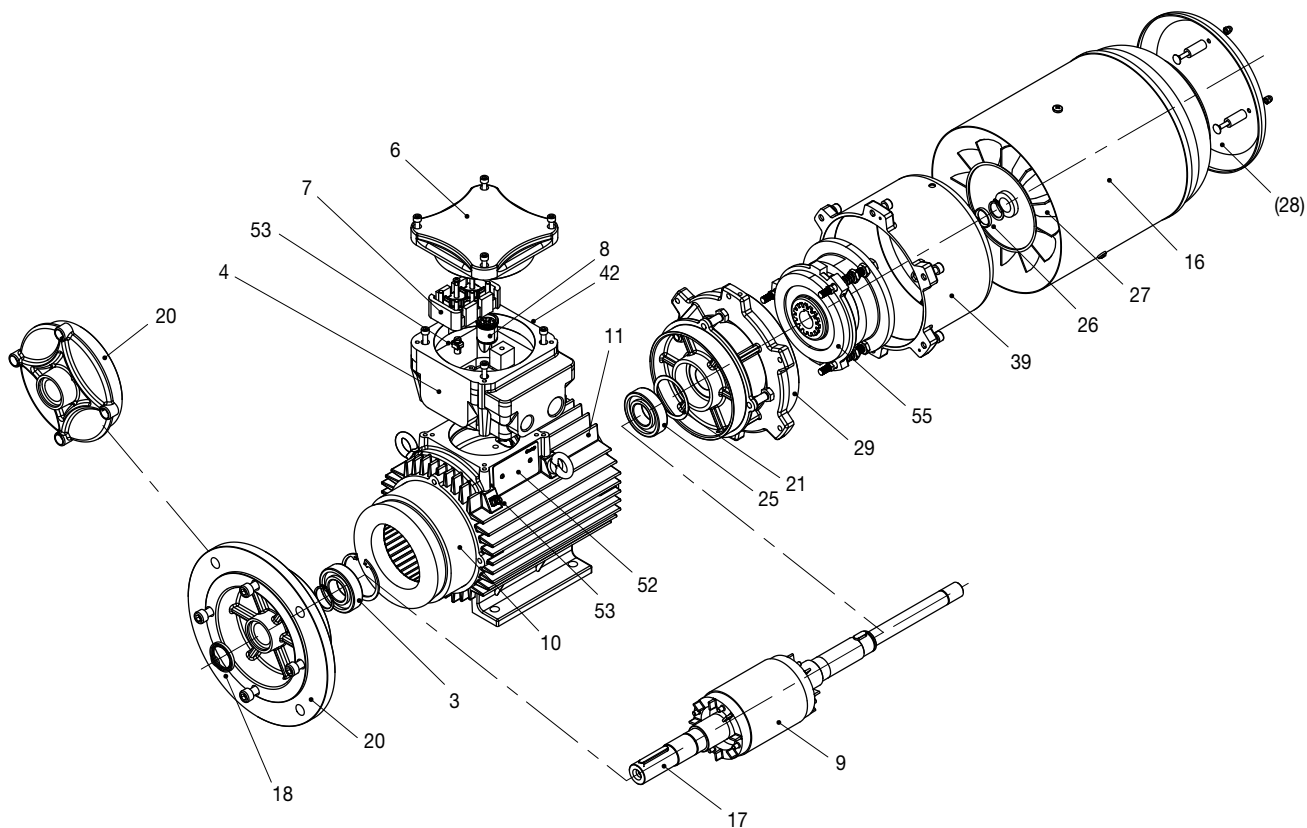
280÷315



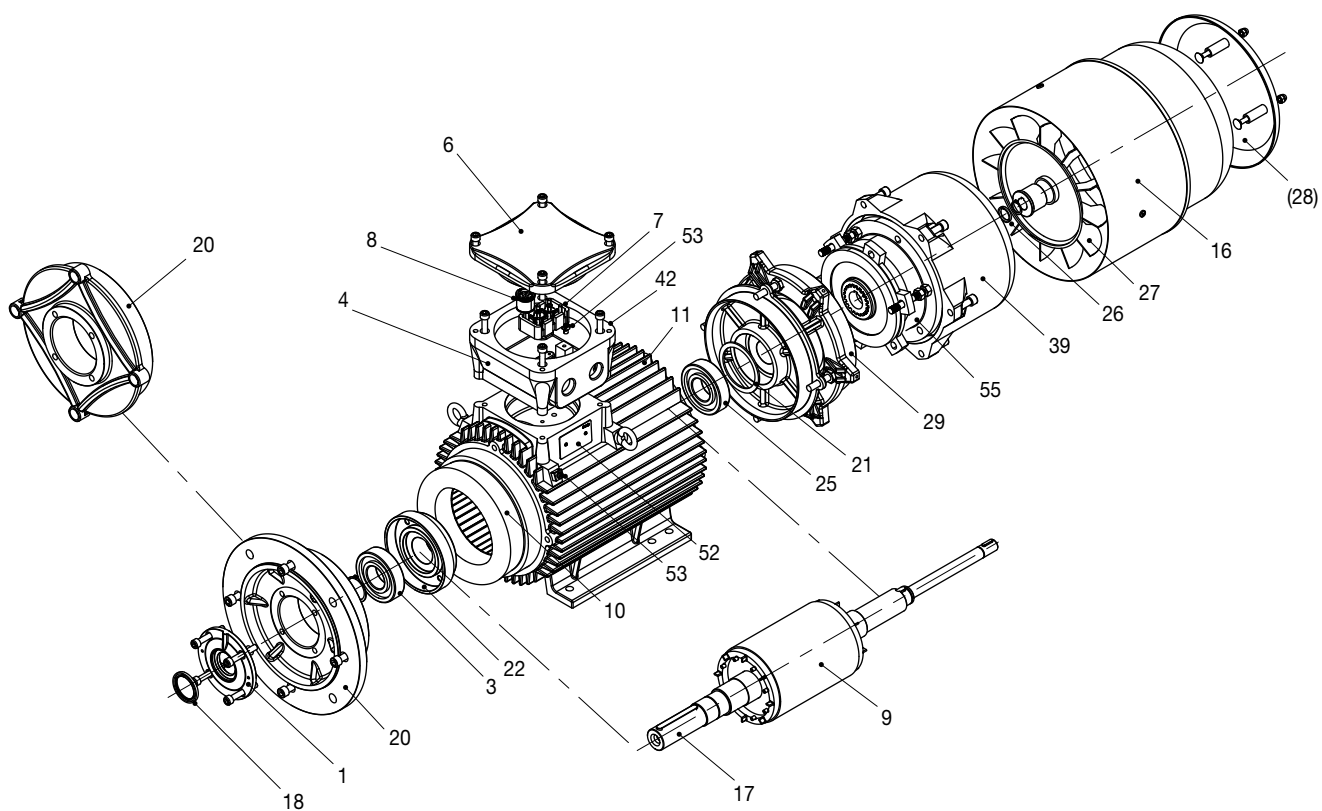
# 6. SPARE PARTS

## MOTORS WITH VENTILATED BRAKES

71+132



160



Kolmer Elektromotoren B.V.

Industrieweg 16  
NL-3881 LB Putten  
T +31 (0) 341 - 36 96 96  
F +31 (0) 341 - 36 96 90  
E [info@kolmer.nl](mailto:info@kolmer.nl)  
I [www.kolmer.nl](http://www.kolmer.nl)

