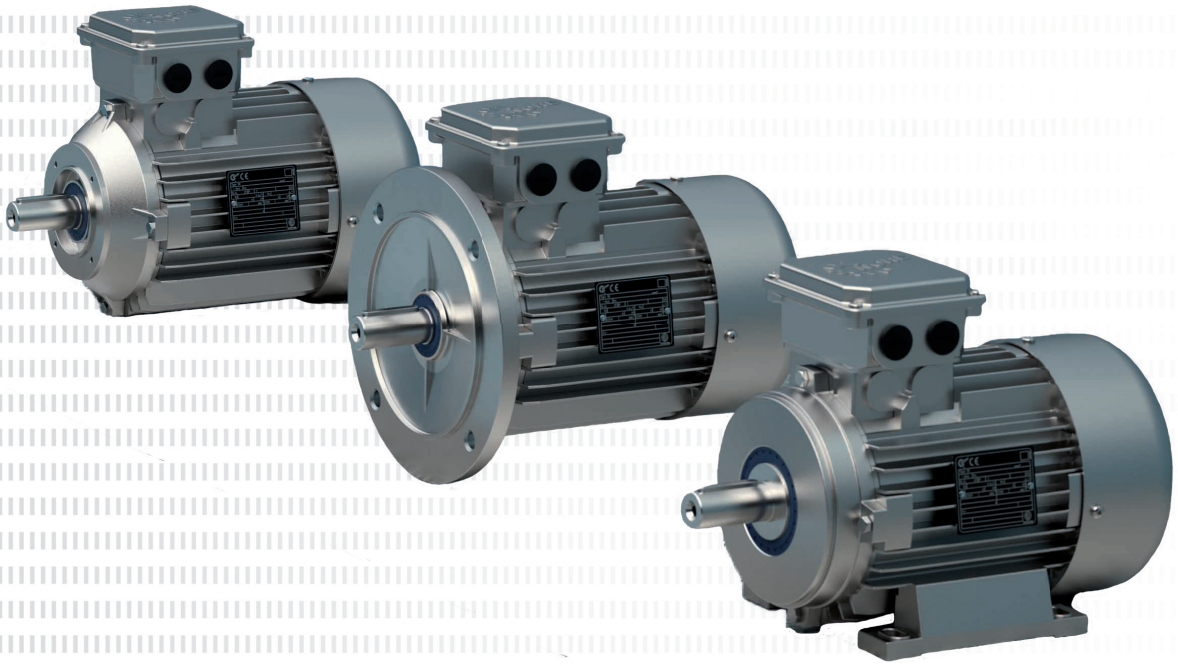


EN

Motors

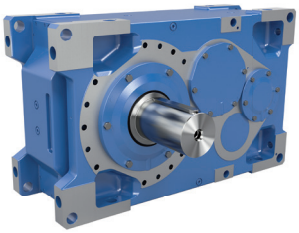
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NORD DRIVESYSTEMS

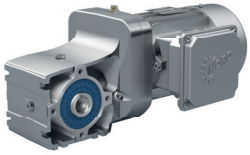
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NORD DRIVESYSTEMS Gruppe



Industrial gear units



Geared motors





Frequency inverters and motor starters



- Headquarters and technology centre in Bargteheide, near Hamburg
- Innovative drive solutions for more than 100 branches of industry
- 7 production locations with cutting edge technology produce gear units, motors and drive electronics for complete drive systems from a single source
- NORD has 48 subsidiaries in 36 countries and further sales partners in more than 50 countries. They provide local stocks, assembly centres, technical support and customer service
- More than 4,700 employees throughout the world create customised solutions



Headquarders in Bargteheide



Gear unit production





Inverter production



Motor production



Production and assembly



Motor mounting

Introduction

Electric drives in industrial applications consume up to 70% of the total energy required. For many companies, this offers great potential for optimisation.

NORD DRIVESYSTEMS supplies a wide range of electric motors, which exceed very much common global efficiency regulations and standards.

Our motors are used in many applications because they are not just powerful and robust, but can also be combined with all NORD gear units.

With high gear ratios and direct motor mounting, toothed motor shafts are used, which enable a compact design.

Whether in agitators, conveyor systems, intralogistics or the food industry:

NORD electric motors can be found wherever high performance is required. They operate reliably over many years with very high efficiency.

This saves operating costs for our customers and at the same time helps protect the environment.



Catalogue G2122 contains information about gear units, motors and inverters for use in gas and dust explosion protection (ATEX).

Certificates and declarations of conformity can be found on our homepage under www.NORD.com.

Asynchronous low voltage motors

The motors listed in this catalogue are asynchronous low voltage motors which can be used as geared motors or stand-alone motors.

The catalogue only includes motors from our own production in the power range from 0.12 to 55 kW. Information about motors with powers > 55 kW and special motors such as submersible motors or pot motors is available on request.

Information about Ex motors can be found in Catalogue G2122.

IEC60034-30 50Hz	60HZ (USA, ...)
IE1	**NEMA Standard Efficiency**
IE2	Equivalent to **NEMA High Efficiency**
IE3	Equivalent to **NEMA Premium Efficiency**
IE4	Equivalent to **NEMA Super Premium Efficiency**

Increased efficiency

NORD IE1/Standard motors

Motors with efficiency class IE1 are still available from NORD. Their use must be checked with regard to national regulations.
Special ambient conditions or operating mode result in exceptional circumstances which legitimises the use of these motors.
Usually, IE1 motors in S1 mode are permissible for export to countries which prescribe IE1/IE2 and countries in which there are no corresponding regulations.

Efficiency classes IE1, IE2, IE3, IE4

The standard IEC 60034-30:2008 specifies efficiency classes and therefore forms the basis for the various national efficiency requirements. In parallel with this, the standard IEC 60034-2-1:2007 harmonises the methods for measuring efficiencies.



Worldwide, requirements regarding motor energy efficiency are to be observed.

The motor selection is influenced by further development of motors and by ever more efficient technology as well as current and future national requirements in the country the drive is to be used.

NORD provides informatiob on this under:
www.nord.com / Products / Energy Efficiency Drives / National Regulations.

Introduction

IE2/IE3 - Technical differences

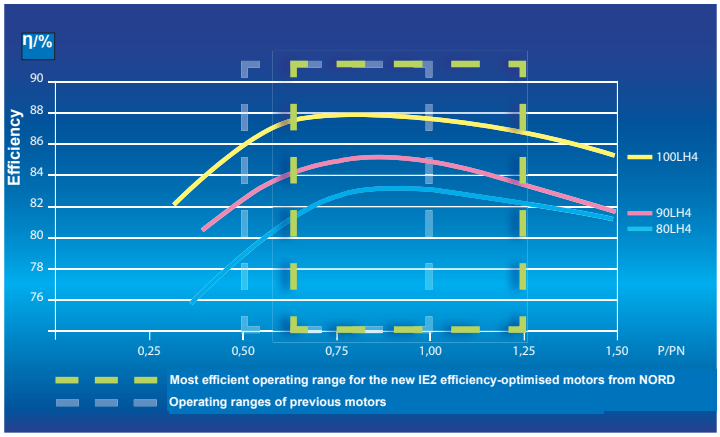
Motors with efficiency class IE3 differ considerably from the previously common IE1 motors.
Increased efficiency is achieved by using additional high quality materials as well as new production methods and design solutions. These definitely comply exceed the statutory requirements.

The change from previous motors to IE3 motors is facilitated by the (usually) same external dimensions of the NORD motor series. The previous motor dimensions are only insufficient in a few cases.

The tables in and beyond ⇨🕮 D2-21. provide a quick overview.

Changed values of the motors must also be taken into account (e.g. higher starting torques, higher breakdown torques, higher speeds, higher power reserves, higher weight).

In the following we explain how you can use the higher starting and stalling torques in connection with the extended operating range to your advantage.



The graphs show the principle efficiency characteristics of asynchronous motors

IE3 - Premium

Motors with efficiency class IE3 achieve a further improvement of efficiency. This increases the thermal reserves and therefore the possibilities for use. In the standard powers, NORD motors retain the standard sizes even with IE3. This is possible by the use of selected materials and innovative production technology. The wide voltage range is not indicated on the rating plate. However, operation as for IE2 motors is still possible. However, IE3 efficiency cannot be completely guaranteed.

The 4-pole IE3 motors are also suitable for 50Hz and 60Hz, which makes them suitable for use throughout the world.

NORD provides information on this under:
www.nord.com / Products / Energy Efficiency Drives / National Regulations.

IE4 / IE5 - The next level

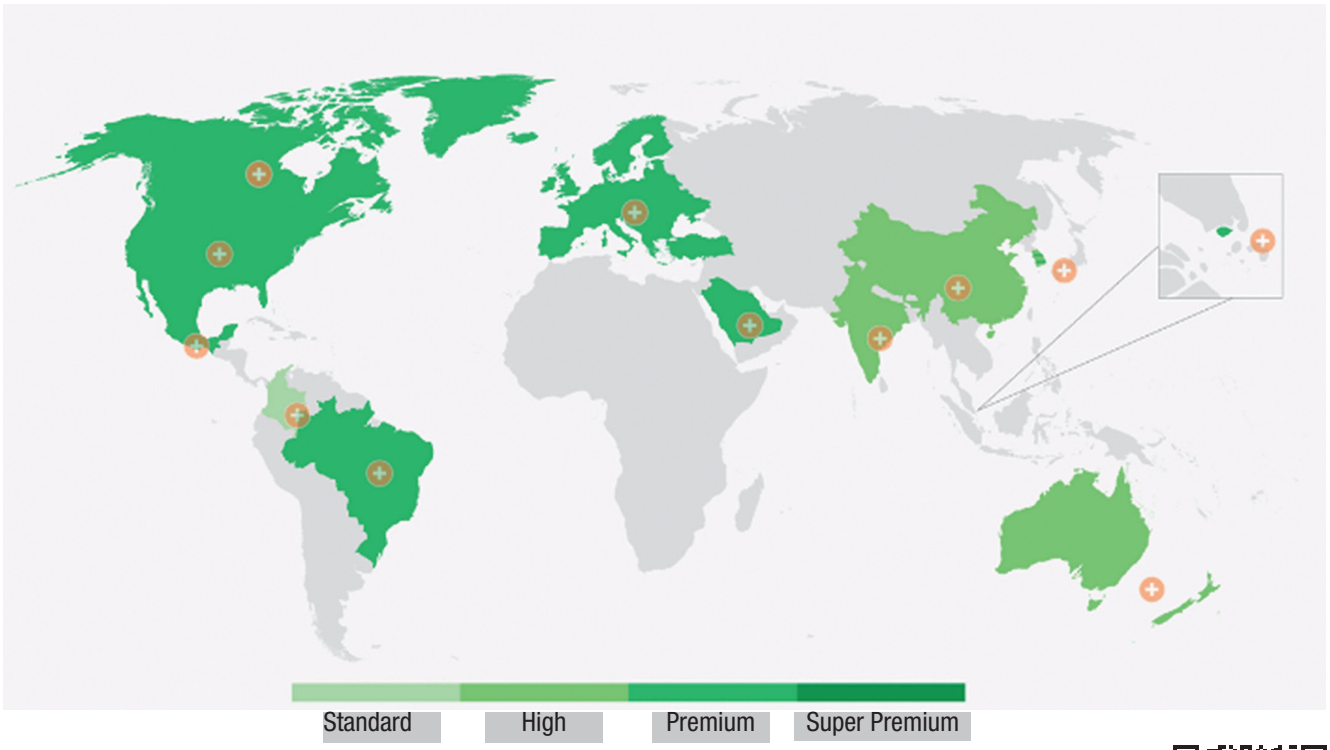
Motors with efficiency class IE4 achieve a further efficiency improvement. NORD has developed permanently excited synchronous motors for inverter operation in the power range up to 5.5. kW.

Further information about IE5 motors can be found in catalogues M5000.

Up date and careful

This catalogue was produced with the greatest care on the basis of the present legal situation. We cannot accept any warranty for technical changes.

Please note that standards and directives are subject to constant change. Even though we make every endeavour to ensure that this information is correct, this document cannot provide a substitute for a study of the relevant directives or import regulations.



Standards, Regulations Terminology

Motor power labelling

Axis height 63, 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250

Power code		
	S, M, L	Standard power (without efficiency class IEx)
	SA, MA, LA, MB, LB	Increased power (without efficiency class IEx)
	MX, LX	Standard power with lower axis height (without efficiency class IEx)
	S_, M_, L_	Standard power with efficiency class IEx
	X_, W_	Standard power with lower axis height with efficiency class IEx
	A_	Increased power "L" with efficiency class IEx
	R_	Reduced power with greater axis height with efficiency class IEx

Effiziency class Normal (IE1) H=high (IE2) P=premium (IE3)

Number of poles Standard: 2, 4, 6, 8-4, 4-2, 8-2... with IE2 + IE3: 4-pole other pole numbers on request

Motor type Only labelled on motors with special features

CUS	Motors approved according to UL and CSA
AR	Energy-efficient motors for Brazil "Alto Rendimento"(high efficiency)
KR	Energy-efficient motors for Korea

Options ⇨🕮 A7, A21

Example

100	L	H	/	4	CUS	RD	=	Axis height 100	Power code L	Efficiency class H(IE2)	Number of poles 4	Motor type CUS	Option RD

Examples

	IE1 + Standard	IE2	IE3
1,5 kW	90 L/4	90 LH/4	90 LP/4
2,2 kW	100 L/4	100 LH/4	100 LP/4
3,0 kW	100 LA/4	100 AH/4	100 AP/4
18,5 kW	180 MX/4	180 MH/4	180 MP/4
22,0 kW	180 LX/4	180 LH/4	180 LP/4
30,0 kW	200 LX/4	200 XH/4	225 RP/4

Options

Abbreviation			Meaning
BRE +			Brake/brake torque + sub-options
DBR +			Double brake + sub options
Sub option (⇨ 📖 B13-14)	RG	*	Rust protected version
	SR	*	Dust and rust protected version
	IR	*	Current relay
	FHL	*	Lockable manual release
	HL		Manual release
	MIK		Microswitch
	AS55		Outdoor installation
		(*	Not for DBR)
BSH			Standstill heater/brake
NRB1/2			Noise-reduced brake
ERD			External earthing terminal
TF			Thermistor, PTC resistor
TW			Temperature sensor, bi-metal
SH			Standstill heating
WU			Silumin rotor
Z			Heavy fan, cast-iron fan
WE +			2. Shaft journal
	HR		Hand wheel
RD			Protective shield
RDT			Protective shield, textile fan cowl
RDD			Double fan cowl
AS66			Outdoor installation

Abbreviation			Meaning
OL			Without fan
OL/H			Without fan, without fan cowl
KB			Closed condensation drain hole
MS			Motor plug connection
EKK			One-piece terminal box
KKV			Encapsulated terminal box
FEU			Humidity protection insulation
TRO			Tropical protection insulation
F			External fan
RLS			Backstop
IG1	(IG11,	12)	1024 pulse incremental encoder
IG2	(IG21,	22)	2048 pulse incremental encoder
IG4	(IG41,	42)	4096 pulse incremental encoder
IG.K			Encoder with terminal box
MG			Magnetic incremental encoder
IG			Incremental encoder
AG			Absolute encoder

Versions

Versions according to DIN EN 60034-7

The same dimensions apply for the following versions:

IM B3 ⇨ IM B6, IM B7, IM B8, IM V5, IM V6
IM B5 ⇨ IM V1, IM V3
IM B14 ⇨ IM V18, IM V19

The motors can be ordered in the basic version and operated according to the above list (universal version) The installation position must be stated for versions with a condensation drain hole (KB). For versions IM V5, IM V1, IM V18 we recommend the version with a protective shield (RD).

The labelled installation position of the gear unit must be observed for geared motors.

Dimension designations as per DIN ISO 50347

⇨ 📖 D2-21

	Fits:	
D, DA	≤ 30	j 6
	> 30	k6
N	≤ 250	j 6
	> 250	h6
H		-0,5

Parallel key grooves + parallel keys as per DIN 6885/1
Threaded holes DB + DC as per DIN 332/2

Classification of power, shaft journals and flanges;
Shaft parallelism / foot surface; shaft concentricity
Flange / Shaft runout as per DIN EN 50347

Standards, Regulations Terminology

NORD motors

- are constructed according to IEC 60034 Part 1, 2, 5 ... 9, 11, 12, 14, 30 and have a CE label
- are enclosed, self-ventilated squirrel cage motors in three or single phase versions
- are also available according to the following standards, recommendations and classifications:

NEMA | cULus LISTED | EAC | cSAus

NORD energy-efficient motors

IE1, IE2, IE3	Efficiency classes according to IEC 60034-30
CC 092A	ElSAct efficiency classification (USA) - ee
AR	Brazilian efficiency classification
KR	Korean efficiency classification

China Compulsory Certifi cation
Nr.: 200 701 040 125 842 9

EAC certificate for import into the Eurasian Customs Union

CE labelling of products which comply with EU directives

NEMA
Regulation of the National Electrical Manufacturers Association

energy verified
CSA approved energy-saving motors (High Efficiency)
File No.: 1305200
Master Contract: 189340

cSAus
CSA and CUS approved motors 63 SP/4 - 250 WP/4
File No.: 1293961 (LR112560)
Master Contract: 189340

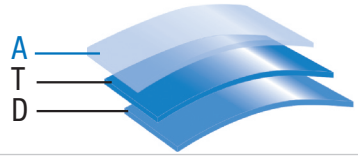
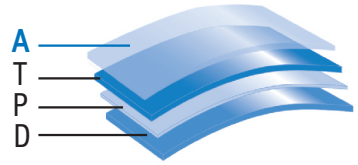
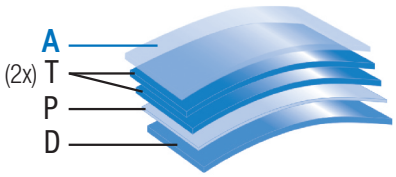
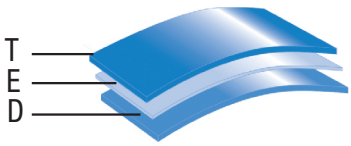
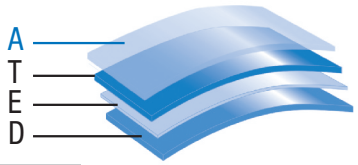
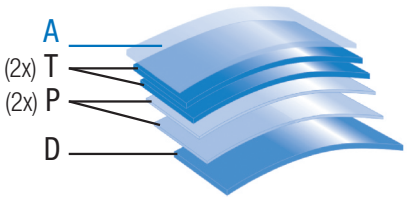
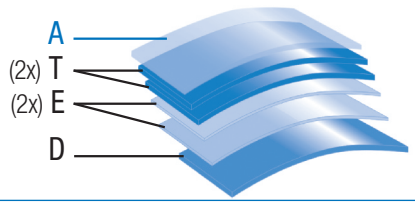
cULus LISTED
UL listed motors
63 S - 180 LX File No.: 191510



Information about explosion protected motors (ATEX 2014/34 EU) can be found in the NORD

- Special catalogues: G2122
- Internet: http://www2.nord.com/cms/de/documentation/dop_documentation.jsp

Painting

Coating / Field of Application	Class **	Structure	Coating Thickness *
Basic Basic+ Indoor installation. *Previously F2*	C2		50 - 90 µm
NORD Severe Duty 2 NORD Severe Duty 2+ Indoor installation and protected outdoor installation (i. e. open, unheated halls). *Previously F3.0*	C2		110 - 150 µm
NORD Severe Duty 3 NORD Severe Duty 3+ Outdoor installation, city and industrial atmosphere with low contamination. *Previously F3.1*	C3		160 - 200 µm
NORD Severe Chem Duty 3 Normale chemical contamination. *Previously F3.4*	C3		100 - 140 µm
NORD Severe Food Duty 3 NORD Severe Food Duty 3+ Food packaging areas. *Previously F3.5*	C3		100 - 140 µm
NORD Severe Duty 4 NORD Severe Duty 4+ Outdoor installation, city and industrial atmosphere with moderate contamination. *Previously F3.2*	C4		220 - 260 µm
NORD Severe Duty 5 NORD Severe Duty 5+ Outdoor installation, city and industrial atmosphere with high contamination. *Previously F3.3*	C5		200 - 240 µm

A	Optional clear lacquer coating (+ versions) Coating Thickness + 25 µm	T	2-Component Polyurethane Top Coat
		E	2-Component EP Zinc Phosphate Primer
Z	Levelling of contour recesses and gaps with polyurethane-based sealant possible for NSD2, NSD3 and NSD4 included in NSD5	P	2-Component Polyurethane Primer
		D	Single Component Dip Primer (for cast-iron units only)

*** Comparable to DIN EN ISO 12944-2 classification of ambient conditions*

** Protocol of the coating thickness based on ISO 19840 available on request*

Motor selection

Selection of a suitable motor

A number of factors must be considered for the selection of a motor. These include e.g. its power, speed, variable speed range, torque, size, the necessary motor options and the ambient conditions. Several aids for motor selection are listed below.

Motor designation

Motors are designated according to their axis height and their rated power. The axis height designates the dimension between the centre of the output shaft and the foot contact surface of a foot-mounted motor. Motors are stamped with a rated power according to DIN EN 50347 Compliance with the standard means that the powers of the motors increase in standardised increments - e.g. for 4-pole motors from 0.12 kW through 0.18 kW up to 0.25 kW etc.

The power which a motor can actually provide in compliance with its thermal class is usually higher than the rated power but less than the next highest power level.

Determination of the apprximate motr speed

According to the version, a differentiation between 2, 4, 6 and 8-pole motors is made in this catalogue. The rounded idling speeds of these motors is stated in the following table

Number of poles	2	4	6	8
Idling speed [rpm] (rounded) 50Hz	3000	1500	1000	750

The most commonly used geared motors have 4 poles. Due to its popularity, this motor has the shortest delivery time and has a good power to price and weight ratio.
With geared motors, the output speed of the gear unit is determined by the motor speed and the speed ratio of the gear unit.

The following relationship applies:

$$\text{Gear unit output speed} = \frac{\text{Motor speed}}{\text{Gear unit speed ratio}}$$

The speed of the motor changes slightly under the influence of the load. The higher the load (the torque which must be provided), the lower the speed. This effect is greater with smaller motors. Rated values which are described in the catalogue and on the rating plate always relate to the speed at the rated power.

In addition extended operating points are described for IE3 motors ⇨📖 A14, in which higher powers can be obtained from the motors. The speed at this operating point deviates from the rated speed. In addition, switchable pole motors are described, which have 2 rated speeds.

Selection of motor power

The power or the speed which the driven machine requires is important for selection of the motor.
In this catalogue, the power is stated in kilowatts [kW] and the torque is stated in newton metres [Nm]. Depending on the drive application, calculation of the necessary power or torque is complex.

The following explanations and technical data assist with the design of a drive unit which is performed with the aid of calculation programs such as NORD-AAP or with technical formularies. The power which is stamped on the motor rating plate depends on the mode in which the motor is operated.

Explanation of the main operating modes

Continuous operation — with constant load — S1

Short-term operation — with constant load — S2

Thermal equilibrium is not reached.
The motor is only switched on again if the motor has cooled to a maximum of 2K above the cooling air temperature.

Example: S2-10min.
Recommended values for specification: 10, 30 min

Intermittent operation — consisting of similar load cycles with phases of constant load and subsequent pauses. The frequency and heaviness of starting must not have a significant influence on heating. Unless otherwise agreed, a cycle time of 10 minutes is assumed. The relative duration of switch on states the ratio of the operating time to the cycle time. — S3

Example: S3-40% ED: 4 min Load - 6 min pause
Recommended values for specification: 40 % – Deviating values on request!

Cyclic operation — with high switching frequency ⇨🕮 A25 External fan (F) — S4

Continuous operation — with intermittent load — S6

consisting of similar load cycles with phases of constant load and subsequent idling. Cycle time and relative switch-on time are as for S3.

Example: S6 - 40% ED
Recommended values for specification: 40 % – Deviating values on request!

Uninterrupted operation — with non-periodic changes of speed and torque — S9

A mode in which, in general, the load and speed change non-periodically within the permissible operating range.
In this mode, there are frequent overloads which may be far in excess of the full load.

Example: S9 – Statement of average power!

Continuous operation — Note

The listed values of NORD motors in the catalogue apply for continuous operation (S1). In practice, motors frequently only operate for brief periods or with frequent interruptions.

Power increase in short-term and intermittent operation

In short-term (S2) and intermittent (S3) mode, electric motors can be subjected to greater loads than in continuous operation (S1). The factors for the permissible power increase in relation to the rated power (P_N) for continuous operation are listed in the following table. In principle, the power may only be increased to the point where the relative breakdown torque (M_K/M_N) divided by the power increase factor results in a value of ≥1.6.
In individual cases, higher factors than those which are stated in the table may result. These will be notified on request.

S2	permissible power	S3	permissible power	S6	permissible power
10min	1,40 x P_N	25%	1,33 x P_N	25%	1,45 x P_N
30min	1,15 x P_N	40%	1,18 x P_N	40%	1,35 x P_N
		60%	1,08 x P_N	60%	1,15 x P_N

For greater switch-on frequencies and heavy starting, the motor design and classification of the operating mode should be carried out by NORD. For this, details must be provided with regard to the:

- Relative switch-on duration
- External moment of inertia
- Switching frequency
- Load torque relative to speed
- Type of braking

Motor selection

Total torque

The necessary total torque for driving a machine is comprised of the

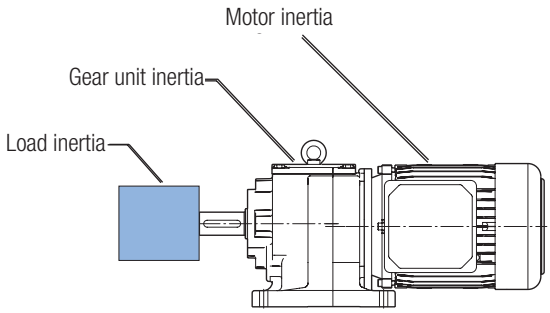
- Static torque
- Dynamic torque

Static torque

The static torque is necessary to operate a machine under constant load and at constant speed. Depending on the machine which is to be driven, friction, efficiencies and lifted loads etc. are taken into account for calculation of the static torque.

Dynamic torque

Torque is also required to accelerate inertial masses. The inertial mass is subdivided into the mass of the load which is to be accelerated and the rotating mass of the motor (rotor).



For calculation of the starting and braking characteristics of the drive, all of the accelerated moments of inertia which act on the motor shaft are included and added together.

$$J_x = \frac{J_L}{i_{Ges}^2}$$

J_x	External moment of inertia reduced to the motor shaft	[kgm²]
J_L	Moment of inertia of the load	[kgm²]
i_{Ges}	Gear unit speed ratio	

If a gear unit is used between the load and the motor, the calculated moment of inertia of the load reduces according to the square of the gear unit speed ratio. The moment of inertia of the gear unit can usually be neglected, as it is small in relation to the moment of inertia of the motor.

The motor torque is calculated using the following formula:

$$M_a = \frac{\pi}{30} \cdot J \cdot \frac{\Delta n}{t_a}$$

The acceleration torque M_a of a motor depends on the total moment of inertia reduced to the motor shaft J, the required speed change Δn and the required acceleration time t_a.

⚠ For mains operation, the acceleration time must not exceed 4 seconds in order to prevent the motor from overheating.

In the catalogue, the acceleration torque for mains operation M_A is described in relation to the rated torque M_A, e.g. $M_A / M_N = 2.3$.

Due to the change in torque from standstill up to the rated speed, approx. 90% of the acceleration torque can be utilised during the acceleration time (see ð& A13 Illustration of torque characteristic curve).

For inverter operation with NORD frequency inverters, the ratio M_A / M_N has a value of 2.0 for a period of 3 seconds and 1.5 for a period of 60 seconds and is therefore less than when starting with mains operation.

Power, torque, speed

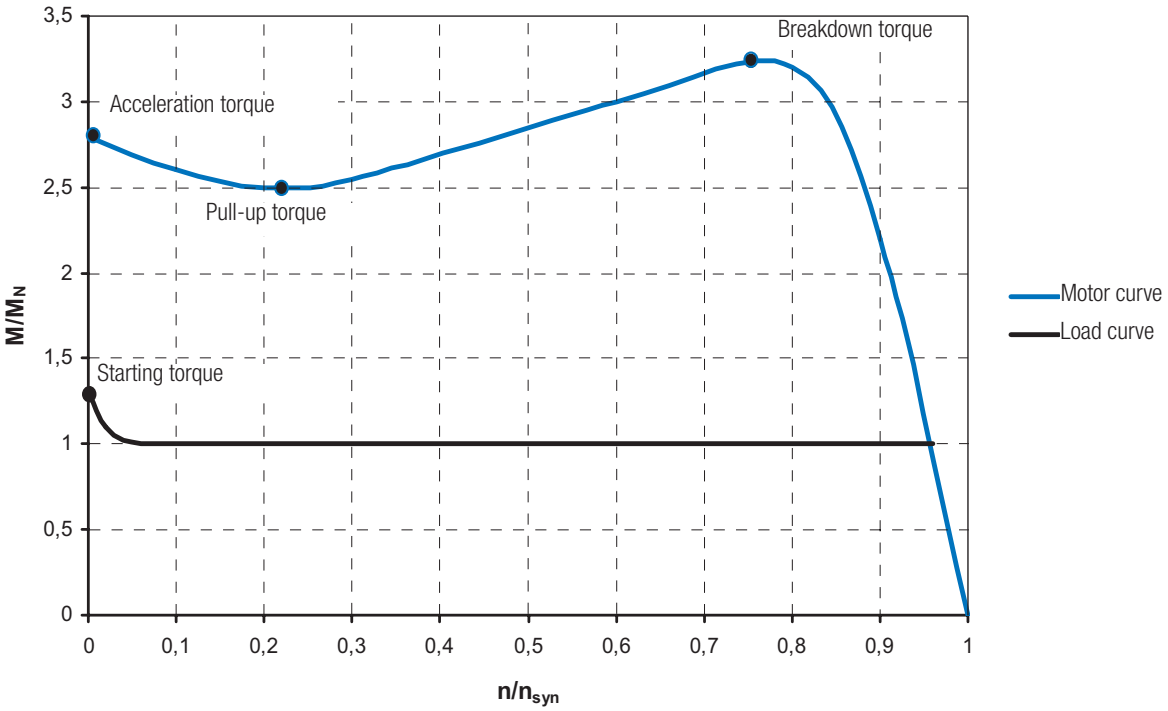
The relationship between power, torque and speed is described by the following formula, into which alternatively the output speed and output torque for geared motors or the motor speed and the motor torque for motors can be entered. The motor power which is stamped on the motor rating plate and stated in the catalogue is the mechanical power which is delivered. Due to the efficiency of the motor, the electrical power which is consumed by the motor is considerably greater than the output power.

$$P_1 = \frac{M_2 \cdot n_2}{\eta \cdot 9550}$$

P_1	Power	[kW]
M_2	Torque	[Nm]
n_2	Speed	[min-1]
η	Gear unit efficiency	[%]

The example in the illustration shows the torque graph for a 90 kW asynchronous motor with mains operation. The load curve may differ depending on the application. The intersection of the load curve and the motor characteristic curve is the operating point of the motor. The operating point usually differs from the rated point, which explains the difference between the actual speed which occurs in the application and the rated speed according to the catalogue.

Torque curve



Load curve and motor curve (starting with mains)

Comparison of NORD motor torques

There are many years of empirical experience for the selection of motors, which can only be roughly transferred to the new IE3 motors. In spite of their essentially identical dimensions, the motor types differ with regard to their torques. The rated torque M_N largely remains the same, as the rated power remains constant and the rated speeds are also largely unchanged.

NORD motors have high acceleration and breakdown torques. Most NORD IE3 motors have even higher values. These high acceleration torques can be used to assist acceleration processes, e.g. To change from static to dynamic friction or to start pumps.

Motor selection

Overload capacity of IE3 motors

The large thermal reserves of IE3 motors can be taken into account for the design of the drive. The following table describes the maximum continuous thermal load within thermal class F with reduced efficiency.

1500 / 1800 1/min
50 / 60 Hz

Extended operating range

Typ	P_N [kW]	f [Hz]	P_{max} ISO F [kW]	U [V]	ΔU [%] +/-	n_N [rpm]	M_N [Nm]	I_N [A]	cos φ	η [%]	Service Faktor (NEMA)
			P_{max} ISO F *								
63 SP/4	0,12	50	0,18	400	10	1210	1,42	0,54	0,82	58,7	1,50
		60	0,18	460	10	1630	1,05	0,43	0,72	68,6	1,50
63 LP/4	0,18	50	0,25	400	10	1270	1,86	0,73	0,79	63,8	1,39
		60	0,25	460	10	1655	1,44	0,59	0,70	72,8	1,39
71 SP/4	0,25	50	0,37	400	10	1305	2,71	0,99	0,85	65,7	1,48
		60	0,37	460	10	1680	2,10	0,77	0,78	74,8	1,48
71 LP/4	0,37	50	0,45	400	10	1345	3,19	1,11	0,80	71,1	1,22
		60	0,55	460	10	1640	3,20	1,11	0,82	74,3	1,49
80 SP/4	0,55	50	0,75	400	10	1350	5,31	1,77	0,81	75,3	1,36
		60	0,75	460	10	1685	4,25	1,49	0,78	80,1	1,36
80 LP/4	0,75	50	1,10	400	10	1335	7,90	2,51	0,83	78,0	1,47
		60	1,10	460	10	1680	6,27	2,08	0,80	82,4	1,47
90 SP/4	1,10	50	1,50	400	10	1370	10,2	3,18	0,84	80,5	1,36
		60	1,50	460	10	1700	8,30	2,66	0,83	84,8	1,36
90 LP/4	1,50	50	2,00	400	5	1330	14,4	4,34	0,85	78,0	1,33
		60	2,20	460	10	1660	12,7	3,88	0,86	83,0	1,47
100 LP/4 **	2,20	50	3,00	400	10	1440	19,9	5,90	0,84	87,2	1,36
		60	3,00	460	10	1750	16,4	5,02	0,84	89,6	1,36
100 AP/4 **	3,00	50	4,00	400	10	1425	26,8	7,82	0,86	86,0	1,33
		60	4,00	460	10	1740	22,0	6,71	0,84	88,9	1,33
112 MP/4	4,00	50	5,00	400	10	1420	33,6	9,71	0,86	85,9	1,25
		60	5,50	460	10	1725	30,4	9,20	0,86	87,2	1,38
132 SP/4	5,50	50	7,50	400	10	1445	49,6	14,6	0,84	87,8	1,36
		60	7,50	460	10	1750	40,9	12,8	0,83	88,8	1,36
132 MP/4	7,50	50	9,20	400	10	1440	61,0	17,8	0,83	89,1	1,23
		60	9,20	460	10	1755	50,1	15,4	0,82	91,1	1,23
160 SP/4	9,20	50	11,0	400	10	1455	72,2	19,8	0,89	90,1	1,20
		60	11,0	460	10	1765	59,5	17,2	0,87	91,0	1,20
160 MP/4	11,0	50	15,0	400	10	1445	99,1	27,2	0,88	88,9	1,36
		60	15,0	460	10	1755	81,6	23,9	0,87	89,6	1,36
160 LP/4	15,0	50	18,5	400	10	1460	121,0	33,0	0,88	90,5	1,23
		60	18,5	460	10	1765	100,1	29,7	0,87	90,7	1,23
180 MP/4	18,5	50	22	400	10	1475	142,4	40,1	0,85	92,4	1,19
		60	22	460	10	1780	118,0	35,6	0,84	92,2	1,19
180 LP/4	22,0	50	28	400	10	1460	183,1	51,1	0,88	89,8	1,27
		60	30	460	10	1765	162,3	47,3	0,88	90,5	1,36
225 RP/4	30,0	50	37	400	10	1480	238,7	68,0	0,85	93,2	1,23
		60	37	460	10	1775	199,0	58,1	0,85	93,8	1,23
225 SP/4	37,0	50	45	400	10	1475	291,3	82,2	0,86	92,7	1,22
		60	45	460	10	1775	242,1	70,1	0,85	94,4	1,22
225 MP/4	45,0	50	55	400	10	1475	356,1	99,1	0,86	92,9	1,22
		60	55	460	10	1775	295,9	84,8	0,85	95,1	1,22
250 WP/4	55,0	50	60	400	5	1475	388,4	105,5	0,87	93,2	1,09
		60	60	460	10	1775	322,8	91,2	0,86	95,4	1,09

* Supplement for motors ⇨ C12 ** APAB series

Inverter operation

Frequency inverter operation

The use of frequency inverters considerably extends to possibilities for using three-phase motors and geared motors in comparison with simple mains operation.

The advantages at a glance:

- Continuous speed variation over a wide range
- Automatic speed-load adjustment through slip compensation with vector inverters
- Programmable acceleration ramp for gentle starting, which protects the drive and the application and prevents high starting currents
- Controlled, adjustable delay down to standstill (only a holding brake may be required)
- Many software-based functions are available for controlling and monitoring the drive, including dynamic positioning with NORD inverters.
- Possibility of energy saving through process modification or optimisation as well as the energy saving function of NORD inverters

NORD three-phase motors (not switchable pole) are suitable for operation with commonly available frequency inverters. Through the use of double-lacquered wire and phase insulation the windings are protected against damage due to rapid voltage increases such as occur with modern inverters with pulse width modulation. The use of dv/dt or sinusoidal filters is necessary for motors with inverter operation above 500V.

With inverter operation, motors can produce their full rated power in continuous operation.
In general there is no restriction for motor options with inverter operation. The motor brake and external fans may not be supplied from the motor power supply.

The type of encoder system (incremental or absolute encoder) depends on the requirements of the application, the type of signal (TTL, HTL, SSI, CANopen) and the type of frequency inverter or encoder interface which is used.

In generally it is advisable to equip each speed-controlled drive with temperature sensors and to evaluate these via the frequency inverter. This protects the motor against overheating.

Inverter operation - characteristic curves and planning

Some important questions, such as

- the lowest possible frequency or speed,
- Frequency increases above 50Hz,
- Power increase of three-phase motors with the 87Hz characteristic curve,
- Extended variable speed range with the 100Hz characteristic curve,

we would like to introduce and answer them here that contribute to the optimal use of frequency converter drives. The three-phase asynchronous motor can in principle be operated in the adjustment range from 0 to 2 times the nominal speed. The maximum speed is determined by mechanical limits.

Lowest possible frequency or speed

At low speeds, cooling by the motor fan is greatly reduced. As a result, the typical thermal losses of the motor are not adequately dissipated and overheating may occur in continuous operation. With operation at the rated load, this range starts at speeds which are < 1/2 of the rated speed (25Hz).

This can be remedied by the use of an external fan which completely eliminates the thermal problem.
Continuous operation is then possible even with the lowest possible speeds (2 x 5Hz slip frequency).

Alternatively, a larger motor can be used.

With this, the drive is operated with a reduced capacity. Therefore there is also a lower power loss with an additional increase in the thermal reserve due to the larger size of the motor.

The possible torque, overload and smooth running essentially depend on the performance of the frequency inverter which is used. A low required speed or speed “0” may only be possible with the use of speed feedback via an encoder.

Motor selection

Design according to the 50Hz characteristic curve (standard design)

Adjustment range 1 : 10 (5 - 50Hz)

Three-phase asynchronous motors are designed for a rated operating point (e.g. 400V/50Hz). Up to its rated frequency the motor is able to develop its rated torque.

Depending on the frequency, the speed of a 4-pole motor can be calculated as follows:

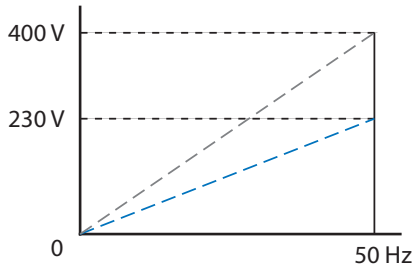
$$n_{Hz} = [(1500\ rpm \cdot f_{Hz}) / 50Hz] - Slip\ speed$$

For 4-pole motors, depending on the speed, the relationship between the power and torque is as follows:

$$M = \frac{P \cdot 9550}{n}$$

A speed reduction < 50 Hz does not result in increased torque as is the case with variable speed gear units, but rather results in a power reduction. For constant torque the current remains constant and the voltage reduces with the frequency.

A further frequency increase in the weak field range therefore results in a torque reduction.



Above the rated frequency the available torque reduces, as at higher frequencies the voltage is no longer increased. The magnetic flux reduces. This range is referred to as the weak field range.

Physical conditions for constant torque:

M = Constant	⇨	Φ = Constant	⇨	V/f = Constant
Torque		Magnetic flux		Voltage/frequency

The condition V/f = Constant can only be implemented by the frequency inverter at most up to the rated operating point (V_{nenn}/f_{nenn} = Constant). A further voltage increase above the mains voltage is not technically possible.

The torque reduces according to the relationship

$$^1/_x \quad \Rightarrow \quad M_{AB}/M_{NENN} = f_{Nenn}/f_{AB}$$

Minus further additional losses, due to the increased frequency

Example:

1.4X rated frequency = 70Hz

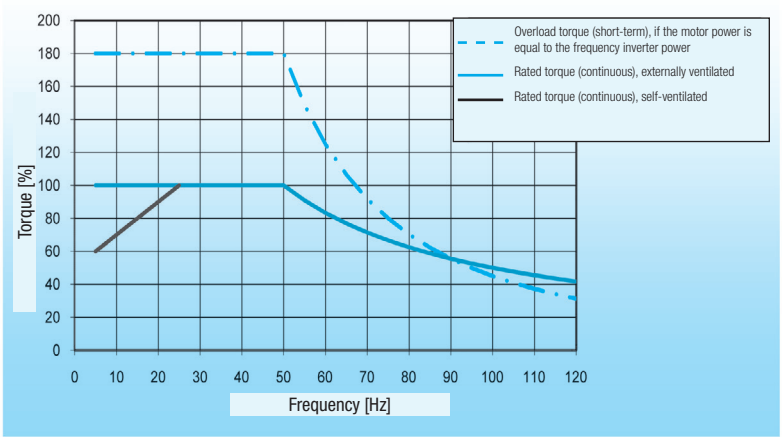
$$M_{70Hz} = \frac{f_{NENN}}{f_{AB}} \cdot M_{NENN} = \frac{50Hz}{70Hz} \cdot M_{NENN} = 71\% \cdot M_{NENN}$$

Under certain circumstances the weak field range may start before the actual point for the type is reached.

Possible causes of this are voltage losses due to the frequency inverter as well as chokes or long cable lengths.

In the weak field range, in particular the reduced overload capacity of the drive must be taken into account, because the field weakening causes a large reduction in the breakdown torque of the motor.

The effect is explained in the following 50Hz characteristic curve:



The torque reduction for self-ventilated motors at frequencies < 25Hz applies for continuous operation.
The normal acceleration and overload torques for short-term operation are also available on the frequency inverter.

If applications do not require a constant torque over the entire adjustment range, this must be taken into account.

For example, centrifugal pumps and fans have a quadratically increasing characteristic curve, which favours operation at low speeds.

Design according to the 87Hz characteristic curve (for 4-pole asynchronous motors)

Adjustment range *1 : 17 (5 - 87Hz)*

The advantage of this design is an increase of the motor power and speed above the rated values for the motor at constant torque. This results in a greater adjustment range of 1:17 or greater, or selection of a smaller motor for the given power with adaptation of the speed ratio. This also achieves an improvement in efficiency.

Disadvantages are louder (fan) noises and the possible necessity for an additional gear unit stage.

With the 87Hz characteristic curve the same thermal restrictions apply in the low speed range as for the 50Hz version ⇨🕮 A16.

The weak field range only begins above the cut-off frequency of 87Hz.

This mode of operation is possible if the following conditions are taken into account:

- The motor must be wired for 3~230V, i.e. For 230/400V motors → Delta circuit (motors with 400/690V windings are not suitable for this operating mode and mains with 230V per phase)
- The frequency inverter must have an operating voltage of 3~400V and the rated output current must at least correspond to the delta current of the motor. From this, it follows that:

$$\frac{\text{Inverter power}}{\text{Rated motor power}} > 1.73$$

- Due to the higher maximum motor speeds, the speed ratio of the gear unit may need to be redetermined.

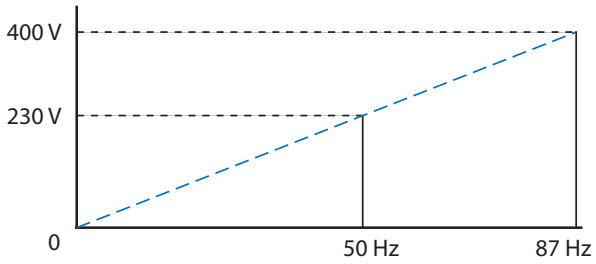
Remarks

With this configuration

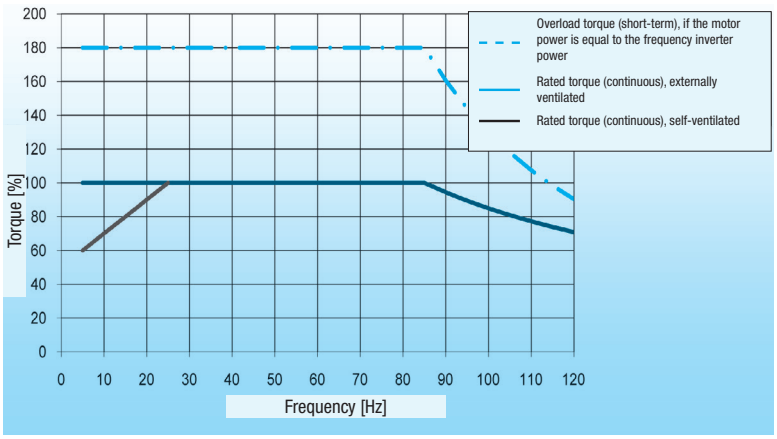
- 230V/50Hz motor on a frequency inverter with 400V
  - the rated operating point is at 230V/50Hz
  - extended operating point at 400V/87Hz.

Due to the increase of the operating point from 50Hz to 87Hz with constant torque, the motor power also increases by a factor of $\sqrt{3} = 1.73$.

Operation of a 230V motor at 400V is completely non-critical, as the motor windings are designed for test voltages > 2000V.



The effect is explained in the following 87Hz characteristic curve:



It must be noted that the rated torque of the motor is not increased. In particular, the behaviour does not change in the range from 0 to 50Hz. The normal adjustment range is 1:17 or greater.

Motor selection

Design according to the 100Hz characteristic curve (for 4-pole asynchronous motors)

Adjustment range 1 : 20 (5 - 100Hz)

The weak field range extends over the entire range up to the 100Hz point, which results in a very large adjustment range. Lower speeds can also be better utilised because the three-phase motor is operated with a lower torque.
This is achieved because the motor is not operated at its thermal limit, but in spite of this is operated with precisely matched motor data by the vector-controlled frequency inverter.

This mode of operation is possible if the following conditions are taken into account:

- The motor must be designed for 3~230V, i.e. for 230/400V motors → delta circuit.
- New 100Hz motor data need to be calculatedn → contact Getriebebau NORD
- The frequency inverter must have an operating voltage of 400V.
- The frequency inverter power must be one standard level higher than that of the motor.
- Due to the higher maximum motor speeds, the speed ratio of the gear unit may need to be redetermined.

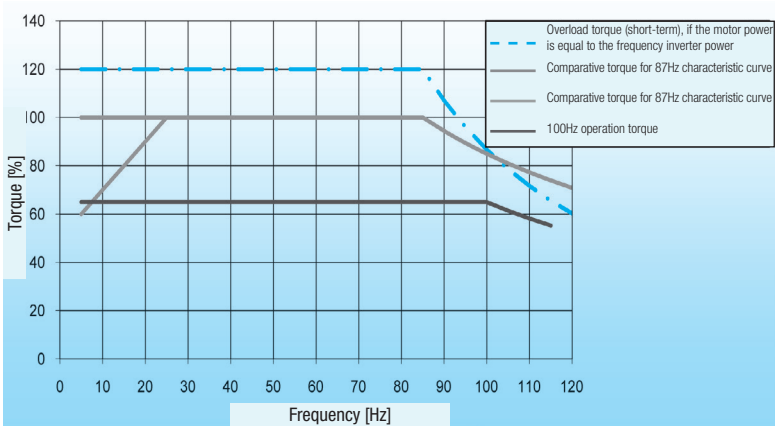
Remarks

With this configuration the rated operating point of the DS standard motor is 400V/100Hz. This is made possible by recalculation of the motor data by Getriebebau NORD.

The resulting torque is available over the entire adjustment range (5...100Hz) and is somewhat below the standard value for the particular motor size.

Depending on the motor size, the reduction of the output power is between 30 and 40%, which however is compensated by the greater speed reduction for the same output speed.

The effect is explained in the following 100Hz characteristic curve:



Allocation of frequency inverters and motors

The frequency inverter is selected considering the characteristic curves depending on mains voltage and rated motor current. For this, the following applies: Rated inverter output current ≥ rated motor current.

4-Pole asynchronous motors have become established as the standard on the market. However, in principle motors with other numbers of poles can be operated with an inverter. For 2-pole motors, the suitability of the motor for the gear unit should be checked. Permissible maximum motor speeds are to be observed, ⇨🕮 Chapter C.

In addition to the SK500 control cabinet inverter, NORD also supplies the SK180E and SK200E decentralised frequency inverters with a higher protection class for direct attachment to the motor. In connection with decentralised inverters, some special features are to be observed with regard to motor options, e.g. brake control directly via the inverter.

Further information can be found in the E3000 catalogue and in the manuals for the corresponding product family,
⇨🕮 www.nord.com / Documentation / Manuals.

Design with the operating point at 70Hz

A further variant to obtain an increased adjustment range is a design with the operating point at 70Hz. This method utilises the 50Hz characteristic curve, but specifies the gear unit speed ratio so that the maximum speed is only achieved at 70Hz. In rare cases, a further gear unit stage is required for this. In comparison with the 50Hz characteristic curve, nothing changes with regard to the frequency inverter and the motor.

Advantages

- The adjustment range increases to 1 : 14 (5 - 70 Hz)
- Higher torques over a large part of the adjustment range, especially 5 - 50 Hz

Above a frequency > 70 Hz, as a result of field weakening the torque decreases more than it increases as a result of the higher gear unit speed ratio.

Calculation of torque

Typical geared motor, mains operation	Typical geared motor, with frequency inverter
n_2 = 100 rpm M_2 = 100 Nm f = 50 Hz	n_2 = 10 - 100 rpm M_2 = 100 Nm f = 7 - 70 Hz (approx.)
P = (100 Nm / 9550) · 100 rpm P = 1.05 kW, Selected = 1.1 kW Motor 90S/4	P = (100 Nm / 9550) · 100 U/min P = 1.05 kW, Selected = 1.1 kW motor
i = 1500 rpm / 100 rpm = 15	i = 2100 rpm / 100 rpm = 21
$M_{N(50Hz)}$ = (1.1 kW · 9550) / (1500 rpm / 15) $M_{N(50Hz)}$ = 105 Nm M_A = 2.3 · 105 Nm = 240 Nm 2.3 = M_A/M_N with motor 90S/4	$M_{N(50Hz)}$ = (1.1 kW · 9550) / (1500 rpm / 21) $M_{N(50Hz)}$ = 147 Nm $M_{N(70Hz)}$ = 105 Nm M_A = 1.7 · 147 Nm = 250 Nm with an assumed frequency inverter overload of 1.7x

Maximum motor speed

Above the speeds described below, special measures are required (Viton radial shaft seals on the A + B side). All details always relate to the operating mode S1 - continuous operation. For short periods, the motors can deliver higher speeds even without modification.

Type	Maximum speed [rpm]
63	2500
71	2500
80	2860
90	3400
100	3500
112	3500
132	3300
160	3200
180	3100
225	2800
250	2800

Motor selection

Abbreviation	Meaning	Einheit
ED	Relative switch-on duration	[%]
P_N	Rated power	[kW]
n_N	Rated speed	[min^{-1}]
n_{syn}	Synchronous speed	[min^{-1}]
I_A	Acceleration current	[A]
I_N	Rated current	[A]
I_A / I_N	Acceleration current / Rated current (ratio of acceleration current to rated current)	[–]
cos φ	Power factor	[–]
η	Efficiency	[%]
M_A	Acceleration torque	[Nm]
M_N	Rated torque	[Nm]
M_A / M_N	Acceleration torque / Rated torque (ratio of acceleration torque to rated torque)	[–]
M_K	Breakdown torque	[Nm]
M_K / M_N	Breakdown torque / Rated torque (ratio of breakdown torque to rated torque)	[–]
M_B	Braking torque	[Nm]
J	Moment of inertia	[kgm^2]
J_x	External moment of inertia reduced to the motor shaft	[kgm^2]
J_L	Moment of inertia of the load	[kgm^2]
U	Voltage	[V]
L_{PA}	Sound level	[dB(A)]
L_{WA}	Sound power level	[dB(A)]
t_E	Heating time in blocked state (Exe motors)	[s]
Z_o	Idle switching frequency	[1h]
S_F	Service factor (only for NEMA)	[–]
T_{amb}	Ambient temperature	[°C]
Code Letter NEMA	The Code Letters are a measure of the mains load when the motor is switched on directly. They are defined in the context of the NEMA standard and are coded with with a letter from A to V (only for NEMA).	

Abbreviation	Meaning	⇨📖	Standard / IE1	IE3	AR	KR	CUS
BRE +	Brake/brake torque + sub-options	B2-19	x	x	x	x	x
DBR +	Double brake + sub options	B15	x	x	x	x	x
RG *	Rust protected version	B13	x	x	x	x	x
SR *	Dust and rust protected version	B13	x	x	x	x	x
IR *	Current relay	B14	x	x	x	x	
FHL *	Lockable manual release	B12	x	x	x	x	x
HL [1)]	Manual release	B12	x	x	x	x	x
CL	Clamp for hand release lever	B12	x	x	x	x	x
MIK	Microswitch	B12	x	x	x	x	x
AS55	Outdoor installation	A42	x	x	x	x	x
* **not for** DBR							
BSH	Standstill heater/brake	B14	x	x	x	x	x
NRB1/2	Noise-reduced brake	B14	x	x	x	x	
ERD	External earthing terminal	A22	x	x	x	x	
TF	Thermistor, PTC resistor	A22,40	x	x	x	x	x
TW	Temperature sensor, bi-metal	A22,40	x	x	x	x	x
SH	Anti-condensation heating	A22	x	x	x	x	x
WU	Silumin rotor	A22	x				x
Z	Heavy fan, cast-iron fan	A23	x	x**			x
WE +	2. Shaft journal	A23	x	x	x	x	x
HR	Hand wheel	A22	x	x	x	x	
RD	Protective shield	A22	x	x	x	x	x
RDT	Protective shield, textile fan cowl	A23	x	x	x	x	x
RDD	Double fan cowl	A22	x	x	x	x	x
AS66	Outdoor installation	A41,42	x	x	x	x	x
OL	Without fanr	A24	x				x
OL/H	Without fan, without fan cowl	A24	x				x
KB	Closed condensation drain hole	A22	x	x	x	x	x
MS	Motor plug connection	A31	x	x	x	x	x
EKK	One-piece terminal box	A23	x	x	x	x	x
KKV	Encapsulated terminal box	A23	x	x	x	x	x
FEU	Humidity protection insulation	A22	x	x	x	x	x
TRO	Tropical protection insulation	A23	x	x	x	x	
F	External fan	A25	x	x	x	x	x
RLS	Backstop	A24	x	x	x	x	x
IG1 (IG11, 12)	1024 pulse incremental encoder	A28	x	x	x	x	x
IG2 (IG21, 22)	2048 pulse incremental encoder		x	x	x	x	x
IG4 (IG41, 42)	4096 pulse incremental encoder		x	x	x	x	x
MG	Magnetic incremental encoder	A26	x	x	x	x	x
IG	Incremental encoder	A28	x	x	x	x	x
IG.P	Incremental encoder with plug connector	A29	x	x	x	x	x
IG.K	Encoder with terminal box	A29	x	x	x	x	
AG	Absolute encoder	A30	x	x	x	x	x

** Option Z is not available for IE3 in the sizes 63 and 71

1) Under certain circumstances option HL must be mounted in a swivelled position - see WN-0-900-03

Options

External earthing terminal (ERD)

A corrosion-resistant earthing terminal is fastened to the motor housing in the form of a flat terminal with a clamping clip or as a terminal lug.

e. g.: 112 MP/4 **ERD**

Thermal motor monitoring (⇨🕮 A40)

NORD offers two thermal protection components for an extra charge.
– **TW** = Bi-metal thermostat
– **TF** = PTC resistor temperature sensor

Protective cover (RD)

Protection against rain and entry of foreign bodies for vertical installation with the shaft facing downwards. For Ex motors according to DIN EN 50014 the protective cover is generally prescribed for the vertical version with downward-facing shaft.

e. g.: 112 MP/4 **RD IM V5** (⇨🕮 from D3)

Double fan cowl (RDD)

Protection against rain and snow and entry of foreign bodies for vertical installation with the shaft facing downwards. Protection against water jets from all directions;

e. g.: 132 SP/4 **RDD IM V1** (⇨🕮 from D5)

Condensation drain holes (KB)

Depending on the installation position there are condensation drain holes at the lowest point of the A or B bearing cover. These are closed with pan head screws.

⚠ The version must be stated!

e. g.: 71 SP/4 **KB IM B3**

Before commissioning and during operation the condensation drain holes must be opened at regular intervals to drain off condensation.

Anti-condensation heating (SH)

An anti-condensation heater must be used in case of severe temperature fluctuations, high humidity or extreme climatic conditions. This prevents condensation inside the motor.
The anti-condensation heater must never be switched on while the motor is running!
For versions with TF or TW the brake terminal box is used. ⚠ Dimensions

Available version: 110 V; 230 V; 500 V
⚠ State the required connection voltage!

e. g.: 100 LP/4 **SH 230V**

Silumin rotor (WU)

For conveyor technology applications without inverter supply;
e.g.: 90 S/8-2 WU

⚠ **Not possible for IE3 motors!**

Hand wheel (HR)

Motors with hand wheel mounted on the 2nd shaft journal;

e. g.: 132 MP/4 **HR** (⇨🕮 D16)

Humidity protection insulation (FEU)

For motors used in humid environments we recommend the version with humidity protected insulation.

e. g.: 71LP/4 **FEU**

2. Shaft journal (WE)

Motors with 2nd shaft journal, B-side Motors with or without brake
This option cannot be combined with the options(⇨🕮 D3-D13)

- External fan (F)
- Encoder attachment (IG)
- Protective cover (RD)
- Protective cover, textile fan cowl (RDT)
- Double fan cowl (RDD)

The transmissible power as well as the permissible axial forces for the 2nd shaft journal can be provided on request.

e. g.: 112 MP/4 **WE**

Protective cover, textile fan cowl (RDT)

These motors have a specially designed fan cowl for use in the textile sector. Elimination of the normal fan grille prevents lint and fluff from accumulating and impairing the motor cooling.

⚠ Possible for motor type 63 to 132;

e. g.: 80 SP/4 **RDT IM V5** (⇨🕮 D3)

Tropicalisation (TRO)

We recommend the tropicalised version for motors which are used under extreme climatic conditions (tropics);

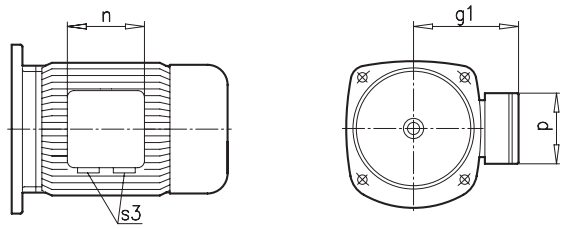
e.g.: 71 LP/4 **TRO**

One-piece terminal box (EKK)

Version with a small, one-piece terminal box. Note the cable entry (⇨🕮 A40);

e. g.: 63 LP/4 **EKK** (⇨🕮 D18)

⚠ Not possible with the Brake option!



Type	g1 [mm]	n [mm]	p [mm]	S3 (EKK)
63	100	75	75	2x M16 x 1,5
71	109	75	75	2x M16 x 1,5
80	124	92	92	2x M20 x 1,5
90	129	92	92	2x M20 x 1,5
100	140	92	92	2x M20 x 1,5
112	150	92	92	2x M20 x 1,5
132	174	105	105	2x M25 x 1,5

Encapsulated terminal box (KKV)

The interior of the terminal box base is encapsulated;

e. g.: 80 LP/4 **KKV**

Back stop (RLS)

Back stops are used to prevent backward rotation due to the load when the motor is switched off.
A drive with a back stop can only run in one direction. The required direction of rotation of the drive must be stated on ordering:

e. g.: 100 LP/4 **RLS CW**

⚠ Caution with motors with higher numbers of poles (>4) and with FI operation. It is essential to observe the lift-off speed! The back stop only operates without wear above the lift-off speed.

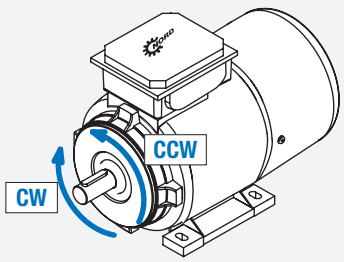
Type	RLS [Nm]	Lift-off speed n [min^{-1}]	Motor extension x_{RLS} [mm]
80	130	860	64
90	130	860	75
100	130	860	91
112	370	750	93
132	370	750	107
160	890	670	135
180 .X	890	670	135
180	1030	630	127
200	1030	630	127
225	1030	630	180
250.W	3600	400	180

See Brake Motors for the motor length!

⚠ The required direction of rotation of the motor must be stated on ordering!

CW = Clockwise – Direction of rotation in the clockwise direction, **right-hand running**

CCW = CounterClockwise – Direction of rotation in the counter-clockwise direction, **left-hand running**



Options

Types of cooling for motors

Overview of cooling types EN 60034-6

Designation	English short form
IC410 without fan	TENV
IC411 self-ventilated	TEFC (Standard)
IC416 externally ventilated	TEBC

⚠ The following minimum distances must be observed for installation with limited air supply:

Length of motor + protective shield (LS) minus motor length (L)
⇨🕮 D2-3

Internal fan with fan cowl IC411 TEFC

Internal fan + fan cowl is the standard version for all motors in this catalogue.

The radial fan cools independently from the rotation direction and is made of plastic. The fan cowl is made of coated sheet steel.

Metal fan (ML) IC411 TEFC

An optional metal fan wheel can be ordered in place of the plastic fan wheel.

Additional flywheel (Z) IC411 TEFC

Motor with cast iron fan for more gentle acceleration with mains operation.

⚠ Motor extension as with brake motors!
⇨🕮 D14-15

Type	Power code	Moment of inertia J_z [kgm²]
63	S/L	0,00093
71	S/L	0,0020
80	S/L SH/LH SP/LP	0,0048
90	S/L SH/LH SP/LP	0,0048 0,0100 (for brake 40 ⇨🕮 B11)
100	L/LA LH/AH LP/AP	0,0113
112	M MH MP	0,0238
132	S/M/MA SH/MH/LH SP/MP	0,0238

z.B.: 90 S/8-2 Z

Without fan (OL) IC410 TENV
Without fan / Without fan cowl (OL/H)

Option (OL) = Motor without fan with fan cowl
Option OL/H = Motor without fan and without fan cowl

e. g.: 63 S/4 OL/H (⇨🕮 D18)

Advantage:
- no fan noise,
- reduced length with option OL/H

⚠ Reduction in power or only for operating mode S3 - 40%
Not possible for efficiency class IE3!

External fan (F) IC416 TEBC

Typical applications for external fans are drives which are controlled by frequency inverters, which can be operated over a long period at low motor speeds and full nominal torque.

External fans are also frequently used for applications in cyclic operation with high switching frequency (S4 mode).

The external fan is integrated into the fan cowl of the motor and is suited for ambient temperatures from -20°C to +60°C.

The version is standard with

- ISO class F (24 VDC special version ISO class E)
- Protection class IP66
- CE + cURus approval

External fans on NORD motors are universally suited for 50Hz and 60Hz operation in single phase and three-phase networks.

All external fans have a separate terminal box and are available in special design with a HARTING plug connector.

External fans cool the motor regardless of the speed of the motor and with appropriate switching, even when the motor is switched off.

The external fan must be connected separately from the main motor and the main motor should be protected against failure of the external fan by using thermistors (TF).

The external fans are as follows according to the motor sizes

- 63 - 112 2-pole
- 132 - 250 4-pole

Technical data - External fan (F) IC416 TEBC

Standard circuit for external fans:

- Single phase operation / Steinmetz circuit
  for motor sizes 63 - 90 (230V standard) and motor size 63 - 112 (115V special)
- Three-phase operation △- or Y- Circuit
  for motor sizes 100 - 250

Standard version: External fan for 50 Hz and 60 Hz operation

50 Hz		Single phase operation				Three-phase operation					
		U_N	I_{max}	P_{max}	n_N	U_N△	I_{max}△	U_NY	I_{max}Y	P_{max}	n_N
		[V]	[mA]	[W]	[r/min]	[V]	[mA]	[V]	[mA]	[W]	[r/min]
Motor size	63	230 - 277	180	46	2710	200 - 303	150	346 - 525	90	28	2830
	71	230 - 277	180	48	2730	200 - 303	150	346 - 525	90	29	2820
	80	230 - 277	190	48	2650	200 - 303	160	346 - 525	90	33	2760
	90	220 - 277	290	59	2890	200 - 303	390	346 - 525	220	78	2890
	100	220 - 277	290	62	2820	200 - 303	370	346 - 525	210	80	2830
	112	220 - 277	270	64	2750	200 - 303	350	346 - 525	200	87	2780
	132	230 - 277	330	48	1460	200 - 303	420	346 - 525	240	67	1450
	160	230 - 277	340	59	1400	200 - 303	430	346 - 525	250	84	1420
	180	230 - 277	340	59	1400	200 - 303	430	346 - 525	250	84	1420
	200	220 - 277	340	59	1400	200 - 303	430	346 - 525	250	84	1420
	225	-	-	-	-	200 - 400	910	346 - 525	310	238	1410
	250	-	-	-	-	200 - 400	910	346 - 525	310	238	1410

60 Hz		Single phase operation				Three-phase operation					
		U_N	I_{max}	P_{max}	n_N	U_N△	I_{max}△	U_NY	I_{max}Y	P_{max}	n_N
		[V]	[mA]	[W]	[r/min]	[V]	[mA]	[V]	[mA]	[W]	[r/min]
Motor size	63	230 - 277	210	54	3120	220 - 332	140	380 - 575	80	29	3420
	71	230 - 277	210	56	3100	220 - 332	130	380 - 575	70	28	3370
	80	230 - 277	220	59	2830	220 - 332	130	380 - 575	70	36	3250
	90	220 - 277	230	61	3440	220 - 332	320	380 - 575	180	71	3430
	100	220 - 277	280	73	3340	220 - 332	300	380 - 575	180	80	3390
	112	220 - 277	360	88	3170	220 - 332	290	380 - 575	170	93	3260
	132	230 - 277	230	53	1740	220 - 332	360	380 - 575	210	55	1730
	160	230 - 277	290	71	1680	220 - 332	370	380 - 575	210	86	1670
	180	230 - 277	290	71	1680	220 - 332	370	380 - 575	210	86	1670
	200	220 - 277	290	71	1680	220 - 332	370	380 - 575	210	86	1670
	225	-	-	-	-	220 - 400	620	380 - 575	340	247	1670
	250	-	-	-	-	220 - 400	620	380 - 575	340	247	1670

Special version: External fan for 115 V_{AC} operation

60 Hz		Single phase operation			
		U_N	I_{max}	P_{max}	n_N
		[V]	[mA]	[W]	[r/min]
Motor size	63	100 - 135	560	49	3540
	71	100 - 135	550	54	3530
	80	100 - 135	570	57	3500
	90	100 - 135	650	65	3440
	100	100 - 135	690	75	3450
	112	100 - 135	800	86	3170

Special version: External fan for 24V_{DC} operation

DC		Direct current (DC) operation			
		U_N	I_{max}	P_{max}	n_N
		[V]	[mA]	[W]	[r/min]
Motor size	63	24	300	7,2	2740
	71	24	440	10,5	2740
	80	24	520	12,5	2750
	90	24	790	19,0	2730
	100	24	1150	27,6	2730
	112	24	1620	38,8	2730

Type		kg	Volume flow, minimal		
			50 Hz V [m³/h]	60 Hz V [m³/h]	DC V [m³/h]
2-pole	63	1,55	52	63	54
	71	1,60	76	91	78
	80	1,65	123	131	128
	90	2,20	216	258	216
	100	2,40	277	323	278
	112	2,60	351	406	355
4-pole	132	3,20	290	340	-
	160	4,70	513	620	-
	180	4,70	513	620	-
	200	4,70	513	620	-
	225	6,70	1062	1237	-
	250	6,70	1062	1237	-

Connection diagrams ⇨ A35
Cable entry details ⇨ A40
Sound level ⇨ A41
Dimension for the motor extension ⇨ D14-15

Options

Encoder

Magnetic incremental encoder (MG)

An economical, robust and flexible incremental encoder system is available for NORD motors with axis heights from 63 to 180. The system operates on the basis of a contactless magnetic measuring principle and does not require separate bearings. Because of this it is very resistant to vibrations and is not sensitive to impacts which act on the drive unit.

The encoder is mounted on the B side of the motor. The magnetic encoder is mounted using a threaded hole on the shaft and the evaluation sensor is mounted on the fan cowl. The alignment of the system tolerates +/- 1 mm in all three axes. By means of a special design of the magnetic system, use in the vicinity of electrical brakes is also possible.

The encoder provides 2 output channels (Track A and B) which deliver pulse flanks which are staggered by 90°. This enables detection of the direction of rotation and quadruples the number of pulses.

The lowest resolution supplied by NORD is provided by an encoder with 1 pulse per revolution (1ppr) which delivers a “1” and then a “0” for each 180° of rotation of the motor shaft.

This enables economical monitoring which does not require a fast PLC or counter input. The pulse time may fluctuate slightly, as the absolute accuracy is typically 200 ppr.

In addition, NORD offers a magnetic encoder with zero track setting (MGZ), which can take over the simple tasks of an incremental encoder. This version is available in a 1024 ppr version.

Wire connection / colour	Function connection
red	Power supply (+)
black	Power supply (-)
brown	Channel A
orange	Channel B
green	Zero track setting (MGZ only)

Technical data	Value range
Standard resolutions	1 ppr, 32 ppr, 256 ppr, 512 ppr, 1024 ppr (Pulses/revolution)
Output signals (Track A and B)	HTL push-pull level / max. 40 mA / short-circuit protected
Supply voltage and current consumption without load	10-30 VDC / < 30 mA (MGZ = 8-35 VDC)
Technical EMC and ESD resistance	EN 55022: Class B (30…1000 MHz) EN 61000-4-2: Kontakt 4 kV/Luft 8 kV EN 61000-4-3: 30 V/m EN 61000-4-4, EN 61000-4-5: 1 kV EN 61000-4-6: 10 Vemk EN 61000-4-8: 30 A/m
Temperature range	-20 ... 80°C
Speed range	0 ... 5000 min^{-1}
Protection class	IP68
Length of connection cable and sheath cross section	1000 mm / Ø 4,9 mm
Number and cross-section of conductors	4x Ø 0,34 mm^2 (AWG22) (MGZ = 5x Ø 0,34 mm^2)
Changes of motor dimensions	max. 20 mm longer

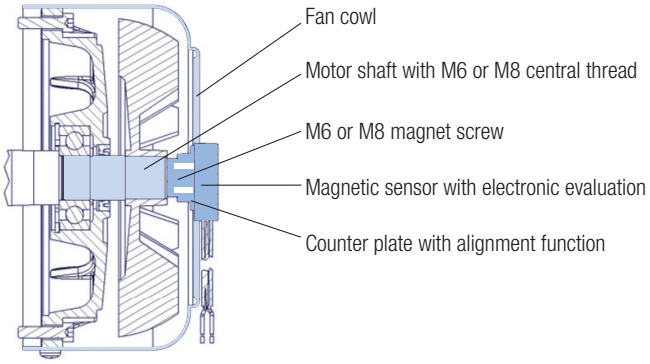
Magnetic encoder system mounting

Due to an automatic alignment function, mounting of the magnetic encoder system is very simple. Alignment is carried out automatically by tightening the screws on the fan cowl and the sensor housing.

In the subsequent trial run the auxiliary alignment cams are slightly worn down by the counter plate. The connection cable is then fastened to the fan cowl and passed to the terminal box according to the version.

⚠ Motor extension with magnetic encoder ⇨🕮 D17.

Cross-section diagram / cable lengths



Type code	Options
MG = Magnetic encodeer 01 = 1 pulse 20 = 32 pulses 45 = 256 pulses 55 = 1024 pulses 0 = loose cable ends (standard)	▸ MG ... M 4-pin, A-coded M12 flange plug connector on the terminal box ▸ MG ... N 4-pole A-coded M12 coupling plug ▸ MG ... V 4-pole cable connector for extension cable
e.g. **MG 45 0** Magnetgeber (MG) mit 256 Impulsen (45) und losen Kabelenden (0)	

Connections Coupling plug / cable connector	Function connection
Pin 1 / red	Power supply (+)
Pin 2 / bown	Channel A
Pin 3 / orange	Channel B
Pin 4 / black	Power supply (-)

M12 plug connections	Function connection
Pin 1 /brown	Power supply (+)
Pin 2 / white	Channel A
Pin 3 / blue	Channel B
Pin 4 / black	Power supply (-)
Pin 5 / green	Zero track setting (MGZ only)

Options

Encoder

Incremental encoder (IG)

Modern drive applications often require speed feedback. Normally, incremental encoders, which convert rotary movement into electrical signals are used for this.

These signals are read out and processed by frequency inverters or other control devices. Incremental encoders operate according to the photoelectric method by scanning a disc with alternating lines and spaces.

The integrated electronics converts the measuring signals into a digitalised square wave signal according to TTL or HTL logic. There are types with differing resolution/pulse numbers. Standard encoders have 4096 pulses per rotation.

The following configurations can be implemented in combination with NORD frequency encoders:

- Speed control with large adjustment range
- Highly accurate speeds, independent of the load
- Synchronisation control
- Position control
- Standstill torques
- High overload reserves

Technical data		Type / Number of pulses		
		IG1 / 1024 IG2 / 2048 IG4 / 4096	IG11 / 1024 IG21 / 2048 IG41 / 4096	IG12 / 1024 IG22 / 2048 IG42 / 4096
Interface		TTL / RS 422	TTL / RS 422	**HTL** **push-pull**
Operating voltage $+U_B$	[V]	5 (±5%)	10...30	10...30
Max. output frequency	[kHz]	300		
Max. operating speed	[min^{-1}]	6000		
Ambient temperature	[°C]	- 20...+80		
Protection class		IP66		
Max current consumption	[mA]	90	90	150

Incremental encoder mounting

Encoders can be mounted on motor sizes 63 to 225.

The motors can be either self-ventilated or externally ventilated, with or without brakes. NORD hollow shaft push-in encoders are mounted directly on the B side shaft end of the motor, protected by the fan cowl.This ensures a secure, torsion-free coupling of the encoder.

Electrical connection is via a pre-assembled cable (as standard, 1.5 m long with open wire ends; other lengths or versions with plugs are possible).

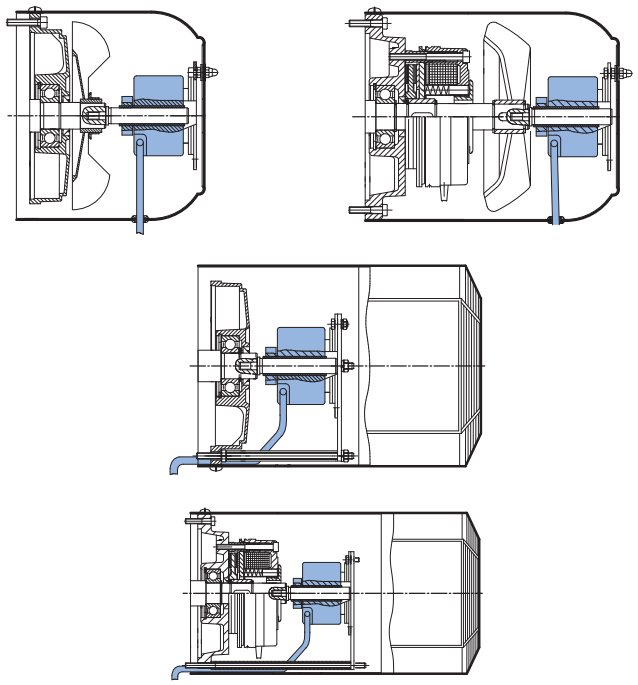
Cable	Bending radius (standard)
Permanently mounted	26 mm
Flexibly mounted	78 mm

Encoder without plugs

⚠ The wire end is sealed with an ESD shield. This protects the encoder against electrostatic voltages. The connection wiring must be ESD protected!

⚠ Encoders with a protective cover (RD) are only possible with the fitting of an external fan (F)!

Exemplary sketches:



Selection of the encoder according to the output logic is determined by the interface of the evaluation electronics. The following conditions apply for NORD frequency inverters:

NORDAC frequency inverter series			Incremental encoder logic	⇨📖
SK500P, SK510P SK530P, SK550P	NORDAC *PRO*	(SK500P)	* HTL with 10 – 30V supply TTL with 10 – 30V supply	BU 0600
SK520E, SK530E, SK535E, SK540E, SK545E	NORDAC *PRO*	(SK500E)	TTL with 10 – 30V supply	BU 0500 / BU 0505
SK200E, SK205E, SK210E, SK215E, SK220E, SK225E, SK230E, SK235E	NORDAC *FLEX*	(SK200E)	* HTL with 10 – 30V supply	BU 0200
NORDAC LINK	(SK250E - FDS)		* HTL with 10 – 30V supply	BU 0250

For further details, please refer to the operating instructions for the frequency inverter.
An external electronic module to convert HTL into TTL signals (e.g. connection of the encoder to 530P with very long cables) is available from NORD.

* up to max. 10 m encoder cable length M20x1.5).

Options

Encoder

Absolute encoders (AG)

Absolute encoders are encoders for rotational movements, which output absolute position information in the range of a revolution of the motor (360°, Singleturn) or additionally, the number of rotations with reference to a zero point (Multiturn).

Typical values are 8192 (13Bit) steps per rotation and with Multiturn, additionally 4096 (12Bit) distinguishable rotations.

Singleturn encoders are mounted on the output side of the system (typically: turntables) whereas Multiturn encoders are mounted on the output side of the gear unit or directly on the motor.

With absolute encoders the rotations are measured either entirely electromagnetically or mechanically by means of small gear stages which reduce the speed of additional bar code discs.

Advantages over incremental encoders for positioning applications

The position information is always up to date, even in case of changes of position when no voltage is present, and in the case of lost or impaired pulses.

Absolute encoders cannot be used for speed control (with NORDAC inverters).

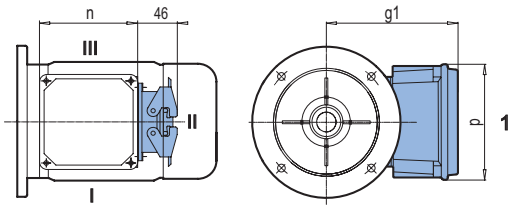
However, combined encoders with absolute and additional incremental encoder signals are available.
Absolute encoders with various data protocols, e.g. DDI, CANopen or Profibus, are available. The selection depends on the evaluation electronics.

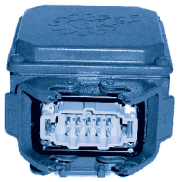
Overview of Multiturn absolute encoders

(Only certain CANopen encoders are approved for the SK500E and SK200E series)

Encoder type	AG2 - Multiturn Absolute encoder with incremental signals (TTL)	AG7 - Multiturn Absolute encoder	AG1 - Multiturn Absolute encoder with incremental signals (TTL)	AG4 - Multiturn Absolute encoder with incremental signals (HTL)	AG3 - Multiturn Absolute encoder with incremental signals (TTL)	AG6 - Multiturn Absolute encoder with incremental signals (HTL)
For inverter type	SK 54xE / SK 5xxP with SK CU5-ENC/MLT SK 530P / SK550P with SK CU5-MLT	SK 2xxE, SK 53xE, SK 54xE, SK 5xxP	SK 53xE, SK54xE, SK 530/550P	SK 2xxE, SK 5xxP	SK 53xE, SK54xE, SK 530/550P	SK 2xxE, SK 5xxP
Singleturn resolution	8192 (13 Bit)	8192 (13 Bit)	8192 (13 Bit)	8192 (13 Bit)	8192 (13 Bit)	8192 (13 Bit)
Multiturn resolution	4096 (12 Bit)	4096 (12 Bit)	4096 (12 Bit)	4096 (12 Bit)	65536 (16 Bit)	65536 (16 Bit)
Interface	SSI-Gray-Code	CANopen Profile DS406 V3.1	CANopen Profile DS406 V3.1	CANopen Profile DS406 V3.1	CANopen Profile DS406 V3.0	CANopen Profile DS406 V3.1
CAN Address/ Baud rate	-	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable
Bus cover	-	yes	yes	yes	yes	yes
Incremental encoder output	TTL / RS422 2048 pulses	no	TTL / RS422 2048 pulses	HTL 2048 pulses	TTL / RS422 2048 pulses	HTL 2048 pulsea
Power supply	10 – 30 VDC	10 – 30 VDC	10 – 30 VDC	10 - 30 VDC	10 – 30 VDC	10 - 30 VDC
Referencing	SET - input	über CANopen	über CANopen	über CANopen	über CANopen	über CANopen
Scanning method	optical / mechanical	optical / mechanical	optical / mechanical	optical / mechanical	optisch / magnetic	optical / optical
Shaft version	Hollow shaft D=12	Blind hole D=12	Blind hole D=12	Blind hole D=12	Blind hole D=12	Blind hole D=12
Electrical connection	Cable end 1,5 m	Terminal	M12 socket	M12 plug connector	Terminal IG: M12 plug connector	M12 plug connector
Temperature range	-30°C to +75°C	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C	-25°C to +85°C	-25°C to +85°C
IP Protection class	IP 67	IP 67	IP 67	IP 67	IP 66	IP 66

Motor plug connection (MS)





Type		63	71	80	90	100	112	132
g1 / g1 Bre	[mm]	140	149	158	163	174	184	204 / 219
n		114	114	114	114	114	114	122
p		114	114	114	114	114	114	122

If required, three-phase (brake) motors with sizes 63 - 132 can also be supplied with plug connectors (type suffix: MS).

The plug connector is mounted on the side of the terminal box. Standard version pointing toward the fan cowl with II. Plug connector possible for I or III.

With sizes 63 - 112 a HAN 10 ES male connector is used on the motor side. On the customer side, a HAN 10 ES female connector is required (Harting).

Above size 132 a male HAN C Modular is provided on the motor side.

The specified contact assignment is for single speed and switchable pole motors (separated windings and Dahlander circuit). The contacts for PTC temperature sensors or thermostats as well as the brake connection voltage are specified.

The motor plug connector is supplied without the opposite connector and has a protective cap to protect against dirt.

Technical data for sizes 63 - 112

Plug connectors:	HAN 10 ES/Han 10 ESS
Number of contacts:	10
Current:	16 A max.
Voltage:	500 V max. (600 V max. according to UL/CSA)

Cage clamp spring release terminal connection

Technical data for sizes 132

Plug connectors:	HAN C-Modular
Number of contacts:	9
Current:	22 A max.
Voltage:	690 V max.

Crimp connection

Please request detailed information!

See circuit diagrams ⇨ 🕮 A34

ATEX motors (Directive 2014/34 EU)

Explosive dust atmospheres occur in various areas of industry and crafts. They are usually caused by mixtures of oxygen in combination with flammable gases or circulating or deposited flammable dust. Because of this, electrical and mechanical equipment for use in explosion hazard areas is subject to special national and international standards and directives.

The term ATEX which is often used for explosion protection comes from the initial letters of an older French directive “ATmosphères EXplosible”.

Building on this, the European Parliament decided in March 1994 with the EU Directive 94/9 / EC to harmonize the legal provisions for devices and protective systems for their intended use in explosion-protected areas.

In the design of mechanical and electrical equipment the objective is to avoid ignition or to limit its effects. For this, the explosion protection regulations are used.

Gas explosion protection for Zone 1 and Zone 2

- Increased safety Ex eb
- Pressure-resistant encapsulation, increased safety terminal box Ex de eb IIC

dust explosion protection

- Zone 21 and Zone 22

Zone classification for flammable gases, vapours and aerosols

Zone 1:

Is the area in which during normal operation an explosive atmosphere consisting of a mixture of air and flammable gases, vapours or aerosols can form occasionally.

Zone 2:

The area in which an explosive atmosphere of air and combustible gases, vapours or aerosols **normally does not occur,** or only occurs for a **short time** during normal operation.

Zone classification for flammable dusts

Zone 21:

The area in which an explosive atmosphere consisting of a cloud of air which contains inflammable dust can **occasionally** form during normal operation.

Zone 22:

The area in which, during normal operation, an explosive atmosphere in the form of a cloud of air which contains inflammable dust **normally does not occur,** and if so, only rarely or for **a short time.**

Increased safety (Ex eb)

For motors of device categories 2G and 3G, i.e. Ex-Zones 1 and 2, sparking and impermissible temperatures are prevented as per ignition protection type „**eb**“ (Increased Safety).

This is achieved by the design of the fans and fan cowls, bearings and terminal boxes. Characteristic for this is e.g. the low surface resistance of plastic fans (depending on the circumferential speed of the fan). There is a large air gap between rotating parts and large clearances and creepage distances in the terminal box.

For the selection of the model it should be noted that drive units with ignition protection type “**e**“ often have a reduced output power when compared to the corresponding standard motor. These motors have windings which are different to those for comparable motors for non-Ex areas. This results in a genuine reduction in power! These motors are usually used up to **temperature class T3.**

Pressure-resistant encapsulation (Ex d and Ex de)

Ignition protection type “**de**” is a different protection concept:

Ignition protection type “**de**” is a different protection concept: The design of these motors resists explosions inside the motor and prevents the explosion from spreading to the surrounding atmosphere. These motors have large wall thicknesses which can withstand the pressure which results from an internal ignition. Among other things, these systems also require fans with protection class “**e**”.

The drives provide the same rated powers as non ex-protected motors and in principle can be used like geared motors with protection class “**e**“ in Zone 1 and 2. These motors are often used in cases where inverter operation, brakes, encoders and/or a very high level of safety are required. Typically, pressure resistant encapsulated motors supplied by NORD fulfil the requirements for **Explosion Group IIC** and **Temperature Class T4.**

Further information can be found in

- Catalogue G2122 Explosion Protection

This catalogue can also be found under
www.nord.com/cms/de/documentation/catalogues

Motor Enquiry form

Company: _____
Customer number: _____
Town/Postcode/Country: _____
Contact: _____
E-mail: _____
Phone: _____
Installation country: _____
Quantity: _____

Please send the enquiry directly to you local NORD contact.
See homepage:
www.nord.com
(NORD ➔ Sales)

Date: _____
E-Task: _____
Project: _____
Subsidiary contact: _____

Attachment	WN position	Axis height	Power code	Number of poles	Motor options	Delete section

Motor							Delete section
Efficiency class	IE1	IE2	IE3	IE4	Supply	DOL	VFD
Voltage	_____ [V]				Mains voltage	_____ [Hz]	
Power	_____ [kW]				Operation	_____ (S1, S2, S3, etc.)	
Insulation class	_____ (F, H)				Terminal box position	_____ (1, 2, 3, 4)	
IP Protection class*	_____				Cable entry	_____ (I, II, III, IV)	
Housing material	_____				Certificates	_____	

Ambient conditions		Delete section
Ambient temperature	min. _____ [°C]	max. _____ [°C]
Max. relative humidity	max. _____ [%]	
Max. installation altitude	max. _____ [m]	
Other (dust / dirt/ aggressive media; mechanical / chemical)	_____	

Brake rectifier parameters (if brake required)		Delete section
Braking torque	_____ [Nm] *(for double brake DBR: braking torque per brake)*	
Brake/coil voltage	_____ [V_{DC}] **or** _____ [V_{AC}]	
Brake type	Holding/emergency brake	Working brake

ATEX			Delete section
ATEX Gas			
Zone 1		II 2G Ex eb T3	
		II 2G Ex de T4	
Zone 2		II 3G Ex ec T3	
ATEX Dust			
Zone 21		II 2D T_____ [°C]	
Zone 22		II 3D T_____ [°C]	
		Conducting dust (only Zone 21)	
		Non-conducting dust	

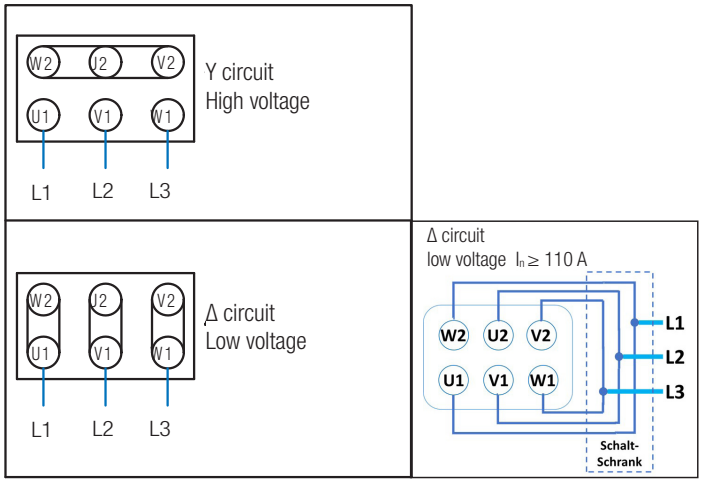
Frequency inverter operation		Delete section
		50 Hz Curve
		87 Hz Curve
		100 Hz Curve
		Other _____
		Minimum frequency [Hz]
		Maximum frequency [Hz]

Remarks

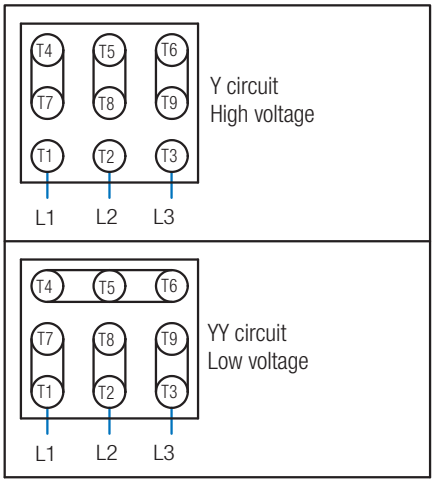
Current forms can be found under
www.nord.com/cms/de/documentation/forms/Forms

Circuit diagrams

Three-phase motors

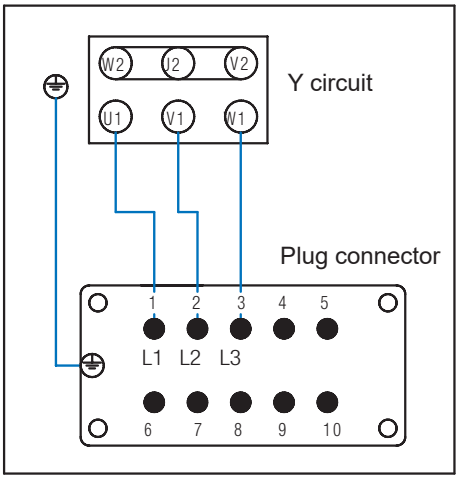


NEMA three-phase motor (230 / 460V)

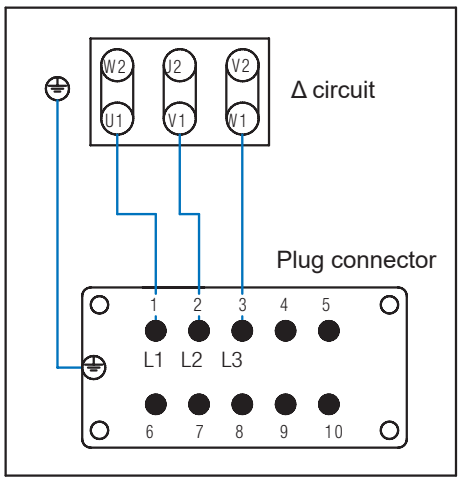


With motor plug connector (MS)

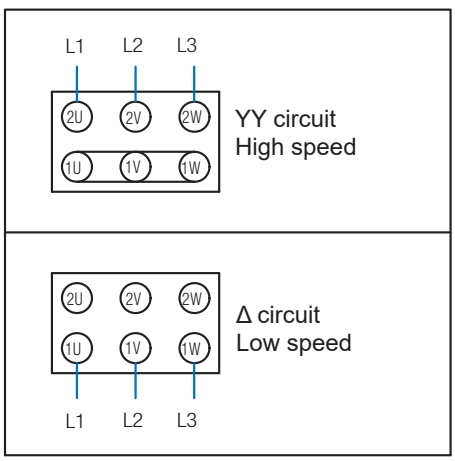
400 V - star circuit Y



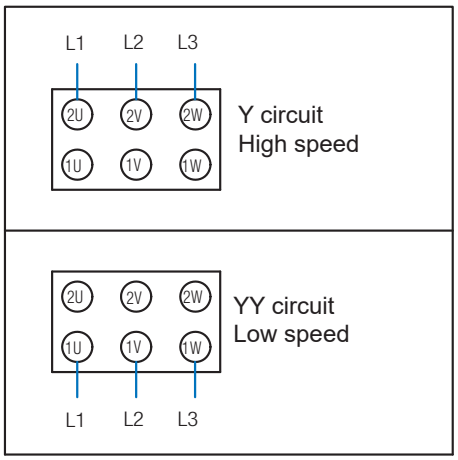
400 V - delta circuit Δ



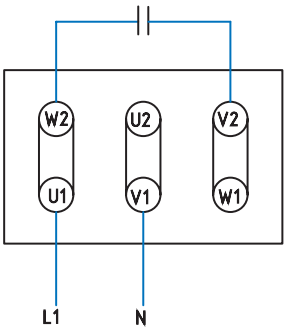
three-phase motor, switchable pole Dahlander circuit



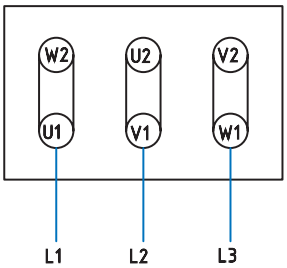
Tree-phase motor, switchable pole separated windings



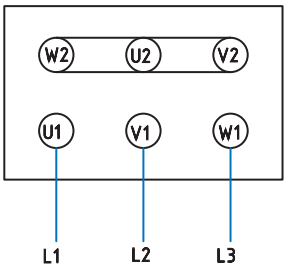
Connection diagrams for external fans



Single phase operation
Steinmetz circuit
230V - 277V 50 + 60Hz



Three-phase operation
Delta circuit Δ
200V - 303V 50Hz
220V - 332V 60Hz



Three-phase operation
Star circuit Y
346V - 525V 50Hz
380V - 575V 60Hz

Technical explanations

Efficiency

The following table shows the efficiency specifications according to the efficiency class, depending on the motor power

- for various national efficiency classifications
- for closed 4-pole motors

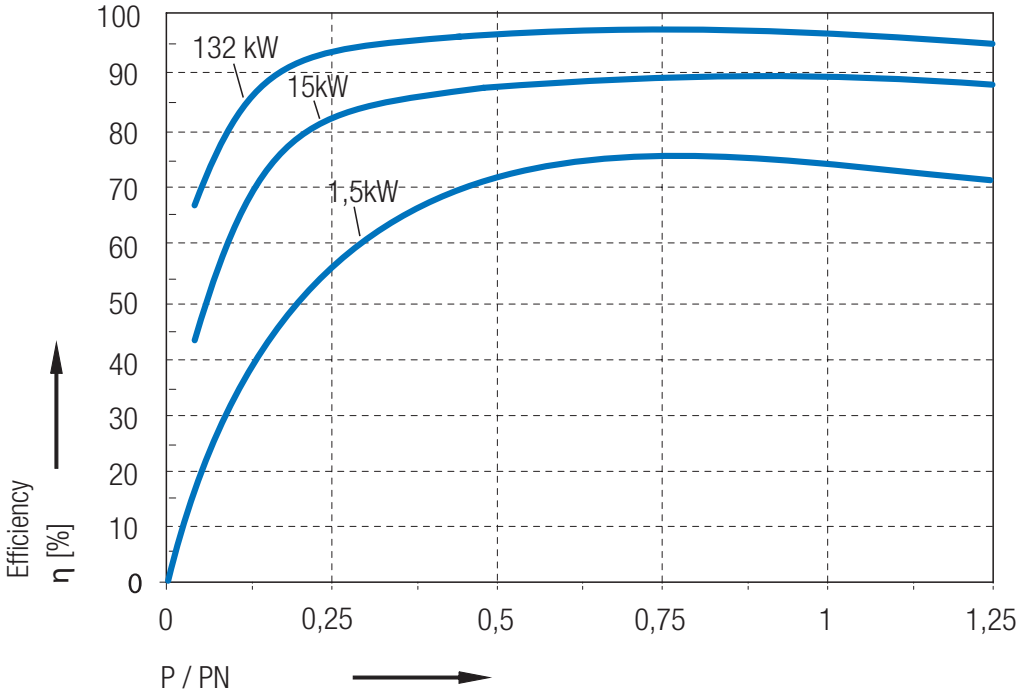
A direct comparison of efficiencies is not possible, because different measuring methods are used.

		IEC		Australia New Zeeland	IEC	China
50Hz		IE1	IE2	AS/NZS 1359.5:2004 Level 1B	IE3	GB 18613-2020 Grade 3
[kW]	HP	η soll [%]	η soll [%]	η soll [%]	η soll [%]	η soll [%]
0,55	-	-	-	-	-	80,7
0,73	-	-	-	82,2	-	-
0,75	1,00	72,1	79,6	82,2	82,5	82,3
1,10	1,50	75,0	81,4	83,8	84,1	83,8
1,50	2,00	77,2	82,8	85,0	85,3	85,0
2,20	3,00	79,7	84,3	86,4	86,7	86,5
3,00	4,00	81,5	85,5	87,4	87,7	87,4
4,00	-	83,1	86,6	88,3	88,6	88,3
5,50	7,50	84,7	87,7	89,2	89,6	89,2
7,50	10,0	86,0	88,7	90,1	90,4	90,1
9,20	12,5	-	-	-	-	-
11,0	15,0	87,6	89,8	91,0	91,4	91,0
15,0	20,0	88,7	90,6	91,8	92,1	91,8
18,5	25,0	89,3	91,2	92,2	92,6	92,2
22,0	30,0	89,9	91,6	92,6	93,0	92,6
30,0	40,0	90,7	92,3	93,2	93,6	93,2

The actual efficiency of the motor is stamped on the rating plate. For wide range voltages, the efficiency at the least favourable operating point is stamped. At the rated voltage, the efficiency is then better than the efficiency stamped on the rating plate.

Relationship between efficiency and utilisation with mains operation

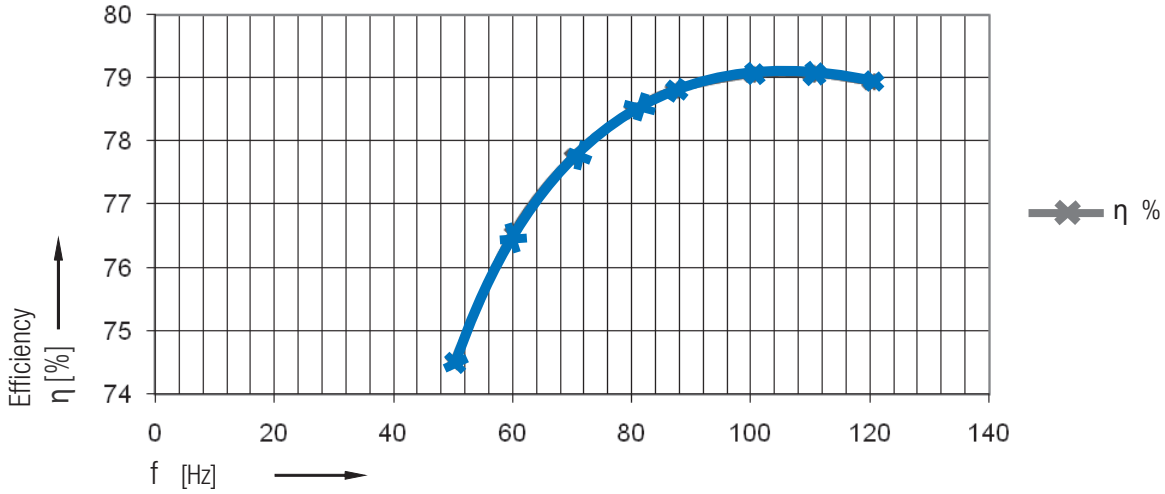
For efficient utilisation of a motor it is advisable that it is operated close to its rated power.
Depending on the rated power of the motor, operation under partial load may be inefficient, especially with small motors.



Relationship of efficiency and FI frequency range

For operation of a motor with a frequency inverter, the efficiency of the motor increases with the frequency with which it is operated.

The following diagram illustrates this relationship using the example of a 90S/4 motor. For geared motors it must be noted that higher input speeds may result in increased gearing losses.



Technical explanations

Mains connection / Rated voltages / Voltage fluctuations

Voltage tolerance as per DIN IEC 60038

DIN IEC 60038 recommends that the voltages at handover points are not allowed to deviate from the new standard voltages by more than ± 10%

Previous mains voltage	Actual mains voltage
220 V, 380 V, 660 V	230 V, 400 V, 690 V +6/-10%
240 V, 415 V	230 V, 400 V +10/-6%

Permissible voltage and frequency deviations according to DIN EN 60034-1

AC motors must operate reliably with a tolerance of ± 5% of their rated voltage or rated voltage range and ± 2% of their rated frequency. With this, their heating limit must not exceed Thermal Class (F) by more than 10K. The voltages or voltage ranges stamped on the motor name plates are the rated voltages or voltage ranges to which the voltage tolerance relates.

Permissible voltage deviations accordin to NEMA, CSA

The permissible voltage deviation according to NEMA and CSA is ± 10% of the stamped rated voltage or voltage range.

In North America, according to ANSI C84.1 a differentiation is made between rated system voltages

- Nominal System Voltage - 120V, 208V, 240V, 480V, 600V and correspond to the nominal utilization voltages
- Nominal Utilization Voltage - 115V, 200V, 230V, 460V, 575V.

Accordingly, consumers must be stamped with the nominal utilization voltages.

Stamping of electric motors with 120V, 208V, 240V, 480V or 600V are non-standard and are not usual in North America.

System voltage	Utilization voltage
600 V	575 V
480 V	460 V
240 V	230 V
208 V	200 V
120 V	115 V

Rated voltages for NORD-motors

NORD 4-pole standard motors and IE2 motors for 50Hz are rated for the

- Voltage ranges 220-240 / 380-420V and
- Voltage ranges 380-420 / 660-725V

According to DIN EN 60 034 they operate reliably in continuous operation at ± 5% of these voltage ranges. Therefore, reliable operation in the recommended range of the IEC standard voltages 230V, 400V and 690V +/-10% is ensured.

NORD NEMA, CSA (cCSAus), UL motors are only stamped with one rated voltage and not with a rated voltage range. The voltage deviation for reliable operation is ± 10% of the stamped rated voltage.

Voltage and frequency

NORD three-phase motors are wound as follows:

- rated power < 3.0 kW for 230/400V Δ/Y 50Hz
- rated power ≥ 3.0 kW for 400/690V Δ/Y 50Hz

As standard, NORD motors have the following windings:

Nr. of poles	Motor type	Rated voltage		Frequency
4	63 S/4 - 100 L/4 100 LA/4 - 200 LX/4	230/400 V 400/690 V	Δ/Y Δ/Y	50 Hz
2	63 S/2 - 90 L/2 100 L/2 - 132 MA/2	230/400 V 400/690 V	Δ/Y Δ/Y	50 Hz
6	63 S/6 - 112 M/6 132 S/6 - 132 MA/6	230/400 V 400/690 V	Δ/Y Δ/Y	50 Hz
4-2	63 S/4-2 - 160 L/4-2	400 V	Δ/YY	50 Hz
8-2	71 S/8-2 WU - 160 L/8-2 WU	400 V	Y/Y	50 Hz
8-4	71 S/8-4 - 132 M/8-4	400 V	Δ/YY	50 Hz

Operation of 50 Hz motors on 60 Hz mains

Guideline values for conversion factors for listed values

50 Hz	60 Hz	n_N*	P_N	M_N	I_N	M_A/M_N M_K/M_N	I_A/I_N
230V	230V	ca. 1,2	1,00	0,83	1,00	0,80	0,80
400V	400V	ca. 1,2	1,00	0,83	1,00	0,80	0,80
400V	460V	ca. 1,2	1,00	0,83	0,90	1,10	1,10
400V	460V	ca. 1,2	1,15	0,96	1,00	1,00	1,00
500V	500V	ca. 1,2	1,00	0,83	1,00	0,80	0,80
500V	575V	ca. 1,2	1,00	0,83	0,90	1,10	1,10
500V	575V	ca. 1,2	1,15	0,96	1,00	1,00	0,90

* The actual speed ratio depends on the motor type.

NORD motors with special windings are available for other voltages and frequencies.

Special ambient conditions

Thermal class 155 (F)

NORD motor windings are produced with insulation material class 155 (F). For cooling air temperatures up to 40°C and installation altitudes up to 1000 m the maximum permissible temperature increase is 105 K.

The maximum permissible winding temperature is 155°C.

This table contains guideline values which cover the entire motor spectrum, including those with high thermal utilisation. Somewhat higher values apply for motors with low or moderate thermal utilisation. The values for motors for explosion hazard areas also differ.

	40°C	45°C	50°C	55°C	60°C
1000 m	100%	96%	92%	87%	82%
1500 m	97%	93%	89%	84%	80%
2000 m	94%	90%	86%	82%	77%
2500 m	90%	86%	83%	78%	74%
3000 m	86%	83%	79%	75%	71%
3500 m	83%	80%	76%	72%	68%
4000 m	80%	77%	74%	70%	66%

Thermal class 180 (H)

A modified version of the NORD 4-pole standard/IE1 motors is available for ambient temperatures up to 60 °C. The windings are produced in insulation material class 180 (H) and temperature-critical components are replaced with suitable components. The values on pages ⇨🕮 C2-3 should be used for planning.

⚠ Not all options are possible. Please contact us!

- Ambient temperature < -20°C and > 60°C

For cooling temperatures of < -20°C and > 60°C technical modifications to the motor may be required. The type of modification is selected according to the application.

- Outdoor installation ⇨🕮 A41, 42
- Submersed or temporarily flooded drive

If motors or geared motors are to be operated temporarily or permanently in a submersed condition, they are selected according to the type of application. The information which is required for an offer is listed below. Submersed drives are not covered by this catalogue but rather are individually planned and offered.

- Operation in surfaced or submerged condition
- Immersion depth
- Medium in which submerged
- Medium is contaminated with abrasive materials (sand etc.)
- Temperature of medium in which submerged
- Required cable length
- Application requires bio oil / bio painting
- Operating hours per year
- Direct attachment of the motor to the gear unit is permitted (preferred)

Technical explanations

Thermal motor monitoring

A sensible motor selection protects the motor against overheating due to the application or the ambient conditions. Factors which may result in the motor overheating are e.g. overload, high ambient temperatures, restricted cooling air flow and low motor speed due to inverter operation.
NORD offers two thermal protection components for a extra charge.

- TW = Bi-metal thermostat
- TF = PTC resistor temperature sensor

These are used to directly monitor the winding temperatures with full utilisation of the motor power.

Three (one for each strand) TW or TFs connected in series are located at the hottest points of the windings. They are connected to 2 terminals in the terminal box.

⚠ TW or TF motor protection is urgently recommended for frequency inverter operation, heavy starting, switching operation, increased ambient temperature, limited cooling, etc.

Thermostats (TW)

(Other common names: Thermal NC switch, Klixon, Bi-metal NC switch)

The thermostat is an encapsulated bi-metal switch which is normally designed to be normally closed.

It must be wired so that when the switching temperature is reached the circuit breaker interrupts the motor power supply. The circuit breaker opens and switches the motor off.
The thermostat only closes its contacts again after a considerable temperature reduction.

Trigger temperature: 155° C
Rated current: 1.6 A at 250 V
Switch version: NC (terminals TB1 + TB2)

Also available as 2**TW,** for warning and shut-down!

Temperature sensor (TF)

(Other common names: PTC, PTC temperature sensor, PTC-Thermistor)

When the rated trigger temperature (NAT) is reached, the resistance of the temperature sensor suddenly increases to almost 10x its normal value.

The PTC temperature sensor only performs its protective function when connected to a trigger device!

A triggering device evaluates the resistance increase and switches the drive off.

Trigger temperature: 155° C
Max. voltage: 30 V
Terminals TP2+ TP2

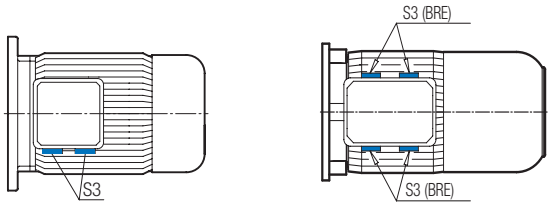
Also available as 2TF for warning and shut-down!
e. g.: 130°C = **Warning** , 155°C = **Shut-down**

NVibration level A according to DIN EN 60034-14

NORD three-phase motors are designed according to vibration level A.

Cable glands

Standard motor	Braking motor
Type 63 - 250	Type 63 - 132
Braking motor	
Type 160 - 250	



Type	S3	S3 (BRE)
63	M20 x 1,5	M20 x 1,5
71	M20 x 1,5	M20 x 1,5
80	M25 x 1,5	M25 x 1,5
90	M25 x 1,5	M25 x 1,5
100	M32 x 1,5	M32 x 1,5
112	M32 x 1,5	M32 x 1,5
132	M32 x 1,5	M32 x 1,5
160	M40 x 1,5	
180	M40 x 1,5	
200 .X	M40 x 1,5	
225	M50 x 1,5	
250	M63 x 1,5	

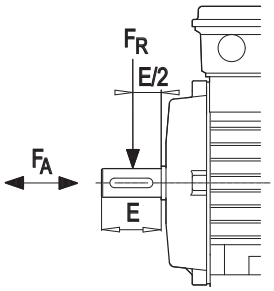
⚠ If possible according to the version the cable glands in the terminal box must be at the bottom.

Permissible radial and axial forces for IEC / NEMA motors

The listed values apply for a calculated bearing life of

L_h = 20,000 hours, for 4-pole motors with 50Hz operation.

F_R = Permissible radial force at $F_A = 0$
F_A = Permissible axial force at $F_R = 0$



Permissible radial and axial forces

Type	F_R [N]	F_A [N]
63	530	480
71	530	480
80	860	760
90	910	810
100	1300	1100
112	1950	1640
132	2790	2360
160	3500	3000
180 .X	3500	3000
180	5500	4000
200 .X	5500	4000
225	8000	5000
250	on request	

⚠ These values do not apply for the 2nd shaft journal.
Please enquire for the transmissible power and radial force!

⚠ Motors which are mounted directly onto a housing are subjected to the radial and axial forces from the 1st gear stage and therefore in some cases may have reinforced bearings.

Bearing and shaft seals

NORD-IEC motors have lifelong lubricated roller bearings. The B side bearing is implemented as a fixed bearing.

Refer to the operating and maintenance instruction B1091 for roller bearing replacement.

Sealed grooved ball bearings (2RSR) are used for the option AS66 outdoor installation

Type	A bearing	B bearing (fixed bearing)
63	6202.2Z	6202.2Z
71	6202.2Z	6202.2Z
80	6204.2Z	6204.2Z
90	6205.2Z	6205.2Z
100	6206.2Z	6206.2Z
112	6306.2Z.C3	6306.2Z.C3
132	6308.2Z.C3	6308.2Z.C3
160	6309.2Z.C3	6309.2Z.C3
180 .X	6310.2Z.C3	6309.2Z.C3
180	6312.2Z.C3	6311.2Z.C3
200 .X	6312.2Z.C3	6311.2Z.C3
225	6315.2Z.C3	6313.2Z.C3
250	on request	

Geräuschemission

Sound pressure level and sound power level

In accordance with DIN EN ISO 3745/44 the sound pressure level SPL is measured in an anechoic chamber with the test sample idling. The measurement surface area A [dB] is calculated from the geometrical dimensions of the test sample. The sound power level SWL is determined by adding the measurement surface area to the sound pressure level. For inverter operation a slightly increased noise level due to magnetic humming or whistling is to be expected. At higher speeds due frequencies above 50Hz or 60Hz the fan noise increases. External fans are supplied directly from the mains. Their cooling effect and noise emission do not depend on the motor speed.

Measurement surface sound pressure level and sound power level for mains operation of 4-pole motors

Tolerance ± 3 [dB(A)]			IC411 / TEFC self-cooled				IC416 / TEBC with external fan			
			50Hz 1500/min		60Hz 1800/min		50Hz		60Hz	
Type			L_{PA}	L_{WA}	L_{PA}	L_{WA}	L_{PA}	L_{WA}	L_{PA}	L_{WA}
IE1	IE2	IE3	[dB(A)]				[dB(A)]			
63 S/L	-	63 SP/LP	40	52	44	56	47	59	50	62
71 S/L	-	71 SP/LP	45	57	49	57	51	63	53	65
80 S 80 L	80 SH 80 LH	- 80 LP	47	59	51	63	56	68	59	71
90 S 90 L	90 SH 90 LH	90 SP 90 LP	49	61	53	65	61	73	65	77
100 L 100 LA	100 LH 100 AH	100 LP 100 AP	51	64	55	68	59	72	63	76
112 M	112 MH	112 MP	54	66	58	70	61	74	64	77
132 S - -	132 SH 132 MH 132 LH	- 132 MP -	60	73	64	77	57	70	60	73
- 160 M 160 L	160 SH 160 MH 160 LH	160 SP 160 MP 160 LP	66	79	70	83	60	73	64	77
180 MX 180 LX	- -	- -	66	79	70	83	60	73	64	77
- -	180 MH 180 LH	180 MP 180 LP	62	75	66	79	60	73	64	77
200 LX	200 XH	-	62	75	66	79	60	73	64	77
-	-	225 RP	on request							
-	225 SH	225 SP								
-	225 MH	225 MP								
-	250 WH	250 WP								

Technical explanations

Protection class according to DIN EN 60034-5

Protection against touching moving and electrically live components as well as entry of solid foreign bodies, dust and water. The protection class is stated by the letters IP (International Protection) and two code numbers (e.g. IP55)

1st code number	Protection class	
	Brief description	Explanation of standard IEC60034-5
5	Protection against touching, foreign bodies and dust	Complete protection against touching. Dust cannot enter in harmful quantities
6	Protection against touching, foreign bodies and dust	Complete protection against touching. Dust cannot enter
2nd code number	**Brief description**	**Explanation**
5	Protection against water	Protection against water from all directions Water cannot enter in harmful quantities.
6	Protection against water	Protection against heavy seas and strong water jets from all directions Water cannot enter in harmful quantities.

Motors for indoor installation

NORD recommends the following options for indoor installation:

	Indoor installation dry	Indoor installation wet
Motor version	IP 55 (Standard)	IP 55 (Standard)
Temperature fluctuations and/or high humidity	–	KB, SH, FEU
Vertical version	RD	RDD

Motors for outdoor installation

NORD recommends the following options for outdoor installation:

	Outdoor installation	Extreme ambient conditions
Motor version	IP 55 (Standard)	IP 66
Temperature fluctuations and/or high humidity	AS55 or AS66, KB, SH, EP	
Vertical version	RD	RDD

The option KKV (encapsulated terminal box) can be supplied for both types of installation if required by the customer.

Outdoor installation AS66 or AS55

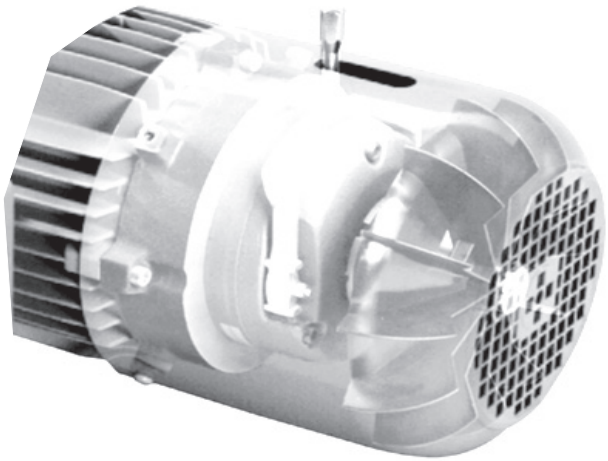
For outdoor installation or for motors which are used in wet environments we recommend the option AS66 or AS55.

Measures for AS66	Measures forn AS55 - only for brake motors
▸ Protection class IP66	▸ Protection class IP55
▸ Encapsulated terminal box	▸ Brake IP55 RG (rust-protected version)
▸ Motor bearings with sealing discs (2RS)	▸ Painting at least NORD Severe Duty 2 (⇨🕮 A9)
▸ IP66 brake	
▸ Painting at least NORD Severe Duty 3 (⇨🕮 A9)	

⚠ For outdoor installation of vertical versions (e.g. IM V1 or IM V5 ⇨🕮 ab D2) we urgently recommend the option “double fan cowl“ (RDD). If possible according to the version, the cable gland in the terminal box must be at the bottom.

Technical explanations . . . . . B 2 - 9
Technical data . . . . . B 10 - 11
Calculation of brake size . . . . . B 12
Options . . . . . B 13 - 17
Switching variants . . . . . B 18 - 21

Technical explanations



NORD brake motors

are equipped with DC-excited spring pressure brakes. The brakes prevent accidental rotation of machines (as holding brakes) or bring rotation of the machine to a standstill (as a working brake or for emergency stop).

Environment

The brake linings are asbestos-free.

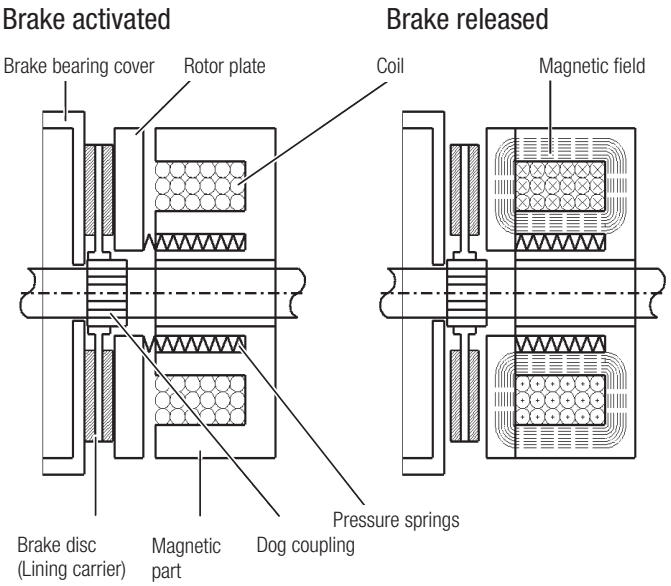
Safety

The braking action is activated on interruption of the current (idling current principle).
The brake can no longer be released if the brake linings are worn.

Idling current principle

The brake disc is located between the brake bearing cover and the rotor plate. The brake disc has a brake lining on both sides. The brake disc transfers the braking torque to the motor shaft by means of the coupling. The brake disc can be moved in an axial direction on the coupling. The rotor plate presses the brake disc against the brake cover plate by means of spring pressure. The friction between the rotor plate and the brake lining and between the brake bearing cover and the brake lining produces the braking torque. The brake is released by an electromagnet (magnetic component).

After the current is switched on, the electromagnet pulls the rotor plate back from the brake lining by several tenths of a millimetre against the pressure of the spring. This allows the brake disc to rotate freely. Interruption of the current causes the magnetic force to collapse, so that the spring pressure predominates. Therefore the brake is automatically activated.



Power-to-apply principle

Brakes which are activated by the force of an electro-magnet are designated as power-to-apply brakes. (Please enquire!)

Brake type codes

BRE 100 RG HL [...]

- [...] further options possible
- HL Manual brake release
- RG Rustproof design
- 100 Brake size/brake torquet
- BRE Brake

Example

BRE 40 FHL SR

Brake 40 Nm
with lockable manual release FHL
Dust and corrosion protected version SR

Type code for brake rectifiers

Example

G H E 4 0 L

- L Protection of electronic components
- 0 Current loading
- 4 Voltage range
- E Type of DC switch-off
- H Type of rectification
- G Rectifier

Explanations

1st place: G: Rectifier

2nd place: Type of rectification
- H: Half-wave (one-way circuit)
- V: Full wave (bridge circuit)
- P: Push (brief full wave, then half-wave) rapid rectifier

3rd place: Type of DC switch-off
- E: via external contact (circuit breaker)
- U: be internal voltage evaluation

4th place: Voltage range
- 2: up to 275V_{AC}
- 4: up to 480V_{AC}
- 5: up to 575V_{AC}

5th place: max. current load
⇨ B10

6th place: Protection of electronic components against vibration and moisture
- L: Paint coating
- V: Fully encapsulated

Switching variants ⇨ B18 and above

Brake torque (M_B)

According to DIN VDE 0580/2011/11, the actuation torque is defined as the value of the braking torque at a speed of 1m/s relative to the mean friction radius.

It applies for brakes which are in a run-in condition. The effective braking torque is not identical to the actuation torque and is to be regarded as a guideline value.

The actual value of the braking torque depends on the temperature, speed (frictional speed), ambient conditions (dirt, humidity) and the state of wear. These must be taken into account during planning.

If must be noted that the stated braking torques are subject to a tolerance. The precise values must be obtained from the relevant operating and installation instructions.

⚠ The full braking torque is only available after a short running-in period.

The friction surface of the brakes must be dry. Under no circumstances must they come into contact with grease or oil!
Grease or oil on the friction surfaces drastically reduces the braking torque.

Technical explanations

Spring pressure brakes: 5 - 800 Nm IP55

Type			BRE 5	BRE 10	BRE 20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400	BRE 800
	IE1	IE3	M_B [Nm]									
63	S/L	SP/LP	**5**	10 [2]								
71	S/L	SP/LP	**5**	10								
80 80	S L	SP LP	**5H** 5	**10W** **10**	20 20							
90 90	S L	SP LP		10 10	**20** **20**	40 40						
100 100	L LA	LP AP			20 20	**40** **40**						
112	M	MP			20	40	**60**					
132 132 132	S M MA	SP MP -					**60** 60 60	100 **100** 100	150 150 **150**			
160 160 160	- M L	SP MP LP						100 100 100	**150** **150** 150	250 250 **250**		
180 180 180 180	MX LX - -	- - MP LP							150 150	**250** **250** **250** **250**	 400 [2] 400 [2]	
200	LX	-								250	**400** [2]	
225 225 225	- - -	RP SP MP								250 250	**400** **400H*** 400	 **800**
250	-	WP									400	**800**
Brake series			BR55PH / BR55PW							BR55MH / BR55MW		
Extra weight [kg]			2	3	5,5	7	10	16	22	27	39	62
J [10^{-3} kgm^2]			0.015	0.045	0.173	0.45	0.86	1.22	2.85	7.18	21.5	42

Brake torques in bold type: Standard version for 4 pole motors,
other brake-motor combinations may result for different numbers of poles

H Holding brake
W Working brake
***** for working brake please inquire
2) Option HL not possible!

Spring pressure brake: 5 - 800 Nm IP66

Type			BRE 5	BRE 10	BRE 20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400	BRE 800
	IE1	IE3	M_B [Nm]									
63	S/L	SP/LP	**5**									
71	S/L	SP/LP	**5**									
80 80	S L	SP LP	**5H** 5	10W **10**								
90 90	S L	SP LP		10	**20**							
100 100	L LA	LP AP			20 20	**40** **40**						
112	M	MP			20	40	**60**					
132 132 132	S M MA	SP MP -					**60** 60 60	100 **100** 100				
160 160 160	- M L	SP MP LP						100 100 100	**150** **150** 150	250 250 **250**		
180 180 180 180	MX LX - -	- - MP LP							150 150	**250** **250** **250** **250**	 400 [2] 400 [2]	
200	LX	-								250	**400** [2]	
225 225 225	- - -	RP SP MP								250 250	**400** **400** 400	 **800**
250	-	WP									400	**800**
Brake series			BR66PH / BR66PW							BR66MH / BR66MW		
Extra weight [kg]			2	3	5,5	7	10	16	22	27	39	62
J [10^{-3} kgm^2]			0.015	0.045	0.173	0.45	0.86	1.22	2.85	7.18	21.5	42

Brake torques in bold type: Standard version for 4 pole motors,
other brake-motor combinations may result for different numbers of poles

H Holding brake
W Working brake

2) Option HL not possible!

Technical explanations

Selection of standard motor-brake combination

The selection of a standard combination of motor and brake according to the overview above must be carried out by careful planning. The braking torque must be specified according to the requirements of the application.

It should be noted that motors of the same type, but with different numbers of poles develop very different torques, especially 4-pole motors in comparison with 8-2-pole motors (rated, starting and breakdown torques ⇨🕮 Table C2-C26)

Among other things, the design of the drive units is orientated to both the torque required for the application and the motor torque. If necessary, the braking torque must be considerably reduced (ð& Table B5), so that there is no overload of the gear unit when large moving masses are braked (⇨🕮 B11 “Selection of brake size”).

Holding brake • Working brake • Emergency stop brake

The differentiation between a “holding brake”, a “working brake” and am “emergency stop brake” results from the type of application. A holding brake has the task of preventing a drive chain, which is at a standstill from starting to move.

As soon as a brake needs to produce amount of friction it is known as a working brake. The relevant friction and the switching frequency must be determined and taken into account for the selection of the brake (⇨🕮 B10-12).

For the emergency stop function of a brake, large masses must be braked once and the brake correspondingly large with amounts of energy are applied to the brake. In this case, the selection of the brake must be made according to the maximum permissible friction for each braking process.

Examples for Holding brake and Working brake

Holding brake

A frequency inverter controls the acceleration and deceleration of the application. The mechanical spring-loaded brake is only applied after the application has come to a standstill.

The brake is therefore only used for “holding” the application (parking position). It does not perform any friction work.

Only in the event of an emergency stop or power failure is friction work done while driving.

Brake series

BR55PH, BR55MH, BR66PH, BR66MH

Working brake

The geared motor is directly supplied by the local voltage supply. To slow down the application, the mechanical spring-loaded brake must generate a braking torque and thus performs friction work.

The mechanical brake is also used for “holding” the application (parking position).

Brake series

BR55PW, BR55MW, BR66PW, BR66MW

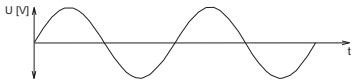
Electrical design

The brake windings are designed for continuous operation. At the rated voltage they heat up in a continuously released state according to heat class 130(B) (Temperature increase ≤ 80K). The brakes are supplied with DC current. For this, current from the AC mains is rectified.

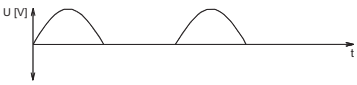
Half wave and bridge rectifiers are available as well as rapid switching rectifiers whose function will be described in the following sections. Selection of the rectifier should be made according to the requirements of the application.

Please note the section ‚Excess voltages' for DC supplies without a rectifier ⇨📖 B8!

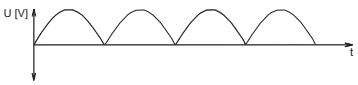
To protect against freezing, the brakes can be electrically heated, ⇨📖 B15 “Anti condensation heater of brakes (Option BSH)”. Please ask!



Sine wave AC voltage



Voltage form for
half-wave rectifiers
$U_{DC} = U_{AC} \times 0{,}45$



Voltage form with
bridge rectifiers
$U_{DC} = U_{AC} \times 0{,}9$

Brake switching characteristics

The build-up of the magnetic field to release the brake and its collapse on application of the brake requires a certain amount of time. This delay is often undesirable, but it can be effectively shortened by means of suitable measures.

Actvation of the brake (application)

AC switch-off
(Rectifiers GVE, GHE, GPE)

- Slow brake activation

If only the AC side of a bridge or half wave rectifier is disconnected from the mains, a DC current continues to flow through the rectifier until the magnetic field in the brake has been reduced.

The brake is only applied when the magnetic field has collapsed to a minimum amount. The time for the collapse of the field depends on the inductance of the brake and the resistance of the windings. As supplied, terminals 3 and 4 of the standard rectifier are connected by means of a wire bridge.

These must not be removed for AC switching.

DC switch-off
(Rectifiers GVE, GHE, GPE) and external contact

- Accelerated brake activation

The magnetic field of the brake collapses rapidly and the braking action occurs quickly if the interruption of the current is made on the “DC side” between the rectifier and the brake.

This interruption can be implemented by means of a contact between terminals 3 and 4 of the rectifier (see circuit example).
The contact must be suitable for the switching load due to the DC current. As supplied, terminals 3 and 4 of the standard rectifier are connected with a wire bridge.

This must be removed for DC switching. Accelerated brake activation ⇨📖 B14 Option “Current measurement relay” (IR).

Activation of the brake (application)

Under-excitation with quick switching rectifiers (GPU, GPE) e.g. mains voltage $230V_{AC}$ and brake voltage $205V_{DC}$

- High speed brake activation

  If the reduction of the application time by means of DC switching is not sufficient, under-excitation of the brake with the aid of a quick switching rectifier is advisable. After the brake has been released, the quick switching rectifier switches from bridge rectification to half-wave rectification. This halves the output voltage (DC) and the current (in the electrically released condition, the supply-voltage to the brake can be reduced to about 30% of the rated value without the brake being applied).

  At half voltage, the energy of the magnetic field is reduced to a quarter in comparison with the energy at full voltage (the same also applies for the heating of the coil). ⇨🕮 A39 (ISO-H)

  On the other hand, switch-off is carried out by DC. A weakened magnetic field collapses more quickly than a full strength field. As a result, with this weakened field, the brake is applied more quickly than a brake with a full field.

  In this switching combination, accelerated release by over-excitation is not possible!

⚠ This switching type must not be combined with a noise-reduced brake.

Releasing the brake (Ventilation)

- Normal brake release

  The release of the brake has already been explained in the Section “Idling current principle” (⇨🕮 B2).

Over-excitation with quick switching rectifiers (GPU, GPE2) e.g. mains voltage $230V_{AC}$ and brake voltage $105V_{DC}$

- Accelerated brake release

  The rapid action rectifier is briefly in bridge rectification mode (Push).

  For a short time, double the rated voltage is applied to the brake. The force with which the stator disc is pulled in by the magnetic component is enormously increased due to the double voltage, so that the rotor plate is released considerably quicker and the brake is released more quickly than with normal excitation.

  After the brake has been released, the quick switching rectifier switches from bridge rectification to half-wave rectification. The rated voltage is then applied to the brake terminals.

⚠ In this switching combination, accelerated activation of the brake by under-excitation is not possible!

Excess voltage

High voltages may occur when a brake is switched off. This results in severe erosion of the switching contacts. In addition, the brake can be destroyed by the high voltage.

NORD rectifiers are equipped with an appropriate protective circuit. This prevents the occurrence of impermissible excess voltages.

Other circuits, primarily for the supply of brakes from an external voltage source, can be equipped with additional protection. Please ask!

NORD Brake rectifiers	Technical data	
Bridge rectifiersr	GVE20L/V	
Rated voltage	230V_{AC}	
Max. permissible voltage range	110V...275V+10%	
Output voltage	205V_{DC} (U_{DC} = U_{AC} x 0.9)	
Rated current up to 40°C	1.5A	
Rated current up to 75°C	1.0A	
DC switch-off	by external contact or current measuring relay possible	
Half-wave rectifie	GHE40L/V	GHE50L/V
Rated voltage	480V_{AC}	575V_{AC}
Max. permissible voltage range	230V...480V+10%	230V...575V+10%
Output voltage	216V_{DC} (U_{DC} = U_{AC} x 0.45)	259V_{DC} (U_{DC} = UAC x 0.45)
Rated current up to 40°C	2.0A	2.0A
Rated current up to 75°C *	1.0A	1.0A
DC switch-off	by external contact or current measuring relay possible	
Brief bridge rectification then half-wave rectification	GPU20L/V	GPU40L/V
Rated voltage	230V_{AC}	480V_{AC}
Max. permissible voltage range	200V...275V+/-10%	330V...480V+/-10%
Output voltage	104V_{DC} (U_{DC} =U_{AC} x 0.45)	216V_{DC} (U_{DC} =U_{AC} x 0.45)
Rated current up to 40°C	0.7A	0.7A
Rated current up to 75°C *	0.5A	0.5A
DC switch-off	is carried out automatically internally! This is deactivated via bridge 3-4	
Brief bridge rectification then half-wave rectification	GPE20L/V	GPE40L/V
Rated voltage	230V_{AC}	480V_{AC}
Max. permissible voltage range	200...275V+/-10%	330V...480V+/-10%
Output voltage	104V_{DC} (U_{DC} =U_{AC} x 0.45)	216V_{DC} (U_{DC} =U_{AC} x 0,45)
Rated current up to 40°C	0.7A	0.7A
Rated current up to 75°C *	0.5A	0.5A
DC switch-off	by external contact or current measuring relay possible	

* Normally installation of the rectifier in the motor terminal box is permissible.
In the case of greater thermal loads or higher currents the rectifier must be mounted outside of the terminal box e.g. in a separate terminal box on the the fan cover or in the control cabinet.

Technical data

Brake connection voltage

The brakes are available with the following coil voltages:
24VDC, 105VDC, **180**VDC, **205**VDC, 225VDC, 250VDC (preferred voltages are printed bold)

Supple voltage [V_{AC}]	Standard rectifier			
110 - 128	GVE20			
180 - 220		GVE20		
205 - 250			GVE20	
210 - 256	GHE40			
225 - 275				GVE20
360 - 440		GHE40		
410 - 480			GHE40	
410 - 500			GHE50	
450 - 550				GHE50
Coil voltage (Brake) [V_{DC}]	105	180	205	225

Supple voltage [V_{AC}]	Quick release - quick switching rectifier			
200 - 256 **(230)**	GPU20 / GPE20			
380 - 440 **(400)**		GPU40 / GPE40		
380 - 480 **(460)**			GPU40 / GPE40	
450 - 480				GPU40 / GPE40
Coil voltage (Brake) [V_{DC}]	105	180	205	225

Supple voltage [V_{AC}]	Qick application - quick switching rectifier		
200 - 275 **(200)**	GPU20 / GPE20		
200 - 275 **(230)**		GPU20 / GPE20	
200 - 275 **(250)**			GPU20 / GPE20
Coil voltage (Brake) [V_{DC}]	180	205	225

Optimal values are printed bold

Calculation of brake sizes

Selection of brake size

The torque and moment inertia relate to the motor speed.
Gear output torques must always be divided by the gear ratio.
Moments of inertia for the gear unit must always be divided by the square of the gear ratio.

1. Selection according to static load (holding brakes)

$$M_{erf} = M_{stat} = M_{Load} \times K$$

2. Design according to static and dynamic load (service brakes)

$$\sum J = J_{Motor} + \frac{J_{Load}}{i^2}$$

Other moments of inertia (brake, gear unit), can usually be neglected.

$$M_{dyn} = \frac{\sum J \times n}{9{,}55 \times tr}$$

$$M_{erf} = (M_{dyn} \pm M_{Load}) \times K$$

for a driving load: M_{Load} must be entered as positive
for a braking load: M_{Load} must be entered as negative

3. Check for maximum permissible friction

$$W = \frac{J \times n^2}{182{,}5} \times \frac{M_B}{M_B \pm M_{Load}} \Rightarrow W \leq W_{max}\,!$$

for a driving load: M_{Load} must be entered as negative
for a braking load: M_{Load} must be entered as positive

For economic and technical reasons the brakes should not be overdimensioned.

Definition of abbreviations

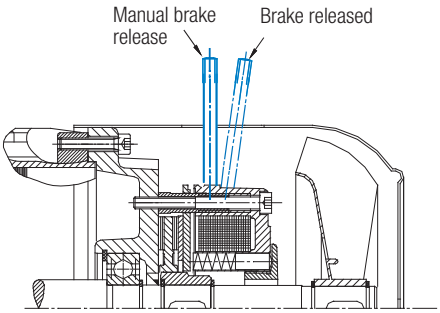
c/h	=	Number of braking actions per hour
$\sum J$ [kgm^2]	=	Sum of all driven moments of inertia, related to the motor speed
i	=	Gear ratio
K	=	Safety factor ⚠ related to the application, selection according to individual design specifications. - Guide values: 0.8...3.0 - Lifting equipment: >2 - Lifting equipment with personnel safety : 2...3 - Travelling drives: 0.5...1.5
M_B [Nm]	=	torque provided by the brake
M_{dyn} [Nm]	=	Dynamic torque (deceleration torque)
M_{erf} [Nm]	=	Required braking torque
M_{Load} [Nm]	=	Load torque resulting from the application
M_{stat} [Nm]	=	Static torque (holding torque)
n [min^{-1}]	=	Motor speed
t_r [sec]	=	Slipping time: the time in which the drive unit should come to a standstill
W [J]	=	Frictional work per braking action
W_{max} [J]	=	Maximum permissible friction work per braking action

Options

Manual release - HL ⇨🕮 D19

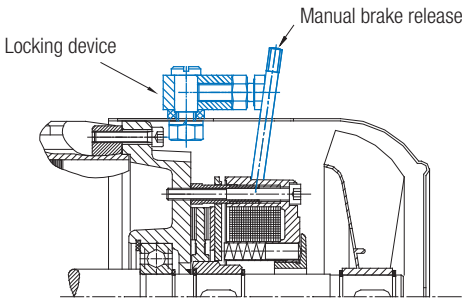
The braking effect of a brake with manual release can be released without dismantling, when no current is present.

To do this, the manual release lever is pulled in the direction of the air intake. Return is by means of spring pressure.



Lockable manual release - FHL

Brakes (up to 250Nm) with manual release can be locked in the released state by means of a locking device.

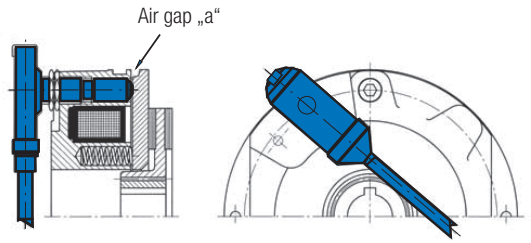


Microswitch – MIK

The brakes can be supplied with an attached micro switch for simple electrical monitoring of the release function.

A micro switch should be used if movement monitoring is necessary or required. The motor circuit breaker is triggered by the micro switch when the rotor disc is in contact with the magnetic part.

Then the motor can only start when the brake has released. Once the maximum air gap “a” has been reached the magnet no longer attracts the rotor disc. The motor circuit breaker is not triggered and the motor does not start. The air gap “a” must be re-adjusted.



Optionally, it is possible to intermediately store unscrewed manual brake release levers in a spring clip on the stator housing (Option CL ⇨🕮 A21).

Manual release (HL) - Dimensions and forces

Brake size	Row of brakes	Lever arm [mm]	Release force [N]	Key-width [mm]	Screw-in thread	Thread length [mm]	Ventil. angle a
BRE 5	BR55PH, BR55PW	100	40	8	M5	7	ca. 10 °
BRE 10	BR55PH, BR55PW	110	70				
BRE 20	BR55PH, BR55PW	135	85	10	M6	9	
BRE 40	BR55PH, BR55PW	140	140				
BRE 60	BR55PH, BR55PW	165	160	12	M8	12	
BRE 100	BR55PH, BR55PW	22	250				
BRE 150	BR55PH, BR55PW	250	320				
BRE 250	BR55PH, BR55PW	330	380	19	M12	15	
BRE 400	BR55PH, BR55PW	357	330				
BRE 800	BR55PH, BR55PW	357	330				
BRE 250	BR55MH, BR55MW	330	390	-	M20	19	
BRE 400	BR55MH, BR55MW	357	360				
BRE 800	BR55MH, BR55MW	357	360				

Protection against corrosion • Dust • Dirt • Moisture - RG, SR

1) B bearing cover painted and stainless friction disc
   - **Option RG** (only possible with protection class IP55)

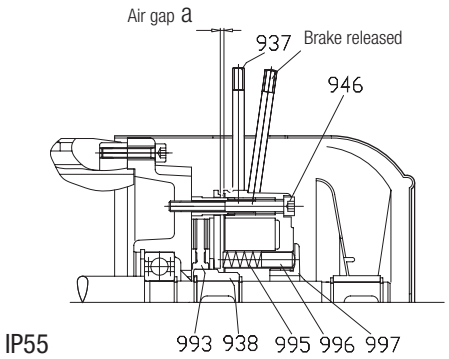
2) B bearing cover painted and dust protection ring
   - **Option SR** including stainless friction disc
   (only possible with protection class IP55)

3) Protection class **IP66**, note motor protection type, **please ask!**

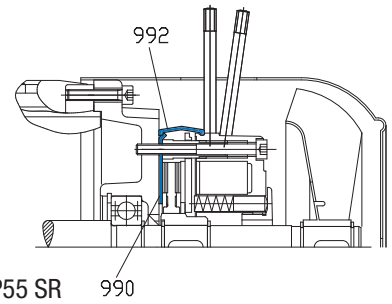
4) Protection class **IP67** (Sea water brake), note motor protection type, **please ask!**

Sectional drawings

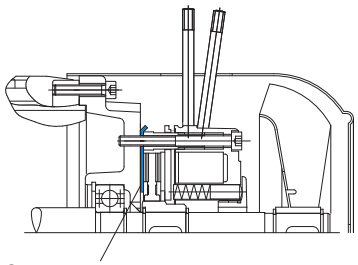
937	Manual brake release
938	Brake coupling
946	Fastening screw
971	O-ring
990	Rubbing plate
992	Dust protection ring
993	Brake lining
995	Compression spring
996	Compression piece
997	Adjustment ring 5-40 Nm
998	Socket / Sealing fin
999	V-Ring



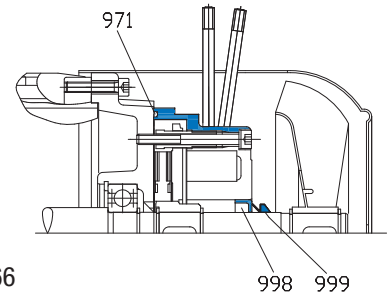
IP55



IP55 SR



IP55 RG



IP66

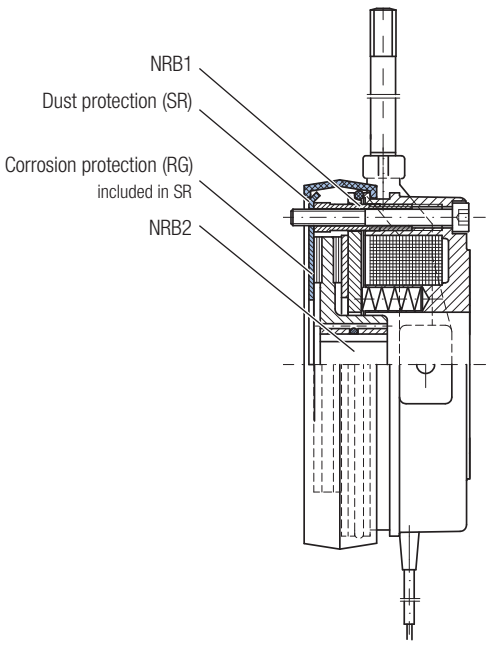
Noise-reduced brake - NRB1

In order to reduce switching noise, the brakes can be supplied with an O-ring between the rotor disc and the magnetic part.

⚠ Use with rapid action rectifiers for under-excitation is not permitted.

Noise-reduced brake - NRB2

Noise due to torque oscillations in inverter operation or with single-phase motors can be effectively reduced by the use of rings on the couplings.



Options

Current measuring relay - IR

Accelerated brake activation

Rectifiers which are directly wired to the motor terminals are supplied via the motor supply cable. This saves a separate supply line for the brake. After the motor is switched off, the brake remains electrically connected to the motor. As long as the motor has not come to a standstill, it works as a generator and continues to feed the brake via the rectifier, which considerably delays the activation of the braking effect.

This can result in an impermissible operating state, especially with loaded lifting equipment.

A current measuring relay must be used in order to achieve short application times with this switching variant. The current measuring relay measures the motor current. If the motor is switched off, the current measuring relay releases. At the same time, the brake is switched off by DC.

However, due to internal reaction times, the activation of the braking effect is slower than with normal DC switch-off.

The current measuring relay can only be used in combination with the rectifiers GVE, GHE and GPE!

Technical data	Current measuring relay (IR)	
Switching voltage	42...550 V_{DC}	
Switching current	1.0 A_{DC}	
Primary current	25 A_{AC}	50 A_{AC}
max. primary current	75A (0.2 sec)	150A (0.2 sec)
Holding current	< 0.7 A_{AC}	< 0.7 A_{AC}
max. operating temperature	-25°C... +90 °C	-25°C... +90 °C

Anti condensation heater / Brake (BSH)

In the case of severe temperature fluctuations, high humidity or extreme climatic conditions, a standstill heating system must be used. This prevents moisture precipitation inside the brake.

⚠ The anti condensation heater of the brake must not be switched on when the motor is running and when the brake is energized!

Available version: 115 V; 230 V

Brake size	Heating power [W] at 115 V	Current [A] at 115 V	Heating power [W] at 230 V	Current [A] at 230 V	Row of brakes	Marking of the auxiliary terminals [EN 60034-8]
BRE 5	-	-	-	-	BR55PH, BR55PW	2 HE1 - 2HE2
BRE 10	14	0.12	16	0.07	BR55PH, BR55PW	
BRE 20	27	0.23	28	0.12	BR55PH, BR55PW	
BRE 40	33	0.29	33	0.14	BR55PH, BR55PW	
BRE 60	38	0.33	35	0.15	BR55PH, BR55PW	
BRE 100	56	0.49	47	0.20	BR55PH, BR55PW	
BRE 150	47	0.41	52	0.23	BR55PH, BR55PW	
BRE 250	53	0.46	70	0.30	BR55PH, BR55PW	
BRE 400	72	0.63	109.5	0.48	BR55PH, BR55PW	
BRE 800	-	-	-	-	BR55PH, BR55PW	
BRE 250	20	0.17	20	0.09	BR55MH, BR55MW	
BRE 400	30	0.26	30	0.13	BR55MH, BR55MW	
BRE 800	30	0.26	30	0.13	BR55MH, BR55MW	

Double brake for theatre applications - DBR

Combinations of 2 brakes for example for theater applications requirements are available in noise-reduced versions.

In order to reduce the switching noise (< 50 dB(A) with AC switch-off) the theatre version of the brakes has an O-ring between the rotor disc and the magnetic part.

Redundancy:

Safety-relevant systems must be designed in parallel, so that if one component fails, the other component ensures the function.

According to DIN EN 17206, the brake must be able to hold at least 1.25 x the load (test load). It is advisable to design the brake for 1.6 x and a maximum of 2.0 x the load torque.

⚠ The coil voltages correspond to the values stated in this catalogue. Two rectifiers are required for the double brake. Combination with voltage reduction is not possible.

Note:

It is advisable to stagger the application of the brakes, as if they are applied simultaneously, the braking torques add up and can therefore cause damage to the gear unit and the system. If there is the possibility of an emergency stop, the gear unit should be appropriately designed to handle the full braking torque of both brakes!

⚠ To prevent damage to the theater brake, an optional microswitch (MIK) is recommended ⇨📖 B12.

Options

Double brakes: 6 - 500 Nm IP55

				Double brake								
				DBR 6	DBR 12	DBR 25	DBR 50	DBR 75	DBR 125	DBR 187	DBR 300	DBR 500
	IE1	IE2	IE3	M_B [Nm]								
63	S/L	-	SP/LP	6								
71	S/L	-	SP/LP	6								
80 80	S L	SH LH	SP LP	6 6	12 **12**							
90 90	S L	SH LH	SP LP		**12** 12	25 **25**						
100 100	L LA	LH AH	LP AP			**25** 25	50 **50**					
112 112	M -	SH MH	- MP				**50** 50	75 **75**				
132 132 132	S M MA	SH MH LH	SP MP -					**75** 75 75	125 **125** 125	187 187 **187** [2]		
160 160 160	- M L	SH MH LH	SP MP LP						125 125 125	**187** **187** **187**	300 300 300	
180 180 180 180	MX LX - -	- - MH LH	- - MP LP							187 187 187 187	**300** **300** **300** **300**	
200	LX	XH	-							187	**300**	500 [2]
225 225	- -	- /SH MH	RP/SP MP								300 300	**500** **500**
250	-	WH	WP								300	**500**
Brake serie				**DB55PH**								
Weight [kg]				3	5	8	12	18	24	36	50	80
J [10^{-3} kgm^2]				2 x 0.015	2 x 0.045	2 x 0.173	2 x 0.45	2 x 0.86	2 x 1.22	2 x 2.85	2 x 6.65	2 x 19.5

Brake torques in bold type: Standard version

2) Option HL in combination with fan cover not possible!

Reduction of braking torque										
Number of springs per spring package	DBR 6	DBR 12	DBR 25	DBR 50	DBR 75	DBR 125	DBR 187	Number of springs per spring package	DBR 300	DBR 500
	M_B [Nm]								M_B [Nm]	
7	2 x 6	2 x 12	2 x 25	2 x 50	2 x 75	2 x 125	2 x 187	8	2 x 300	2 x 500
5	2 x 4	2 x 8.5	2 x 17.5	2 x 35	2 x 52	2 x 89	2 x 132	6	2 x 225	2 x 375
4	2 x 3,5	2 x 7	2 x 14	2 x 28	2 x 42	2 x 70	2 x 107	4	2 x 150	2 x 250

Brake torques in bold type: Standard version

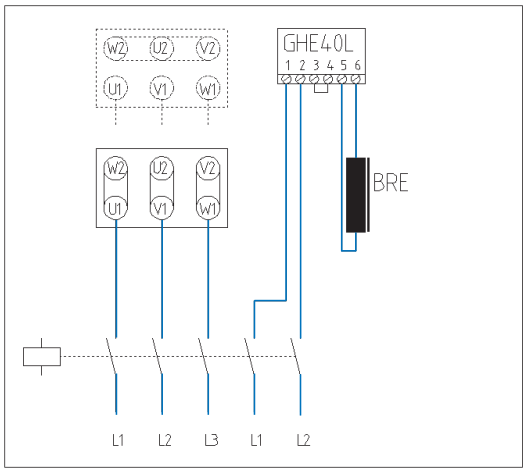
Notes

Switching variants

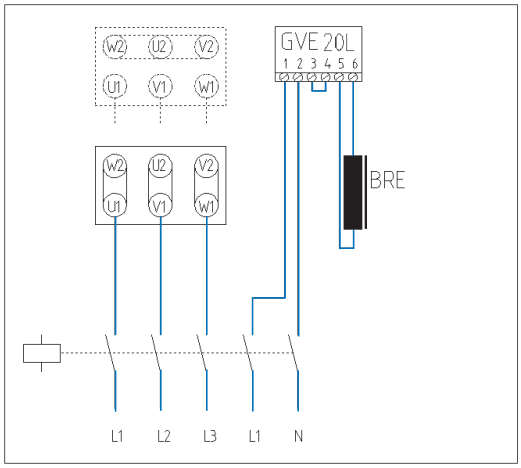
Switching variants for brake motors (Examples)

The following selection shows the must usual switching variants for single-speed brake motors.
The correct combination of rectifier and coil voltage for the brake must be made according to the available supply voltage from ⇨🕮 Table B10.

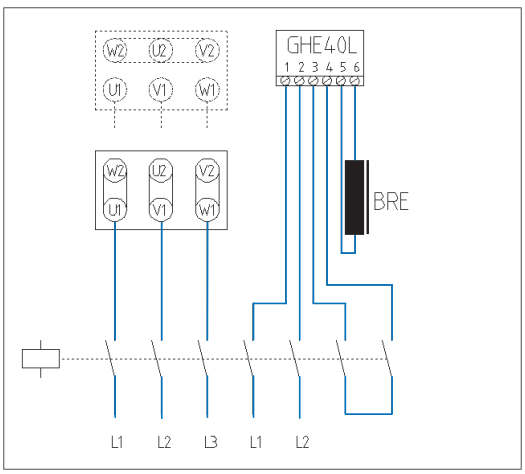
1. Motor Δ circuit: $400V_{AC}$
   Alternative Y circuit: $400V_{AC}$
   Half-wave rectifier: GHE40L
   Separate supple: $400V_{AC}$
   Brake: $180V_{DC}$
   Switch-off: AC



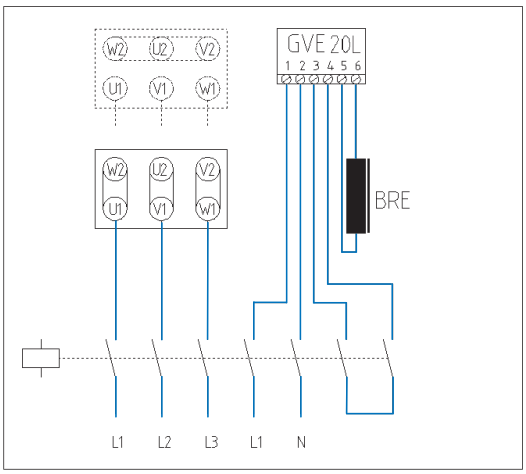
2. Motor Δ circuit: $400V_{AC}$
   Alternative Y circuit: $400V_{AC}$
   Bridge rectifier: GVE20L
   Separate Supple: $230V_{AC}$
   Brake: $205V_{DC}$
   Switch-off: AC



3. Motor Δ circuit: $400V_{AC}$
   Alternative Y circuit: $400V_{AC}$
   Half-wave rectifier: GHE40L
   Separate supple: $400V_{AC}$
   Brake: $180V_{DC}$
   Switch-off: DC

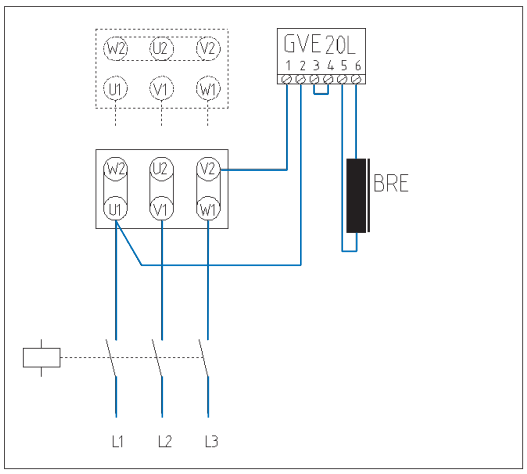


4. Motor Δ circuit: $400V_{AC}$
   Alternative Y circuit $400V_{AC}$
   Bridge rectifier: GVE20L
   Separate supple: $230V_{AC}$
   Brake: $205V_{DC}$
   Switch-off: DC



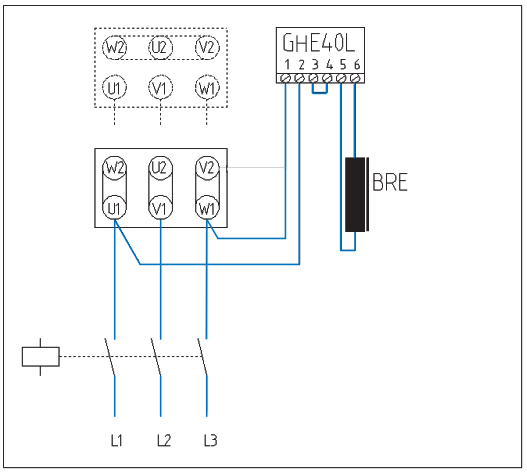
5. Motor Δ circuit: $230V_{AC}$
Alternative Y circuit: $400V_{AC}$
Bridge rectifier: GVE20L
Supply via the motor terminals: $230V_{AC}$
Brake: $205V_{DC}$
Switch-off: AC

Brake applies very slowly!



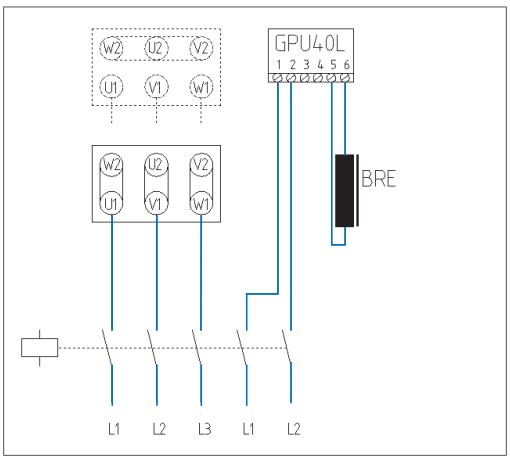
6. Motor Δ circuit: $400V_{AC}$
Alternative Y circuit: $400V_{AC}$
Half-ware rectifier: GHE40L
Supply via the motor terminals: $400V_{AC}$
Brake: $180V_{DC}$
Switch-off: AC

Brake applies very slowly!



7. Motor Δ circuit: $400V_{AC}$
Alternative Y circuit: $400V_{AC}$
Quick-switching rectifier: GPU40L
Brake: $180V_{DC}$
Separate supply: $400V_{AC}$
Switch-off: DC, internal

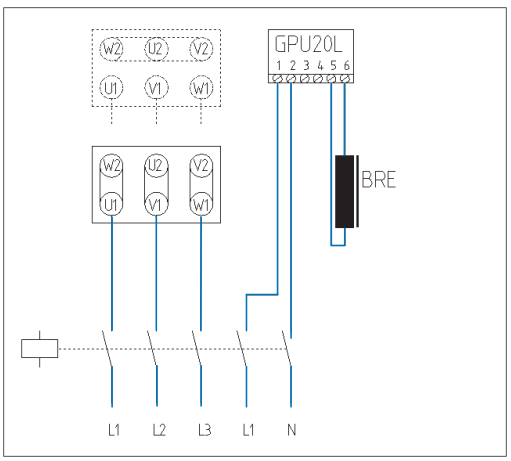
Switching variants for rapid release!



Typical for FI operation

8. Motor Δ circuit: $400V_{AC}$
Alternative Y circuit: $400V_{AC}$
Quick-switching rectifier: GPU20L
Brake: $105V_{DC}$
Separate supply: $230V_{AC}$
Switch-off: DC, internal

Switching variants for rapid release!

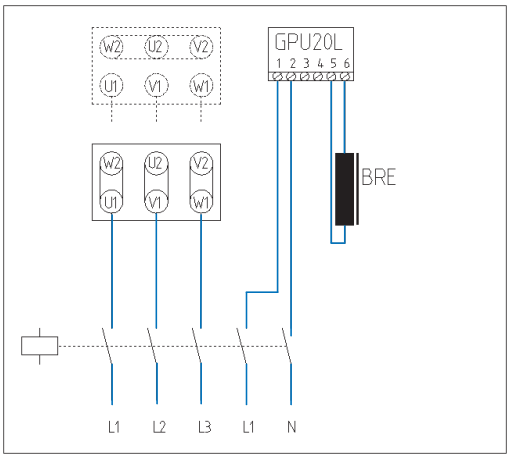


Typical for FI operation

Switching variants

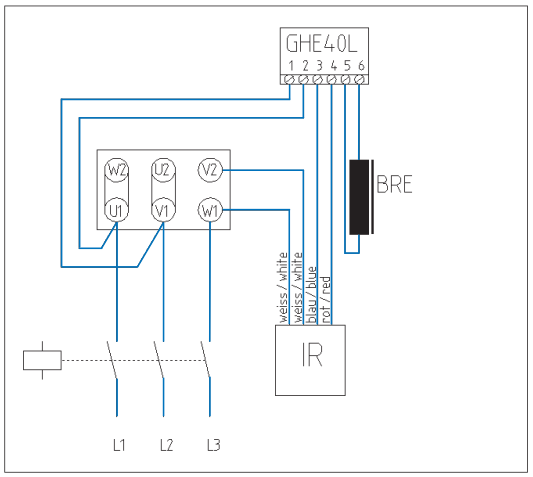
9. Motor Δ circuit: $400V_{AC}$
   Alternative Y circuit: $400V_{AC}$
   Quick-switching rectifier: GPU20L
   Brake: $205V_{DC}$
   Separate supply: $230V_{AC}$
   Switch-off: DC, internal

   Switching variant for rapid application!



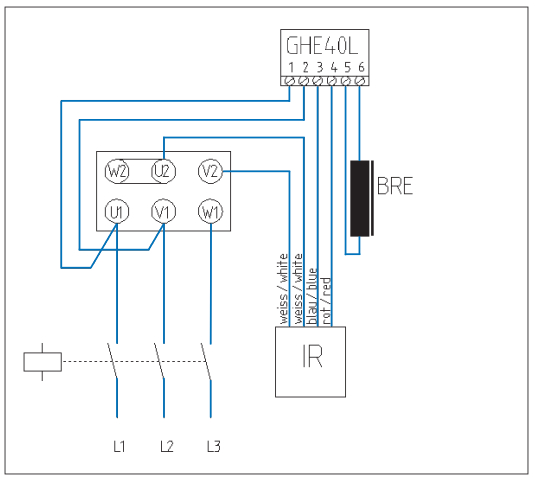
10. Motor Δ circuit: $400V_{AC}$
    Half-wave rectifier: GHE40L
    Bake: $180V_{DC}$
    Supply via the motor terminals: $400V_{AC}$
    Switch-off: **DC via current measuring relay**

    Switching variant for rapid application!



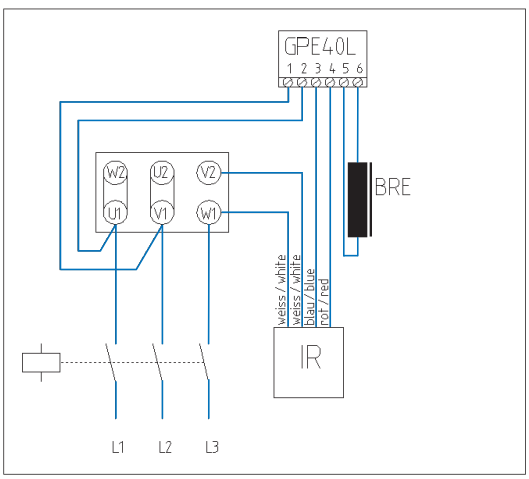
11. Motor Y circuit: $400V_{AC}$
    Half-wave rectifier: GHE40L
    Brake: $180V_{DC}$
    Supply via the motor terminals: $400V_{AC}$
    Switch-off: **DC via current measuring relay**

    Switching variant for rapid application!



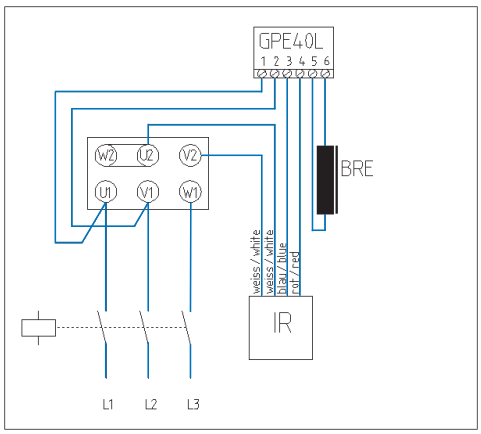
12. Motor Δ circuit: $400V_{AC}$
    Quick-switching rectifier: GPE40L
    Brake: $180V_{DC}$
    Supply via the motor terminals: $400V_{AC}$
    Switch-off: **DC via current measuring relay**

    Switching variant for rapid release and application!



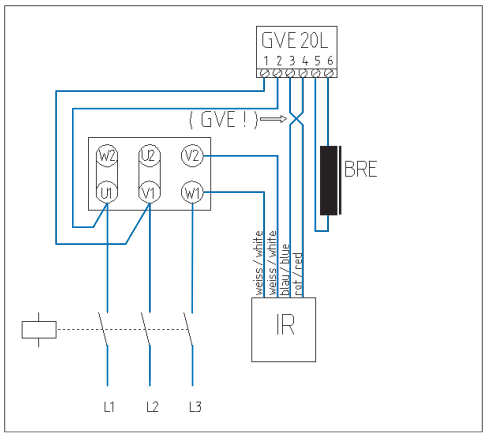
13. Motor Y circuit: $400V_{AC}$
Quick switching rectifier: GPE40L
Brake: $180V_{DC}$
Supply via the motor terminals: $400V_{AC}$
Switch-off: DC via current measuring relay

Switching variants for rapid release and application!



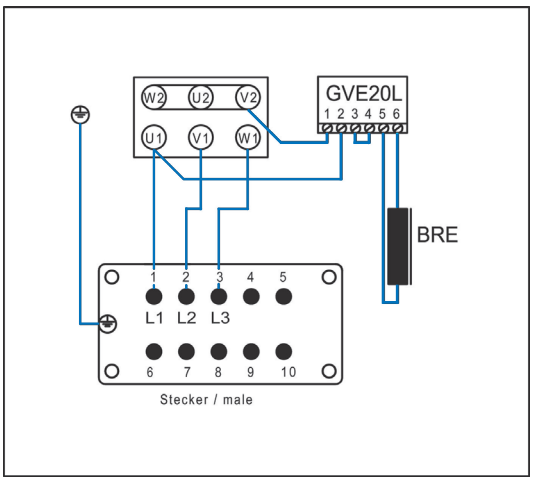
14. Motor Δ circuit: $230V_{AC}$
Bridge rectifier: GVE20L
Brake: $205V_{DC}$
Supply via the motor terminals: $230V_{AC}$
Switch-off: DC via current measuring relay

Switching varaints for rapid application.
Not the connection of the current measuring relay to the rectifier!



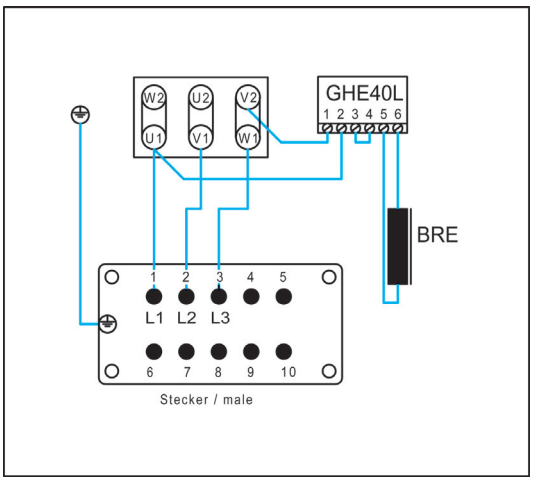
15. Motor Y circuit: $400V_{AC}$
Bridge rectifier: GVE20L
Brake: $205V_{DC}$
Supply via the motor terminals: $230V_{AC}$
Switch-off: AC

Switching variant oe connection via motor plug connector (MS)!



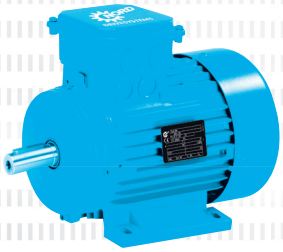
16. Motor Δ circuit: $400V_{AC}$
Half-wave rectifier: GHE40L
Brake: $180V_{DC}$
Supply via the motor terminals: $400V_{AC}$
Switch-off: AC

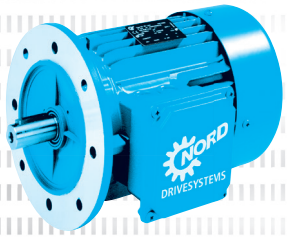
Switching variant oe connection via motor plug connector (MS)!



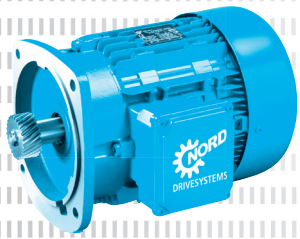
Notes

Motor data









IE3 ..... C 2 - 17

Standard + IE1 ..... C 18 - 22

1500 rpm
50 Hz

230/400 V
4 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	J	kg
					230V	400 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N					*
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/4	0.12	1370	0.84	0.68	0.39	0.66	58.3	64.7	66.4	2.7	2.6	3.3	0.00024	3.80
63	LP/4	0.18	1385	1.24	1.02	0.59	0.62	62.2	65.6	69.9	3.3	3.1	3.6	0.00033	4.70
71	SP/4	0.25	1415	1.69	1.21	0.70	0.71	68.2	73.0	73.5	3.2	3.2	4.9	0.00086	6.10
71	LP/4	0.37	1405	2.51	1.58	0.91	0.76	72.8	76.7	77.3	2.8	2.8	5.0	0.00110	7.20
80	SP/4	0.55	1420	3.70	2.23	1.29	0.75	79.5	81.8	81.4	2.6	2.8	5.1	0.00145	9.70
80	LP/4	0.75	1415	5.06	3.10	1.79	0.72	83.7	84.7	83.7	3.0	3.1	5.4	0.0019	10.2
90	SP/4	1.10	1430	7.35	4.12	2.38	0.78	84.7	86.0	85.3	3.6	4.0	6.8	0.0034	15.1
90	LP/4	1.50	1415	10.1	5.59	3.23	0.79	86.6	86.3	85.3	3.3	3.5	5.9	0.0039	16.8
100	LP/4**	2.20	1460	14.4	8.13	4.68	0.76	87.3	88.3	87.9	3.6	4.2	7.9	0.0074	24.5
100	AP/4**	3.00	1450	19.8	10.9	6.26	0.80	88.2	88.6	87.7	3.2	3.6	7.0	0.0086	27.4
112	MP/4	4.00	1440	26.5	13.6	7.85	0.83	88.9	89.2	88.6	3.3	3.5	7.4	0.014	35.5
132	SP/4	5.50	1465	35.8	18.9	10.9	0.80	90.6	91.5	90.9	3.9	4.1	8.6	0.032	55.0
132	MP/4	7.50	1460	49.0	27.3	15.7	0.77	90.2	90.5	90.4	3.9	4.2	7.5	0.035	62.0
160	SP/4	9.20	1470	59.8	29.0	16.7	0.88	90.4	91.1	91.0	2.9	3.3	8.1	0.067	93.0
160	MP/4	11.0	1465	71.7	35.5	20.5	0.85	91.6	92.0	91.4	2.9	3.4	7.4	0.067	93.0
160	LP/4	15.0	1465	97.8	48.3	27.9	0.85	92.3	92.8	92.3	3.8	4.3	9.1	0.092	122
180	MP/4	18.5	1480	119	58.9	34.0	0.84	92.4	93.1	93.1	3.4	3.8	9.2	0.16	155
180	LP/4	22.0	1475	142	68.1	39.3	0.87	93.2	93.5	93.1	2.8	3.2	8.0	0.16	155
225	RP/4	30.0	1485	193	97.3	56.2	0.82	93.6	94.3	94.1	3.0	3.4	7.8	0.49	315
225	SP/4	37.0	1485	238	118	68.2	0.83	93.6	94.4	94.1	2.9	3.2	7.7	0.54	330
225	MP/4	45.0	1485	289	142	81.7	0.83	94.6	94.9	94.6	3.0	3.4	8.0	0.67	365
250	WP/4	55.0	1480	355	166	96.1	0.87	95.2	95.0	94.6	2.6	2.8	7.0	0.82	400

* Version B5, without options

** Series **APAB**

1500 rpm
50 Hz

400/690 V
4 - pole

Type		IE3 S1 P_N [kW]	n_N [r/min]	M_N [Nm]	400 V [A]	690 V [A]	cos φ $4/4xP_N$	η $1/2xP_N$ [%]	η $3/4xP_N$ [%]	η $4/4xP_N$ [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
63	SP/4	0.12	1370	0.84	0.39	0.23	0.66	59.0	64.6	65.6	2.7	2.6	3.30	0.00024	3.80
63	LP/4	0.18	1375	1.25	0.55	0.32	0.66	65.6	70.1	70.4	3.5	3.4	3.62	0.00033	4.70
71	SP/4	0.25	1415	1.69	0.71	0.41	0.68	68.2	73.0	73.5	3.1	3.1	4.94	0.00086	6.10
71	LP/4	0.37	1405	2.51	0.92	0.53	0.76	72.8	76.7	77.3	2.8	2.8	4.98	0.00110	7.20
80	SP/4	0.55	1420	3.70	1.29	0.74	0.75	79.5	81.8	81.4	2.6	2.8	5.09	0.00145	9.70
80	LP/4	0.75	1415	5.06	1.79	1.03	0.72	83.7	84.7	83.7	2.9	3.1	5.30	0.0019	10.2
90	SP/4	1.10	1430	7.35	2.38	1.37	0.78	84.7	86.0	85.3	3.6	4.0	6.80	0.0034	15.1
90	LP/4	1.50	1415	10.1	3.23	1.86	0.79	86.6	86.3	85.3	3.3	3.5	5.90	0.0039	16.8
100	LP/4 **	2.20	1460	14.4	4.68	2.71	0.76	87.3	88.3	87.9	3.6	4.2	7.90	0.0074	24.5
100	AP/4 **	3.00	1450	19.8	6.26	3.63	0.80	88.2	88.6	87.7	3.2	3.6	7.00	0.0086	27.4
112	MP/4	4.00	1440	26.5	7.85	4.53	0.83	88.9	89.2	88.6	3.4	3.6	7.50	0.014	35.5
132	SP/4	5.50	1465	35.8	10.9	6.29	0.80	90.6	91.5	90.9	3.9	4.1	8.60	0.032	55.0
132	MP/4	7.50	1460	49.0	15.7	9.10	0.77	90.2	90.5	90.4	3.9	4.2	7.50	0.035	62.0
160	SP/4	9.20	1470	59.8	16.7	9.65	0.88	90.4	91.1	91.0	2.9	3.3	8.10	0.067	93.0
160	MP/4	11.0	1465	71.7	20.5	11.8	0.85	91.6	92.0	91.4	2.9	3.4	7.40	0.067	93.0
160	LP/4	15.0	1465	97.8	27.9	16.1	0.85	92.3	92.8	92.3	3.8	4.3	9.10	0.092	122
180	MP/4	18.5	1480	119	34.0	19.6	0.84	92.4	93.1	93.1	3.4	3.8	9.20	0.16	155
180	LP/4	22.0	1475	142	39.3	22.7	0.87	93.2	93.5	93.1	2.8	3.2	8.00	0.16	155
225	RP/4	30.0	1485	193	56.2	32.4	0.82	93.6	94.3	94.1	3.0	3.4	7.79	0.49	315
225	SP/4	37.0	1485	238	68.2	39.8	0.83	93.6	94.4	94.1	2.9	3.2	7.67	0.54	330
225	MP/4	45.0	1485	289	81.7	47.2	0.83	94.6	94.9	94.6	3.0	3.4	8.02	0.67	365
250	WP/4	55.0	1480	355	96.1	55.5	0.87	95.2	95.0	94.6	2.6	2.8	7.04	0.82	400

* Version B5, without options

** Series **APAB**

1500 rpm
50 Hz

220/380 V
4 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	J	kg
					220V	380 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N					*
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/4	0,12	1.390	0,82	0,8	0,46	0,6	55,1	62	64,8	3,1	2,9	3,6	0,00024	3,8
63	LP/4	0,18	1.385	1,24	1,07	0,62	0,62	62,2	65,6	69,9	3,3	3,1	3,6	0,00033	4,7
71	SP/4	0,25	1.415	1,69	1,28	0,74	0,71	68,2	73	74,3	3,2	3,2	4,9	0,00086	6,1
71	LP/4	0,37	1.405	2,51	1,66	0,96	0,76	72,8	76,7	77,3	2,8	2,8	5,0	0,0011	7,2
80	SP/4	0,55	1.420	3,70	2,36	1,36	0,75	79,5	81,8	81,4	2,6	2,8	5,1	0,00145	9,7
80	LP/4	0,75	1.415	5,06	3,24	1,87	0,72	83,7	84,7	83,7	3,0	3,1	5,4	0,0019	10,2
90	SP/4	1,1	1.430	7,35	4,35	2,51	0,78	84,7	86	85,3	3,7	4,1	6,9	0,0034	15,1
90	LP/4	1,5	1.415	10,12	5,89	3,4	0,79	86,6	86,3	85,3	3,3	3,5	5,9	0,0039	16,8
100	LP/4	2,2	1.465	14,34	7,79	4,5	0,83	88,7	89,6	88,1	2,7	4,0	8,4	0,0081	24,5
100	AP/4	3	1.460	19,62	11	6,35	0,81	88,4	88,8	88,1	2,4	3,6	7,3	0,0081	28,0
112	MP/4	4	1.440	26,53	14,3	8,26	0,83	88,9	89,2	88,6	3,3	3,5	7,3	0,014	35,5
132	SP/4	5,5	1.465	35,85	19,9	11,5	0,8	90,6	91,5	90,9	3,9	4,1	8,6	0,032	55,0
132	MP/4	7,5	1.460	49,06	28,6	16,5	0,77	90,2	90,5	90,4	3,9	4,2	7,5	0,035	62,0
160	SP/4	9,2	1.470	59,77	30,4	17,6	0,88	90,4	91,1	91	2,9	3,3	8,1	0,067	93,0
160	MP/4	11	1.465	71,71	37,4	21,6	0,85	91,6	92	91,4	2,9	3,4	7,4	0,067	93,0
160	LP/4	15	1.465	97,78	50,9	29,4	0,85	92,3	92,8	92,3	3,8	4,4	9,3	0,092	122
180	MP/4	18,5	1.480	119,38	62	35,8	0,84	92,4	93,1	93,1	3,4	3,8	9,2	0,16	155
180	LP/4	22	1.475	142,44	72,4	41,8	0,86	93,2	93,5	93,1	3,0	3,3	8,2	0,16	155
225	RP/4	30	1.485	192,93	102,2	59	0,82	93,6	94,3	94,1	3,0	3,4	7,8	0,49	315
225	SP/4	37	1.485	237,95	128,05	73,93	0,83	93,6	94,4	94,1	3,0	3,4	7,7	0,54	330
225	MP/4	45	1.485	289,39	147,21	84,99	0,86	0	0	94,5	2,7	3,0	7,3	0,67	365
250	WP/4	55	1.475	356,10	176,5	101,9	0,88	0	0	94,3	2,3	2,5	6,3	0,82	400

* Version B5, without options

1500 rpm
50 Hz

380/660 V
4 - pole

Type		IE3 S1 P_N [kW]	n_N [r/min]	M_N [Nm]	400 V [A]	690 V [A]	cos φ 4/4xP_N	η 1/2xP_N [%]	η 3/4xP_N [%]	η 4/4xP_N [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
63	SP/4	0.12	1350	0.85	0.41	0.24	0.74	0.0	0.0	65.8	2.4	2.3	3.0	0.00024	3.80
63	LP/4	0.18	1370	1.25	0.58	0.33	0.71	0.0	0.0	65.7	2.9	2.8	3.5	0.00033	4.70
71	SP/4	0.25	1405	1.70	0.71	0.41	0.75	0.0	0.0	74.5	2.9	2.8	4.6	0.00086	6.10
71	LP/4	0.37	1390	2.54	0.95	0.55	0.81	0.0	0.0	77.0	2.5	2.5	4.5	0.00110	7.20
80	SP/4	0.55	1405	3.74	1.37	0.79	0.79	0.0	0.0	80.6	2.4	2.5	4.6	0.00145	9.70
80	LP/4	0.75	1405	5.10	1.87	1.08	0.79	0.0	0.0	83.7	2.7	2.8	4.9	0.0019	10.2
90	SP/4	1.10	1420	7.40	2.45	1.41	0.81	0.0	0.0	85.3	3.2	3.6	6.3	0.0034	15.1
90	LP/4	1.50	1405	10.2	3.45	1.99	0.80	0.0	0.0	84.4	2.9	3.1	5.4	0.0039	16.8
100	LP/4	2.20	1460	14.4	4.54	2.62	0.83	0.0	0.0	87.9	3.3	3.8	7.4	0.0074	24.5
100	AP/4	3.00	1445	19.8	6.21	3.59	0.83	0.0	0.0	87.7	2.8	3.1	6.4	0.0086	28.0
112	MP/4	4.00	1430	26.7	8.42	4.86	0.82	0.0	0.0	88.1	3.0	3.1	6.6	0.014	35.5
132	SP/4	5.50	1460	36.0	11.4	6.56	0.83	0.0	0.0	90.8	3.5	3.7	7.8	0.032	55.0
132	MP/4	7.50	1455	49.2	15.9	9.15	0.82	0.0	0.0	90.1	3.5	3.8	7.1	0.035	62.0
160	SP/4	9.20	1465	60.0	17.4	10.0	0.86	0.0	0.0	91.0	2.6	3.0	7.0	0.067	93.0
160	MP/4	11.0	1460	71.9	21.5	12.4	0.88	0.0	0.0	91.4	2.6	3.0	6.7	0.067	93.0
160	LP/4	15.0	1460	98.1	28.8	16.6	0.87	0.0	0.0	92.0	3.4	3.8	8.4	0.092	122
180	MP/4	18.5	1475	120	35.0	20	0.85	0.0	0.0	93.1	3.0	3.4	8.5	0.16	155
180	LP/4	22.0	1470	143	41.5	24.0	0.87	0.0	0.0	92.8	2.6	2.9	7.2	0.16	155
225	RP/4	30.0	1485	193	57.9	33.4	0.85	0.0	0.0	94.0	2.7	3.1	7.2	0.49	315
225	SP/4	37.0	1485	238	70.7	40.8	0.85	0.0	0.0	93.9	2.6	2.9	7.0	0.54	330
225	MP/4	45.0	1485	289	147	85.0	0.86	0.0	0.0	94.5	2.7	3.0	7.3	0.67	365
250	WP/4	55.0	1475	356	102	58.8	0.88	0.0	0.0	94.3	2.3	2.5	6.3	0.82	400

* Version B5, without Options

1800 rpm
60 Hz

265/460 V
4 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
					265 V	460 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N					
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/4	0.12	1695	0.68	0.62	0.36	0.62	58.9	65.9	68.5	3.40	3.30	4.00	0.00024	3.80
63	LP/4	0.18	1705	1.01	0.94	0.54	0.57	63.6	70.2	72.3	4.10	3.90	4.30	0.00033	4.70
71	SP/4	0.25	1725	1.38	1.09	0.63	0.67	67.7	74.3	73.5	3.70	3.90	5.90	0.00086	6.10
71	LP/4	0.37	1725	2.05	1.40	0.81	0.72	73.2	78.0	78.2	3.30	3.60	6.10	0.00110	7.20
80	SP/4	0.55	1735	3.03	1.99	1.15	0.72	79.8	82.7	83.4	2.80	3.40	6.10	0.00145	9.70
80	LP/4	0.75	1730	4.14	2.72	1.57	0.70	84.4	86.1	86.1	3.40	3.80	6.50	0.0019	10.2
90	SP/4	1.10	1740	6.04	3.64	2.10	0.76	86.3	87.4	86.9	4.20	4.90	8.40	0.0034	15.1
90	LP/4	1.50	1730	8.28	4.85	2.80	0.78	86.3	87.4	87.0	3.90	4.30	7.60	0.0039	16.8
100	LP/4**	2.20	1765	11.9	7.13	4.11	0.75	87.7	89.3	89.5	3.80	5.00	9.60	0.0074	24.5
100	AP/4**	3.00	1760	16.3	9.42	5.43	0.79	88.7	89.7	89.5	3.60	4.48	8.75	0.0086	27.4
112	MP/4	4.00	1750	21.8	11.9	6.84	0.82	89.2	90.4	90.2	3.70	4.30	9.00	0.014	35.5
132	SP/4	5.50	1770	29.7	16.9	9.75	0.77	90.2	91.5	91.7	4.70	5.00	10.2	0.032	55.0
132	MP/4	7.50	1765	40.6	23.2	13.4	0.77	90.7	91.6	91.7	4.70	5.00	9.60	0.035	62.0
160	SP/4	9.20	1775	49.5	25.5	14.7	0.87	90.0	91.4	91.7	3.20	3.70	8.80	0.067	93.0
160	MP/4	11.0	1770	59.3	30.8	17.8	0.84	91.2	92.5	92.5	3.20	3.80	8.80	0.067	93.0
160	LP/4	15.0	1775	80.7	41.2	23.8	0.85	90.9	92.3	93.0	4.30	4.70	10.8	0.092	122
180	MP/4	18.5	1780	99.2	52.5	30.3	0.82	92.5	93.4	93.6	3.90	4.00	10.1	0.16	155
180	LP/4	22.0	1780	118	60.3	34.8	0.85	93.6	94.0	93.6	3.30	3.40	8.80	0.16	155
225	RP/4	30.0	1785	160	85.7	49.5	0.81	93.4	94.4	94.5	3.40	3.80	8.90	0.49	315
225	SP/4	37.0	1785	198	103	59.7	0.82	93.6	94.5	94.6	3.00	3.70	8.80	0.54	330
225	MP/4	45.0	1785	241	125	72.0	0.83	94.6	95.2	95.2	3.30	3.60	9.10	0.67	365
250	WP/4	55.0	1785	294	146	84.4	0.86	95.2	94.5	95.4	2.90	3.20	8.20	0.82	400

* Version B5, without Options

** Serie **APAB**

1800 rpm
60 Hz

460 V D
4 - pole

Type		IE3 S1 P_N	n_N	M_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	J	kg
					460 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N					*
		[kW]	[r/min]	[Nm]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/4	0.12	1695	0.68	0.36	0.62	58.8	65.8	68.5	3.40	3.30	4.00	0.00024	3.80
63	LP/4	0.18	1695	1.01	0.51	0.60	63.6	70.2	72.3	4.40	4.20	4.30	0.00033	4.70
71	SP/4	0.25	1730	1.38	0.65	0.65	67.7	74.3	73.5	3.60	3.80	5.90	0.00086	6.10
71	LP/4	0.37	1725	2.05	0.81	0.72	73.2	78.0	78.2	3.30	3.60	6.10	0.00110	7.20
80	SP/4	0.55	1735	3.03	1.15	0.72	79.8	82.7	83.4	2.80	3.40	6.10	0.00145	9.70
80	LP/4	0.75	1730	4.14	1.57	0.70	84.4	86.1	86.1	3.40	3.70	6.40	0.0019	10.2
90	SP/4	1.10	1740	6.04	2.10	0.76	86.3	87.4	86.9	4.20	4.90	8.40	0.0034	15.1
90	LP/4	1.50	1730	8.28	2.80	0.78	86.3	87.4	87.0	3.90	4.30	7.60	0.0039	16.8
100	LP/4**	2.20	1765	11.9	4.11	0.75	87.7	89.3	89.5	3.80	5.00	9.60	0.0074	24.5
100	AP/4**	3.00	1760	16.3	5.43	0.79	88.7	89.7	89.5	3.60	4.48	8.75	0.0086	27.4
112	MP/4	4.00	1750	21.8	6.85	0.82	89.2	90.4	90.2	3.80	4.30	9.10	0.014	35.5
132	SP/4	5.50	1770	29.7	9.75	0.77	90.2	91.5	91.7	4.70	5.00	10.2	0.032	55.0
132	MP/4	7.50	1765	40.6	13.4	0.77	90.7	91.6	91.7	4.70	5.00	9.60	0.035	62.0
160	SP/4	9.20	1775	49.5	14.7	0.87	90.0	91.4	91.7	3.20	3.70	8.80	0.067	93.0
160	MP/4	11.0	1770	59.3	17.8	0.84	91.2	92.5	92.5	3.20	3.80	8.80	0.067	93.0
160	LP/4	15.0	1775	80.7	23.8	0.85	90.9	92.3	93.0	4.30	4.70	10.8	0.092	122
180	MP/4	18.5	1780	99.2	30.3	0.82	92.5	93.4	93.6	3.90	4.00	10.1	0.16	155
180	LP/4	22.0	1780	118	34.8	0.85	93.6	94.0	93.6	3.30	3.40	8.80	0.16	155
225	RP/4	30.0	1785	160	49.5	0.81	93.4	94.4	94.5	3.40	3.80	8.90	0.49	315
225	SP/4	37.0	1785	198	59.7	0.82	93.6	94.5	94.6	3.00	3.70	8.80	0.54	330
225	MP/4	45.0	1785	241	72.0	0.83	94.6	95.2	95.2	3.30	3.60	9.10	0.67	365
250	WP/4	55.0	1785	294	84.4	0.86	95.2	94.5	95.4	2.90	3.20	8.20	0.82	400

* Version B5, without options

** Serie **APAB**

3000 rpm 50 Hz — 230/400 V 2 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N 230 V	I_N 400 V	cos φ 4/4xP_N	η 1/2xP_N	η 3/4xP_N	η 4/4xP_N	M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/2	0,18	2.750	0,63	0,78	0,45	0,84	65,1	68,9	68,2	3,3	3,3	4,9	0,00021	3,8
63	LP/2	0,25	2.770	0,86	0,98	0,57	0,82	74,2	76,7	76,3	3,2	3,2	5,5	0,00024	4,7
71	SP/2	0,37	2.845	1,24	1,52	0,88	0,77	71,8	76,2	77,3	3,4	3,5	5,1	0,00035	6,1
71	LP/2	0,55	2.820	1,86	2,11	1,22	0,80	79,1	81,5	81,2	3,8	3,7	5,8	0,00046	7,2
80	SP/2	0,75	2.870	2,50	2,72	1,57	0,85	78,8	81,5	81,6	3,9	4,3	7,6	0,000897	9,7
90	RP/2	1,10	2.865	3,67	3,71	2,14	0,89	84,0	84,9	83,8	3,0	3,3	6,9	0,00145	15,1
90	SP/2	1,5	2.875	4,98	5,21	3,01	0,85	84,1	85,3	84,4	3,5	3,6	7,1	0,0016	15,1
90	LP/2	2,2	2.895	7,26	7,93	4,58	0,81	84,4	86,4	86,4	3,9	4,7	7,5	0,0023	16,8
112	SP/2	3,0	2.940	9,74	10,1	5,81	0,85	84,4	87,0	88,0	4,6	5,3	11,1	0,0069	35,5
112	MP/2	4,0	2.920	13,08	12,7	7,36	0,89	89,1	90,0	89,6	3,6	4,4	9,2	0,00769	35,5
132	SP/2	5,5	2.945	17,84	17,26	9,96	0,89	88,6	90,1	90,2	4,3	4,9	10,2	0,0155	55
132	MP/2	7,5	2.945	24,32	23,13	13,35	0,90	90,0	91,1	91,0	4,2	5,1	10,6	0,02	55

* Version B5, without Options

3000 rpm 50 Hz — 220/380 V 2 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N 220 V	I_N 380 V	cos φ 4/4xP_N	η 1/2xP_N	η 3/4xP_N	η 4/4xP_N	M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/2	0,18	2.750	0,63	0,81	0,47	0,84	65,1	68,9	68,2	3,3	3,3	4,9	0,00021	3,8
63	LP/2	0,25	2.770	0,86	1,04	0,60	0,82	74,2	76,7	76,3	3,2	3,2	5,5	0,00024	4,7
71	SP/2	0,37	2.845	1,24	1,61	0,93	0,77	71,8	76,2	77,3	3,4	3,5	5,1	0,00035	6,1
71	LP/2	0,55	2.820	1,86	2,23	1,29	0,80	79,1	81,5	81,2	3,8	3,7	5,8	0,00046	7,2
80	SP/2	0,75	2.870	2,50	2,86	1,65	0,85	78,8	81,5	81,6	3,9	4,3	7,6	0,000897	9,7
90	RP/2	1,1	2.865	3,67	3,90	2,25	0,89	84,0	84,9	83,8	3,0	3,3	6,9	0,00145	15,1
90	SP/2	1,5	2.875	4,98	5,49	3,17	0,85	84,1	85,3	84,4	3,5	3,6	7,1	0,0016	15,1
90	LP/2	2,2	2.895	7,26	8,35	4,82	0,81	84,4	86,4	86,4	3,9	4,7	7,5	0,0023	16,8
112	SP/2	3,0	2.940	9,74	10,59	6,12	0,85	84,4	87,0	88,0	4,6	5,3	11,1	0,0069	35,5
112	MP/2	4,0	2.920	13,08	13,42	7,75	0,89	89,1	90,0	89,6	3,6	4,4	9,2	0,00769	35,5
132	SP/2	5,5	2.945	17,84	18,20	10,5	0,89	88,6	90,1	90,2	4,3	4,9	10,2	0,0155	55,0
132	MP/2	7,5	2.945	24,32	24,40	14,1	0,90	90,0	91,1	91,0	4,2	5,1	10,6	0,02	55,0

* Version B5, without Options

3000 rpm
60 Hz

265/460 V
2 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
					265 V	460 V	$4/4xP_N$	$1/2xP_N$	$3/4xP_N$	$4/4xP_N$					
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
63	SP/2	0,18	3.390	0,51	0,69	0,4	0,81	62,4	68,1	69,6	3,9	3,9	5,0	0,00021	3,8
63	LP/2	0,25	3.400	0,70	0,86	0,5	0,8	71,6	76,0	77,1	4,1	4,0	6,3	0,00024	4,7
71	SP/2	0,37	3.465	1,02	1,32	0,76	0,74	70,5	76,1	78,4	4,2	4,5	6,3	0,00035	6,1
71	LP/2	0,55	3.445	1,52	1,87	1,08	0,78	77,9	81,4	82,3	4,5	4,5	6,0	0,00046	7,2
80	SP/2	0,75	3.485	2,06	2,42	1,40	0,83	73,8	78,6	80,3	4,6	4,9	8,0	0,000897	9,7
90	RP/2	1,1	3.485	3,01	3,22	1,86	0,88	81,7	84,2	84,3	3,3	3,9	8,2	0,00145	15,1
90	SP/2	1,5	3.495	4,10	4,54	2,62	0,84	82,9	85,2	85,5	3,2	4,4	5,5	0,0016	15,1
90	LP/2	2,2	3.510	5,99	6,93	4,00	0,81	83,6	86,2	86,9	4,5	5,7	9,0	0,0023	16,8
112	MP/2	4,0	3.530	10,82	11,20	6,48	0,88	86,0	88,2	88,9	4,2	5,1	11,4	0,00769	35,5
132	SP/2	5,5	3.550	14,80	15,02	8,67	0,89	86,8	89,3	90,1	4,8	5,5	11,8	0,0155	55,0
132	MP/2	7,5	3.550	20,18	20,26	11,7	0,90	88,5	90,5	91,0	5,0	5,7	12,1	0,02	55,0

* Version B5, without Options

1000 rpm 50 Hz — 230/400 V 6 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N 230 V	I_N 400 V	cos φ 4/4xP_N	η 1/2xP_N	η 3/4xP_N	η 4/4xP_N	M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
71	RP/6	0,12	935	1,23	0,8	0,46	0,63	49,4	56,7	59,7	2,3	2,7	3,2	0,00091	6,1
71	SP/6	0,18	935	1,84	1,06	0,61	0,62	60,0	66,9	68,5	3,3	3,4	4,0	0,0015	6,1
80	RP/6	0,25	940	2,54	1,32	0,76	0,67	65,0	69,7	70,6	2,0	2,6	3,7	0,0017	9,7
80	SP/6	0,37	940	3,76	1,85	1,07	0,66	70,7	75,2	75,9	2,8	3,1	4,4	0,00264	9,7
90	RP/6	0,55	950	5,53	2,34	1,35	0,73	77,5	79,7	79,4	2,2	2,9	5,0	0,005	15,1
90	SP/6	0,75	945	7,58	3,46	2,00	0,67	77,9	80,3	80,5	2,9	3,4	5,4	0,005	15,1
100	SP/6	1,1	955	11,00	4,64	2,68	0,71	81,2	83,1	82,7	2,5	3,0	5,0	0,0092	24,5
100	LP/6	1,5	955	15,00	6,87	3,97	0,66	80,8	83,2	83,3	3,5	3,7	5,7	0,0128	24,5
112	MP/6	2,2	965	21,77	9,54	5,51	0,67	84,3	86,1	86,1	3,6	4,0	6,6	0,018	35,5
132	SP/6	3,0	975	29,38	11,9	6,87	0,72	84,8	87,0	87,3	3,1	3,9	7,7	0,038	55,0
132	MP/6	4,0	965	39,59	14,8	8,55	0,77	87,9	88,5	87,7	2,4	3,3	6,6	0,0377	55,0

* Version B5, without Options

1000 rpm 50 Hz — 220/380 V 6 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N 230 V	I_N 400 V	cos φ 4/4xP_N	η 1/2xP_N	η 3/4xP_N	η 4/4xP_N	M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]				[kgm²]	[kg]
71	RP/6	0,12	925	1,24	0,85	0,48	0,64	49,4	56,7	59,7	2,3	2,7	3,0	0,00091	6,1
71	SP/6	0,18	935	1,84	1,11	0,64	0,62	60,0	66,9	68,5	3,3	3,4	4,0	0,0015	6,1
80	RP/6	0,25	940	2,54	1,39	0,80	0,67	65,0	69,7	70,6	2,0	2,6	3,7	0,0017	9,7
80	SP/6	0,37	940	3,76	1,95	1,13	0,66	70,7	75,2	75,9	2,8	3,1	4,4	0,00264	9,7
90	RP/6	0,55	950	5,53	2,46	1,42	0,73	77,5	79,7	79,4	2,2	2,9	5,0	0,005	15,1
90	SP/6	0,75	945	7,58	3,65	2,11	0,67	77,9	80,3	80,5	2,9	3,4	5,4	0,005	15,1
100	SP/6	1,1	955	11,00	4,88	2,82	0,71	81,2	83,1	82,7	2,5	3,0	5,0	0,0092	24,5
100	LP/6	1,5	955	15,00	7,24	4,18	0,66	80,8	83,2	83,3	3,5	3,7	5,7	0,0128	24,5
112	MP/6	2,2	965	21,77	10,05	5,8	0,67	84,3	86,1	86,1	3,6	4,0	6,6	0,018	35,5
132	SP/6	3,0	975	29,38	12,53	7,23	0,72	84,8	87,0	87,3	3,1	3,9	7,7	0,038	55,0
132	MP/6	4,0	965	39,59	15,59	9,00	0,77	87,9	88,5	87,7	2,4	3,3	6,6	0,0377	55,0

* Version B5, without Options

Note

Premium Efficiency (North America)

1800 rpm
60 Hz

230/460 V
4 - pole

Premium Efficiency
S1

Type		P_N **		n_N	M_N	I_N		cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	Codeletter	J	kg
						230 V	460 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N				⇨ A20		*
		[hp]	[kW]	[r/min]	[Nm]	[A]	[A]		[%]	[%]	[%]					[kgm²]	[kg]
63	SP/4	0.16	0.12	1695	0.67	0.72	0.36	0.62	58.9	65.9	68.5	3.40	3.40	4.02	H	0.00024	3.80
63	LP/4	0.25	0.18	1705	1.04	1.08	0.54	0.57	63.6	70.2	72.3	4.00	3.80	4.34	J	0.00033	4.70
71	SP/4	0.33	0.25	1725	1.36	1.26	0.63	0.67	67.7	74.3	75.8	3.80	4.00	5.92	K	0.00086	6.10
71	LP/4	0.50	0.37	1725	2.06	1.62	0.81	0.72	73.2	78.0	79.2	3.20	3.60	6.12	J	0.00110	7.20
80	SP/4	0.75	0.55	1735	3.08	2.30	1.15	0.72	79.8	82.7	83.4	2.80	3.30	6.11	J	0.00145	9.70
80	LP/4	1.00	0.75	1730	4.12	3.14	1.57	0.70	84.4	86.1	86.1	3.50	3.80	6.50	K	0.0019	10.2
90	SP/4	1.50	1.10	1740	6.14	4.20	2.10	0.76	86.3	87.4	86.9	4.10	4.80	8.40	L	0.0034	15.1
90	LP/4	2.00	1.50	1730	8.23	5.60	2.80	0.78	86.3	87.4	87.0	3.90	4.40	7.60	K	0.0039	16.8
100	LP/4***	3.00	2.2	1765	11.9	8.21	4.11	0.75	87.7	89.3	89.5	4.6	5.0	9.6	M	0.0074	24.5
100	AP/4***	4.00	3.0	1760	16.3	10.9	5.43	0.79	88.7	89.7	89.5	3.6	4.5	8.8	L	0.0086	27.4
112	MP/4	5.00	3.70	1755	20.3	13.0	6.50	0.8	89.2	90.4	90.3	4.00	4.60	9.50	L	0.014	35.5
132	SP/4	7.50	5.50	1770	30.2	19.5	9.75	0.77	90.2	91.5	91.7	4.60	4.90	10.2	M	0.032	55.0
132	MP/4	10.0	7.50	1765	40.3	26.7	13.4	0.77	90.7	91.6	91.7	4.70	5.00	9.60	M	0.035	62.0
160	MP/4	15.0	11.0	1770	60.3	35.6	17.8	0.84	91.2	92.5	92.5	3.20	3.70	8.80	K	0.067	93.0
160	LP/4	20.0	15.0	1775	80.2	47.6	23.8	0.85	90.9	92.3	93.0	4.40	4.70	10.8	M	0.092	122
180	MP/4	25.0	18.5	1780	100	60.6	30.3	0.82	92.5	93.4	93.6	3.90	3.90	10.1	L	0.160	155
180	LP/4	30.0	22.0	1780	120	69.6	34.8	0.85	93.6	94.0	93.6	3.20	3.30	8.80	K	0.160	155

* Version B5, without options
** SF=1.15
*** Serie APAB

1800 1pm
60 Hz

460 V Δ
4 - pole

Premium Efficiency
S1

Type		P_N **		n_N	M_N	I_N	cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	Codeletter	J	kg
						460 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N				⇨ A20		*
		[hp]	[kW]	[1/min]	[Nm]	[A]		[%]	[%]	[%]					[kgm²]	[kg]
225	RP/4	40.0	30.0	1785	160	49.5	0.81	93.4	94.4	94.5	3.40	3.90	8.91	K	0.490	315
225	SP/4	50.0	37.0	1785	199	59.7	0.82	93.6	94.5	94.6	3.00	3.60	8.79	K	0.540	330
225	MP/4	60.0	45.0	1785	239	72.0	0.83	94.6	95.2	95.2	3.40	3.60	9.10	K	0.670	365
250	WP/4	75.0	55.0	1785	299	84.4	0.86	95.2	94.5	95.4	2.80	3.10	8.15	J	0.820	400

* Version B5, without options
** SF=1.15

Premium Efficiency (North America)

1800 rpm
60 Hz

575 V
4 - pole

Premium Efficiency
S1

Type		P_N **		n_N	M_N	I_N	cos φ	η			M_A/M_N	M_K/M_N	I_A/I_N	Codeletter	J	kg
						575 V	4/4xP_N	1/2xP_N	3/4xP_N	4/4xP_N				⇨ A20		*
		[hp]	[kW]	[r/min]	[Nm]	[A]		[%]	[%]	[%]					[kgm²]	[kg]
63	SP/4	0.16	0.12	1695	0.67	0.29	0.62	58.9	65.9	68.5	3.40	3.40	4.02	H	0.00024	3.80
63	LP/4	0.25	0.18	1705	1.04	0.43	0.57	63.6	70.2	72.3	4.00	3.80	4.34	J	0.00033	4.70
71	SP/4	0.33	0.25	1725	1.36	0.50	0.67	67.7	74.3	75.8	3.80	4.00	5.92	K	0.00086	6.10
71	LP/4	0.50	0.37	1725	2.06	0.65	0.72	73.2	78.0	79.2	3.20	3.60	6.12	J	0.00110	7.20
80	SP/4	0.75	0.55	1735	3.08	0.92	0.72	79.8	82.7	83.4	2.80	3.30	6.11	J	0.00145	9.70
80	LP/4	1.00	0.75	1730	4.12	1.26	0.70	84.4	86.1	86.1	3.50	3.80	6.50	K	0.0019	10.2
90	SP/4	1.50	1.10	1740	6.14	1.68	0.76	86.3	87.4	86.9	4.10	4.80	8.40	L	0.0034	15.1
90	LP/4	2.00	1.50	1730	8.23	2.24	0.78	86.3	87.4	87.0	3.90	4.40	7.60	K	0.0039	16.8
100	LP/4***	3.00	2.20	1765	11.9	3.28	0.75	87.7	89.3	89.5	4.6	5.0	9.6	M	0.0081	28.0
100	AP/4***	4.00	3.00	1760	16.3	4.34	0.79	88.7	89.7	89.5	3.6	4.5	8.8	L	0.0081	28.0
112	MP/4	5.00	3.70	1755	20.3	5.20	0.80	89.2	90.4	90.3	4.00	4.60	9.50	L	0.014	35.5
132	SP/4	7.50	5.50	1770	30.2	7.80	0.77	90.2	91.5	91.7	4.60	4.90	10.2	M	0.032	55.0
132	MP/4	10.0	7.50	1765	40.3	10.7	0.77	90.7	91.6	91.7	4.70	5.00	9.60	M	0.035	62.0
160	MP/4	15.0	11.0	1770	60.3	14.2	0.84	91.2	92.5	92.5	3.20	3.70	8.80	K	0.067	93.0
160	LP/4	20.0	15.0	1775	80.2	19.0	0.85	90.9	92.3	93.0	4.40	4.70	10.8	M	0.092	122
180	MP/4	25.0	18.5	1780	100	24.2	0.82	92.5	93.4	93.6	3.90	3.90	10.1	L	0.160	155
180	LP/4	30.0	22.0	1780	120	27.8	0.85	93.6	94.0	93.6	3.20	3.30	8.80	K	0.160	155
225	RP/4	40.0	30.0	1785	160	39.6	0.81	93.4	94.4	94.5	3.40	3.90	8.91	K	0.490	315
225	SP/4	50.0	37.0	1785	199	47.8	0.82	93.6	94.5	94.6	3.00	3.60	8.79	K	0.540	330
225	MP/4	60.0	45.0	1785	239	57.6	0.83	94.6	95.2	95.2	3.40	3.60	9.10	K	0.670	365
250	WP/4	75.0	55.0	1785	299	67.5	0.86	95.2	94.5	95.4	2.80	3.10	8.15	J	0.820	400

* Version B5, without options
** SF=1.15
*** Serie APAB

IE3 - Brazil

1800 rpm
60 Hz

220/380 V
4 - pole

Type		IE3 S1 P_N	S_F	n_N	M_N	I_N		cos φ	η	M_A/M_N	M_K/M_N	I_A/I_N	J	kg
						220V	380 V	$4/4xP_N$	$4/4xP_N$					*
		[kW]		[r/min]	[Nm]	[A]	[A]		[%]				[kgm^2]	[kg]
63	SP/4	0.12	1.15	1670	0.69	0.67	0.39	0.68	68.5	2.90	2.80	3.70	0.00024	3.80
63	LP/4	0.18	1.15	1690	1.02	1.11	0.64	0.61	69.5	3.60	3.40	4.00	0.00033	4.70
71	SP/4	0.25	1.15	1720	1.39	1.26	0.73	0.69	73.4	3.50	3.70	5.70	0.00086	6.10
71	LP/4	0.37	1.15	1720	2.05	1.66	0.96	0.73	78.2	3.00	3.30	5.70	0.00110	7.20
80	SP/4	0.55	1.15	1725	3.04	2.32	1.34	0.75	81.4	2.60	3.10	5.80	0.00145	9.70
80	LP/4	0.75	1.15	1730	4.14	3.29	1.90	0.70	83.5	3.40	3.80	6.50	0.0019	10.2
90	SP/4	1.10	1.15	1740	6.04	4.40	2.54	0.76	86.5	4.20	4.90	8.40	0.0034	15.1
90	LP/4	1.50	1.15	1730	8.28	5.87	3.39	0.78	86.5	3.90	4.30	7.60	0.0039	16.8
100	LP/4 **	2.20	1.15	1765	11.9	8.58	4.58	0.75	89.5	3.80	5.00	9.60	0.0074	24.5
100	AP/4 **	3.00	1.15	1760	16.2	11.4	6.57	0.79	89.5	3.60	4.50	8.80	0.0086	27.4
112	MP/4	3.70	1.15	1755	20.1	13.7	7.89	0.8	89.5	4.00	4.60	9.40	0.014	35.5
112	MP/4	4.40	1.15	1750	24.0	16.3	9.40	0.81	89.5	3.80	4.40	9.20	0.014	35.5
132	SP/4	5.50	1.15	1770	29.7	20.4	11.8	0.77	91.7	4.70	5.00	10.2	0.032	55.0
132	MP/4	7.50	1.15	1765	40.6	28.4	16.4	0.77	91.7	4.70	5.00	9.60	0.035	62.0
160	SP/4	9.20	1.15	1780	49.4	33.1	19.1	0.8	91.7	3.80	4.50	9.90	0.067	93.0
160	MP/4	11.0	1.15	1770	59.3	37.3	21.5	0.84	92.4	3.20	3.80	8.80	0.067	93.0
160	LP/4	15.0	1.15	1775	80.7	49.9	28.8	0.85	93.0	4.30	4.70	10.8	0.092	122
180	MP/4	18.5	1.15	1780	99.2	63.4	36.6	0.82	93.6	3.90	4.00	10.1	0.160	155
180	LP/4	22.0	1.15	1780	118	77.9	45.0	0.80	93.6	3.30	3.40	8.80	0.160	155
225	RP/4	30.0	1.15	1785	160	104	59.8	0.81	94.1	3.40	3.90	8.90	0.490	315
225	SP/4	37.0	1.15	1785	198	125	72.3	0.82	94.5	3.00	3.70	8.80	0.540	330
225	MP/4	45.0	1.15	1785	241	151	86.9	0.83	95.0	3.30	3.60	9.10	0.670	365
250	WP/4	55.0	1.15	1785	294	177	102	0.86	95.4	2.90	3.20	8.20	0.820	400

* Version B5, without options

** APAB - Serie

1800 rpm
60 Hz

440 V
4 - pole

Type		IE3 S1 P_N [kW]	S_F	n_N [r/min]	M_N [Nm]	I_N 440 V [A]	cos φ $4/4xP_N$	η $4/4xP_N$ [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
63	SP/4	0.12	1.15	1680	0.68	0.36	0.65	68.0	3.10	3.00	3.90	0.00024	3.80
63	LP/4	0.18	1.15	1690	1.02	0.56	0.61	69.5	3.60	3.40	4.00	0.00033	4.70
71	SP/4	0.25	1.15	1720	1.39	0.61	0.70	76.0	3.40	3.50	5.70	0.00086	6.10
71	LP/4	0.37	1.15	1715	2.06	0.81	0.75	79.2	3.00	3.30	5.80	0.00110	7.20
80	SP/4	0.55	1.15	1725	3.04	1.15	0.75	83.4	2.60	3.10	5.80	0.00145	9.70
80	LP/4	0.75	1.15	1720	4.16	1.58	0.73	85.3	3.20	3.40	6.30	0.0019	10.2
90	SP/4	1.10	1.15	1740	6.04	2.12	0.78	86.5	3.80	4.40	8.00	0.0034	15.1
90	LP/4	1.50	1.15	1725	8.30	2.83	0.80	86.9	3.50	3.90	7.20	0.0039	16.8
100	LP/4 **	2.20	1.15	1765	11.9	4.30	0.75	89.8	3.80	5.00	9.60	0.0074	24.5
100	AP/4 **	3.00	1.15	1760	16.3	5.68	0.79	89.5	3.60	4.50	8.80	0.0086	27.5
112	MP/4	3.70	1.15	1755	20.1	6.81	0.80	89.5	4.00	4.60	9.40	0.014	35.5
112	MP/4	4.40	1.15	1750	24.0	8.12	0.81	89.5	3.80	4.40	9.20	0.014	35.5
132	SP/4	5.50	1.15	1765	29.8	9.79	0.81	91.7	4.20	4.50	9.70	0.032	55.0
132	MP/4	7.50	1.15	1765	40.6	13.6	0.79	91.7	4.30	4.60	9.00	0.035	62.0
160	SP/4	9.20	1.15	1780	49.4	16.4	0.80	92.4	3.80	4.50	9.90	0.067	93.0
160	MP/4	11.0	1.15	1770	59.3	18.6	0.84	92.5	3.20	3.80	8.80	0.067	93.0
160	LP/4	15.0	1.15	1775	80.7	24.9	0.85	93	4.30	4.70	11.1	0.092	122
180	MP/4	18.5	1.15	1780	99.2	31.9	0.82	93.6	3.90	4.00	10.1	0.160	155
180	LP/4	22.0	1.15	1780	118	36.6	0.85	93.6	3.30	3.40	8.80	0.160	155
225	RP/4	30.0	1.15	1785	160	49.8	0.84	94.2	3.10	3.50	8.50	0.490	315
225	SP/4	37.0	1.15	1785	198	62.4	0.82	94.6	3.00	3.70	8.80	0.540	330
225	MP/4	45.0	1.15	1785	241	75.3	0.83	95.2	3.30	3.60	9.10	0.670	365
250	WP/4	55.0	1.15	1785	294	88.2	0.86	95.4	2.90	3.20	8.20	0.820	400

* Version B5, without options

** APAB - Serie

IE3 - South Korea

1800 rpm
60 Hz

220/380 V
4 - pole

Type		IE3 S1 P_N	n_N	M_N	I_N		cos φ	η	M_A/M_N	M_K/M_N	I_A/I_N	J	kg
					220V	380 V	4/4xP_N	4/4xP_N					*
		[kW]	[r/min]	[Nm]	[A]	[A]		[%]				[kgm²]	[kg]
63	SP/4	0.12	1670	0.69	0.67	0.39	0.68	68.5	2.9	2.8	3.7	0.00024	3.80
63	LP/4	0.18	1690	1.02	1.11	0.64	0.61	69.5	3.6	3.4	4.0	0.00033	4.70
71	SP/4	0.25	1720	1.39	1.26	0.73	0.69	75.8	3.5	3.7	5.7	0.00086	6.10
71	LP/4	0.37	1720	2.05	1.66	0.96	0.73	78.2	3.0	3.3	5.7	0.00110	7.20
80	SP/4	0.55	1725	3.04	2.32	1.34	0.75	81.4	2.6	3.1	5.8	0.00145	9.70
80	LP/4	0.75	1730	4.14	3.29	1.90	0.70	83.5	3.4	3.8	6.5	0.0019	10.2
90	SP/4	1.10	1740	6.04	4.40	2.54	0.76	86.5	4.2	4.9	8.4	0.0034	15.1
90	LP/4	1.50	1730	8.28	5.87	3.39	0.78	86.5	3.9	4.3	7.6	0.0039	16.8
100	LP/4	2.20	1770	11.9	8.05	4.65	0.79	89.5	3.0	4.4	9.1	0.0081	28.0
100	AP/4	3.00	1765	16.2	10.7	6.18	0.79	89.5	2.7	4.2	8.8	0.0081	28.0
112	MP/4	4.00	1750	21.8	14.3	8.29	0.82	89.5	3.7	4.3	9.0	0.014	35.5
132	MP/4	5.50	1770	29.7	19.9	11.5	0.79	91.7	4.8	5.1	10.1	0.035	62.0
132	LP/4	7.50	1775	40.3	27.5	15.9	0.78	91.7	4.0	4.5	9.1	0.035	64.0
160	SP/4	9.20	1780	49.4	33.1	19.1	0.80	91.7	3.8	4.5	9.9	0.067	93.0
160	MP/4	11.0	1770	59.3	37.3	21.5	0.84	92.4	3.2	3.8	8.8	0.067	93.0
160	LP/4	15.0	1775	80.7	49.9	28.8	0.85	93.0	4.3	4.7	10.8	0.092	122
180	MP/4	18.5	1780	99.2	63.4	36.6	0.82	93.6	3.9	4.0	10.1	0.16	155
180	LP/4	22.0	1780	118	77.9	45.0	0.80	93.6	3.3	3.4	8.8	0.16	155
225	RP/4	30.0	1785	160	104	59.8	0.81	94.1	3.4	3.9	8.9	0.49	315
225	SP/4	37.0	1785	198	125	72.3	0.82	94.5	3.0	3.7	8.8	0.54	330
225	MP/4	45.0	1785	241	151	86.9	0.83	95.0	3.3	3.6	9.1	0.67	365
250	WP/4	55.0	1785	294	177	102	0.86	95.4	2.9	3.2	8.2	0.82	400

* Version B5, without options

IE3 - South Korea

1800 rpm
60 Hz

440 V
4 - pole

Type		IE3 S1 P_N [kW]	n_N [r/min]	M_N [Nm]	I_N 440V [A]	cos φ 4/4xP_N	η 4/4xP_N [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
63	SP/4	0.12	1680	0.68	0.36	0.65	66.0	3.1	3.0	3.9	0.00024	3.80
63	LP/4	0.18	1690	1.02	0.56	0.61	69.5	3.6	3.4	4.0	0.00033	4.70
71	SP/4	0.25	1720	1.39	0.61	0.70	73.4	3.4	3.5	5.7	0.00086	6.10
71	LP/4	0.37	1715	2.06	0.81	0.75	78.2	3.0	3.3	5.8	0.00110	7.20
80	SP/4	0.55	1725	3.04	1.15	0.75	81.4	2.6	3.1	5.8	0.00145	9.70
80	LP/4	0.75	1720	4.16	1.58	0.73	83.5	3.2	3.4	6.3	0.0019	10.2
90	SP/4	1.10	1740	6.04	2.12	0.78	86.5	3.8	4.4	8.0	0.0034	15.1
90	LP/4	1.50	1725	8.30	2.83	0.80	86.5	3.5	3.9	7.2	0.0039	16.8
100	LP/4	2.20	1765	11.9	3.97	0.80	89.5	2.7	4.1	8.5	0.0081	28.0
112	MP/4	3.00	1760	16.3	5.49	0.80	89.5	4.1	4.7	9.9	0.014	35.5
112	MP/4	4.00	1745	21.9	7.11	0.82	89.5	3.4	3.9	9.2	0.014	35.5
132	MP/4	5.50	1770	29.7	9.93	0.79	91.7	4.8	5.2	10.2	0.035	62.0
132	LP/4	7.50	1775	40.3	13.9	0.78	91.7	4.0	4.5	9.1	0.035	62.0
160	SP/4	9.20	1780	49.4	16.4	0.80	91.7	3.8	4.5	9.9	0.067	93.0
160	MP/4	11.0	1770	59.3	18.6	0.84	92.4	3.2	3.8	8.8	0.067	93.0
160	LP/4	15.0	1775	80.7	24.9	0.85	93.0	4.3	4.7	11.1	0.092	122
180	MP/4	18.5	1780	99.2	31.9	0.82	93.6	3.9	4.0	10.1	0.16	155
180	LP/4	22.0	1780	118	38.7	0.80	93.6	3.5	3.5	9.1	0.16	155
225	RP/4	30.0	1785	160	49.8	0.84	94.1	3.1	3.5	8.5	0.49	315
225	SP/4	37.0	1785	198	62.4	0.82	94.5	3.0	3.7	8.8	0.54	330
225	MP/4	45.0	1785	241	75.3	0.83	95.0	3.3	3.6	9.1	0.67	365
250	WP/4	55.0	1785	294	88.2	0.86	95.4	2.9	3.2	8.2	0.82	400

* Version B5, without options

Standard - switchable poles

1500 / 3000 rpm **400 V D/YY**
50 Hz **4 - 2 pole**

		switchable poles S1										
Type		P_N	n_N	M_N	I_N 400 V	cos φ	η	M_A/M_N	M_K/M_N	I_A/I_N	J	kg *
		[kW]	[r/min]	[Nm]	[A]		[%]				[kgm²]	[kg]
63	S/4-2	0.10	1415	0.67	0.64	0.58	38.9	3.30	3.60	2.50	0.00021	3.60
		0.15	2840	0.50	0.73	0.68	43.6	3.20	3.80	2.80		
63	L/4-2	0.15	1400	1.02	0.95	0.57	40.0	2.90	3.10	2.30	0.00028	4.20
		0.19	2850	0.64	0.95	0.66	43.7	3.30	3.90	3.00		
71	S/4-2	0.21	1410	1.42	0.66	0.73	62.9	2.10	2.30	3.60	0.00072	5.40
		0.28	2780	0.96	0.80	0.86	58.7	2.50	2.70	3.90		
71	L/4-2	0.30	1385	2.07	0.98	0.75	58.9	2.10	2.10	3.30	0.00086	6.30
		0.45	2715	1.58	1.30	0.88	56.8	1.60	1.80	3.40		
80	S/4-2	0.48	1390	3.30	1.30	0.77	69.2	1.70	1.80	3.30	0.00109	8.00
		0.60	2785	2.06	1.66	0.82	63.6	1.80	2.00	3.60		
80	L/4-2	0.70	1355	4.93	1.84	0.79	69.5	1.60	1.70	3.30	0.00140	9.00
		0.85	2770	2.93	2.34	0.80	65.5	2.00	2.00	3.60		
90	S/4-2	1.10	1400	7.50	2.68	0.84	70.5	1.50	2.10	3.90	0.00235	12.0
		1.40	2780	4.81	3.50	0.88	65.6	1.60	2.10	3.90		
90	L/4-2	1.50	1380	10.4	3.50	0.81	76.4	2.00	2.10	3.90	0.00313	14.0
		1.90	2775	6.54	4.70	0.82	71.2	2.30	2.30	4.20		
100	L/4-2	2.00	1400	13.6	4.60	0.75	83.7	1.80	2.00	3.70	0.0045	18.0
		2.40	2830	8.10	5.50	0.85	74.1	2.00	2.20	4.50		
100	LA/4-2	2.60	1380	18.0	5.62	0.87	76.8	1.80	2.10	3.90	0.006	21.0
		3.10	2825	10.5	6.71	0.88	75.8	2.10	2.20	4.90		
112	M/4-2	3.70	1435	24.6	7.90	0.84	80.5	2.00	2.60	4.90	0.011	32.0
		4.40	2905	14.5	9.60	0.83	79.7	2.40	3.00	6.00		
112	MA/4-2	4.00	1455	26.3	8.72	0.78	84.9	2.50	3.20	5.70	0.0128	32.0
		5.10	2900	16.8	11.9	0.77	80.3	2.80	3.30	6.40		
132	S/4-2	4.70	1465	30.6	9.30	0.84	86.8	1.90	2.50	4.90	0.024	44.0
		5.90	2905	19.4	12.0	0.88	80.6	2.30	2.70	5.80		
132	M/4-2	6.50	1450	42.8	13.0	0.83	87.0	2.20	2.60	5.40	0.032	55.0
		8.00	2915	26.2	18.0	0.79	81.2	2.60	2.90	6.20		
132	MA/4-2	7.30	1455	47.9	14.3	0.84	87.7	2.70	3.20	7.00	0.035	62.0
		9.00	2930	29.3	18.7	0.83	83.7	2.70	3.50	7.60		
160	M/4-2	9.30	1450	61.2	18.0	0.88	84.7	2.20	2.50	5.00	0.050	78.0
		11.5	2935	37.4	22.4	0.91	81.4	2.20	3.00	6.20		
160	L/4-2	13.0	1460	85.0	24.1	0.88	88.5	2.70	3.20	7.50	0.067	93.0
		17.0	2945	55.1	31.1	0.93	84.8	2.60	3.40	7.40		

* Version B5, without options

Standard CUS - switchable poles

1800 / 3600 rpm **230/460/575 V**
60 Hz **4 - 2 pole**

switchable poles CUS
S1

Type		P_N		n_N	M_N	I_N			cos	η	M_A/M_N	M_K/M_N	I_A/I_N	J	*
						230 V	460 V	575 V	φ						
		[HP]	[kW]	[r/min]	[Nm]	[A]	[A]	[A]		[%]				[kgm²]	[kg]
63	S/4-2	0.13	0.10	1700	0.56	1.28	0.64	0.53	0.58	33.8	3.8	3.9	2.40	0.00021	3.60
		0.20	0.15	3410	0.42	1.46	0.73	0.61	0.68	37.9	3.3	4.0	2.60		
63	L/4-2	0.20	0.15	1680	0.85	1.90	0.95	0.76	0.57	34.8	3.3	3.4	2.20	0.00028	4.20
		0.25	0.19	3420	0.53	1.90	0.95	0.76	0.66	38.0	3.6	4.3	2.90		
71	S/4-2	0.28	0.21	1690	1.19	1.32	0.66	0.55	0.73	54.7	2.4	2.5	3.50	0.00072	5.40
		0.37	0.28	3335	0.80	1.60	0.80	0.67	0.86	51.1	2.8	3	3.60		
71	L/4-2	0.40	0.30	1660	1.73	1.96	0.98	0.82	0.75	51.2	2.3	2.3	3.20	0.00086	6.30
		0.60	0.45	3260	1.32	2.60	1.30	1.09	0.88	49.4	1.7	2.0	3.30		
80	S/4-2	0.65	0.48	1670	2.74	2.60	1.30	1.09	0.77	60.2	1.9	2.2	3.10	0.00109	8.00
		0.82	0.60	3340	1.72	3.32	1.66	1.39	0.82	55.3	2.2	2.2	3.50		
80	L/4-2	0.95	0.70	1625	4.11	3.68	1.84	1.54	0.79	60.4	1.8	1.9	3.10	0.00140	9.00
		1.145	0.85	3325	2.44	4.68	2.34	1.95	0.8	57.0	2.2	2.3	3.50		
90	S/4-2	1.50	1.10	1680	6.25	5.36	2.68	2.24	0.84	61.3	1.7	2.3	3.90	0.00235	12.0
		1.90	1.40	3335	4.01	7.00	3.50	2.92	0.88	57.1	1.8	2.3	3.90		
90	L/4-2	2.00	1.50	1655	8.65	7.00	3.50	2.92	0.81	66.4	2.2	2.4	3.70	0.00313	14.0
		2.50	1.90	3330	5.45	9.40	4.70	3.92	0.82	61.9	2.6	2.5	4.00		
100	L/4-2	2.70	2.00	1680	11.4	9.20	4.60	3.85	0.75	72.8	2.1	2.4	3.50	0.0045	18.0
		3.20	2.40	3395	6.75	11.0	5.50	4.60	0.85	64.4	2.4	2.6	4.40		
100	LA/4-2	3.50	2.60	1655	15.0	11.2	5.62	4.70	0.87	66.7	1.8	2.1	3.50	0.006	21.0
		4.20	3.10	3390	8.73	13.4	6.71	5.60	0.88	65.9	2.1	2.3	4.50		
112	M/4-2	5.00	3.70	1750	20.2	13.8	6.90	6.60	0.82	82.1	2.0	2.7	5.20	0.011	32.0
		5.90	4.40	3505	12.0	16.4	8.20	8.00	0.81	83.1	2.5	3.1	6.50		
132	S/4-2	6.30	4.70	1760	25.5	18.6	9.30	7.80	0.84	75.5	2.1	2.8	4.70	0.024	44.0
		7.90	5.90	3485	16.2	24.0	12.0	10.0	0.88	70.1	2.5	3.0	5.60		
132	M/4-2	8.70	6.50	1740	35.7	26.0	13.0	10.9	0.83	75.6	2.4	2.9	5.10	0.032	55.0
		10.7	8.00	3500	21.8	36.0	18.0	15.0	0.79	70.6	2.9	3.2	5.90		

* Version B5, without options

Standard - switchable poles

750 / 3000 rpm **400 V D/YY**
50 Hz **8 - 2 pole**

Type		switchable poles S3-40% P_N [kW]	n_N [r/min]	M_N [Nm]	I_N 400 V [A]	cos φ	η [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
71	S/8-2 WU	0.045	650	0.66	0.44	0.58	25.5	2.60	2.60	1.30	0.00072	5.40
		0.22	2520	0.83	0.60	0.90	58.8	1.80	1.90	2.50		
71	L/8-2 WU	0.06	655	0.87	0.51	0.61	27.8	2.30	2.30	1.60	0.00086	6.30
		0.30	2450	1.17	0.88	0.90	54.7	1.40	1.40	2.30		
80	S/8-2 WU	0.10	650	1.47	0.70	0.57	36.2	2.00	2.00	1.60	0.00109	8.00
		0.45	2695	1.59	1.40	0.76	61.0	2.00	2.00	2.70		
80	L/8-2 WU	0.13	585	2.12	0.74	0.70	36.2	1.40	1.50	1.60	0.00140	9.00
		0.55	2620	2.00	1.47	0.88	61.4	2.10	2.00	3.30		
90	S/8-2 WU	0.20	665	2.87	1.07	0.57	47.3	2.10	2.20	2.00	0.00235	12.0
		0.80	2770	2.76	2.37	0.74	65.8	2.90	2.60	3.50		
90	L/8-2 WU	0.30	640	4.48	1.31	0.60	55.1	1.90	1.90	2.00	0.00313	14.0
		1.20	2770	4.14	3.05	0.79	71.9	2.10	2.30	3.50		
100	L/8-2 WU	0.40	685	5.58	1.70	0.58	58.6	1.10	2.20	2.40	0.0045	18.0
		1.60	2790	5.48	3.60	0.86	74.6	2.00	2.30	4.00		
100	LA/8-2 WU	0.55	680	7.72	2.28	0.56	62.2	2.10	2.30	2.50	0.0060	21.0
		2.20	2810	7.48	4.87	0.83	78.6	2.50	2.60	4.60		
112	M/8-2 WU	0.75	695	10.3	3.05	0.53	67.0	2.30	2.60	2.80	0.0110	32.0
		3.00	2875	9.96	6.37	0.83	81.9	2.30	3.30	5.60		
132	S/8-2 WU	1.00	630	15.2	4.00	0.53	68.1	1.80	2.00	2.60	0.0240	44.0
		4.00	2710	14.1	8.55	0.93	72.6	2.30	2.30	4.80		
132	M/8-2 WU	1.40	700	19.1	5.10	0.60	66.0	1.90	2.30	2.80	0.0320	55.0
		5.50	2835	18.5	10.6	0.93	80.5	2.30	2.50	5.30		

Standard CUS - switchable poles

900 / 3600 rpm **230/460/575 V Y/Y**
60 Hz **8 - 2 pole**

switchable poles CUS
S3-40%

Type	P_N		n_N	M_N	I_N			cos η	η	M_A/M_N	M_K/M_N	I_A/I_N	J	*
					230 V	460 V	575 V							
	[HP]	[kW]	[r/min]	[Nm]	[A]	[A]	[A]		[%]				[kgm²]	[kg]
71 S/8-2 WU	0.06	0.045	820	0.52	0.86	0.43	0.36	0.52	25.3	2.30	2.20	1.70	0.00072	5.40
	0.30	0.22	3250	0.65	0.98	0.49	0.40	0.87	64.8	1.40	1.30	2.50		
71 L/8-2 WU	0.08	0.06	820	0.70	1.00	0.50	0.44	0.54	27.9	2.40	2.40	1.90	0.00086	6.30
	0.40	0.30	3260	0.88	1.36	0.68	0.55	0.89	62.3	2.00	2.10	3.00		
80 S/8-2 WU	0.13	0.10	825	1.16	1.36	0.68	0.59	0.50	37.0	1.70	1.50	1.80	0.00110	8.00
	0.60	0.45	3350	1.28	2.50	1.25	1.12	0.71	63.7	1.40	1.80	3.00		
80 L/8-2 WU	0.17	0.13	650	1.91	1.52	0.76	0.65	0.69	31.2	1.40	1.80	1.80	0.00150	9.00
	0.74	0.55	3110	1.69	2.66	1.33	1.32	0.88	59.1	2.00	1.80	4.00		
90 S/8-2 WU	0.27	0.20	830	2.30	2.04	1.02	0.88	0.50	49.3	2.20	2.20	2.30	0.00230	12.0
	1.07	0.80	3400	2.25	4.18	2.09	1.90	0.71	67.7	3.20	3.00	4.40		
90 L/8-2 WU	0.40	0.30	815	3.52	2.42	1.21	1.04	0.53	58.8	2.00	1.40	1.80	0.00310	14.0
	1.60	1.20	3410	3.36	5.30	2.65	2.41	0.76	74.9	3.30	2.50	4.20		
100 L/8-2 WU	0.54	0.40	845	4.52	3.18	1.59	1.40	0.51	62.0	1.80	2.10	2.40	0.0045	18.0
	2.15	1.60	3425	4.46	6.24	3.12	2.70	0.84	76.7	2.40	2.50	4.60		
100 LA/8-2 WU	0.75	0.55	845	6.22	4.24	2.12	1.83	0.49	66.5	1.50	1.90	2.40	0.0060	21.0
	3.00	2.2	3445	6.10	8.34	4.17	3.64	0.81	81.8	2.10	2.20	4.40		
112 M/8-2 WU	1.00	0.75	850	8.43	5.70	2.85	2.48	0.47	70.4	2.90	2.40	3.30	0.0119	30.0
	4.00	3.00	3495	8.20	10.9	5.43	4.73	0.82	84.7	2.50	3.30	5.70		
132 S/8-2 WU	1.35	1.00	865	11.04	6.68	3.34	2.87	0.53	71.0	2.60	2.30	2.90	0.0233	44.0
	5.40	4.00	3470	11.01	13.7	6.84	5.61	0.91	80.8	2.90	2.40	5.20		
132 M/8-2 WU	1.90	1.40	860	15.55	9.16	4.58	3.89	0.53	72.5	2.50	2.20	3.60	0.0317	55.0
	7.40	5.50	3455	15.20	18.1	9.07	7.33	0.93	81.9	2.90	2.40	4.70		

* Version B5, without options

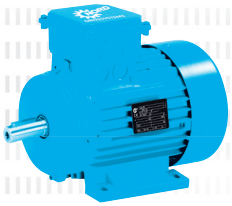
Standard - switchable poles

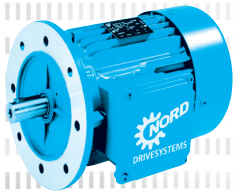
750 / 1500 rpm **400 V D/YY**
50 Hz **8 - 4 pole**

Type		switchable poles S1 P_N [kW]	n_N [r/min]	M_N [Nm]	I_N 400 V [A]	cos φ	η [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm²]	kg * [kg]
71	S/8-4	0.12	670	1.71	0.72	0.69	34.9	1.40	1.80	1.70	0.00091	5.40
		0.18	1410	1.22	0.50	0.79	65.8	1.70	2.30	3.80		
71	L/8-4	0.18	620	2.77	0.90	0.78	37.0	1.60	1.70	2.00	0.0012	6.70
		0.25	1410	1.69	0.64	0.82	68.8	1.80	2.00	3.90		
80	S/8-4	0.25	690	3.46	1.24	0.75	38.8	1.50	1.70	2.60	0.0022	8.90
		0.37	1380	2.56	1.14	0.71	66.0	1.50	1.60	3.80		
80	L/8-4	0.37	680	5.20	1.71	0.76	41.1	1.70	1.90	2.30	0.0028	9.80
		0.55	1380	3.81	1.43	0.76	73.0	1.80	2.00	3.80		
90	S/8-4	0.40	700	5.46	1.81	0.80	39.9	1.60	1.70	2.70	0.0037	12.0
		0.75	1380	5.19	2.00	0.82	66.0	1.50	1.90	3.60		
90	L/8-4	0.55	700	7.50	2.47	0.70	45.9	1.80	2.00	3.10	0.0050	14.0
		1.00	1400	6.82	2.47	0.78	74.9	1.60	1.80	3.90		
100	L/8-4	0.70	710	9.41	2.85	0.75	47.3	1.70	1.90	3.30	0.0045	18.0
		1.40	1400	9.55	3.61	0.88	63.6	1.40	1.50	3.80		
100	LA/8-4	1.00	690	13.8	3.88	0.61	61.0	1.40	2.10	2.50	0.006	21.0
		1.60	1400	10.9	3.62	0.89	71.7	1.40	2.20	4.20		
112	M/8-4	1.50	700	20.5	5.23	0.61	67.9	1.60	1.80	3.60	0.018	32.0
		2.50	1410	16.9	5.23	0.85	81.2	1.50	1.70	4.00		
132	S/8-4	2.20	725	29.0	7.70	0.54	76.4	2.20	2.80	4.50	0.031	42.7
		3.40	1455	22.3	7.20	0.82	83.1	2.20	3.00	6.50		
132	M/8-4	2.90	730	37.9	10.2	0.50	82.1	2.10	3.20	3.70	0.038	48.9
		4.40	1460	28.8	9.40	0.83	81.4	2.20	3.30	6.00		

* Version B5, without options

Dimensions



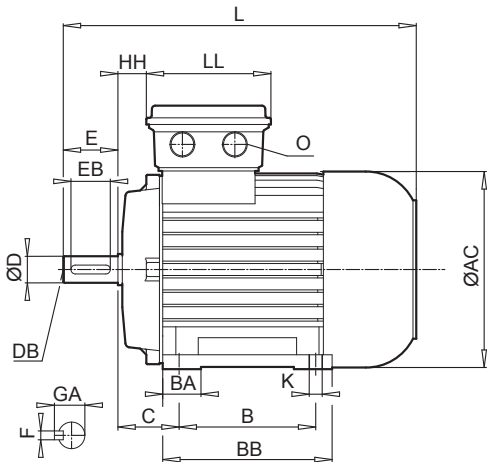


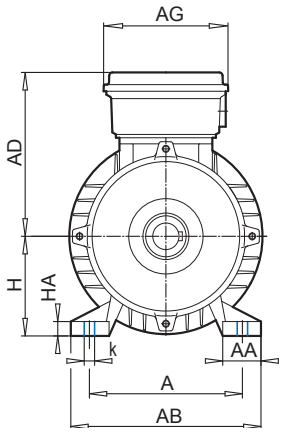


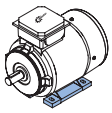


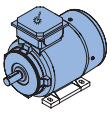
IEC B3 . . . . . D 2 - 3
IEC B5 . . . . . D 4 - 5
IEC B14 . . . . . D 6 - 7
IEC B3-BRE . . . . . D 8 - 9
IEC B5-BRE . . . . . D 10 - 11
IEC B14-BRE . . . . . D 12 - 13
Options . . . . . D 14 - 20
NEMA Footmount . . . . . D 21
NEMA C-Face . . . . . D 21

B3





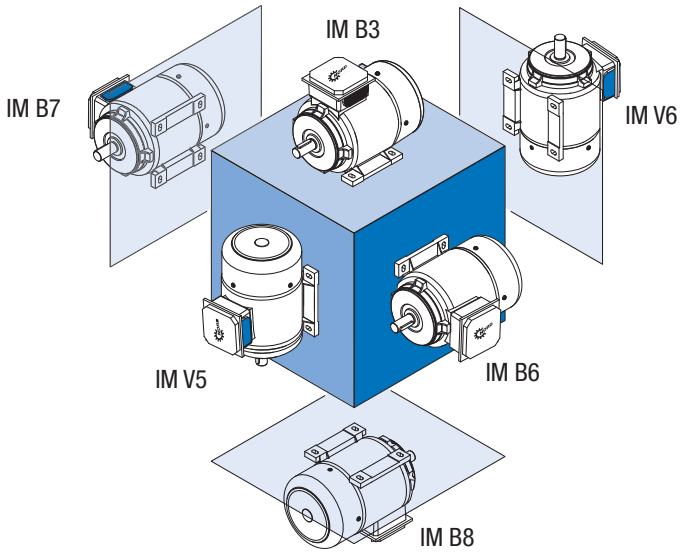


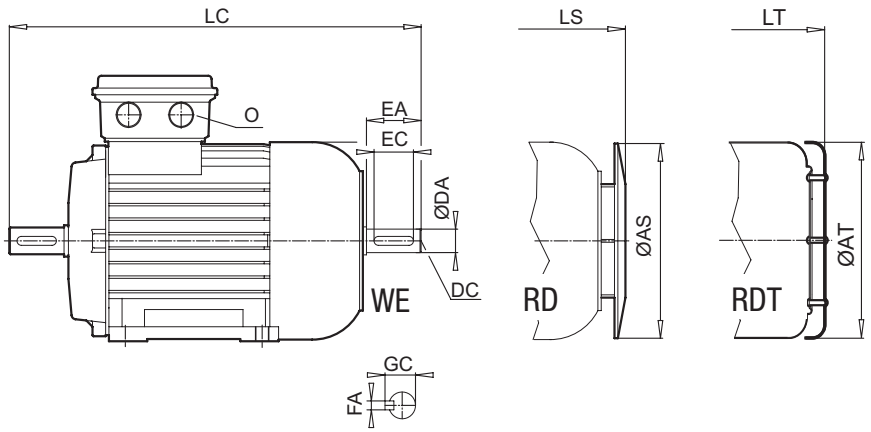


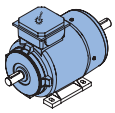
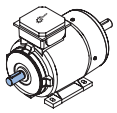
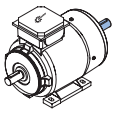
Type																		
	IE1*	IE2	IE3	[mm]	A	AA	AB	B	BA	BB	HA	k	K	AC	AD	AG	C	H	HH	L
63	S/L	-	SP/LP	100	21	120	80	27	105	9	12	7	123	115	100	40	63	12	215
71	S/L	-	RP/SP/LP	112	24	136	90	24	108	10	12	7	138	124	100	45	71	20	244
80	S/L	SH/LH	RP/SP/LP	125	30	160	100	30	125	11	17	10	156	142	114	50	80	22	276
90	S/L	SH/LH	RP/SP/LP	140	34	174	125	35	155	12	17	10	176	147	114	56	90	26	326
100 100	L/LA -	LH/AH -	- LP/AP**	160 160	37 40	192 200	140 140	30 35	175 175	15 18	22 22	12 12	194 194	170 170	114 111	63 63	100 100	32 32	366 366
112 112	M -	- MH	- MP	190	40	224	140	34	175	15	22	12	218	179	114	70	112	35	386 411
132	S/M/MA	SH/MH/LH	SP/MP	216	58	260	178	37	218	18	30	12	258	204	122	89	132	47	491
160 160	M L	MH -	SP/MP -	254	72	318	210 254	52	264 308	25	30	14,5	310	242	186	108	160	52	602
160	-	LH	LP	254	72	318	254	52	308	25	30	14,5	310	242	186	108	160	52	646
180 180	- -	MH LH	MP LP	279	88,5	340	241 279	-	281 319	27	30	14,5	348	259	186	121	180	54	726
225 225	- -	SH MH	SP MP	356	79	443	286 311	66	359	20	25	20	443	347	245	149	225	94	882

* + Standard

** Series **APAB**

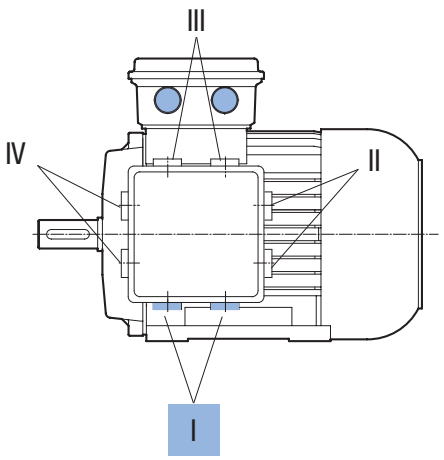


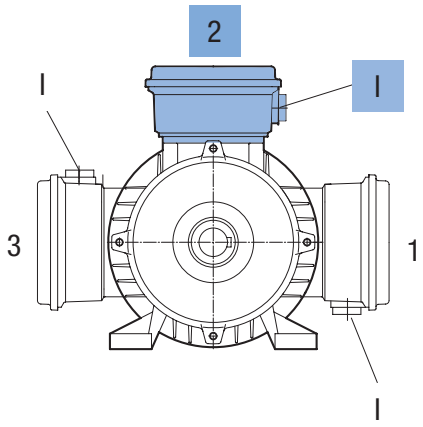


[mm]

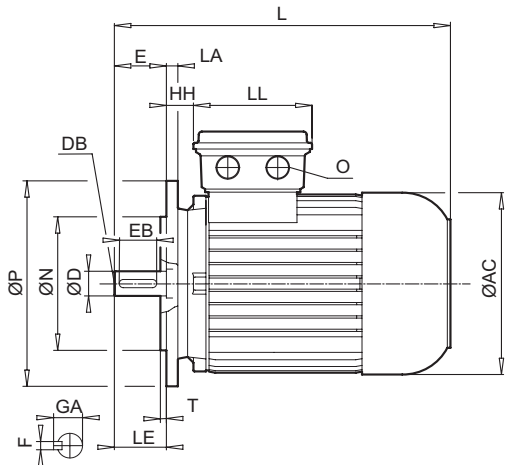
LC	LL	AS	AT	LS	LT	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
238	100	123	123	226	233	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
268	100	138	138	255	258	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
309	114	156	156	291	229	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
373	114	176	176	341	345	M25 x 1,5	24	M8	50	40	8	27,0	19	M6	40	32	6	21,5
422 -	114 112	194 194	194 -	381 381	388 -	M32 x 1,5 M32 x 1,5	28 28	M10 M10	60 60	50 50	8 8	31,0 31,0	24 -	M8 -	50 -	40 -	8 -	27,0 -
440 465	114	218	218	401 426	411 436	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
589	122	257	258	508	534	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0
721	186	310	-	619	-	M40 x 1,5	42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
765	186	310	-	663	-	M40 x 1,5	42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
843	186	348	-	741	-	M40 x 1,5	48	M16	110	100	14	51,5	48	M16	110	100	14	51,5
1002	245	348	-	968,5	-	M50 x 1,5	60	M20	140	125	18	64	55	M20	110	100	16	59

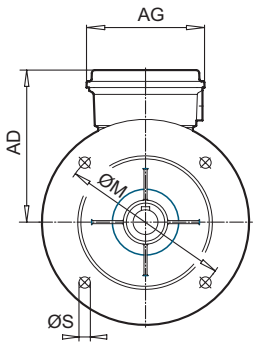


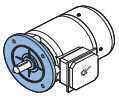


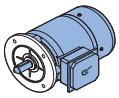
⇨ 🕮 A40

B5





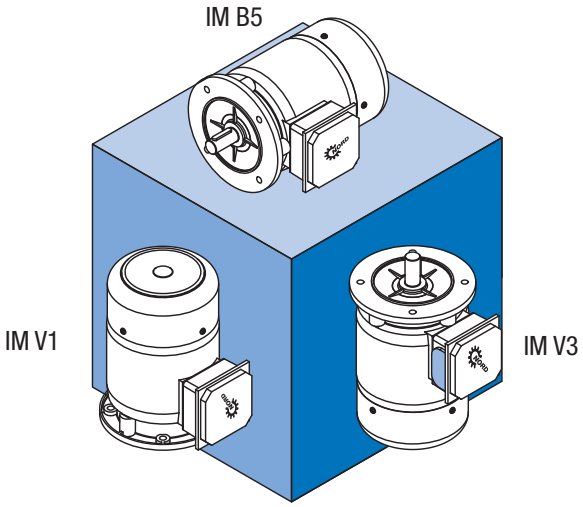


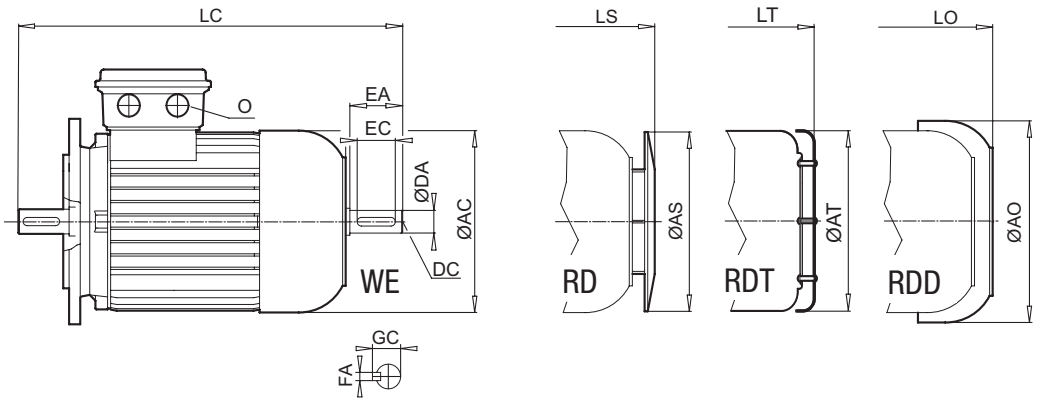


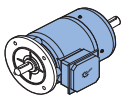
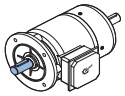
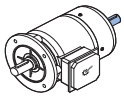
Type	IE1*	IE2	IE3	[mm] LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL
63	S/L	-	SP/LP	10	115	95	140	9	3,0	123	115	100	12	215	23	100
71	S/L	-	RP/SP/LP	10	130	110	160	9	3,5	138	124	100	20	244	30	100
80	S/L	SH/LH	RP/SP/LP	11	165	130	200	11	3,5	156	142	114	22	276	40	114
90	S/L	SH/LH	RP/SP/LP	11	165	130	200	11	3,5	176	147	114	26	326	50	114
100 100	L/LA -	LH/AH -	- LP/AP**	15 15	215 215	180 180	250 250	13,5 13,5	4,0 4,0	194 194	170 170	114 111	32 32	366 366	60 60	114 112
112 112	M -	- MH	- MP	15	215	180	250	13	4,0	218	179	114	35	386 411	60	114
132	S/M/MA	SH/MH/LH	SP/MP	20	265	230	300	13	4,0	258	204	122	47	491	80	122
160 160	M/L -	MH LH	SP/MP LP	20	300	250	350	17,5	5,0	310	242	186	52	602 646	110	186
180 180	MX LX	- -	- -	20	300	250	350	17,5	5,0	310	242	186	52	602 646	110	186
180	-	MH/LH	MP/LP	14	300	250	350	17,5	5,0	348	259	186	54	726	110	186
200	LX	XH	-	14	350	300	400	17,5	5,0	348	259	186	54	726	110	186
225 225	- -	SH MH	SP MP	20	400	350	450	17,5	5,0	443	347	245	94	882	140	245

* + Standard

** Series **APAB**

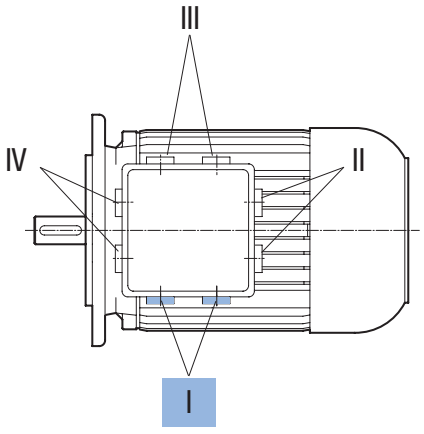


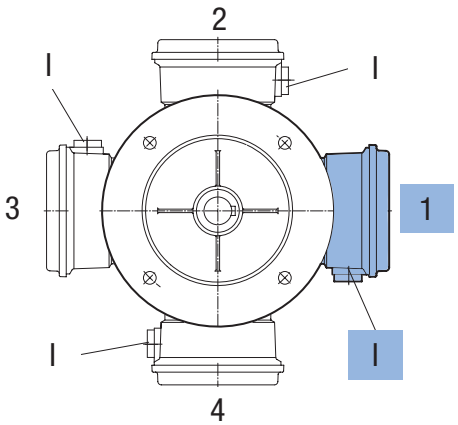


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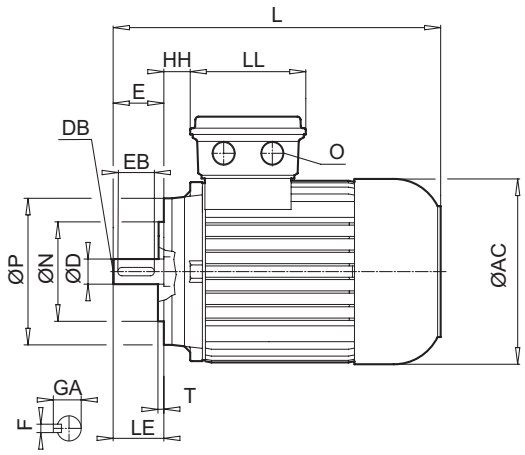
AS	AT	AO	LC	LS	LT	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
123	123	138	238	226	233	243,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
138	138	156	268	255	258	268	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
156	156	176	309	291	296	302	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
176	176	194	373	341	345	357	M25 x 1,5	24	M8	50	40	8	27,0	19	M6	40	32	6	21,5
194 194	194 -	218 218	422 -	381 381	388 -	394 394	M32 x 1,5 M32 x 1,5	28 28	M10 M10	60 60	50 50	8 8	31,0 31,0	24 -	M8 -	50 -	40 -	8 -	27,0 -
218	218	258	440 465	401 426	411 436	424 449	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
257	258	310	589	508	534	532	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0
310	-	367	721 765	619 663	-	647 691	M40 x 1,5	42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
310	-	367	721 765	619 663	-	647 691	M40 x 1,5	48	M16	110	100	14	51,5	42	M16	110	90	12	49,0
348	-	403	843	741	-	794	M40 x 1,5	48	M16	110	100	14	51,5	48	M16	110	100	14	51,5
348	-	403	843	741	-	794	M40 x 1,5	55	M20	110	100	16	59,0	48	M16	110	100	14	51,5
348	-	-	1002	968,5	-	-	M50 x 1,5	60	M20	140	125	18	64,0	55	M20	110	100	16	59,0

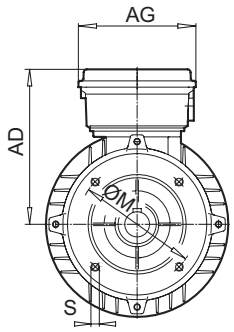


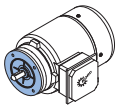


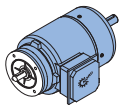
⇨ A40

B14







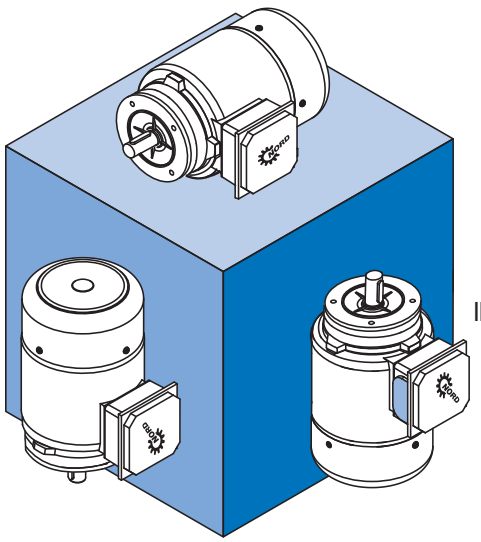


Type	IE1*	IE2	IE3	[mm] M	N	P	S	T	AC	AD	AG	HH	L	LE	LL
63	S/L	-	SP/LP	75	60	90	M5 x 8	2,5	123	115	100	12	215	23	100
71	S/L	-	RP/SP/LP	85	70	105	M6 x 12	2,5	138	124	100	20	244	30	100
80	S/L	SH/LH	RP/SP/LP	100	80	120	M6 x 12	3,0	156	142	114	22	276	40	114
90	S/L	SH/LH	RP/SP/LP	115	95	140	M8 x 15	3,0	176	147	114	26	326	50	114
100 100	L/LA -	LH/AH -	- LP/AP**	130 130	110 110	160 160	M8 x 16 M8 x 16	3,5 4,0	194 194	170 170	114 111	32 32	366 366	60 60	114 112
112 112	M -	- MH	- MP	130	110	160	M8 x 12	3,5	218	179	114	35	386 411	60	114
132	S/M/MA	SH/MH/LH	SP/MP	165	130	200	M10 x 18	3,5	258	204	122	47	491	80	122

* + Standard

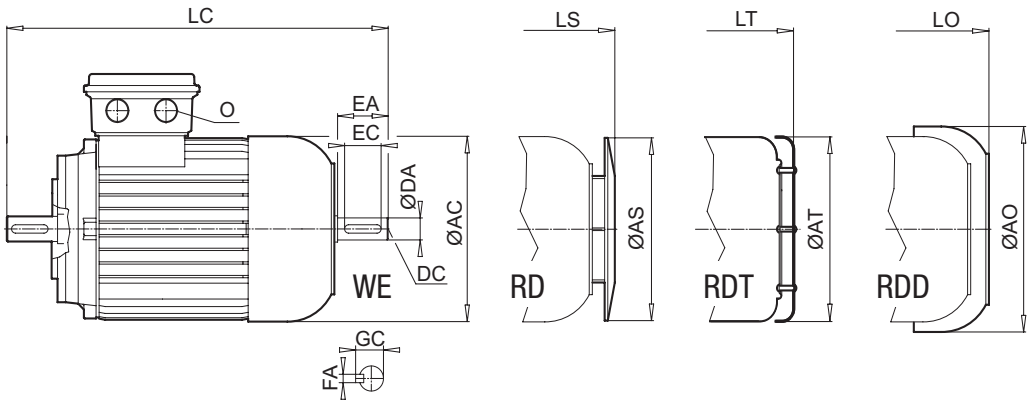
** series **APAB**

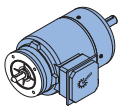
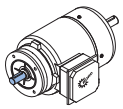
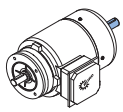
IM B14



IM V18

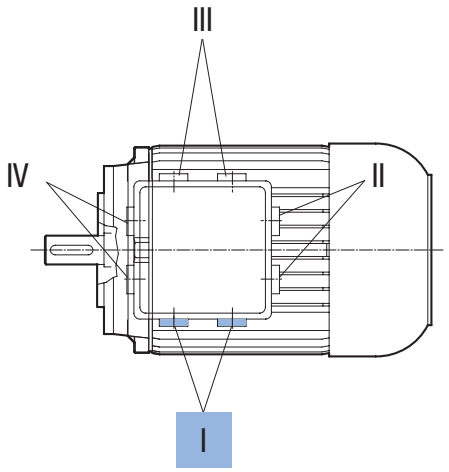
IM V19

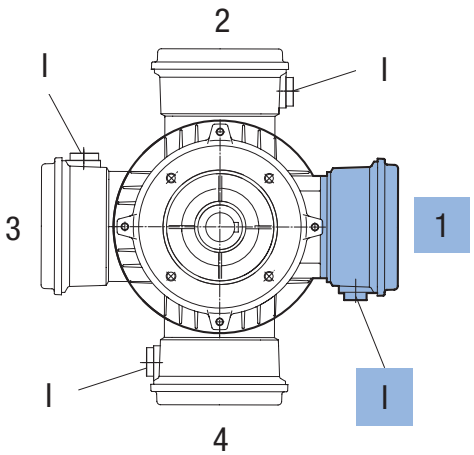


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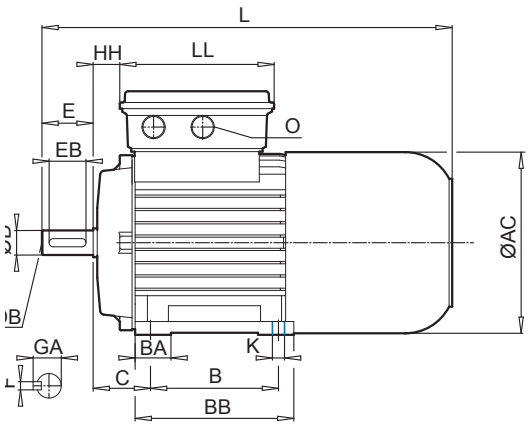
AS	AT	AO	LC	LS	LT	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
123	123	138	238	226	233	243,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
138	138	156	268	255	258	268	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
156	156	176	309	291	296	302	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
176	176	194	373	341	345	357	M25 x 1,5	24	M8	50	40	8	27,0	19	M6	40	32	6	21,5
194 194	194 -	218 218	422 -	381 381	388 -	394 394	M32 x 1,5 M32 x 1,5	28 28	M10 M10	60 60	50 50	8 8	31,0 31,0	24 -	M8 -	50 -	40 -	8 -	27,0 -
218	218	258	440 465	401 426	411 436	424 449	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
257	258	310	589	508	534	532	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0

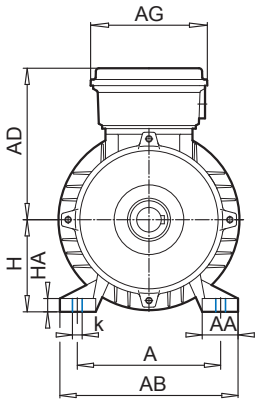


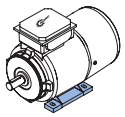


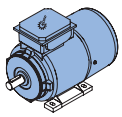
⇨ A40

B3-BRE





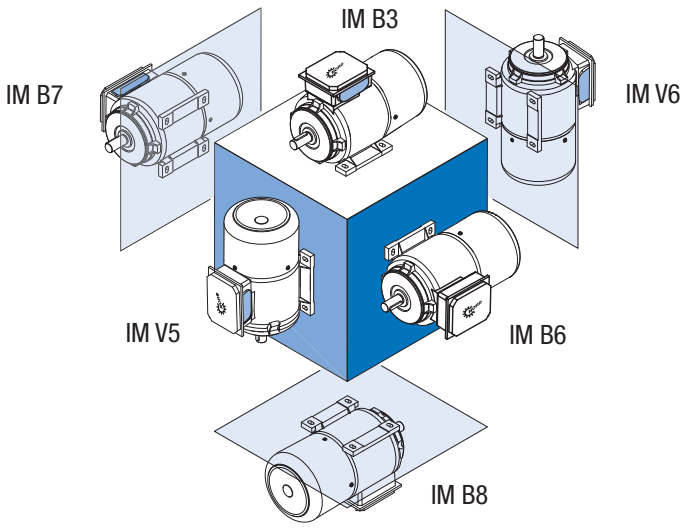


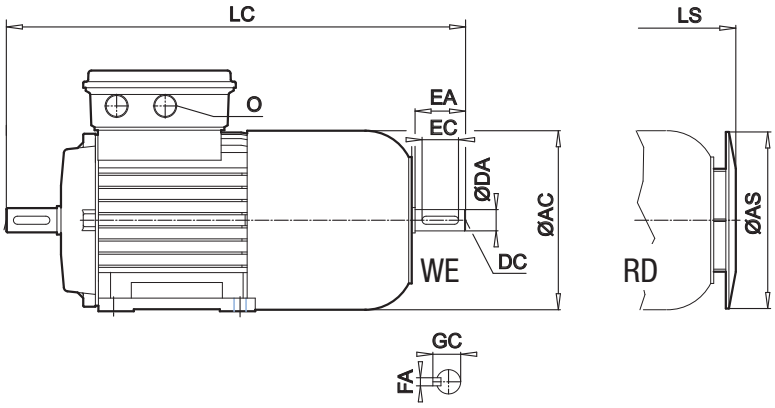


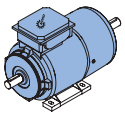
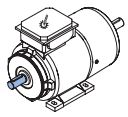
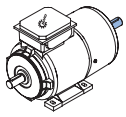
Type																			
	IE1*	IE2	IE3	BRE [Nm]															
				[mm]	A	AA	AB	B	BA	BB	HA	k	K	AC	AD	AG	C	H	HH	L
63	S/L	-	SP/LP	5	100	21	120	80	27	105	9	12	7	123	123	89	40	63	19	271
71	S/L	-	SP/LP	5	112	24	136	90	24	108	10	12	7	138	132	89	45	71	27	302
80 80	S L	SH LH	- LP	5 10	125	30	160	100	30	125	11	17	10	156	142	108	50	80	26	340
90	S/L	SH/LH	SP/LP	20	140	34	174	125	35	155	12	17	10	176	147	108	56	90	30	401
100 100 100	L LA -	LH AH -	LP AP LP/AP **	20 40	160 160	37 40	192 200	140 140	30 35	175 175	15 18	22 22	12 12	194 194	172 170	108 111	63 63	100 100	36 32	457 448
112 112	M -	- MH	- MP	60 60	190	40	224	140	34	175	15	22	12	218	182	108	70	112	39	480 505
132 132 132	S M MA	SH MH LH	SP MP -	60 100 150	216	58	260	178 178 178	37	218 218 218	18	30	12	258	201	139	89	132	40	598 598 598
160 160	M L	MH -	SP/MP -	100 150	254	72	318	210 254	52	264 308	25	30	14,5	310	242	186	108	160	52	737
160	-	LH	LP	250	254	72	318	254	52	308	25	30	14,5	310	242	186	108	160	52	781
180 180	- -	MH LH	MP LP	250 250	279	88,5	340	241 279	-	281 319	27	30	14,5	348	259	186	121	180	54	851
225 225	- -	SH MH	SP MP	250 400	356	79	443	286 311	66	359	20	25	20	443	347	245	149	225	94	1062

* + Standard

** Series **APAB**

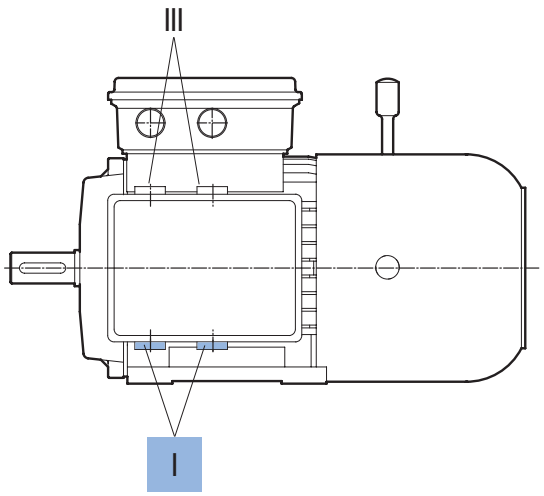


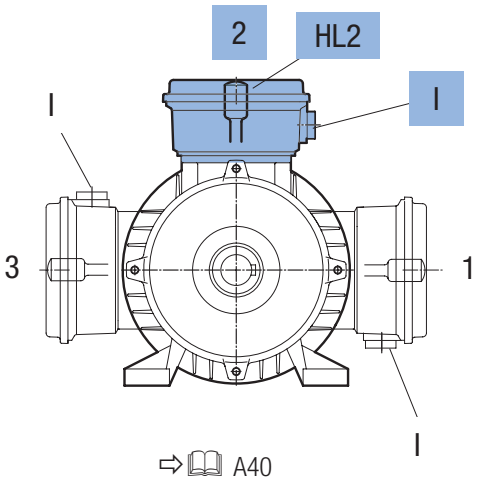


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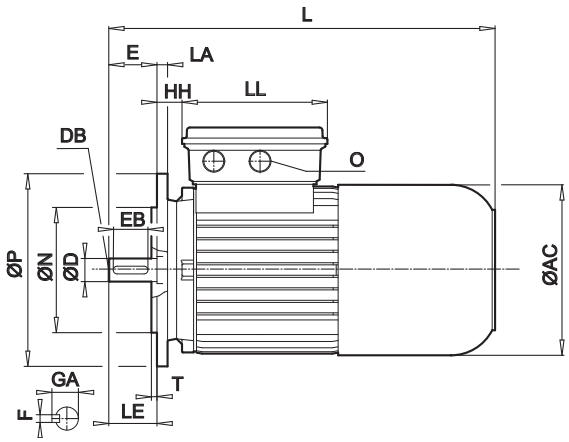
LC	LL	AS	LS	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
298	134	123	282	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
329	134	138	313	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
374	153	156	355	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
439	153	176	416	M25 x 1,5	24	M8	50	40	8	27,0	14	M5	30	20	5	16,0
517	153	194	472	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
-	165	194	463	M32 x 1,5	28	M10	60	50	8	31,0	-	-	-	-	-	-
537 562	153	218	495 520	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
688 688 688	185	257	615 615 615	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0
856	186	310	754	M40 x 1,5	42	M16	110	90	12	45,0	28 42	M10 M16	60 110	50 90	8 12	31,0 45,0
900	186	310	798	M40 x 1,5	42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
970	186	348	868	M40 x 1,5	48	M16	110	100	14	51,5	48	M16	110	100	14	51,5
1182	245	348	1148,5	M50 x 1,5	60	M20	140	125	18	64	48 55	M20	110	100	16	59,0

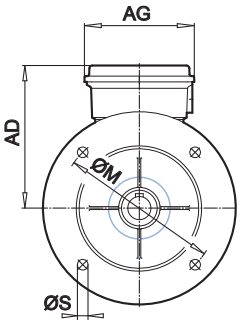


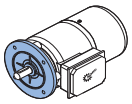


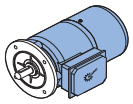
⇨ 🕮 A40

B5-BRE





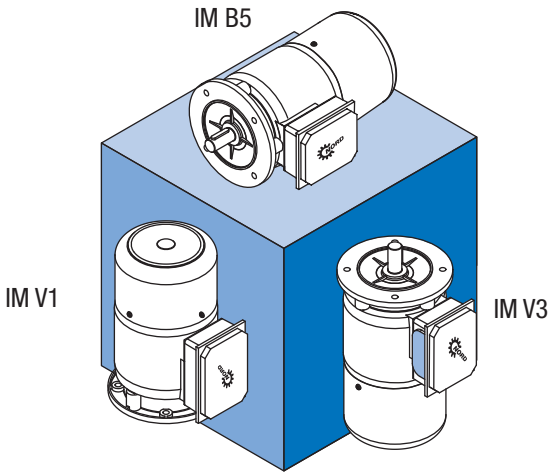


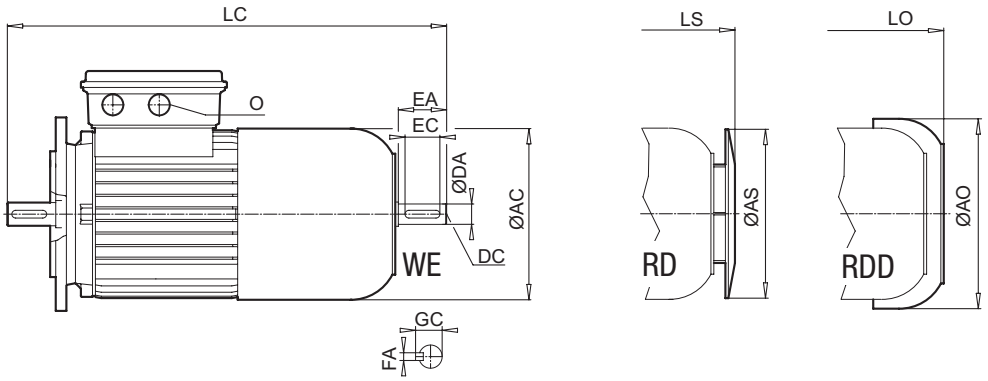


Type				BRE [Nm]												
	IE1*	IE2	IE3	[mm]	LA	M	N	P	S	T	AC	AD	AG	HH	L
63	S/L	-	SP/LP	5	10	115	95	140	9	3,0	123	123	89	19	271
71	S/L	-	SP/LP	5	10	130	110	160	9	3,5	138	132	89	27	302
80 80	S L	SH LH	- LP	5 10	11	165	130	200	11	3,5	156	142	108	26	340
90	S/L	SH/LH	SP/LP	20	11	165	130	200	11	3,5	176	147	108	30	401
100 100 100	L LA -	LH AH -	- - LP/AP **	20 40 20	15 15	215 215	180 180	250 250	13,5 13,5	4,0 4,0	194 194	173 168	108 111	36 32	457 448
112 112	M -	- MH	- MP	60 60	15	215	180	250	13	4,0	218	182	108	39	480 505
132 132 132	S M MA	SH MH LH	SP MP -	60 100 150	20	265	230	300	13	4,0	258	201	139	40	598
160 160 160	M L -	MH - LH	SP/MP - LP	100 150 250	20	300	250	350	17,5	5,0	310	242	186	52	737 737 781
180 180	MX LX	- -	- -	250 250	20	300	250	350	17,5	5,0	310	242	186	52	737 781
180	-	MH/LH	MP/LP	250	14	300	250	350	17,5	5,0	348	259	186	54	851
200	LX	XH	-	400	14	350	300	400	17,5	5,0	348	259	186	54	851
225 225	- -	SH MH	SP MP	400 800	20	400	350	450	17,5	5,0	443	347	245	94	1062

* + Standard

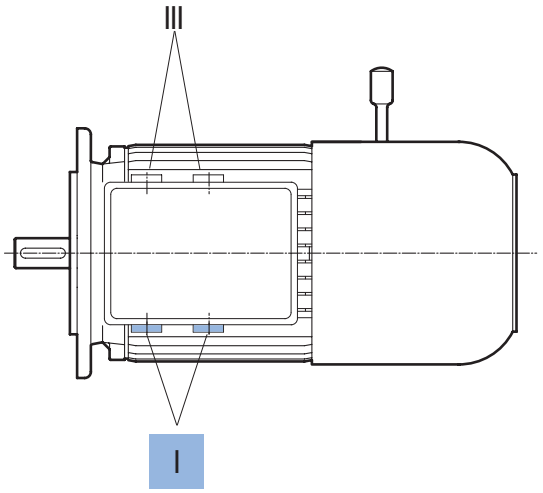
** Series APAB

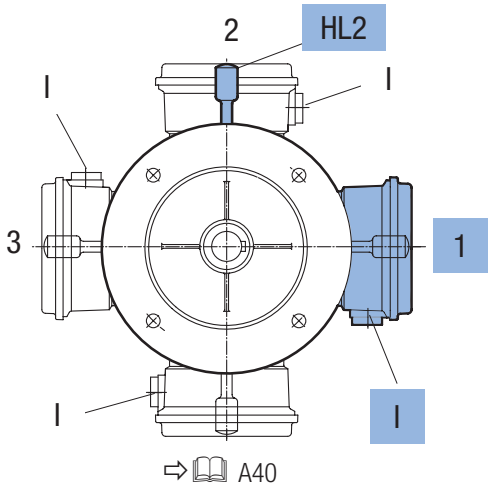




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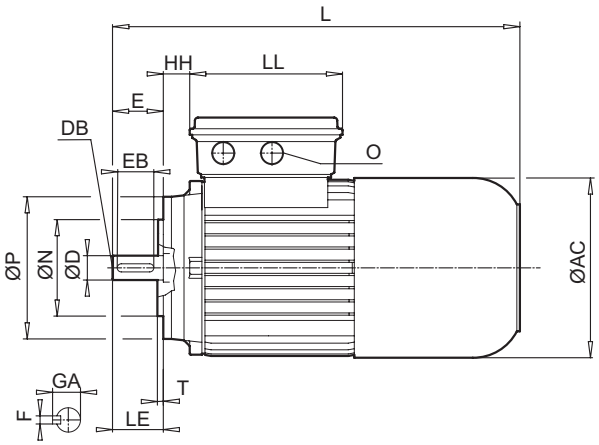
LC	LE	LL	AS	AO	LS	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
298	23	134	123	138	282	294,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
329	30	134	138	156	313	326	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
374	40	153	156	176	355	366	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
439	50	153	176	194	416	431	M25 x 1,5	24	M8	50	40	8	27,0	14	M5	30	20	5	16,0
517	60	153	194	218	472	485	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
-	60	165	194	218	463	476	M32 x 1,5	28	M10	60	50	8	31,0	-	-	-	-	-	-
537 562	60	153	218	258	495 520	518 543	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
688	80	185	257	310	615	634	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0
856 856 900	110	186	310	367	754 754 798	782 782 826	M40 x 1,5	42	M16	110	90	12	45,0	28 42 42	M10 M16 M16	60 110 110	50 90 90	8 12 12	31,0 45,0 45,0
856 900	110	186	310	367	754 798	782 826	M40 x 1,5	48	M16	110	100	14	51,5	42	M16	110	90	12	49,0
970	110	186	348	403	868	921	M40 x 1,5	48	M16	110	100	14	51,5	48	M16	110	100	14	51,5
970	110	186	348	403	868	921	M40 x 1,5	55	M20	110	100	16	59,0	48	M16	110	100	14	51,5
1182	140	245	348	-	1148,5	-	M50 x 1,5	60	M20	140	125	18	64,0	55 55	M20	110	100	16	59,0

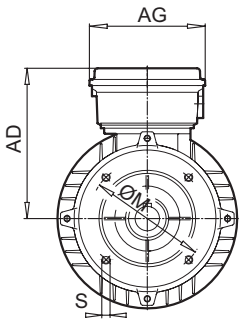


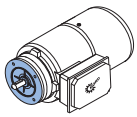


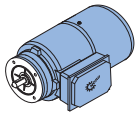
⇨ A40

B14-BRE





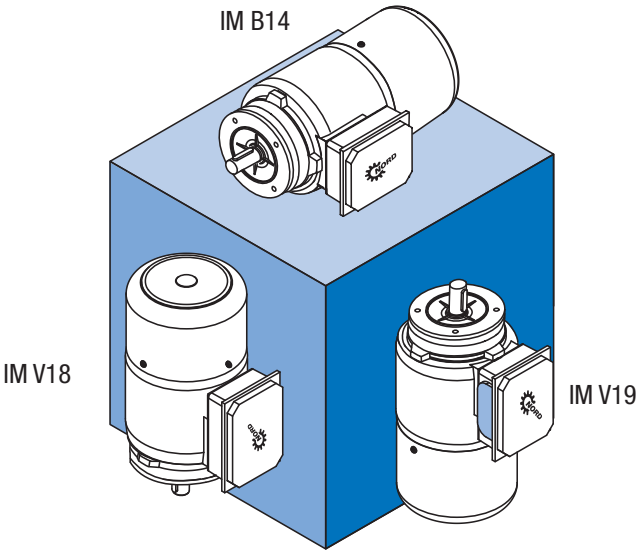


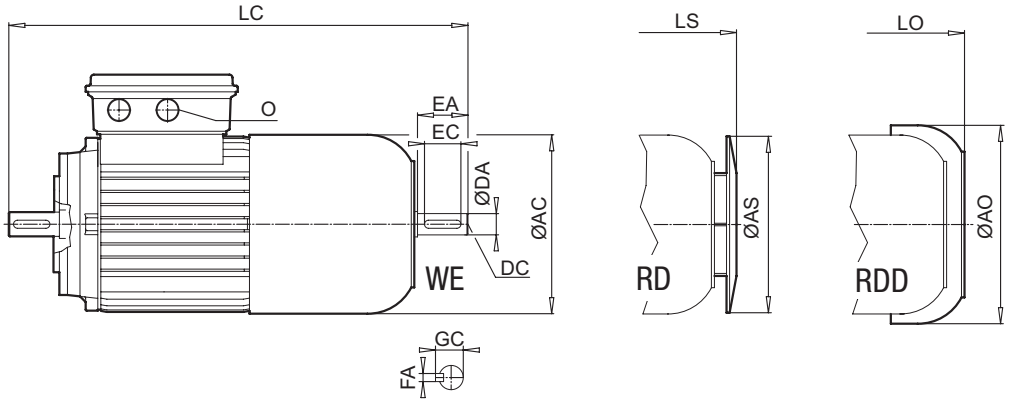


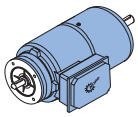
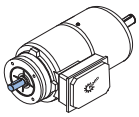
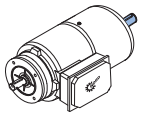
Type	IE1*	IE2	IE3	BRE [Nm]	M	N	P	S	T	AC	AD	AG	HH	L
				[mm]										
63	S/L	-	SP/LP	5	75	60	90	M5 x 8	2,5	123	123	89	19	271
71	S/L	-	SP/LP	5	85	70	105	M6 x 13	2,5	138	132	89	27	302
80 80	S L	SH LH	- LP	5 10	100	80	120	M6 x 12	3,0	156	142	108	26	340
90	S/L	SH/LH	SP/LP	20	115	95	140	M8 x 15	3,0	176	147	108	30	401
100 100 100	L LA -	LH AH -	- - LP/AP **	20 40	130 130	110 110	160 160	M8 x 16 M8 x 16	3,5 4,0	194 194	172 170	108 111	36 32	457 448
112 112	M -	- MH	- MP	60 60	130	110	160	M8 x 12	3,5	218	182	108	39	480 505
132 132 132	S M MA	SH MH LH	SP MP -	60 100 150	165	130	200	M10 x 18	3,5	258	201	139	40	598

* + Standard

** Series **APAB**

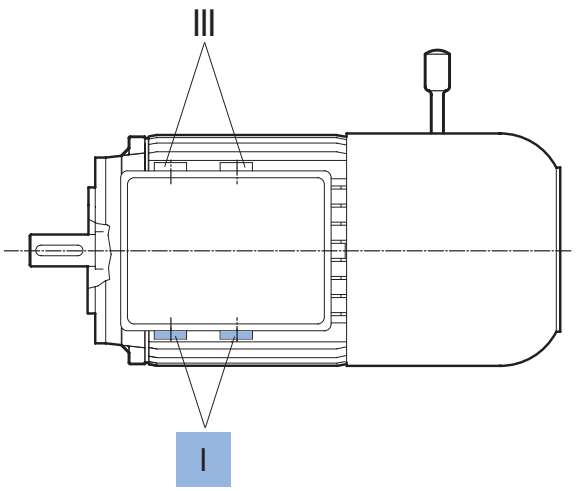


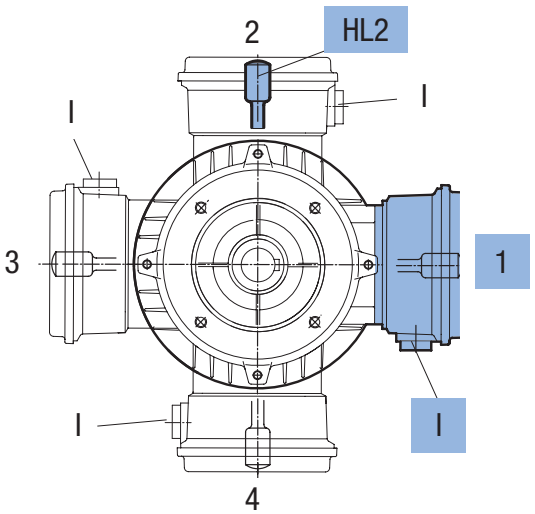


[mm]

LC	LE	LL	AS	AO	LS	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
298	23	134	123	138	282	294,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
329	30	134	138	156	313	326	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
374	40	153	156	176	355	366	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
439	50	153	176	194	416	431	M25 x 1,5	24	M8	50	40	8	27,0	14	M5	30	20	5	16,0
517	60	153	194	218	472	485	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
-	60	165	194	218	463	476	M32 x 1,5	28	M10	60	50	8	31,0	-	-	-	-	-	-
537 562	60	153	218	258	495 520	518 543	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
688	80	185	257	310	615	634	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0

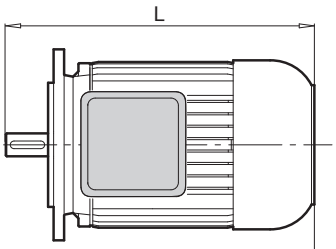




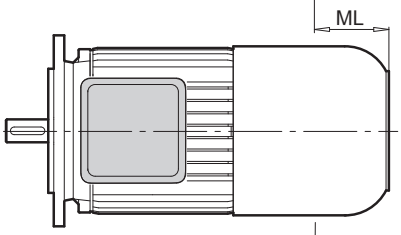
⇨ A40

IG, F, IGF

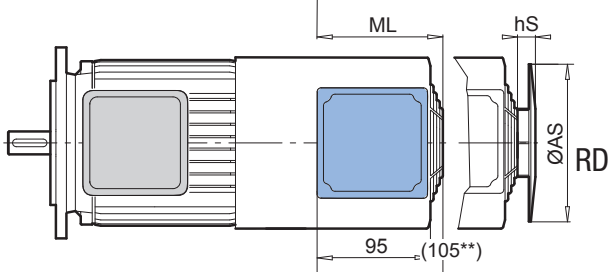
Motor

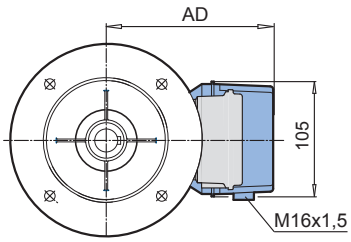


Option IG

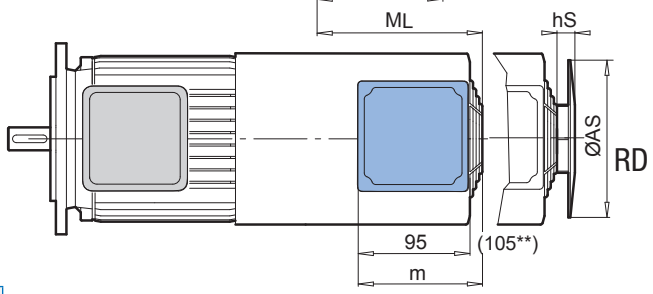


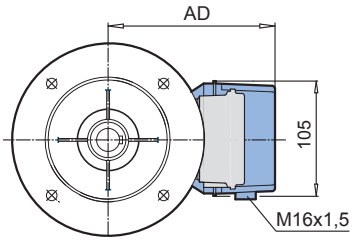
Option F





Option IG F

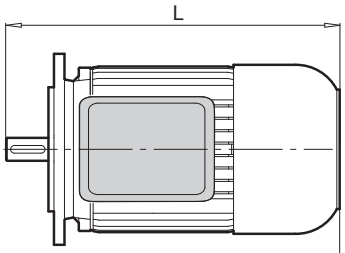




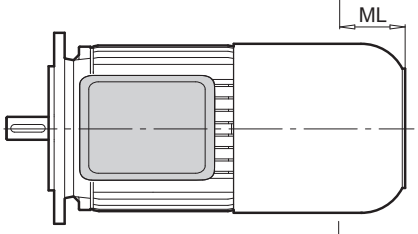
Type	IE1*	IE2	IE3		IG	F	IGF	F RD / IG F RD			
				[mm]	L	ML	ML	ML	AS	hS	AD	m
63	S/L	-	SP/LP		215	55	88	158	133	37	114	107
71	S/L	-	SP/LP		244	56	89	144	150	37	123	107
80	S/L	SH/LH	LP		276	61	90	140	170	40	132	107
90	S/L	SH/LH	SP/LP		326	72	104	149	188	30	142	117
100 100	L/LA -	LH/AH -	- LP/AP **		366 366	69 83	95 100	155 155	210	28	151	117
112 112	M -	- MH	- MP		386 411	68	99	149	249	33	163	117
132	S/M/MA	SH/MH/LH	SP/MP		491	63	115	155	300	25	183	127
160 160	M/L -	MH LH	SP/MP LP		602 646	70	150 145	235	338	32	210	127
180 180	MX LX	- -	- -		602 646	70	150 145	235	338	32	210	127
180	-	MH/LH	MP/LP		726	109	153	233	338	32	210	127
200	LX	XH	-		726	109	153	233	338	32	210	127
225 225 225	- - -	- SH MH	RP SP MP		882	67	127	287	424	50	250	144
250	-	WH	WP		882	67	127	287	424	50	250	144

* + Standard ** Series APAB

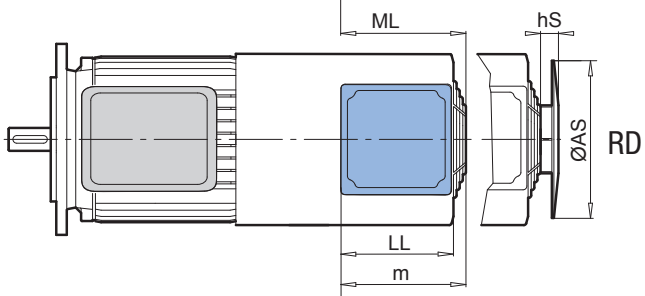
BRE Motor

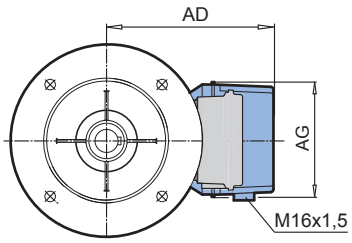


Option
BRE IG

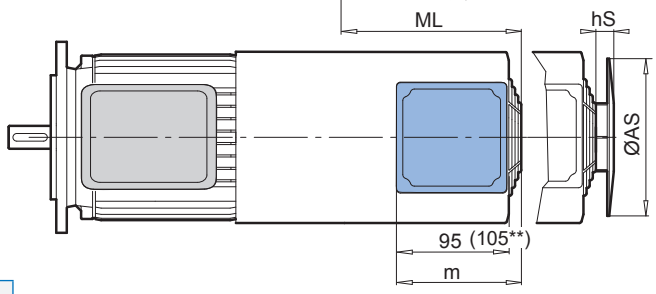


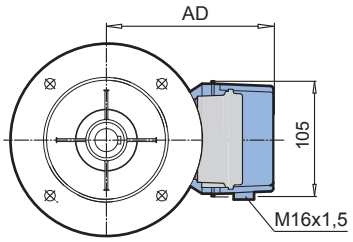
Option
BRE F





Option
BRE IG F

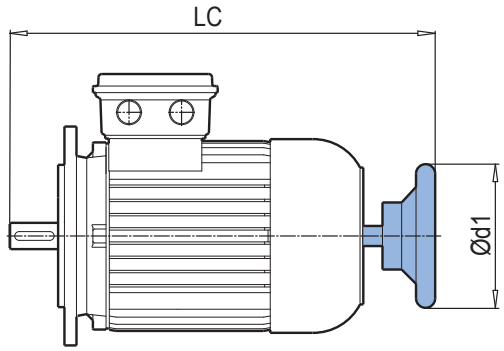




Type BRE	IE1*	IE2	IE3	[mm]	IG	F	IGF	F RD / IG F RD			
				L	ML	ML	ML	AS	hS	AD	m
63	S/L	-	SP/LP	271	62	90	125	133	37	114	107
71	S/L	-	SP/LP	302	74	94	139	150	37	123	107
80	S/L	SH/LH	LP	340	57	90	140	170	40	132	107
90	S/L	SH/LH	SP/LP	401	70	100	145	188	30	142	117
100 100	L/LA -	LH/AH -	LP/AP LP/AP **	457 448	70 79	105 100	140 155	210	28	151	117
112 112	M -	- MH	- MP	480 505	64	105	140	249	33	163	117
132	S/M/MA	SH/MH/LH	SP/MP	598	65	125	155	300	25	183	127
160 160	M/L -	MH LH	SP/MP LP	737 781	70	145	235	338	32	210	127
180 180	MX LX	- -	- -	737 781	70	145	235	338	32	210	127
180	-	MH/LH	MP/LP	851	70	146	251	338	32	210	127
200	LX	XH	-	851	70	146	251	338	32	210	127
225 225 225	- - -	- SH MH	RP SP MP	1062	65	189	279	424	50	250	144
250	-	WH	WP	1062	65	189	279	424	50	250	144

* + Standard ** series APAB

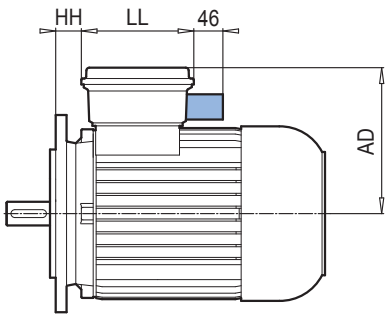
HR



Type						
	IE1*	IE2	IE3			
				[mm] d1	LC	LC + BRE
63	S/L	-	SP/LP	100	254	314
71	S/L	-	SP/LP	100	284	345
80	S/L	SH/LH	LP	100	325	390
90	S/L	SH/LH	SP/LP	160	393	459
100	L/LA	LH/AH	LP/AP	160	442	537
112 112	M -	- MH	- MP	160	460 485	557 582
132	S/M/MA	SH/MH/LH	SP/MP	200	610	709
160 160	M/L -	MH LH	SP/MP LP	315	744 788	879 923
180 180	MX LX -	- - MH/LH	- - MP/LP	315 315	744 788 866	879 923 993
200	LX	XH	-	315	866	993

* + Standard

MS ⇨🕮 A39

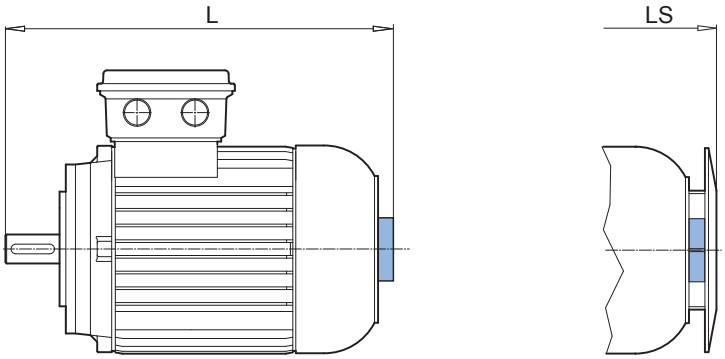


Type						
	IE1*	IE2	IE3			
				[mm] AD	HH	LL
63	S/L	-	SP/LP	140	5	114
71	S/L	-	SP/LP	149	13	114
80	S/L	SH/LH	LP	158	22	114
90	S/L	SH/LH	SP/LP	163	26	114
100	L/LA	LH/AH	LP/AP	174	32	114
112	M	MH	MP	184	45	114
132	S/M/MA	SH/MH/LH	SP/MP	204	47	122

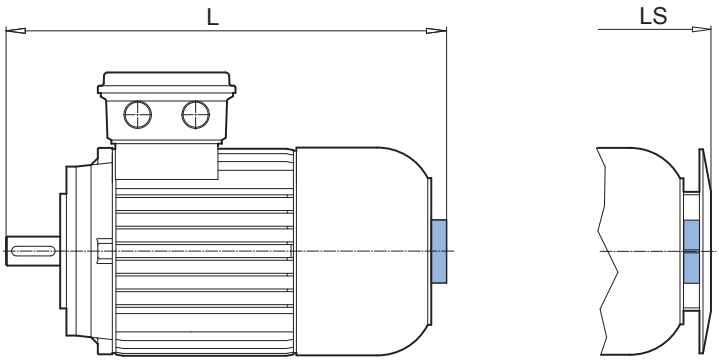
* + Standard

MG

⇨ A34



BRE MG

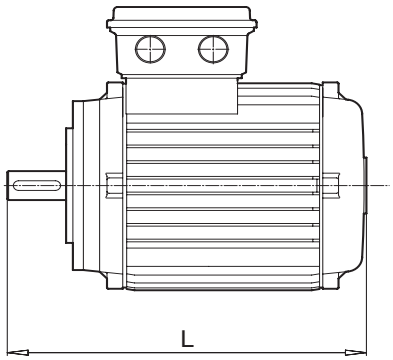


Type	IE1*	IE2	IE3	L	L + BRE	LS	LS + BRE
			[mm]				
63	S/L	-	SP/LP	226	286	237	297
71	S/L	-	SP/LP	256	319	267	330
80	S/L	SH/LH	LP	286	352	295	361
90	S/L	SH/LH	SP/LP	340	414	349	423
100	L/LA	LH/AH	LP/AP	379	470	387	479
112 112	M -	- MH	- MP	398 423	493 518	407 432	502 526
132	S/M/MA	SH/MH/LH	SP/MP	501	607	512	618
160	M/L	MH/LH	SP/MP/LP	on request			
180	-	MH/LH	MP/LP				

* + Standard

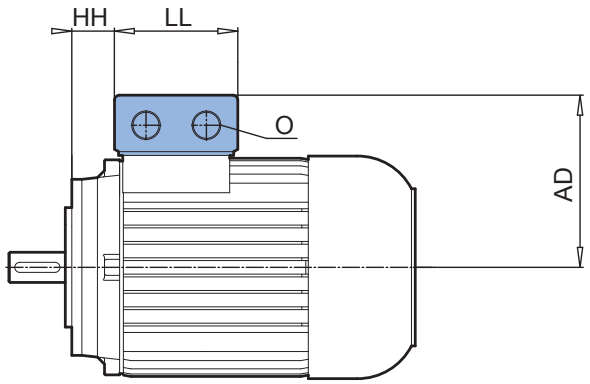
OL/H, EKK

OL/H



Type	IE1 + Standard	
		[mm] L
63	S/L	183
71	S/L	207
80	S/L	236
90	S/L	283
100	L/LA	322
112	M	336
132	S/M/MA	431
160	M/L	527
180 180	MX LX	527 571
200	LX	619

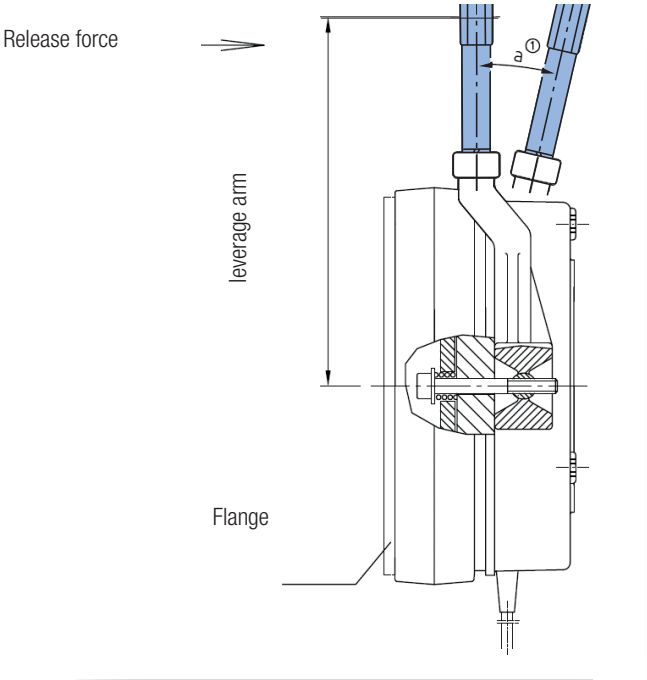
EKK



Type	IE1*	IE2	IE3				
			[mm]	AD	LL	O	HH
63	S/L	-	SP/LP	100	75	M16 x 1,5	25
71	S/L	-	SP/LP	109	75	M16 x 1,5	33
80	S/L	SH/LH	LP	124	92	M20 x 1,5	33
90	S/L	SH/LH	SP/LP	129	92	M20 x 1,5	37
100	L/LA	LH/AH	LP/AP	140	92	M20 x 1,5	43
112	M	MH	MP	150	92	M20 x 1,5	56
132	S/M/MA	SH/MH/LH	SP/MP	174	104	M25 x 1,5	56

* + Standard

HL ⇨🕮 B14

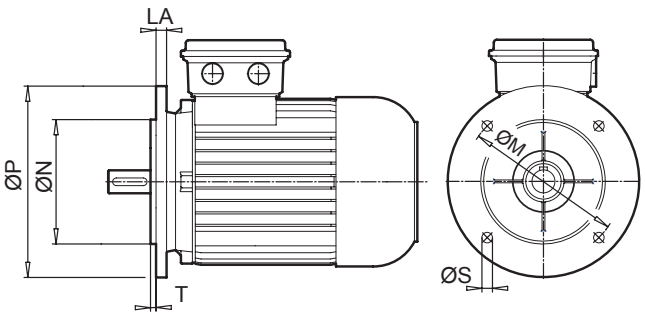


Manual release (HL) - Dimensions and forces

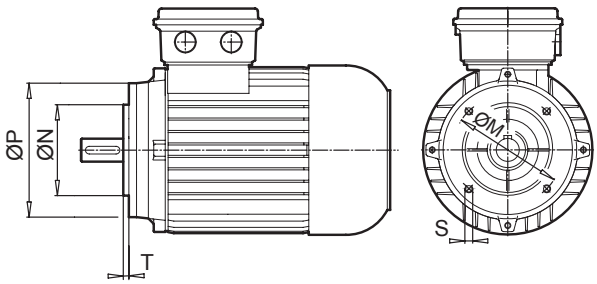
Brake sizes	Row of brakes	Lever arm [mm]	Release force [N]	Key-width [mm]	Screw-in thread	Thread length [mm]	Ventil. angle a
BRE 5	FDB/FDW 08	100	40	8	M5	7	ca. 10°
BRE 10	FDB/FDW 10	110	70				
BRE 20	FDB/FDW 13	135	85	10	M6	9	
BRE 40	FDB/FDW 15	140	140				
BRE 60	FDB/FDW 17	165	160	12	M8	12	
BRE 100	FDB/FDW 20	220	250				
BRE 150	FDB/FDW 23	250	320				
BRE 250	RSM 250	330	390	-	M20	19	
BRE 400	RSM 500	357	360				
BRE 800	RSM 500	357	360				

B5, B14

B5



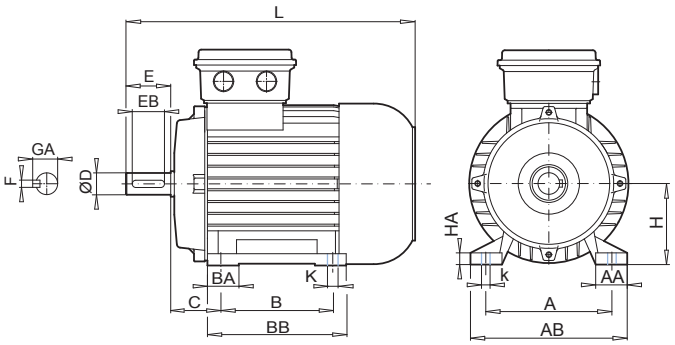
B14

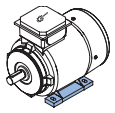
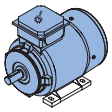
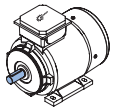


Type	B5, B14	[mm]	LA	M	N	P	S	T
63	B14 *		-	75	60	90	M5 x 8	2,5
	B14		-	85	70	105	M6 x 16	2,5
	B14		-	100	80	120	M6 x 12	3,0
	B5		10	115	95	140	9	3,0
71	B14 *		-	85	70	105	M6 x 13	2,5
	B14		-	100	80	120	M6 x 15	3,0
	B14		-	115	95	140	M8 x 16	3,0
	B5		10	130	110	160	9	3,5
80	B14 *		-	100	80	120	M6 x 12	3,0
	B14		-	115	95	140	M8 x 16	3,0
	B14		-	130	110	160	M8 x 16	3,5
	B5		11	165	130	200	11	3,5
90	B14		-	100	80	120	M6 x 14	3,0
	B14 *		-	115	95	140	M8 x 15	3,0
	B14		-	130	110	160	M8 x 16	3,0
	B5		11	165	130	200	11	3,5
100	B14		-	100	80	120	M6 x 14	3,0
	B14		-	115	95	140	M8 x 14	3,0
	B14 *		-	130	110	160	M8 x 16	3,5
	B14		-	165	130	200	M10 x 16	3,5
	B5		15	215	180	250	13	4,0
112	B14		-	115	95	140	M8 x 16	3,0
	B14 *		-	130	110	160	M8 x 12	3,5
	B14		-	165	130	200	M10 x 17	4,0
	B5		15	215	180	250	13	4,0
132	B14		-	130	110	160	M8 x 12	3,5
	B14 *		-	165	130	200	M10 x 18	4,0
	B5		20	265	230	300	14	4,0
160	B5		20	300	250	350	17,5	5,0
180 .X	B5		20	300	250	350	17,5	5,0
180	B5		14	300	250	350	17,5	5,0
200	B5		14	350	300	400	17,5	5,0
225	B5		20	400	350	450	17,5	5,0

* B14 Standard

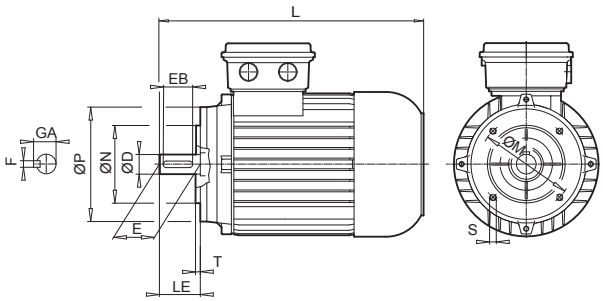
Footmount

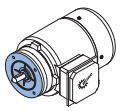
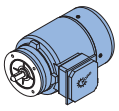
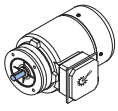


Type B3		NEMA	[mm] A	AA	AB	B	BA	BB	HA	k	K	C	H	L	D $^{0}_{-0,013}$	E	EB	F	GA
71	SP/LP	56	123,95	36,5	148	76,2	19,5	94	12	13,7	8,7	69,9	88,9	280	15,875	47,6	42,9	4,78	17,9
80	SP/LP	56 143 T	123,95 139,70	32,0 39,5	154 170	76,2 101,6	26,5 38	102 127	14 14,5	17,5	8,7	69,9 57,2	88,9	292 294	15,875 22,225	47,6 57,2	42,9 46,1	4,78	17,9 24,4
90	SP/LP	145 T	139,70	43,0	175	127,0	35	157	15	17,5	8,7	57,2	88,9	334	22,225	57,2	46,1	4,78	24,4
100 100	LP AP	182 T 184 T	190,50	52,5	223	114,3 139,7	68	173	15	15	10,3	69,9	114,3	377	28,575	69,9	57,2	6,35	31,4
112	MP	184 T	190,50	45,5	229	139,7	33	170	17	20,7	10,3	69,9	114,3	417	28,575	69,9	57,2	6,35	31,4
132 132	SP MP	215 T	215,90	58,5	260	177,8	37	218	17,5	20,7	10,3	88,9	133,4	497	34,925	85,7	77,8	7,92	38,4

C - Face



Type B14		NEMA	[mm] M	N $^{0}_{-0,076}$	P	S	T	L	LE	D $^{0}_{-0,013}$	E	EB	F	GA
63	SP/LP	56 C	149,3	114,3	165	3/8 - 16	4,1	244	52,3	15,875	47,6	42,9	4,78	17,9
71	SP/LP	56 C	149,3	114,3	165	3/8 - 16	4,1	267	52,3	15,875	47,6	42,9	4,78	17,9
80	SP/LP	56 C 143 TC	149,3	114,3	165	3/8 - 16	4,1	292 294	52,3 53,8	15,875 22,225	47,6 57,2	42,9 46,1	4,78	17,9 24,4
90	SP/LP	145 TC	149,3	114,3	165	3/8 - 16	4,1	334	53,8	22,225	57,2	46,1	4,78	24,4
100 100 100	LP AP LP/AP **	182 TC 184 TC	184,2 184,2	215,9 215,9	229 229	1/2 - 13 1/2 - 13	6,4 6,4	377 371	66,5 54,4	28,575 28,575	69,9 69,8	57,2 57,2	6,35 6,35	31,4 31,4
112	MP	184 TC	184,2	215,9	229	1/2 - 13	6,4	417	66,5	28,575	69,9	57,2	6,35	31,4
132 132	SP MP	213 TC 215 TC	184,2	215,9	229	1/2 - 13	6,4	497	79,2	34,925	85,7	77,8	7,92	38,4
160 160	SP/MP LP	254 TC 256 TC	184,2	215,9	254	1/2 - 13	6,4	587 631	95,3	41,275	101,6	79,4	9,53	45,5

** Series **APAB**

Note

Extracts from the NORD-range

G1000 Fixed speeds
UNICASE housing 50 / 60 Hz

- NORDBLOC.1® Helical geared motors
- Helical geared motors
- Parallel geared motors
- Helical-Bevel geared motors
- Helical-Worm geared motors



G4014 Electronic variable speed drives

- NORDBLOC.1® Helical geared motors
- Helical geared motors
- Parallel geared motors
- Helical-Bevel geared motors
- Helical-Worm geared motors



G1050 MAXXDRIVE® Large Industrial gear units
UNICASE housing 50 / 60 Hz

- Parallel-Axis gear units
- Right_Angle gear units



G1035 UNIVERSAL Worm gear units

- SI and SMI



F3018_E3000 Frequency inverter SK180E
F3020_E3000 Frequency inverter SK200E
F3060_E3000 NORDAC *PRO*
Frequency inverter SK 500P



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