



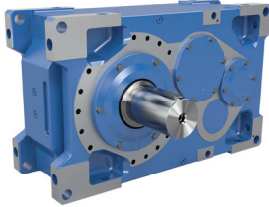
EN

## Synchronous motors with IE5+ energy efficiency

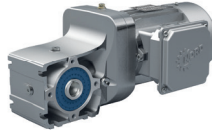
M5000

  
DRIVESYSTEMS

# NORD DRIVESYSTEMS Group



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 approx. 4,700 employees throughout the world create customised solutions



Gear unit production



Inverter production



Motor production



Production and assembly



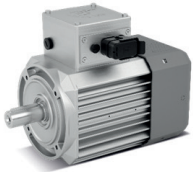
Motor mounting

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# Synchronous motors with IE5+ energy efficiency

NEW



## High-efficiency IE5 motors

NORD supplies IE5+ synchronous motors with outputs between 0,35 and 3,70kW.

The motor achieves its high efficiency, which is sometimes well above efficiency class IE5, over a wide torque range and is therefore ideally suited for economical operation in the partial load range.

The compact IE5+ motor offers a high power density with less installation space:

- ▶ Lower operating costs
  - thanks to highly efficiency synchronous motors with permanent magnet technology
- ▶ Simple and highly flexible combination
  - through full compatibility with the NORD modular system
- ▶ Simplified control of applications
  - thanks to almost constant motor speed

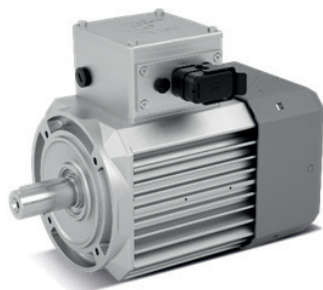


## The new IE5+ motor generation for reducing operating costs:

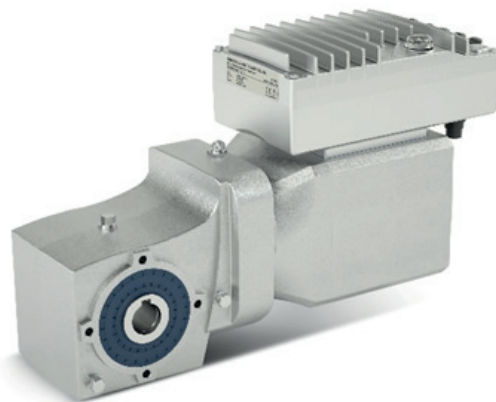
- ▶ Highest operational efficiency
- ▶ Reduced total cost of ownership (TCO) and fast return on investment (ROI)
- ▶ Variant reduction possible due to constant torque over a wide speed range
- ▶ Particularly easy to clean, with high corrosion resistance due to smooth and fanless motor design
- ▶ Ideally coordinated system solution in the NORD modular system with converter, gearbox and motor
- ▶ Compact and hygienic design for ultimate application versatility

## Features:

- ▶ Permanent magnet synchronous motor (PMSM) of the latest generation
- ▶ Power range from 0,35 to 3,70kW
- ▶ EC B14 flange mounting, IEC B5 flange mounting, NEMA C-face flange attachment, direct attachment to all NORD gearboxes
- ▶ Speed range from 0 to 2.400 min<sup>-1</sup>
- ▶ Surface finishing nsd tuPH and protection class IP69K optional
- ▶ Incremental encoder and mechanical brake optional

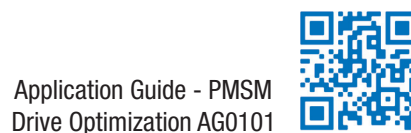


NORD IE5+ Synchronous motor



Bevel gear unit SK 93072.1  
NORD IE5+ Synchronous motor

Further information can be found in:



# Motor informations

## Norms and Standards

The NORD motors comply with the IEC 60034 series of standards and meet the other standards:

Norm	Synchronous Motors	Asynchronous Motors
IEC 60034-1, EN 60034-1	X	X
IEC 60034-2-1, EN 60034-2-1	X	X
IEC 60034-5, EN 60034-5	X	X
IEC 60034-7, EN 60034-7	X	X
IEC 60034-8, EN 60034-8	X	X
IEC 60034-9, EN 60034-9	X	X
IEC 60034-11, EN 60034-11	X	X
IEC 60034-12, EN 60034-12		X
IEC 60034-14, EN 60034-14	X	X
IEC 60034-18-41, EN60034-18-41	X	X
IEC 60034-30-1, EN 60034-30-1		X
IEC 60034-30-2, EN 60034-30-2	X	X
IEC 60072		X
EN 50347		X
NEMA MG1	X	X
UL 1004-1	X	X
UL 1004-6	X	
ABNT NBR 17094-1	X	X
CSA-C22.2 No. 100	X	X

## Type designation

**Frame size: 71, 90**

**N = non ventilated (TENV)    F = fan cooled (TEFC)**

**Package length 1..4    Code depends on length**

**Number of poles**  
**Options**

**71   N/   1   /8   ...**

## Nameplate

										08513780	
Type SK	90N2/8 TF							xxx (YEAR)			
3 ~ Mot.	No.		xxxxxxxx (serial number)								
Th.Cl.	130(B)	IP	55	S1			IEC 60034		(H)		
V	$\Delta/Y$	Hz	kW	HP	A	cos $\varphi$	min-1	%	IES		
	323	140	1,5	2	3,01	0,92	2100	94			
$U_r$	400-460	V	VPWM	CT	SF 1,0	ISF	/	A			
$K_E$	144	mVmin	KT	2,27	Nm/A	$I_{max}$	6,02	A			
$R_{str}$	1,21	$\Omega$	Ld	20,5	mH	Lq	33,2	mH			
Getriebebau NORD GmbH & Co. KG, 22939 Bargteheide / GERMANY											
www.nord.com											

Für folgende Bauformen gelten gleiche Maße:

- ▶ IM B5 = IM V1, IM V3
- ▶ IM THE B14 = IM THE V18, IM THE V19

**Designs**  
 accordings to DIN EN  
 60034-7



The motors can be ordered in the basic design and operated according to the above installation.

- ▶ In the case of a condensation drainage hole (KB), the installation position must be specified.
- ▶ For design IM V1, IM V18 we recommend a protection canopy (RD).
- ▶ For the options condensation drainage hole (KB) and protection canopy (RD) please contact NORD.
- ▶ In the case of geared motors, the stamped installation position of the gearbox must be observed.

**Universal design**



**Installation position**  
 condensation drainage hole  
 with protection canopy (RD)

### Fits

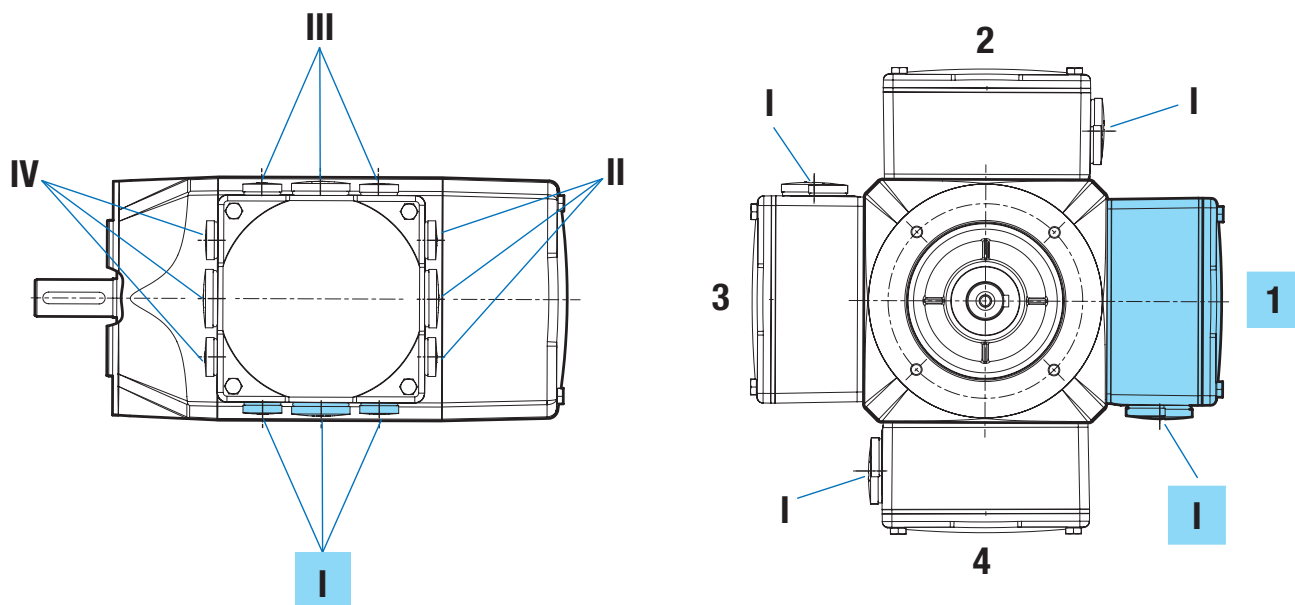
D, DA	≤ 30	j6	▶ Keyways + keys according to DIN 6885/1 ▶ Threaded holes DB + DC according to DIN 332/2
	> 30	k6	
N	≤ 250	j6	▶ Assignment of power, shaft ends and flanges ▶ Parallelism shaft / foot surface; Concentricity of the shaft
	> 250	h6	
H		-0,5	▶ Flat flange / shaft according to DIN EN 50347

### Dimensions

according to DIN EN  
 50347

# Motor informations

Terminal box position  
Cable entry



Motor type	Cable Entry
71N, 71F	1 x M25 x 1,5 2 x M16 x 1,5
90N, 90F	1 x M25 x 1,5 2 x M16 x 1,5



Compared to asynchronous motors, the operation of synchronous motors has the following relevant differences:

- ▶ **No mains operation**  
NORD synchronous motors can only be operated on the converter.
  
- ▶ **Field weakening area**  
NORD synchronous motors cannot be operated or can only be operated to a very limited extent in the field weakening range.  
The permanent magnets in the rotor induce a voltage in the stator during rotation. The induced voltage is proportional to the motor speed and reduces the current-driving clamping voltage. This reduces the available motor torque. In addition, there is a risk, e.B. in the event of falling loads of a hoist, that high induced voltages will damage the converter due to high motor speeds.
  
- ▶ **Inverter functions**  
Certain converter functions such as DC braking are not available.

## Operation modes

NORD IE5 motors can be operated with all frequency converters of the following series.

- ▶ NORDAC ON+
- ▶ NORDAC FLEX
- ▶ NORDAC LINK
- ▶ NORDAC PRO

Some restrictions or boundary conditions must be observed.

The power of the frequency converter may not exceed one power level greater than the nominal motor power.

## Operation on NORD frequency converter

### Sizing

Closed-loop operation is possible with all NORD frequency converters. When configuring/assigning, observe the correct choice of encoder and the appropriate frequency converter encoder interface.

### Control types - closed-loop operation

Open-loop operation is possible with all NORD frequency converters from the following firmware versions.

### - open-loop operation

NORDAC	Devices	Open Loop Firmware
NORDAC	<i>ON+</i>	1.2R5
NORDAC	<i>FLEX</i>	2.3R0
NORDAC	<i>LINK</i>	1.4R0
NORDAC	<i>PRO</i>	
	SK5xxE	3.3R0
	SK54xE	2.5R0
	SK5xxP	1.3R3

Furthermore, the following boundary conditions apply to open-loop operation:

- ▶ the used motor torque shall not exceed the nominal torque of the motor at any time
- ▶ a ramp time of 0.6 seconds must not be undercut during acceleration or deceleration operations

$$M_M \leq M_N$$

Ramp time

# Motor informations

## Cooling types

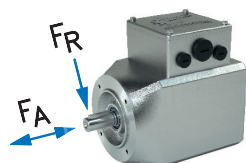
Overview of cooling types EN 60034-6

Designation		English short form
IC410	without fan	TENV
IC411	self-ventilated	TEFC

## Vibration

NORD synchronous motors are designed according to vibration level A according to DIN EN 60034-14.

## Radial- and Axial Forces



### Permissible Radial and Axial Forces for IEC / NEMA Motors

The listed values are valid for a calculated bearing life of  $L_h = 20.000h$  in 140 or 160 Hz operation with an 8-pole motor.

- ▶  $F_R$  = permissible shear force at  $F_A = 0$
- ▶  $F_A$  = permissible axial force at  $F_R = 0$

Motor type	$F_R$ [N]	$F_A$ [N]
71N, 71F	780	680
90N, 90F	1.100	1.000

## Bearing and Shaft sealing

NORD motors have lifetime lubricated rolling bearings. The B-sided bearing is designed as a fixed bearing.

- ▶ On the A and B sides, greased shaft seals without spring are used.
- ▶ For direct attachment to the gearboxes, oil-tight motors with different flanges are available.

## Change of bearings

⇒ Operating and Maintenance Instructions B1091/B5000

## Protection classes according to DIN EN 60034-5

Protection against touching moving and live parts as well as against the ingress of solid foreign bodies, dust and water.

The degree of protection is indicated by the letters IP (International Protection) and two codes. (e.B. IP55).

Reference number 1	Abstract	Explanation
5	Protection against contact, foreign objects, dust	Complete contact protection, dust can not penetrate in harmful amount.
6	Protection against contact, foreign objects, dust	Complete contact protection. Dust cannot penetrate.
Reference number 2	Abstract	Explanation
5	Protection against water	Protection against water jets from all directions. Water cannot penetrate in harmful quantities.
6	Protection against water	Protection against heavy seas and strong water jets from all directions. Water cannot penetrate in harmful quantities.

## Noise emission

The sound pressure level  $L_{PA}$  is measured according to DIN EN ISO 3745/44 in the anechoic space at idle of the test object. The measuring surface dimension  $L_s$  [dB] is calculated from the geometric dimensions of the test object. By adding the measuring surface dimension to the sound pressure level, the sound power level  $L_{WA}$  is determined.

$L_{PA}$  Sound pressure level  
 $L_s$  Meas. surface dimension  
 $L_{WA}$  Sound power level

In converter operation, slightly increased noise due to magnetic humming or whistling tones must be expected.

Motor	$L_{PA}$ [dba]	Motor	$L_{PA}$ [dba]
71 N1/8	52	71 F1/8	55
71 N2/8	52	71 F2/8	55
71 N3/8	52	71 F3/8	55
		71 F4/8	55
90 N1/8	56	90 F1/8	57
90 N2/8	56	90 F2/8	57
90 N3/8	56	90 F3/8	57
		90 F4/8	57

## Winding and Surface Temperature

The winding and surface temperatures in persistence are shown in the following table.

In the event of deviating operating conditions (e.g., load behavior, ambient conditions), the temperature behavior of the motors may differ.

Motor	Winding $\Delta T$ [K]	Surface $\Delta T$ [K]
71 N1/8	39	28
71 N2/8	46	37
71 N3/8	59	47
90 N1/8	44	29
90 N2/8	53	37
90 N3/8	58	45
71 F1/8	27	12
71 F2/8	28	15
71 F3/8	31	16
71 F4/8	42	20
90 F1/8	25	10
90 F2/8	26	10
90 F3/8	33	13
90 F4/8	37	18

# Motor informations

## Special environmental conditions

### Heat class 130 (B)

The windings of the NORD IE5 motors are designed with insulation class 130 (B). With cooling air temperatures of up to 40°C and installation altitudes of up to 1000 m, the maximum permissible temperature increase is 90 K.


The highest permissible winding temperature is 130° C. The integrated temperature protection is dimensioned accordingly.

### Ambient temperature < -20°C oder > 40°C

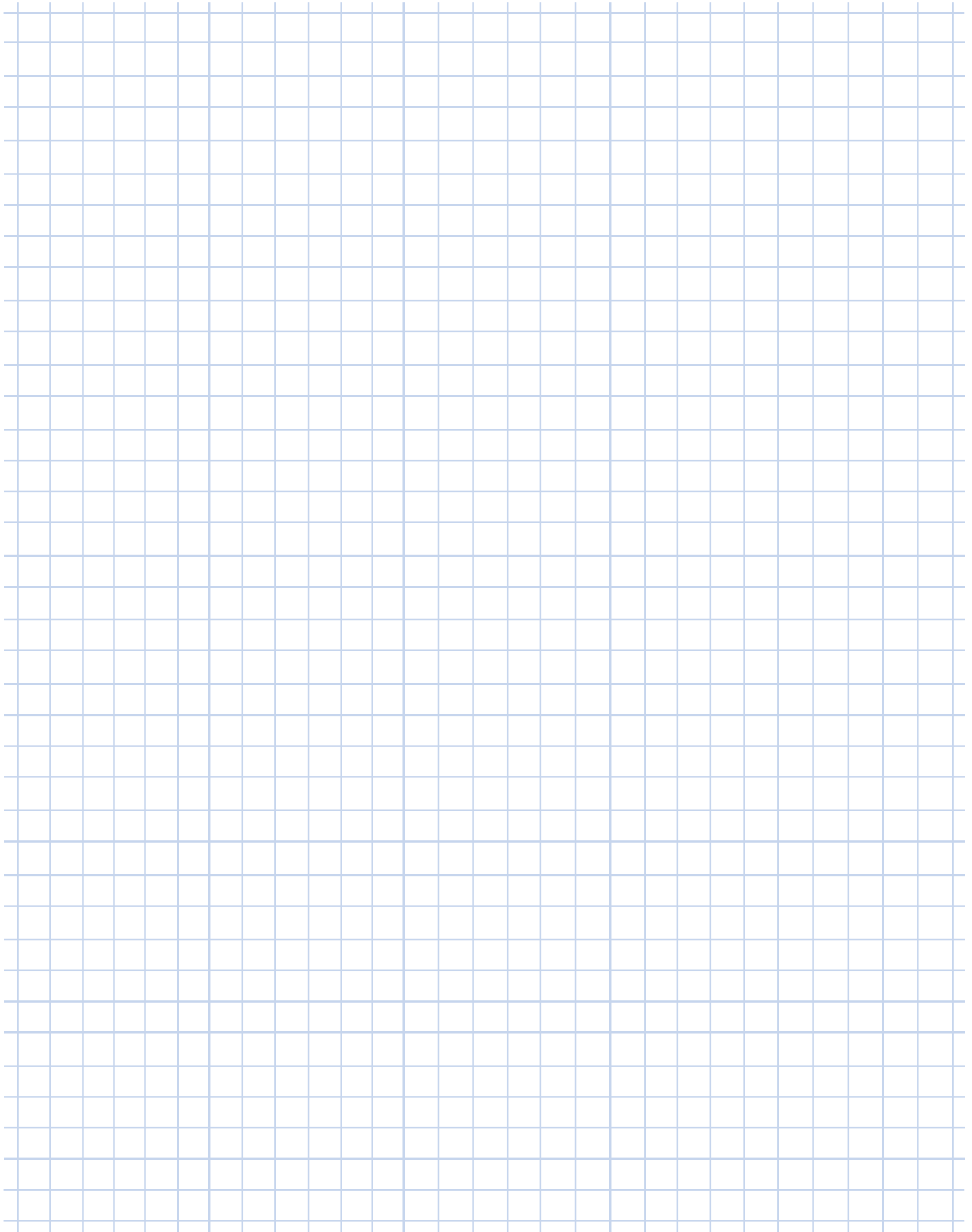
At cooling temperatures of < -20°C or > 40°C, technical modifications to the motor may be necessary. The type of modification is chosen according to the application.

## Certifications and Approvals

NORD motors may be used in every country globally. Local laws, regulations and individual requirements for market access may be considered. NORD provides an overview of the global regulations on: <https://info.nord.com/efficiency-regulations-motors> NORD IE5+ synchronous motors comply with or are certified:

Europe (EU), Switzerland, Turkey	CE	
United Kingdom	UKCA	
Eurasian Customs Union	EAC	
Ukraine	UA TR	
Marocco	CMIM	
USA	UL	
Canada	CSA	
China	CCC & CEL	



A large grid area for taking notes, consisting of a 20x20 grid of light blue lines.

# Motor options

## Available motor options for the IE5+ PMSM 0,35 - 4,00 kW motor series

Abbreviation	Description	TEFC	TENV
TF	Temperature sensors, PTCs	X	X
IP66	Protection class IP66	X	X
IP69K	Protection class IP69K		X
BRE	Holding brake	X	X
BRE HL	Holding brake with hand release lever	X	
MS	Motor connector MS31, MS32, MS21, MSR	X	X
nsd tupH	nsd tupH sealed surface conversion system		X
IGxxP	Incremental encoder with plug 5- or 8-pin IG6P5, IG61P8, IG62P5, IG62P8	X	X
FKM	Shaft seal in FKM design	X	X
MGZ	Magnetic encoder with zero track	X	

### Thermal motor protection (TF)

A sensible motor selection protects the motor from overheating due to the application or the ambient conditions. Factors that can lead to overheating of the motor are e.g..

- ▶ Overload
- ▶ high ambient temperatures
- ▶ a limited cooling air supply
- ▶ low motor speed because of inverter operation

NORD IE5+ motors are equipped with thermal motor protection.

TF = PTC thermistor

These are used for the direct monitoring of the winding temperatures when the motor power is fully utilized.

3 TF temperature sensors (one per strand) connected in series are located at the warmest points of the windings. Their connections are guided to 2 terminals in the terminal box.

When the nominal response temperature (NAT) is reached, the temperature sensor increases its resistance value by leaps and bounds to almost 10 times.

### Response temperature

- ▶ 135° C Spannung max. 30 V Klemmen TP1 + TP2



The PTC temperature sensor fulfils its protective function only connected to a tripping device! A tripping device evaluates the increase in resistance and switches off the drive.

Modern drive applications often require speed feedback. For this purpose, incremental encoders are usually used, which convert the rotational movement into electrical signals as measured value transducers.

These signals are read and processed by frequency converters or other control devices. The incremental encoder of the IE5+ motor works according to a magnetic principle. The encoder consists of two components, the magnetic wheel, which sits on the motor shaft and the sensor board.

The integrated electronics convert the measurement signals into a digitized rectangular signal according to TTL or HTL logic.

**In combination with NORD frequency converters, the following requirements can be met:**

- ▶ Speed control with large adjustment range
- ▶ high speed accuracy, load-independent
- ▶ Synchronization controls
- ▶ Positioning controls
- ▶ Standstill torques
- ▶ high overload reserves

Type	Version	Supply voltage	Resolution	Connection
IG6P5	RS485	10...30 V DC	Digital output of position and speed	M12 / 5-pole
IG61P8	TTL	10...30 V DC	2048 ppr	M12 / 8-pole
IG62P5	HTL	10...30 V DC	2048 ppr	M12 / 5-pole
IG62P8	HTL	10...30 V DC	2048 ppr	M12 / 8-pole
MGZ	HTL	8...35 V DC	1024 ppr	Cable

# Motor options

## Attachment of Incremental encoders IG

The incremental encoder is fully integrated into the motor housing and is possible with all variants of the IE5+ motor. The motor-integrated installation completely protects the encoder system from external influences.

The electrical connection is made via a flange plug in the terminal box of the motor. Depending on the encoder variant, plugs with 5 connections or 8 connections are available. The appropriate signal cable can be supplied on request.

In case of a motor mounted frequency inverter the incremental encoder is not equipped with a plug but are connected directly to the frequency inverter.

### Connection IG

Signal	IG6P5		IG62P5		IG61P8, IG62P8	
	Pin	Color strands	Pin	Color strands	Pin	Color strands
0V	3	blue	3	blue	1	white
+V	1	brown	1	brown	2	brown
A+			4	black	3	green
A\					4	yellow
B+			2	white	5	grey
B\					6	pink
N+			5	grey	7	blue
N\					8	red
RS485A	2	white				
RS485B	4	black				

## Attachment of incremental encoder MGZ

The magnetic screw and the sensor are located under the fan cover.

### Connection MGZ

Signal	MGZ Color strands
GND	black
U <sub>b</sub>	red
Channel A	brown
Channel B	orange
Channel C	green



The IE5+ motors can also be supplied with motor connectors on request. The following motor connectors are available as standard:

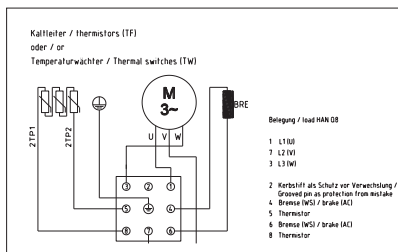
- ▶ Motor plug MS21 (HAN Q8)
- ▶ Motor plug MS31 / MS32 (HAN 10E)
- ▶ Motor plug MSR / MSR VA

The motor connectors are delivered without a mating plug and protected against dirt with a protective cap. The matching mating plugs are also available on request.

## Motor connectors (MS)

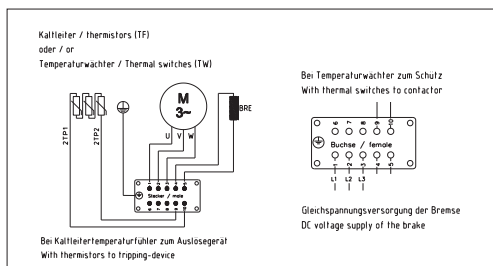
### Motor connector MS21

Plug: HAN Q8  
 Number of contacts: 8 - polig  
 Current: 16 A max.  
 Voltage: 500 V max. (600 V max. gemäß UL/CSA)  
 Cage tension spring connection



### Motor connector MS31 / 32 / 31E / 32E

Plug: HAN 10 ES/HAN ESS  
 Number of contacts: 10-polig  
 Current: 16 A max.  
 Voltage: 500 V max. (600 V max. gemäß UL/CSA)  
 Cage tension spring connection

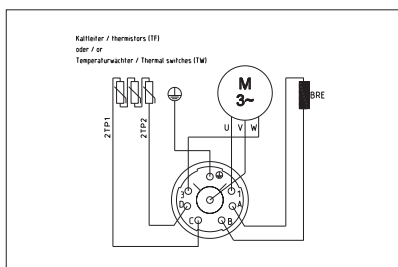


The MS31E and MS32E motor connectors are each suitable for applications with increased electromagnetic compatibility (EMC protection).

with EMC-protection

### Motor connector MSR / MSR VA

Plug: M20 x 1,5 Motor-Einschraubgewinde mit M25 x 1,5 Verbindungsgewinde  
 Number of contacts: 8-polig (4 + 3+ PE)  
 Current: 28 A max.  
 Voltage: 600 V max.  
 Cage tension spring connection



VA-version

Optionally available in stainless steel (VA) version.

# Motor options

## Brake (BRE) Assignment

Motor	BRE 2,5 [Nm]	BRE 5 [Nm]	BRE 7.5	BRE 10 [Nm]	BRE 20 [Nm]
71N1/8	X	*			
71N2/8		X			
71N3/8		X			
90N1/8				X	*
90N2/8				X	*
90N3/8				X	*
71F1/8	X	*	*		
71F2/8		X	*		
71F3/8			X		
71F4/8					
90F1/8				X	*
90F2/8				X	*
90F3/8					X
90F4/8					X
Weight [kg]	2,0	2,0	2,0	3,5	3,5
J [ $10^{-3}$ kgm <sup>2</sup> ]	0,015	0,015	0,015	0,045	0,173

\* alternativ

## Characteristics of the Brake

Characteristics	Value	Remark
Maximum speed	6000 r/min	
Friction work per emergency stop	3000 J	then regeneration by simple braking
Switching frequency at 1500 J	100 circuits/ h	then maximum friction is reduced
Protection class	IP20 IP66	TENV version (brake is enclosed) TEFC version
Control via PWM	possible	
Connection voltage	24 VDC, 180 VDC, 205 VDC	
Hand Release	HL	TEFC Version only

## Control of the brake

To control the brakes, a converter with a corresponding rectifier is required.

### SK EBGR-1

A rectifier integrated in the terminal box of the motor is not available on the IE5+ motors. Alternatively, a rectifier can be used in the control cabinet. With the SK EBGR-1, NORD offers a rectifier.

Further technical information on the rectifier can be found on the NORD homepage.

## Brake selection

The selection of a standard combination motor brake according to the above overview must be ensured by careful project planning! The braking torque must be determined according to the requirements of the application.

The design of the drives is based, among other things, on the torque requirement of the application as well as on the motor side torque. If necessary, the braking torque must be significantly reduced so that the gearbox is not overloaded when braking large moving masses.



Braking torque  
determine

## Holding brake • Working brake • Emergency stop brake

A distinction between „holding brake“, „working brake“ and „emergency stop brake“ arises from the type of application.

A holding brake has the task of preventing a drive train from moving at a standstill or in an almost stationary state.

As soon as a brake must do significant friction work, it is considered a working brake. The respective friction as well as the switching frequency must be determined and taken into account when selecting the brake.

For the emergency stop function of a brake, very large masses must be braked once, and the brake is loaded with correspondingly large energies.

In this case, the brake must be selected according to the maximum permissible friction per braking.

Holding brake

Working brake

Emergency stop brake

## Application-related examples of holding brakes and working brakes

The acceleration and deceleration of the application is controlled by a frequency converter and only when the application comes to a standstill does the mechanical spring brake fall in.

The brake is therefore only used to „hold“ the application (parking position) and does not perform any friction work, consequently no conditioning of the friction surfaces. Friction work is only implemented in the event of an emergency stop or power failure.

The gear motor is fed directly from the local power supply. To delay the application, the mechanical spring-loaded brake must apply a braking torque and thus performs friction work.

The continuous friction work ensures conditioning of the friction pairings. Care must be taken to ensure that the resulting frictional heat is dissipated efficiently. The mechanical brake is also used to „hold“ the application (parking position).

Holding brake

- Parking position

Working brake

- Parkposition

The nsd tupH Sealed Surface Conversion System offers a cost-effective weight saving alternative to stainless steel reducers. Through a revolutionary process, the aluminum alloy reducer housing and components are electrically catalyzed resulting in a molecular surface conversion.

nsd tupH is exceptionally chemical, corrosion and abrasion resistant. The converted surface becomes very scratch resistant as it becomes 6-7 times harder than the original aluminum alloy because of this process.

nsd tuph

# Motor data IE5+

Motor data  
400V

Motor size	M <sub>N</sub> [Nm]	P <sub>N</sub> [kW]	P <sub>N</sub> [hp]	n <sub>N</sub> [r/min]	I 400V [A]	I <sub>max</sub> 400V [A]	η [%]	J [kgm <sup>2</sup> ]	m [kg]	M <sub>max</sub> [Nm]	k <sub>T</sub> [Nm/A]	k <sub>E</sub> [mV/rpm]
71 N1/8	1,6	0,35	0,46	2.100	0,76	1,52	89,10	0,00019	4,90	3,20	2,11	143
71 N2/8	3,2	0,70	0,95	2.100	1,45	2,90	92,50	0,00038	6,00	6,40	2,21	144
71 N3/8	4,8	1,05	1,40	2.100	2,14	4,28	93,60	0,00057	7,00	9,60	2,24	144
90 N1/8	5,0	1,10	1,50	2.100	2,10	4,20	94,00	0,00090	10,00	10,00	2,38	145
90 N2/8	6,8	1,50	2,00	2.100	3,01	6,02	94,00	0,00110	10,80	13,64	2,27	145
90 N3/8	10,0	2,20	3,00	2.100	4,35	8,70	94,60	0,00176	13,20	20,00	2,30	142
71 F1/8	2,0	0,50	0,67	2.400	1,12	2,23	89,10	0,00019	7,00	4,00	1,79	125
71 F2/8	4,0	1,00	1,35	2.400	2,11	4,22	92,50	0,00038	7,50	8,00	1,90	129
71 F3/8	6,0	1,50	2,00	2.400	3,07	6,15	93,20	0,00057	8,00	12,00	1,95	127
71 F4/8	8,8	2,20	3,00	2.400	4,67	9,34	94,40	0,00081	9,50	17,60	1,88	127
90 F1/8	6,0	1,50	2,00	2.400	2,95	5,90	94,00	0,00090	10,00	12,00	2,03	130
90 F2/8	8,8	2,20	3,00	2.400	4,29	8,59	94,20	0,00132	10,80	17,60	2,05	129
90 F3/8	11,9	3,00	4,00	2.400	5,72	11,44	95,20	0,00176	13,80	23,80	2,08	127
90 F4/8	14,7	3,70	5,00	2.400	7,26	14,52	95,30	0,00220	15,60	29,40	2,02	136

**Motor data**  
**230V**

Motor size	M <sub>N</sub>	P <sub>N</sub>	P <sub>N</sub>	n <sub>N</sub>	I	I <sub>max</sub>	η	J	m	M <sub>max</sub>	k <sub>T</sub>	k <sub>E</sub>
	[Nm]	[kW]	[hp]	[r/min]	230V [A]	230V [A]	[%]	[kgm <sup>2</sup> ]	[kg]	[Nm]	[Nm/A]	[mV/rpm]
71 N1/8	1,6	0,35	0,46	2.100	1,45	2,90	89,90	0,00019	4,90	3,20	1,10	89
71 N2/8	3,2	0,70	0,95	2.100	2,70	5,41	92,90	0,00038	6,00	6,40	1,18	86
71 N3/8	4,8	1,05	1,40	2.100	4,03	8,07	93,50	0,00057	7,00	9,60	1,19	87
90 N1/8	5,0	1,10	1,50	2.100	4,12	8,24	94,00	0,00090	10,00	10,00	1,21	87
90 N2/8	6,8	1,50	2,00	2.100	5,20	10,40	94,00	0,00110	10,80	13,60	1,31	88
90 N3/8	10,0	2,20	3,00	2.100	7,54	15,10	93,10	0,00176	13,20	20,00	1,33	86
71 F1/8	2,0	0,50	0,67	2.400	1,88	3,75	88,50	0,00019	7,00	4,00	1,07	76
71 F2/8	4,0	1,00	1,35	2.400	3,54	7,09	92,10	0,00038	7,50	8,00	1,13	77
71 F3/8	6,0	1,50	2,00	2.400	5,15	10,31	92,80	0,00057	8,00	12,00	1,16	76
71 F4/8	8,8	2,20	3,00	2.400	7,78	15,57	93,90	0,00081	9,50	17,60	1,13	77
90 F1/8	6,0	1,50	2,00	2.400	4,87	9,74	92,50	0,00090	10,00	12,00	1,23	76
90 F2/8	8,8	2,20	3,00	2.400	7,24	14,48	92,80	0,00132	10,80	17,60	1,22	77
90 F3/8	11,9	3,00	4,00	2.400	9,42	18,85	93,60	0,00176	13,80	23,80	1,26	77
90 F4/8	14,7	3,70	5,00	2.400	12,38	24,77	94,20	0,00220	15,60	29,40	1,19	78

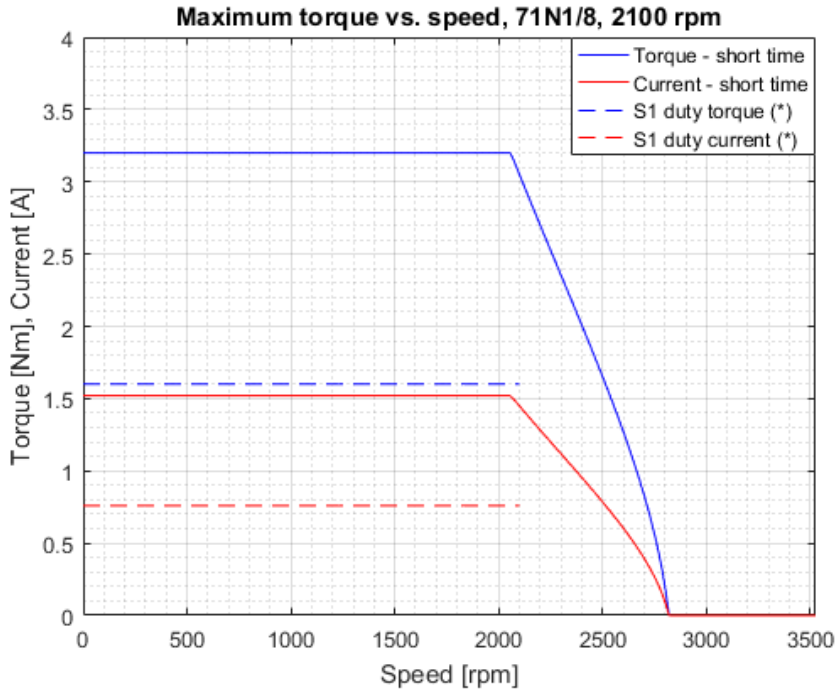
Motor	M <sub>0</sub> /M <sub>N</sub>
71 N1/8	0,90
71 Fx/8	0,65
90 Nx/8	0,85
90 Fx/8	0,60

**Holding torque**

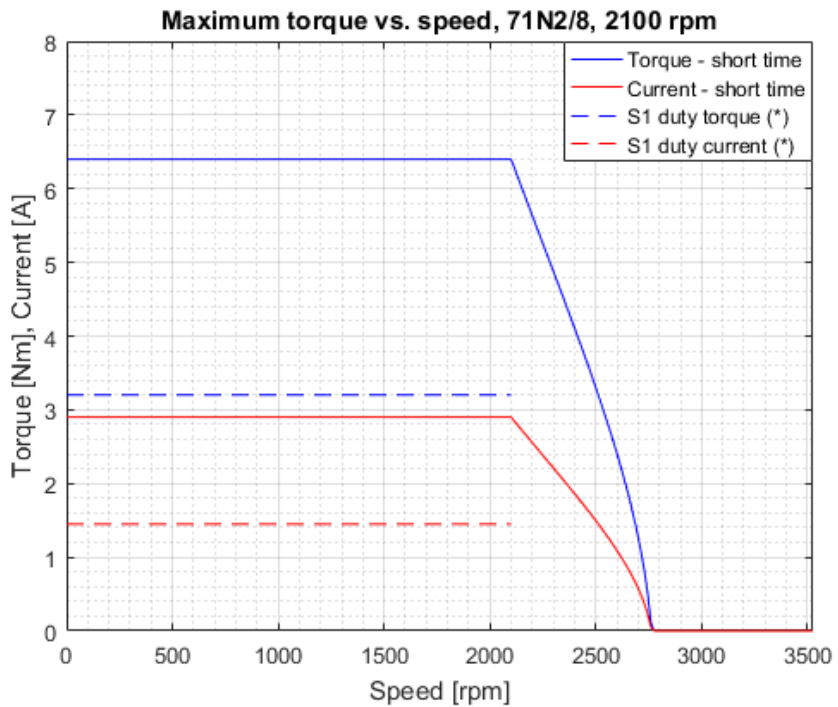
The holding torque is permanently available.

# Motor characteristics IE5+

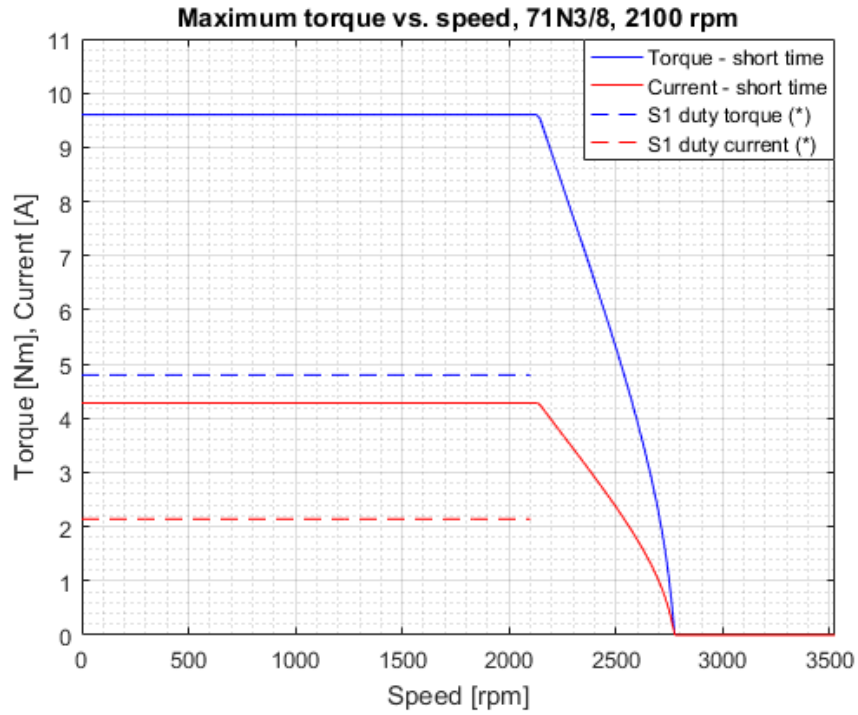
71 N1/8 400V



71 N2/8 400V

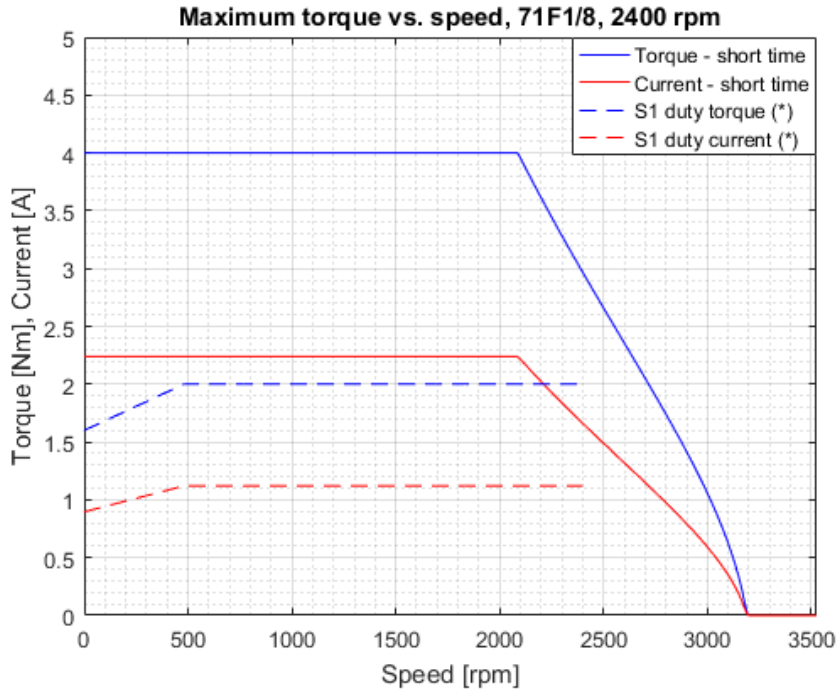


**71 N3/8 400V**

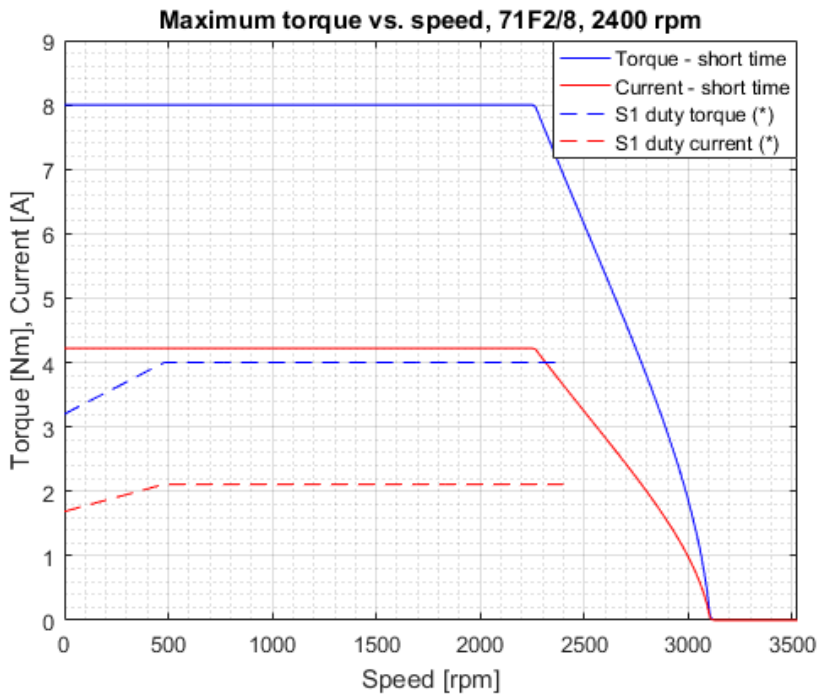


# Motor characteristics IE5+

71 F1/8 400V

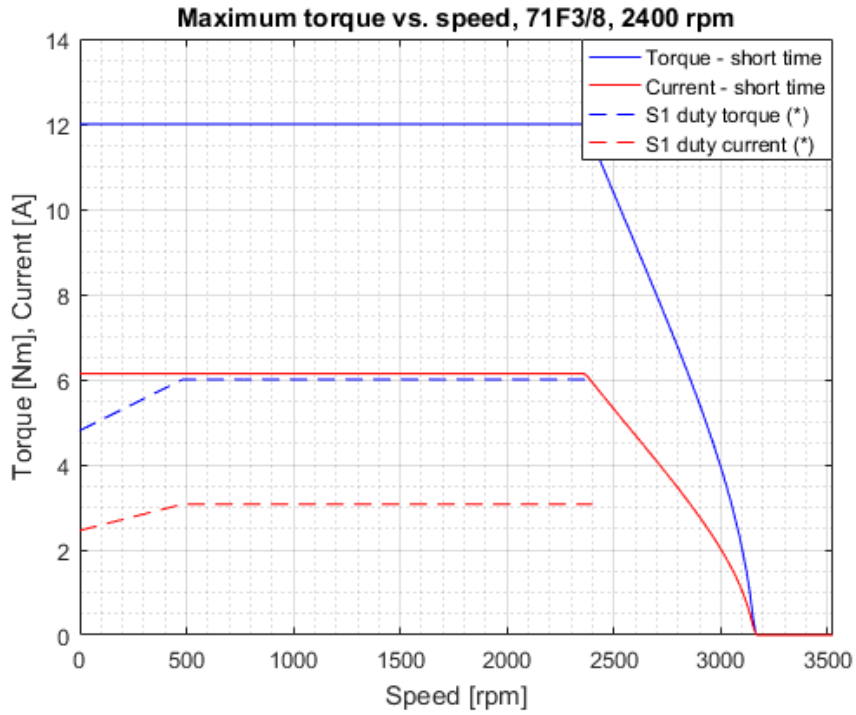


71 F2/8 400V

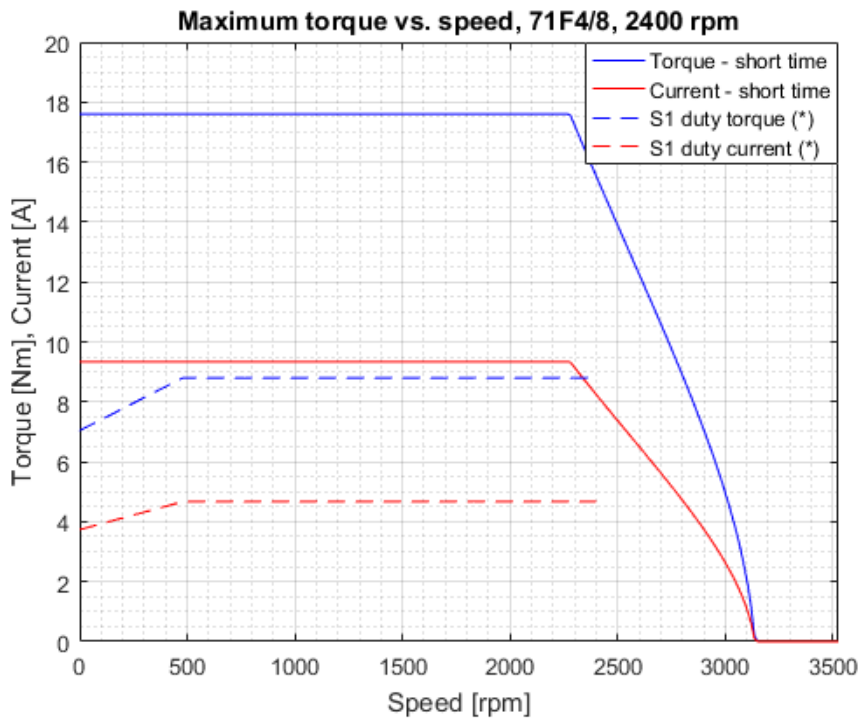




## 71 F3/8 400V

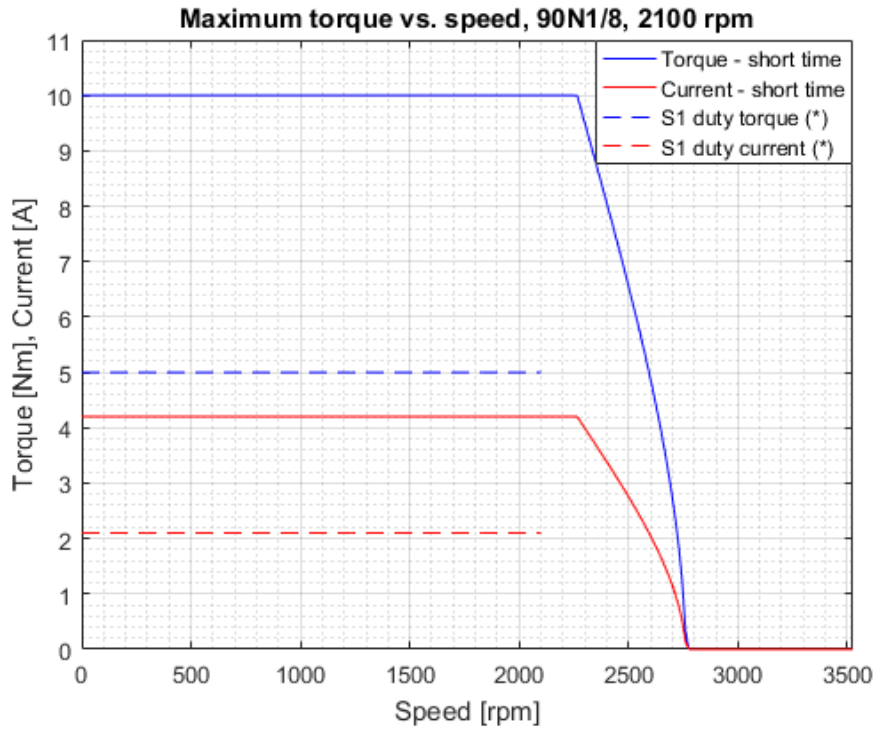


## 71 F4/8 400V

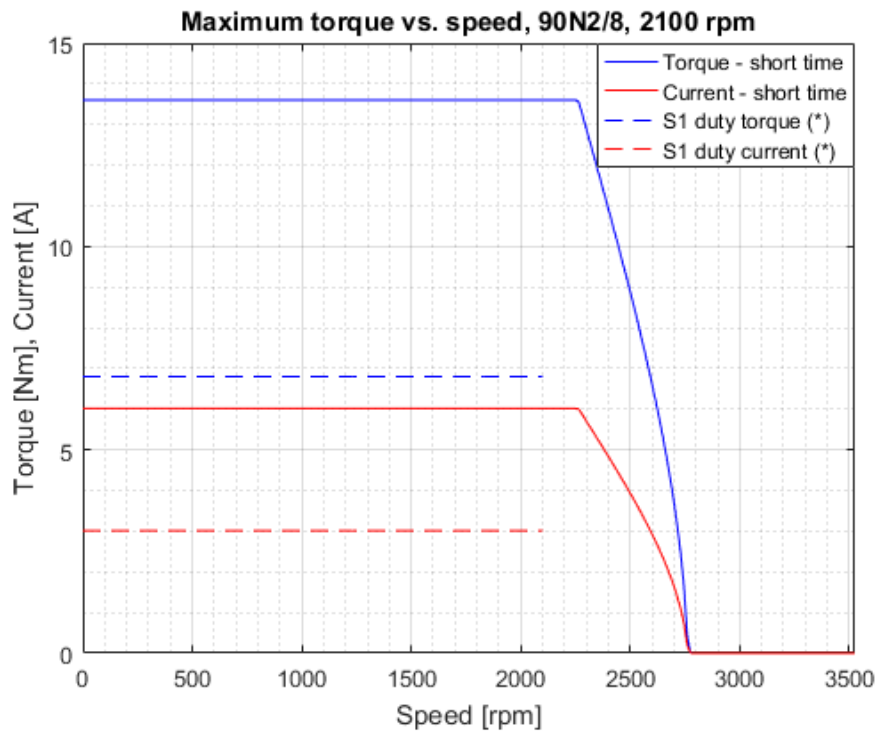


# Motor characteristics IE5+

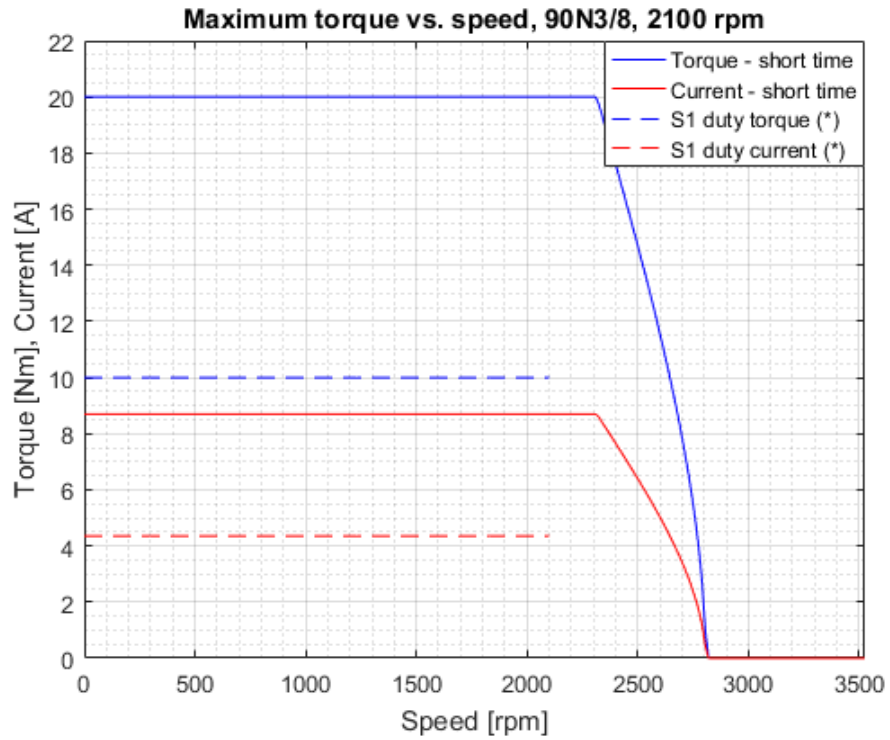
90 N1/8 400V



90 N2/8 400V

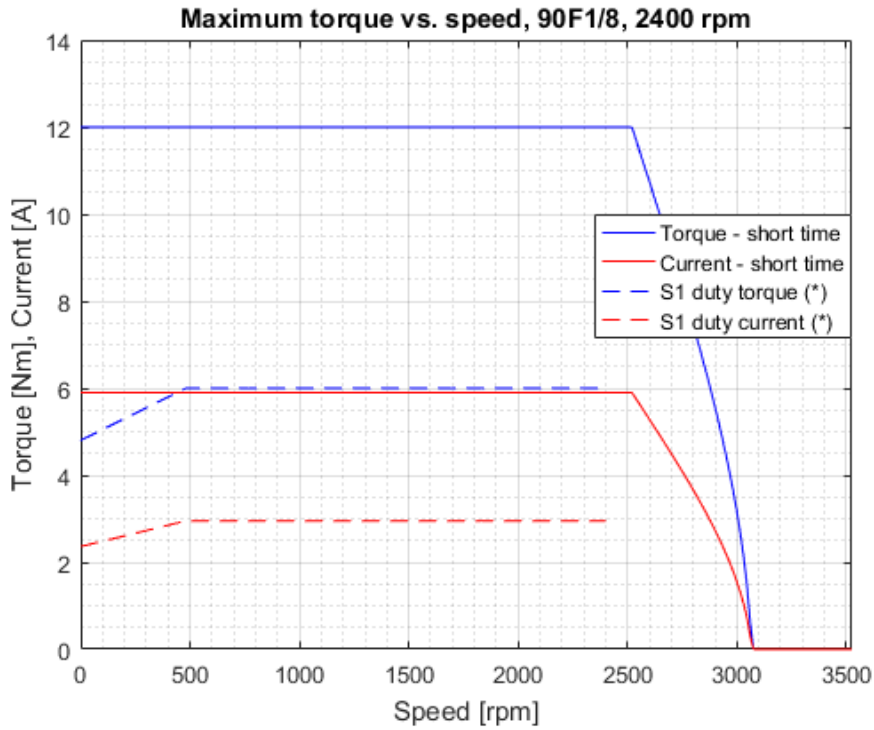


**90 N3/8 400V**

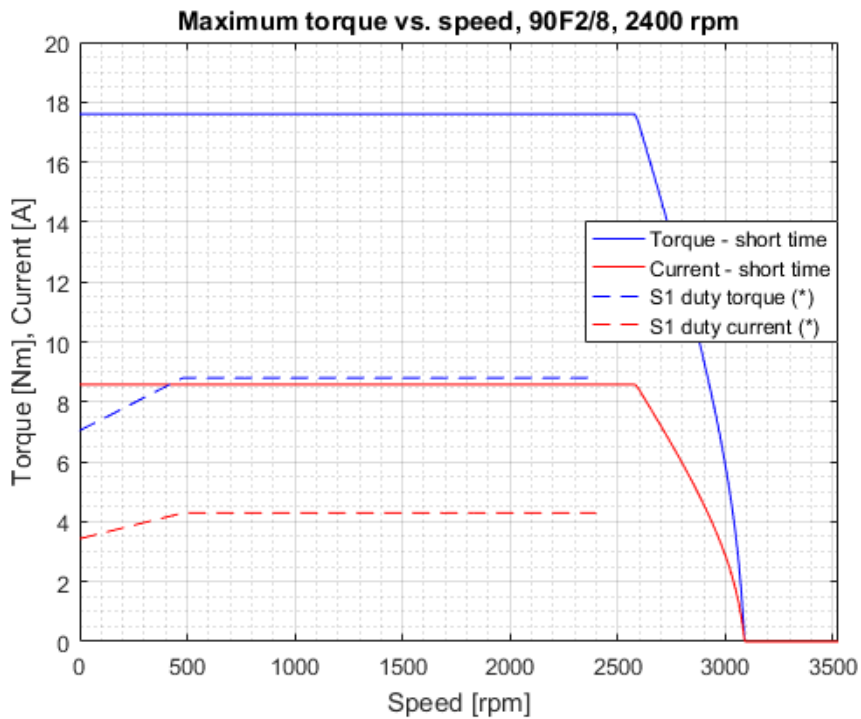


# Motor characteristics IE5+

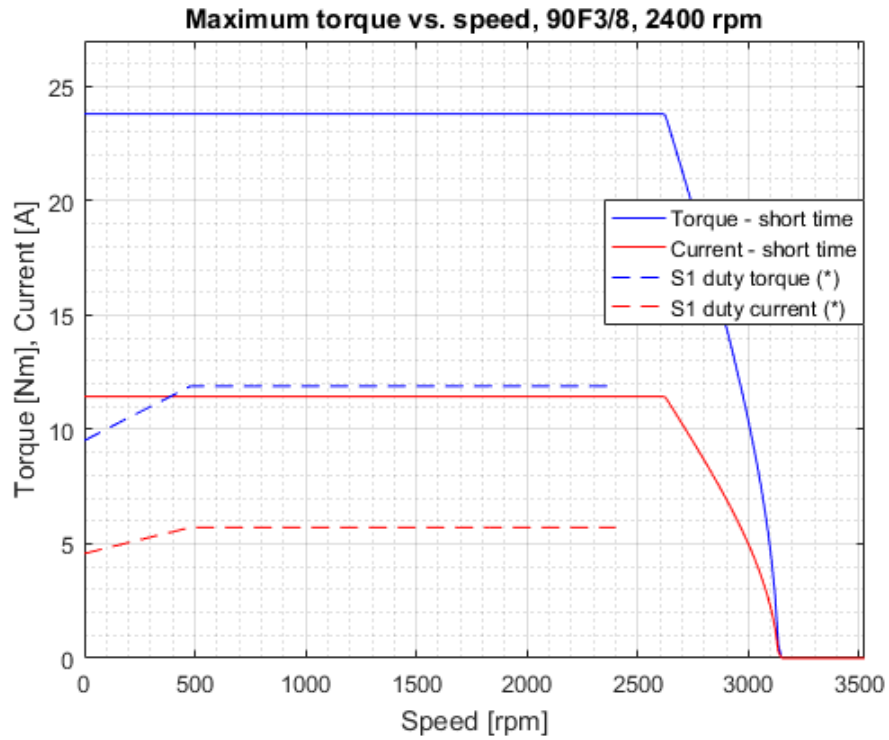
90 F1/8 400V



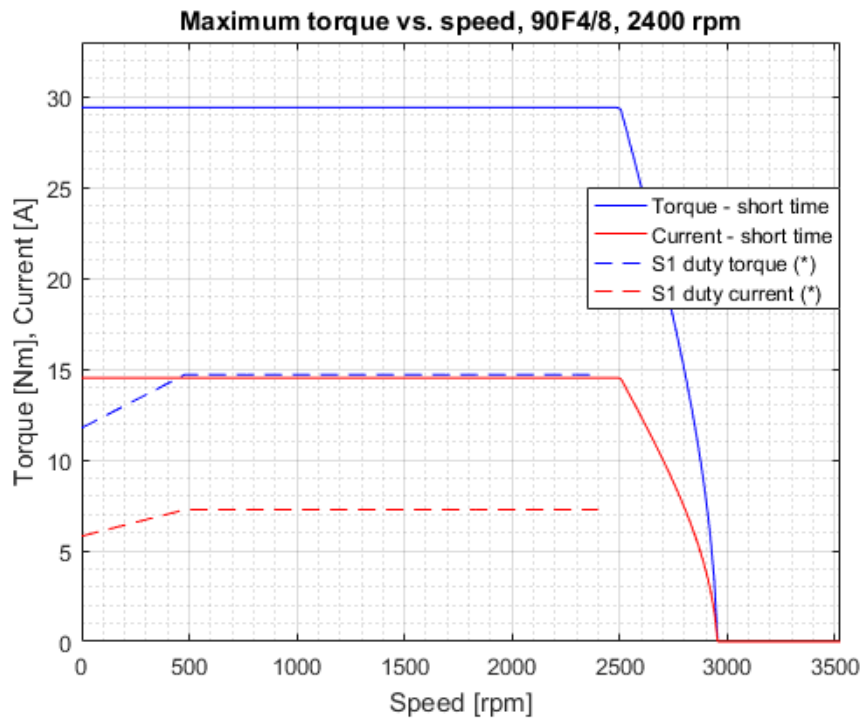
90 F2/8 400V



### 90 F3/8 400V

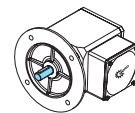
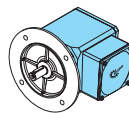
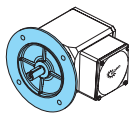
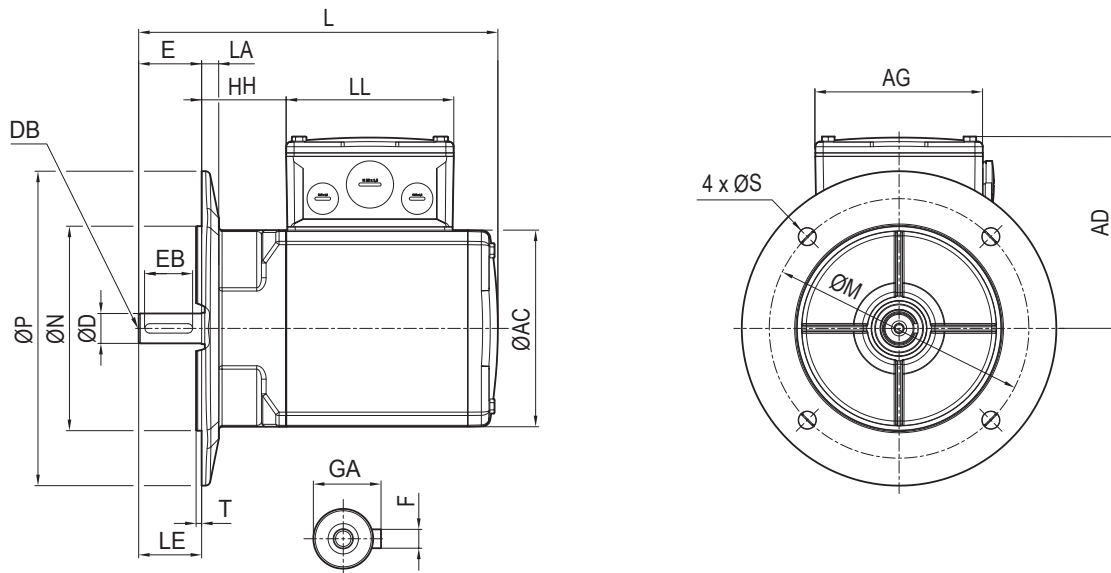


### 90 F4/8 400V



# 71 Nx/8

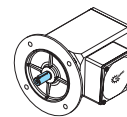
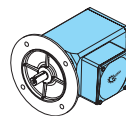
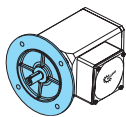
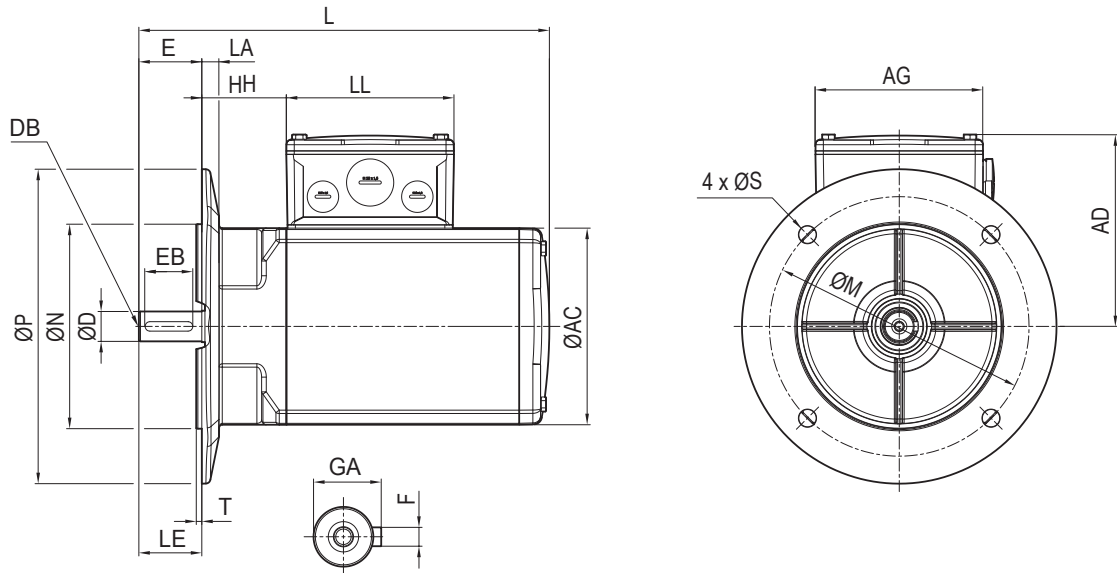
## IEC B5



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71Nx/8	11	165	130	200	11	4,0	125	121	105	55	228	40	105	19	M6	40	32	6	21,5

All specifications in mm unless otherwise indicated.

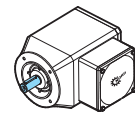
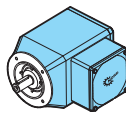
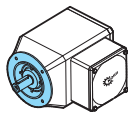
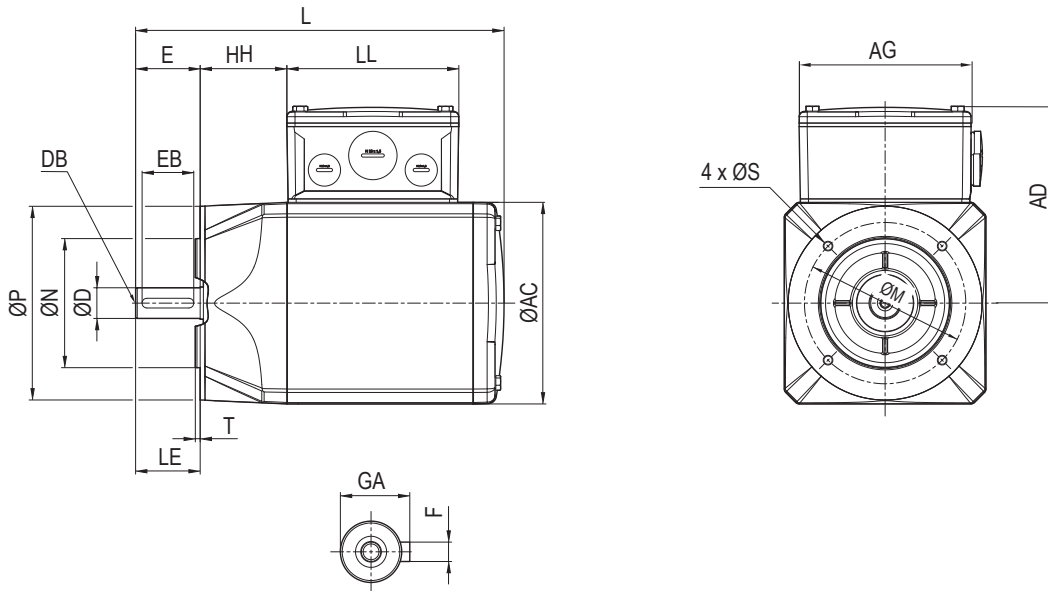
# IEC B5 BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71Nx/8	11	165	130	200	11	4,0	125	121	105	55	274	40	105	19	M6	40	32	6	21,5

# 71 Nx/8

## IEC B14

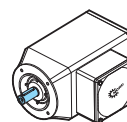
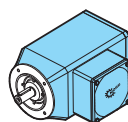
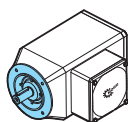
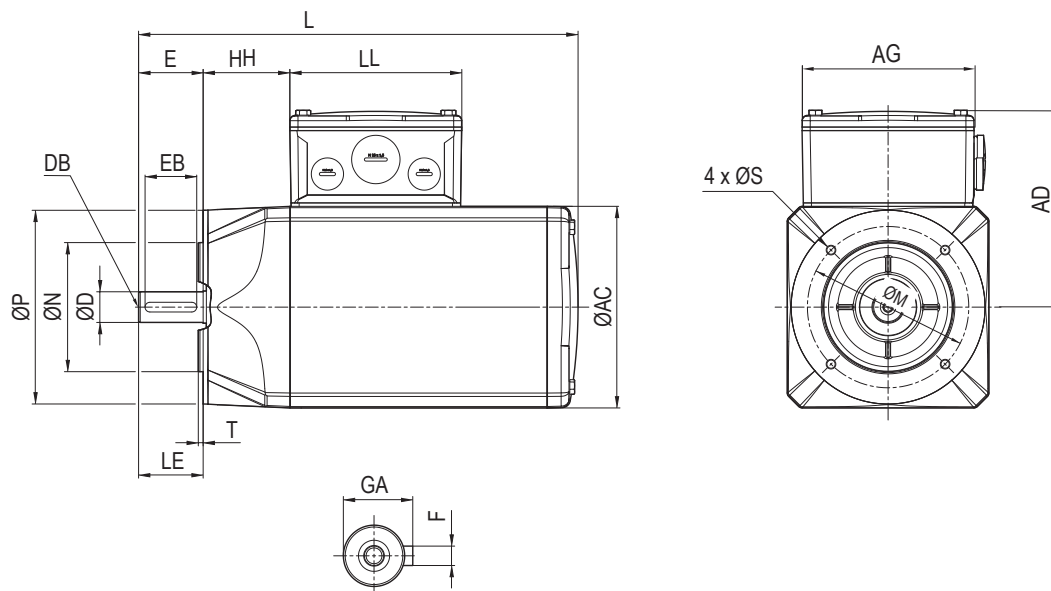


Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71Nx/8	100	80	120	M6x15	3,0	125	121	105	55	228	40	105	19	M6	40	32	6	21,5

All specifications in mm unless otherwise indicated.



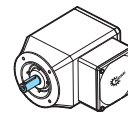
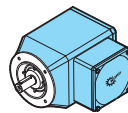
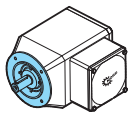
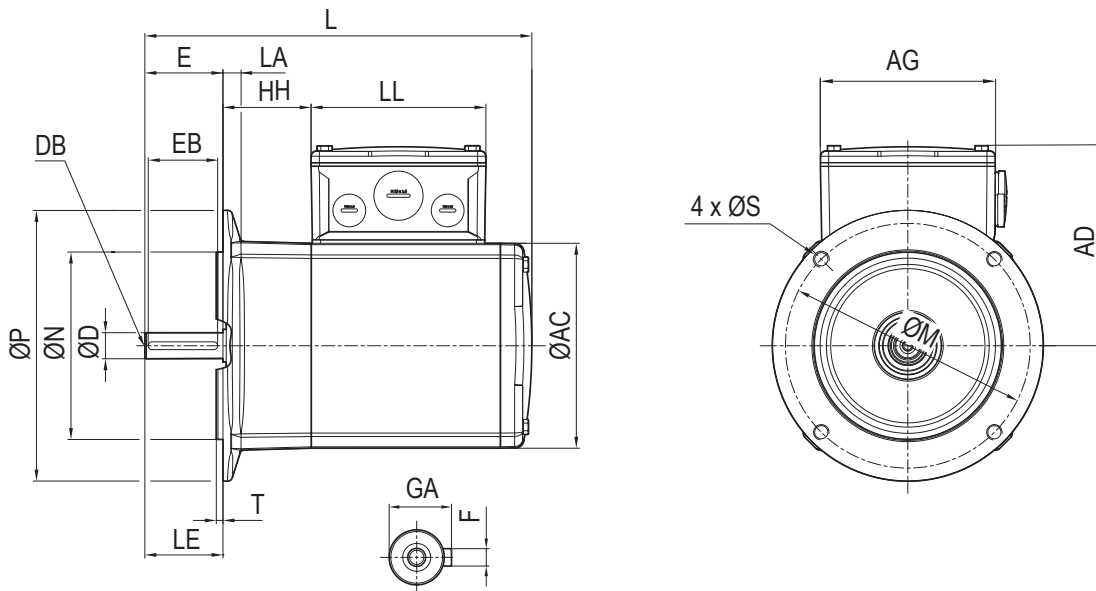
## IEC B14 BRE



Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71Nx/8	100	80	120	M6x15	3,0	125	121	105	55	274	40	105	19	M6	40	32	6	21,5

# 71 Nx/8

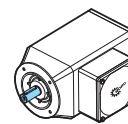
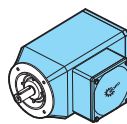
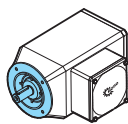
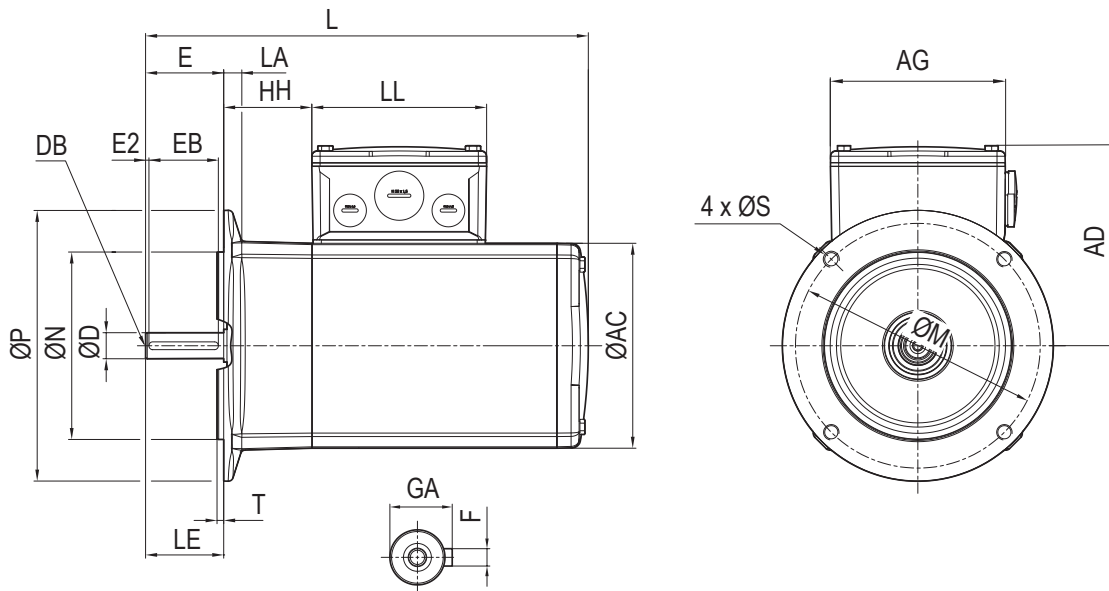
## NEMA C-face



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	E2	EB	F	GA
71Nx/8	11	149,2	114,3	165	M6x15	4,0	125	121	105	55	236	47,6	105	15,87	M6	47,6	1,5	42,9	4,76	17,9

All specifications in mm unless otherwise indicated.

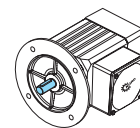
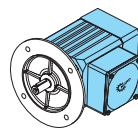
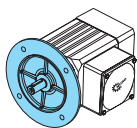
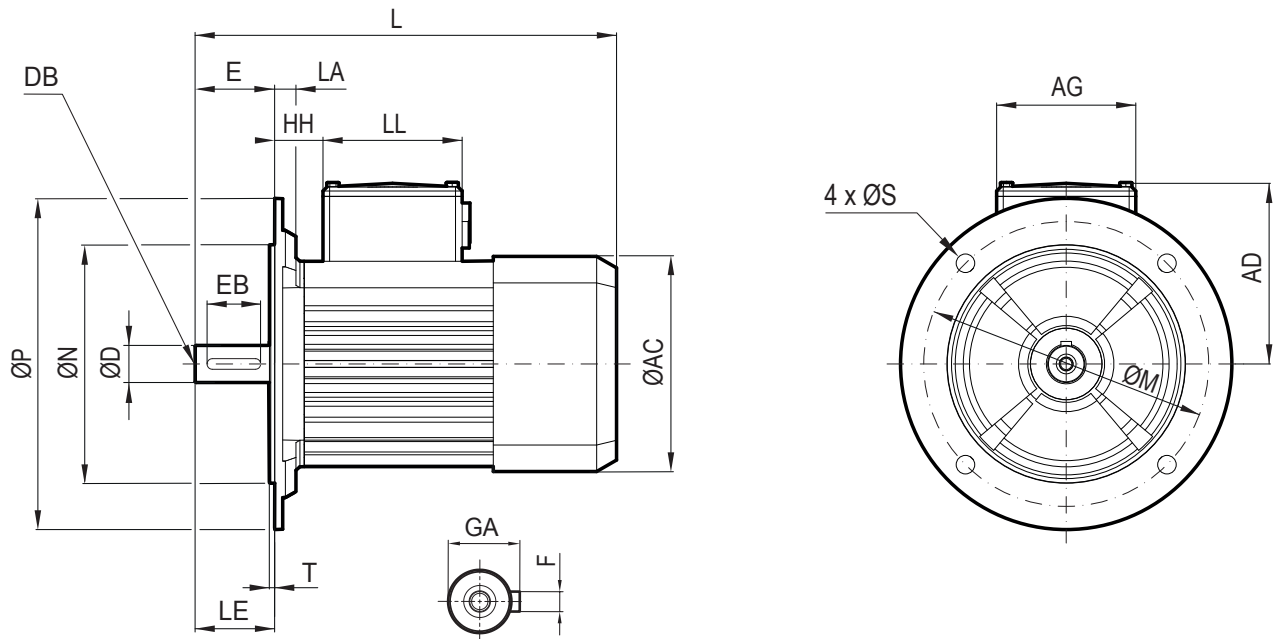
## NEMA C-face BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	E2	EB	F	GA
71Nx/8	11	149,2	114,3	165	M6x15	4,0	125	121	105	55	281	47,6	105	15,87	M6	47,6	1,5	42,9	4,76	17,9

# 71 Fx/8

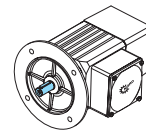
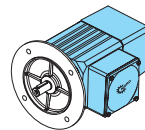
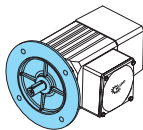
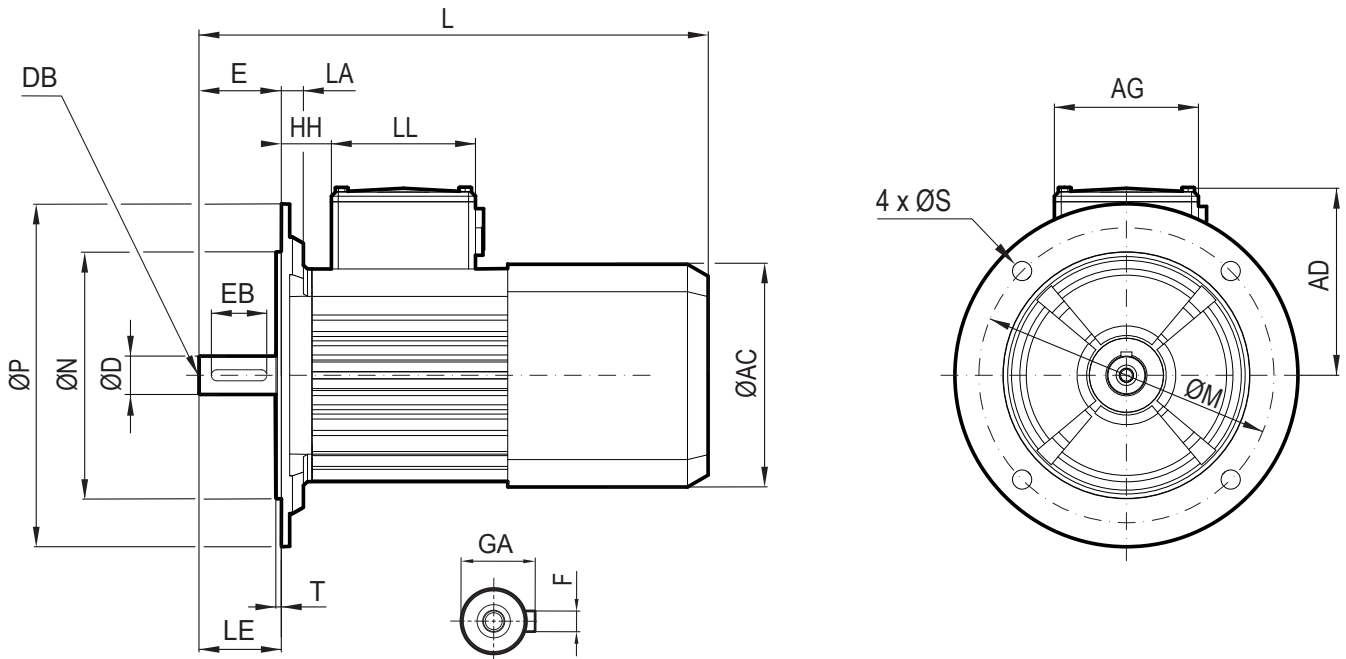
## IEC B5



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71F1/8, 71F2/8 71F3/8	11	165	130	200	11	4,0	132	121	105	54	285	40	105	19	M6	40	32	6	21,5
71F4/8	11	165	130	200	14	4,0	132	121	105	36	312	40	105	19	M6	40	32	6	21,5

All specifications in mm unless otherwise indicated.

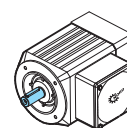
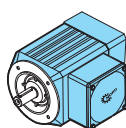
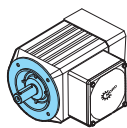
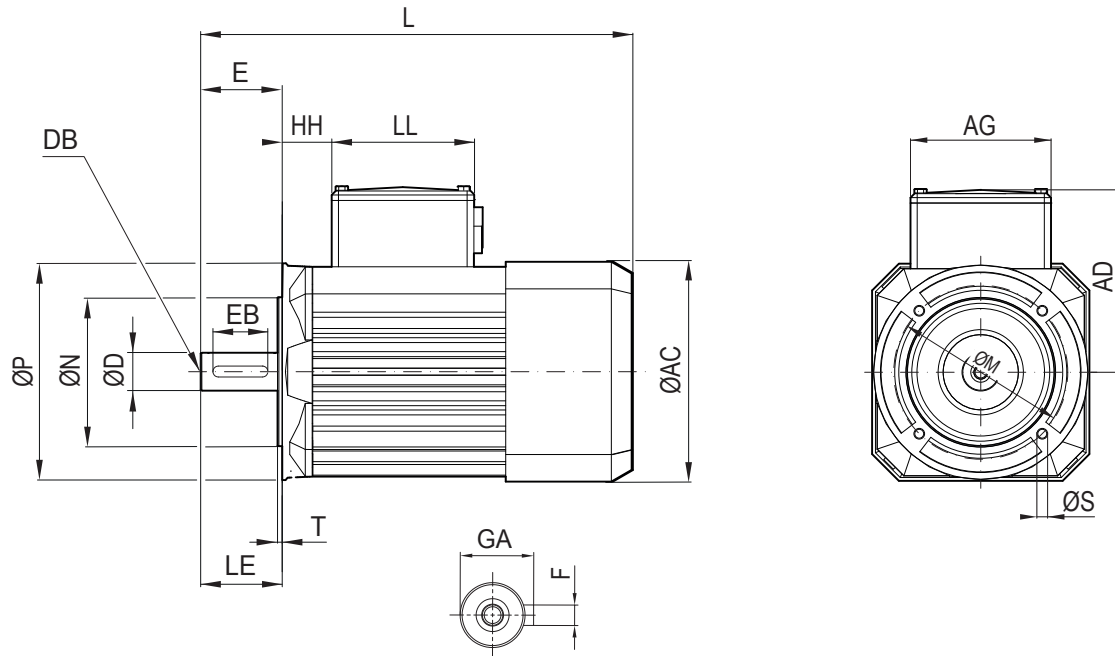
## IEC B5 BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71F1/8, 71F2/8 71F3/8	11	165	130	200	11	4,0	132	121	105	54	322	40	105	19	M6	40	32	6	21,5
71F4/8	11	165	130	200	14	4,0	132	121	105	36	349	40	105	19	M6	40	32	6	21,5

# 71 Fx/8

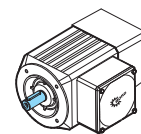
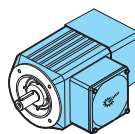
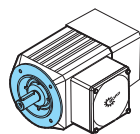
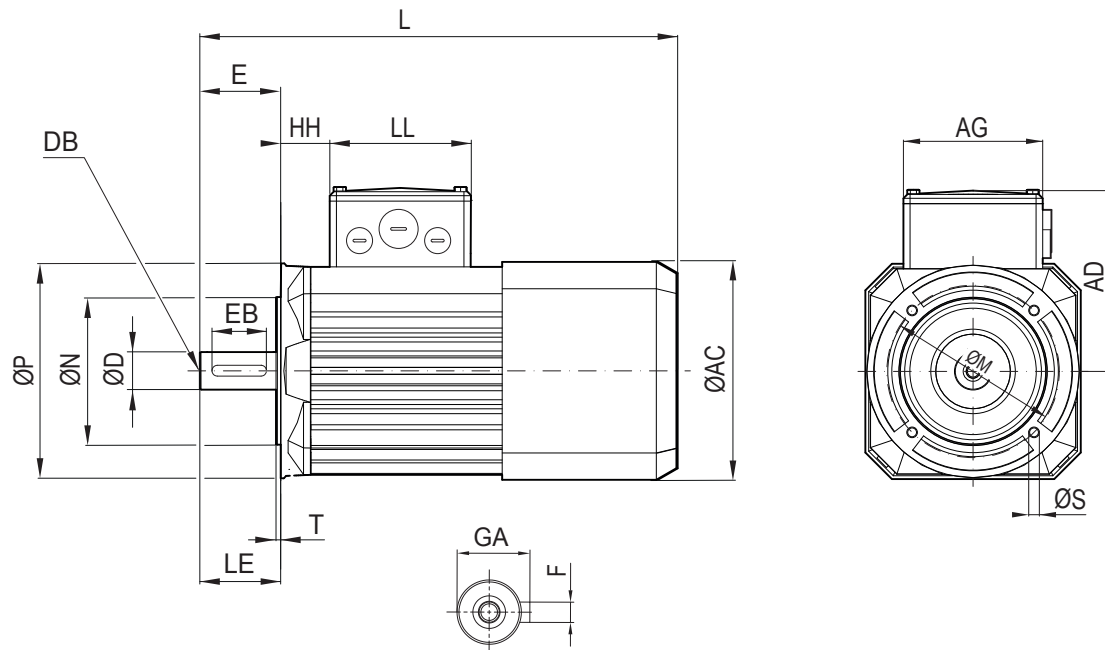
## IEC B14



Typ	Motor Dimensions			S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
	M	N	P															
71F1/8, 71F2/8 71F3/8	100	80	120	M6x15	3,0	132	121	105	54	285	40	105	19	M6	40	32	6	21,5
71F4/8	100	89	120	M6x15	3,0	132	121	105	36	312	40	105	19	M6	40	32	6	21,5

All specifications in mm unless otherwise indicated.

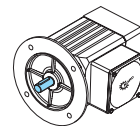
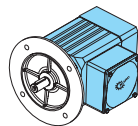
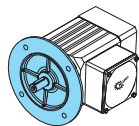
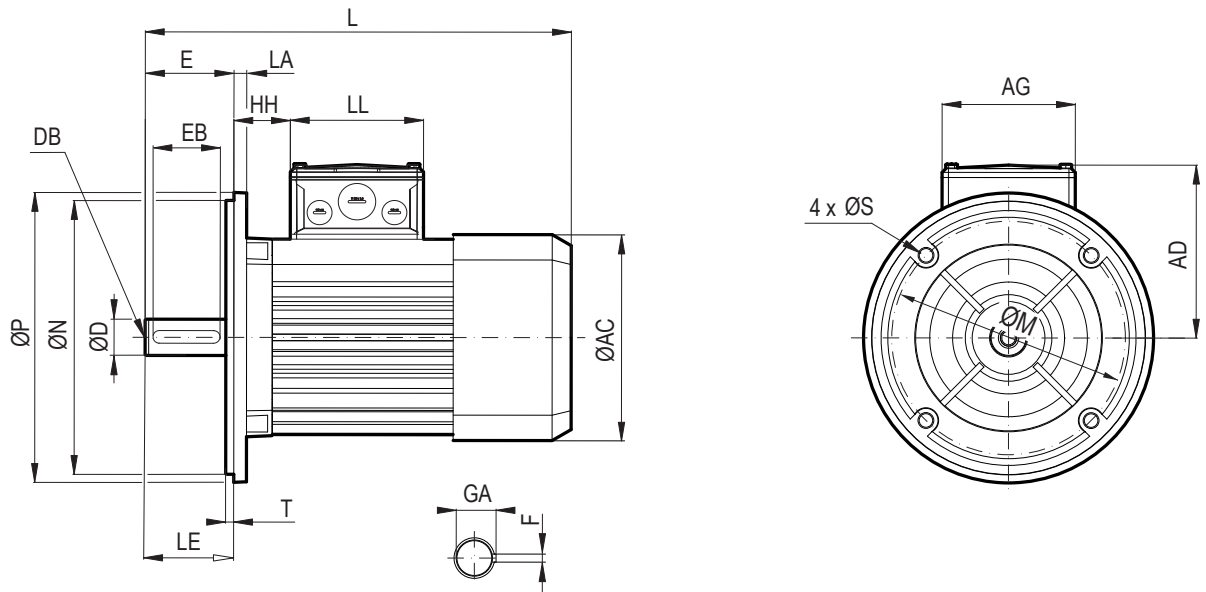
## IEC B14 BRE



Typ	Motor			Terminal Box			Terminal Box			Terminal Box			Terminal Box			Terminal Box		
	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71F1/8, 71F2/8 71F3/8	100	80	120	M6x15	3,0	132	121	105	54	322	40	105	19	M6	40	32	6	21,5
71F4/8	100	89	120	M6x15	3,0	132	121	105	36	312	40	105	19	M6	40	32	6	21,5

# 71 Fx/8

## NEMA C-face

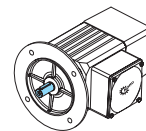
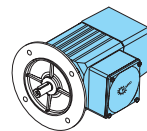
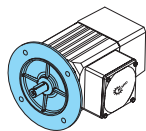
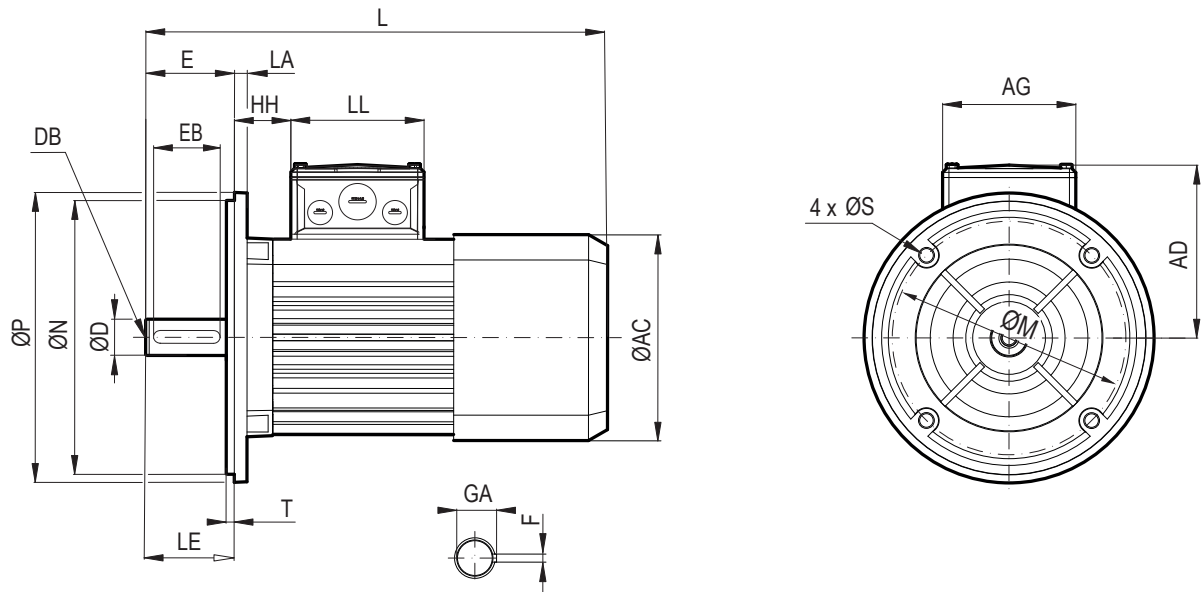


Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71F1/8, 71F2/8 71F3/8	11	149,2	114,3	165,1	3/8-16	4,1	132	121	105	54	293	47,6	105	15,875	M6	47,6	42,9	4,76	17,9
71F4/8	11	149,2	114,3	165,1	3/8-16	4,1	132	121	105	54	320	47,6	105	15,875	M6	47,6	42,9	4,76	17,9

All specifications in mm unless otherwise indicated.



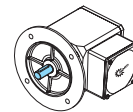
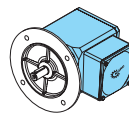
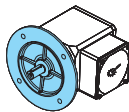
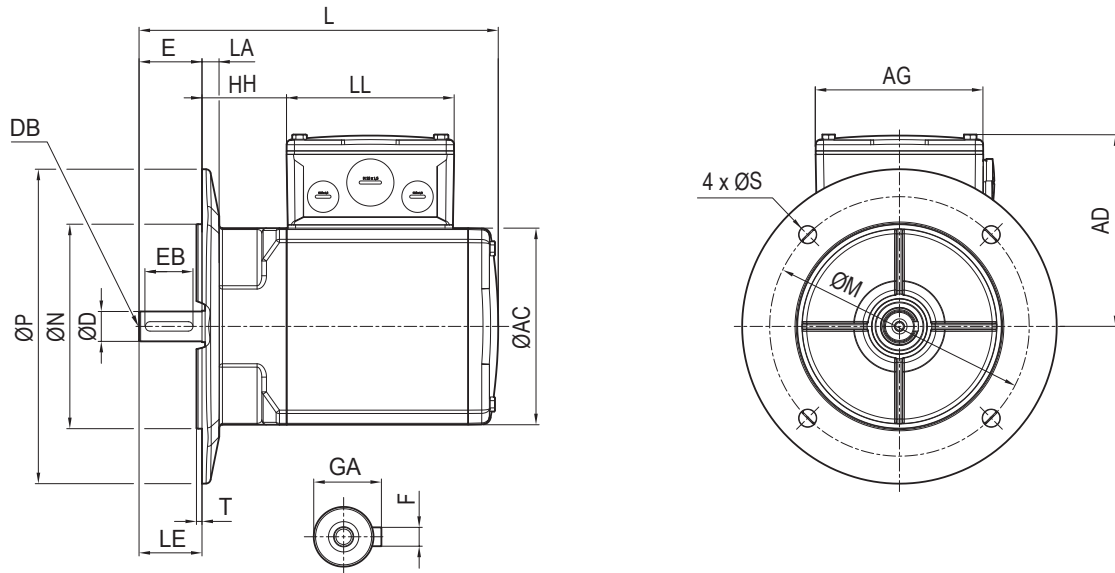
## NEMA C-face BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
71F1/8, 71F2/8 71F3/8	11	149,2	114,3	165,1	3/8-16	4,1	132	121	105	54	330	47,6	105	15,875	M6	47,6	42,9	4,76	17,9
71F4/8	11	149,2	114,3	165,1	3/8-16	4,1	132	121	105	54	357	47,6	105	15,875	M6	47,6	42,9	4,76	17,9

# 90 Nx/8

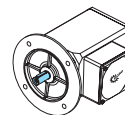
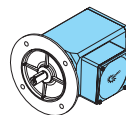
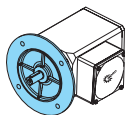
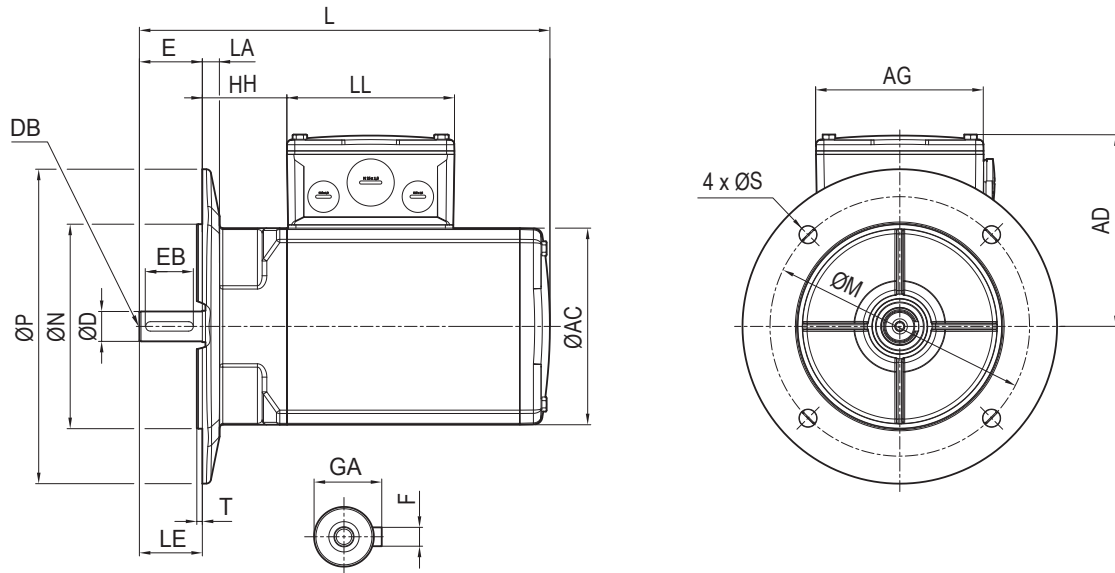
## IEC B5



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	16	215	180	250	14	4,0	155	136	105	36	282	60	105	28	M10	60	50	8	31

All specifications in mm unless otherwise indicated.

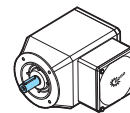
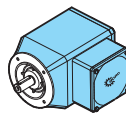
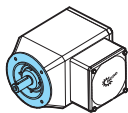
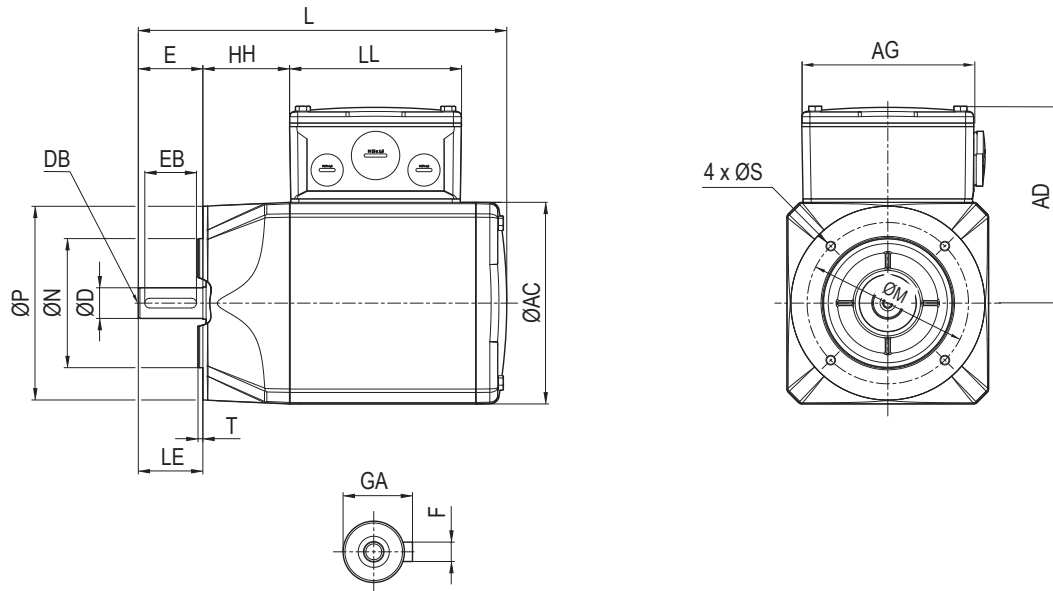
# IEC B5 BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	16	215	180	250	14	4,0	155	136	105	36	337	60	105	28	M10	60	50	8	31

# 90 Nx/8

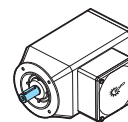
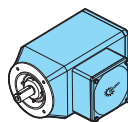
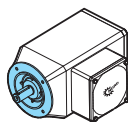
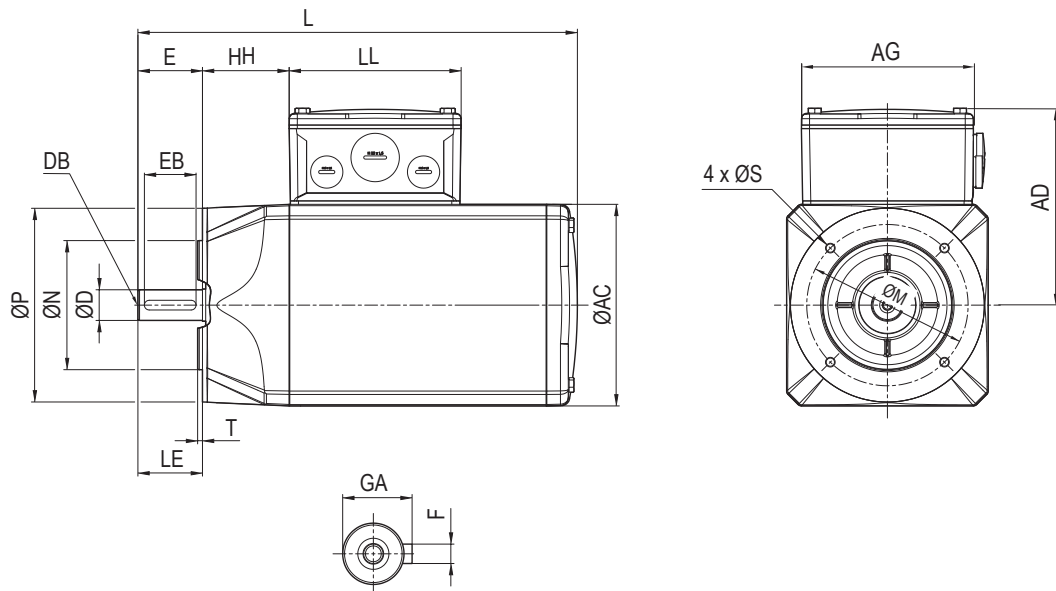
## IEC B14



Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	130	110	160	M8x15	4,0	155	136	105	36	283	60	105	28	M10	60	50	8	31

All specifications in mm unless otherwise indicated.

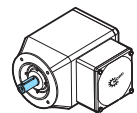
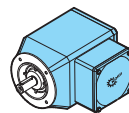
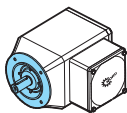
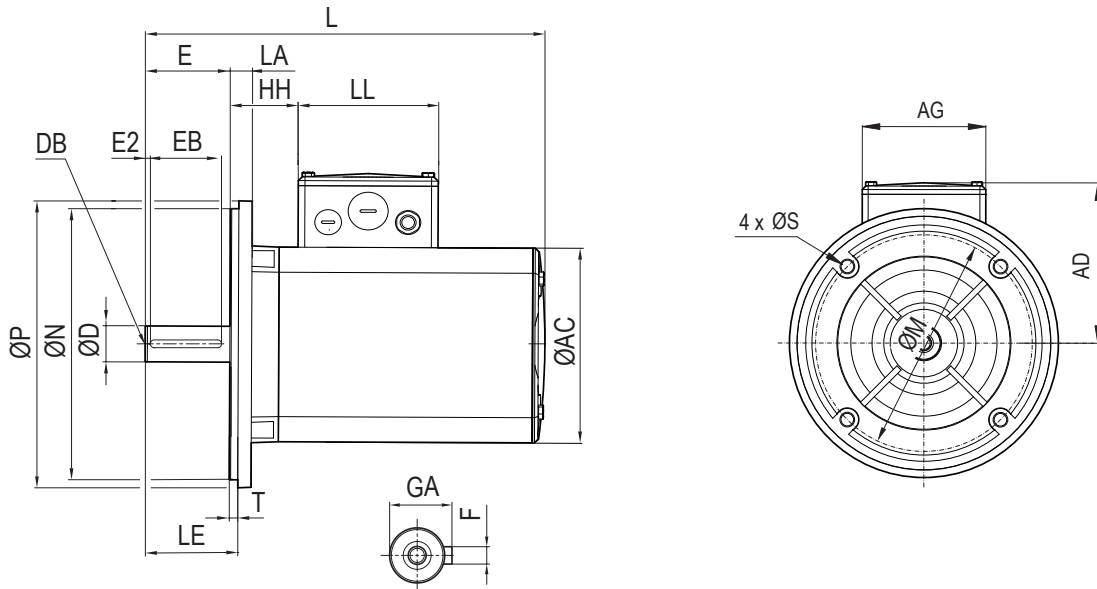
## IEC B14 BRE



Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	130	110	160	M8x15	4,0	155	136	105	36	336	60	105	28	M10	60	50	8	31

# 90 Nx/8

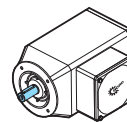
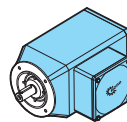
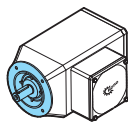
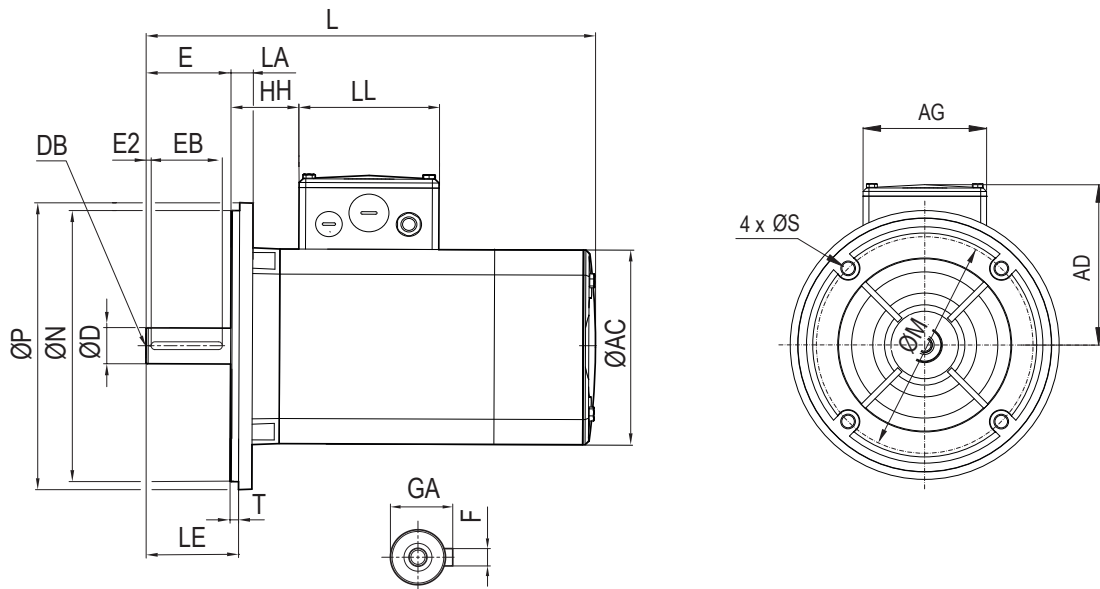
## NEMA C-face



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	10	184,2	216	228,6	3/8-16	6,4	162	121	105	44	301	70	105	28,57	M10	70	57,2	6,35	31,4

All specifications in mm unless otherwise indicated.

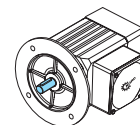
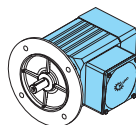
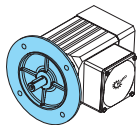
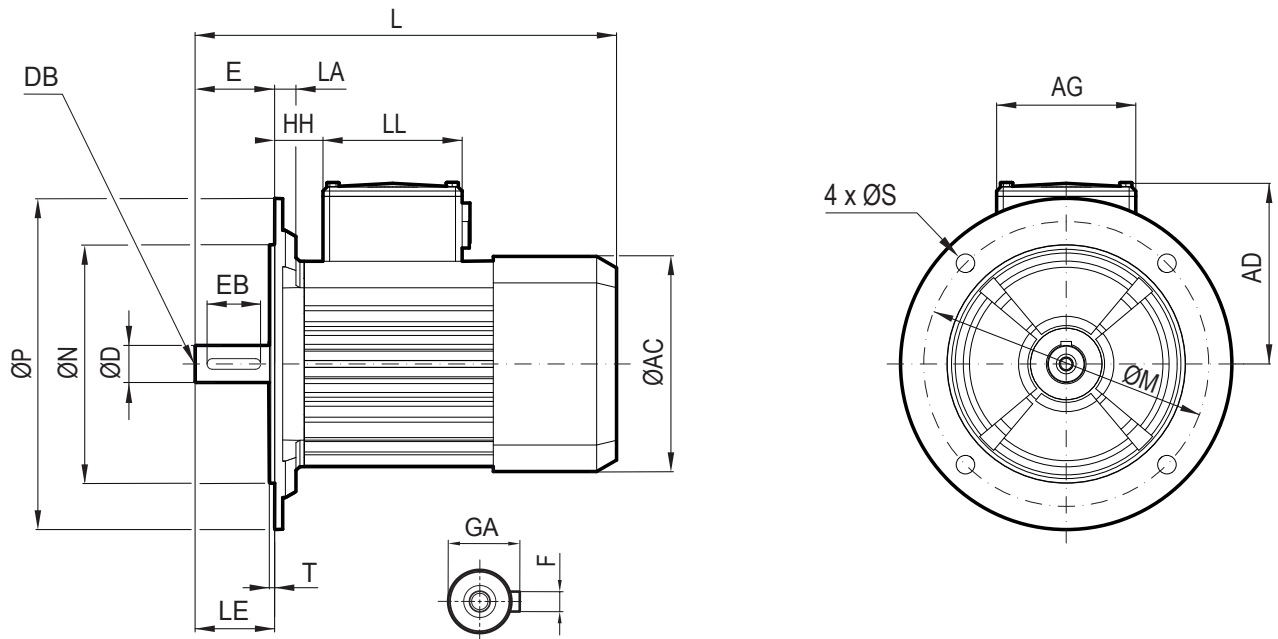
## NEMA C-face BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90Nx/8	10	184,2	216	228,6	3/8-16	6,4	162	121	105	44	354	70	105	28,57	M10	70	57,2	6,35	31,4

# 90 Fx/8

## IEC B5

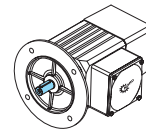
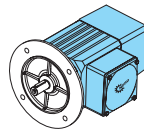
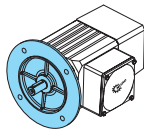
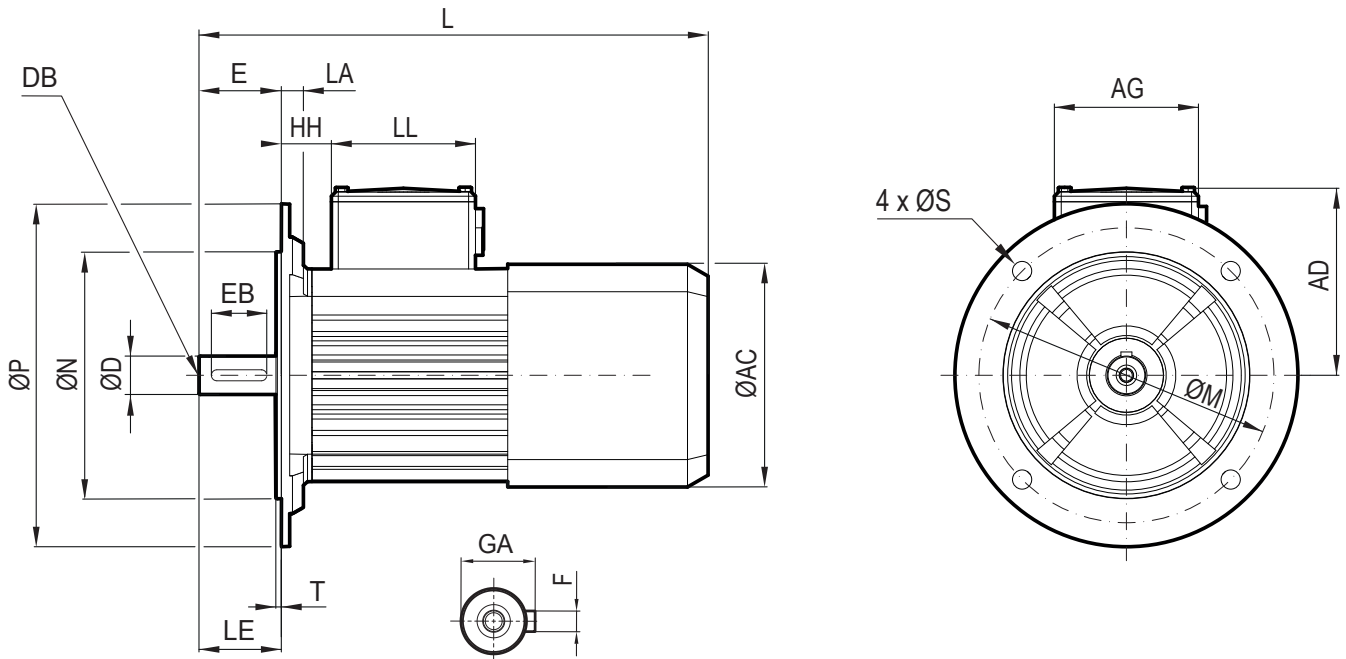


Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	16	215	180	250	14	4,0	162	136	105	36	318	60	105	28	M10	60	50	8	31
90F3/8, 90F4/8	16	215	180	250	14	4,0	162	136	105	36	358	60	105	28	M10	60	50	8	31

All specifications in mm unless otherwise indicated.



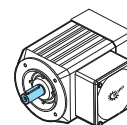
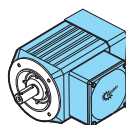
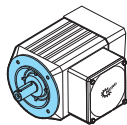
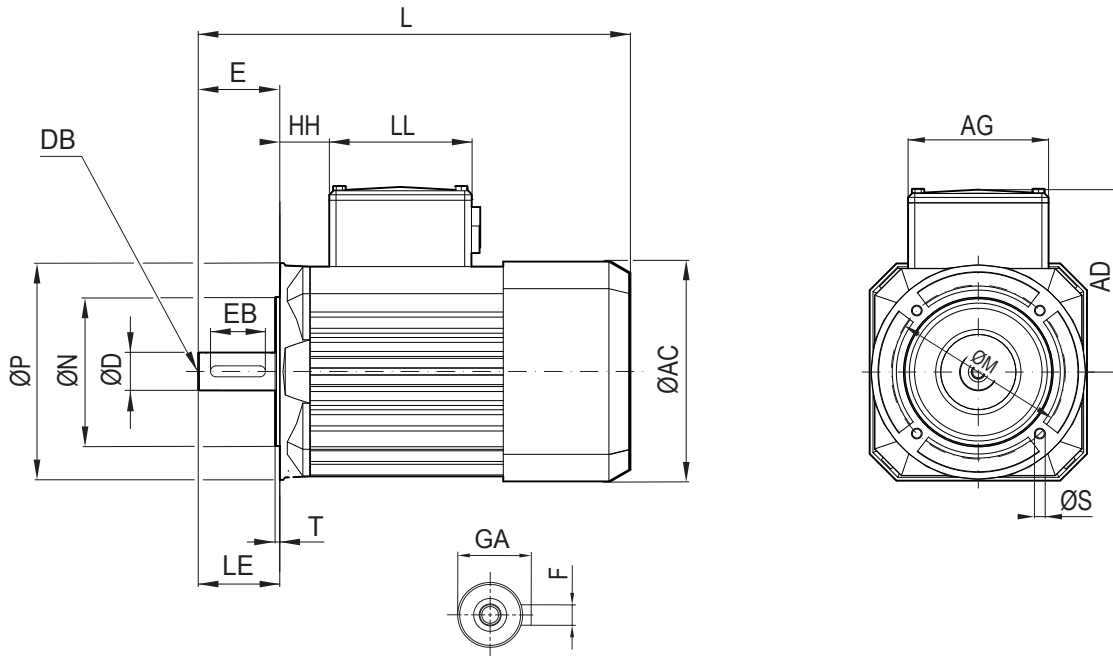
## IEC B5 BRE



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	16	215	180	250	14	4,0	162	136	105	36	371	60	105	28	M10	60	50	8	31
90F3/8, 90F4/8	16	215	180	250	14	4,0	162	136	105	36	411	60	105	28	M10	60	50	8	31

# 90 Fx/8

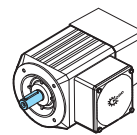
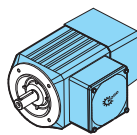
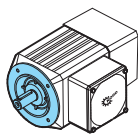
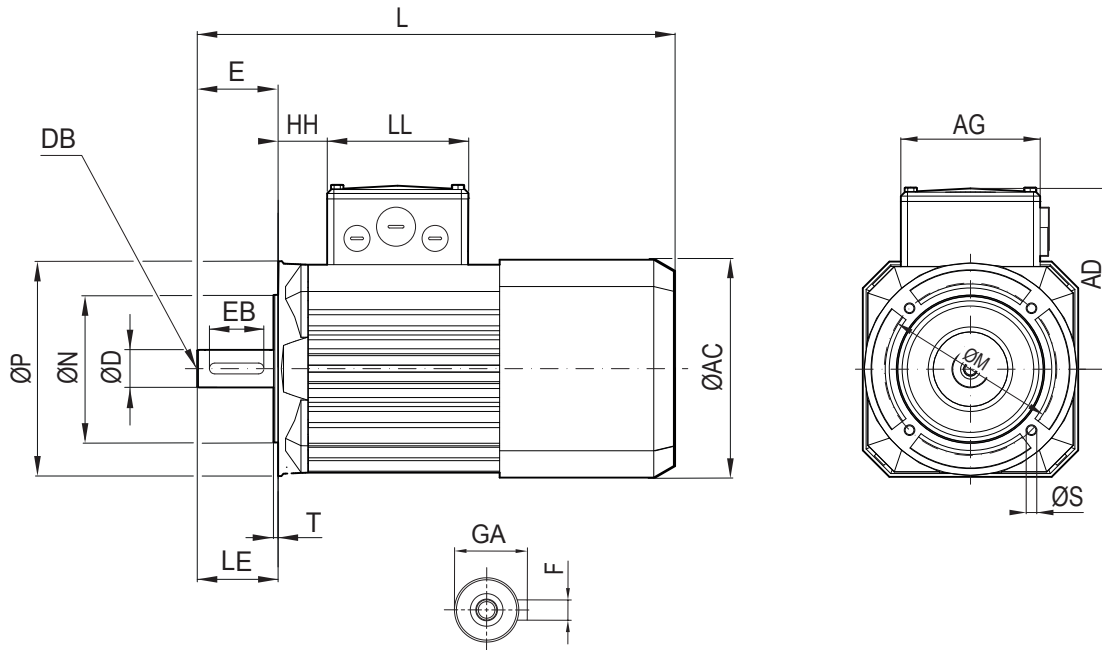
## IEC B14



Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	130	110	160	M8x15	4,0	162	136	105	36	318	60	105	28	M10	60	50	8	31
90F3/8, 90F4/8	130	110	160	M8x15	4,0	162	136	105	36	358	60	105	28	M10	60	50	8	31

All specifications in mm unless otherwise indicated.

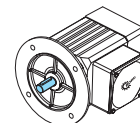
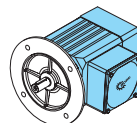
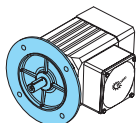
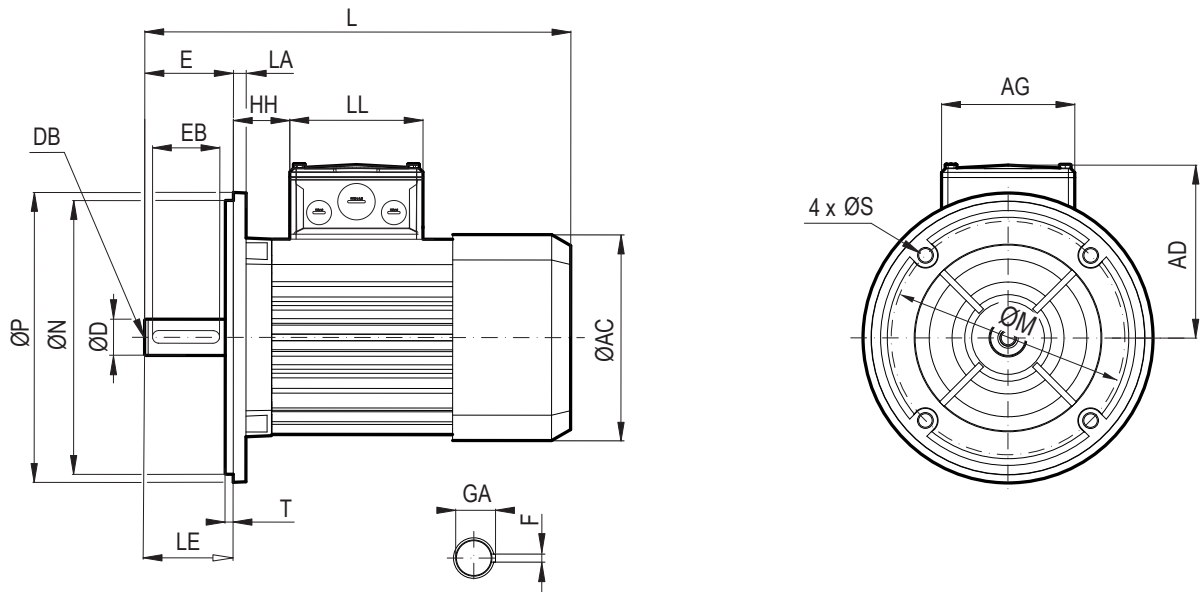
## IEC B14 BRE



Typ	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	130	110	160	M8x15	4,0	162	136	105	36	371	60	105	28	M10	60	50	8	31
90F3/8, 90F4/8	130	110	160	M8x15	4,0	162	136	105	36	411	60	105	28	M10	60	50	8	31

# 90 Fx/8

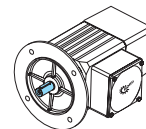
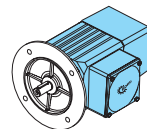
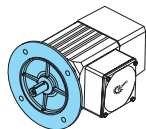
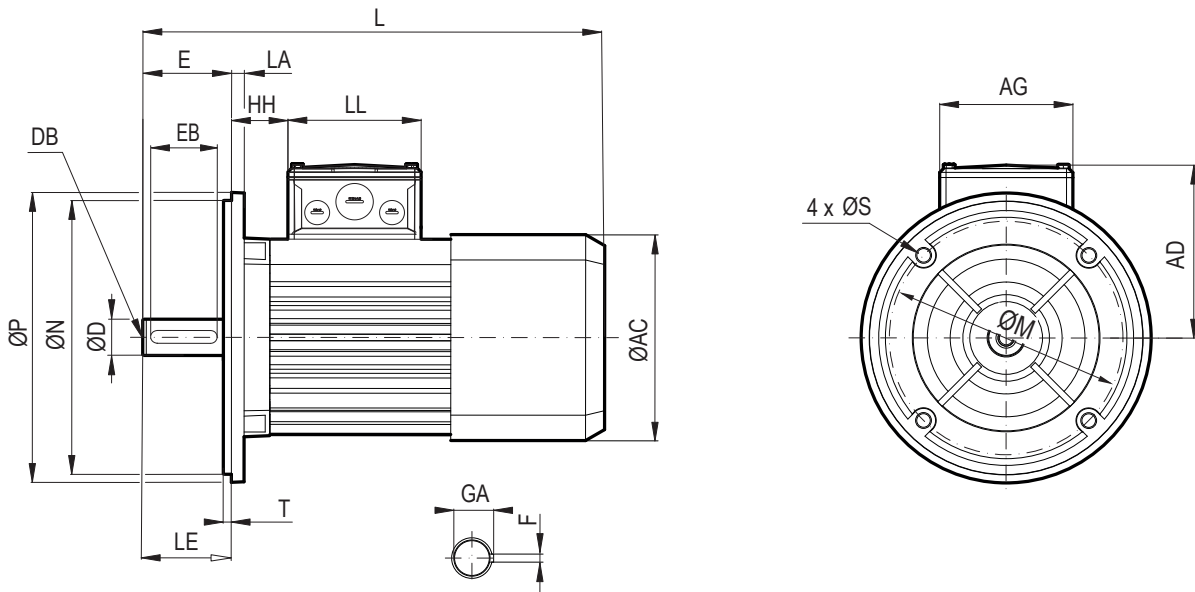
## NEMA C-face



Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	10	184,2	215,9	228,6	3/8-16	6,4	162	121	105	44	336	70	105	28,57	M10	70	57,2	6,35	31,4
90F3/8, 90F4/8	10	184,2	215,9	228,6	3/8-16	6,4	162	121	105	44	376	70	105	28,57	M10	70	57,2	6,35	31,4

All specifications in mm unless otherwise indicated.

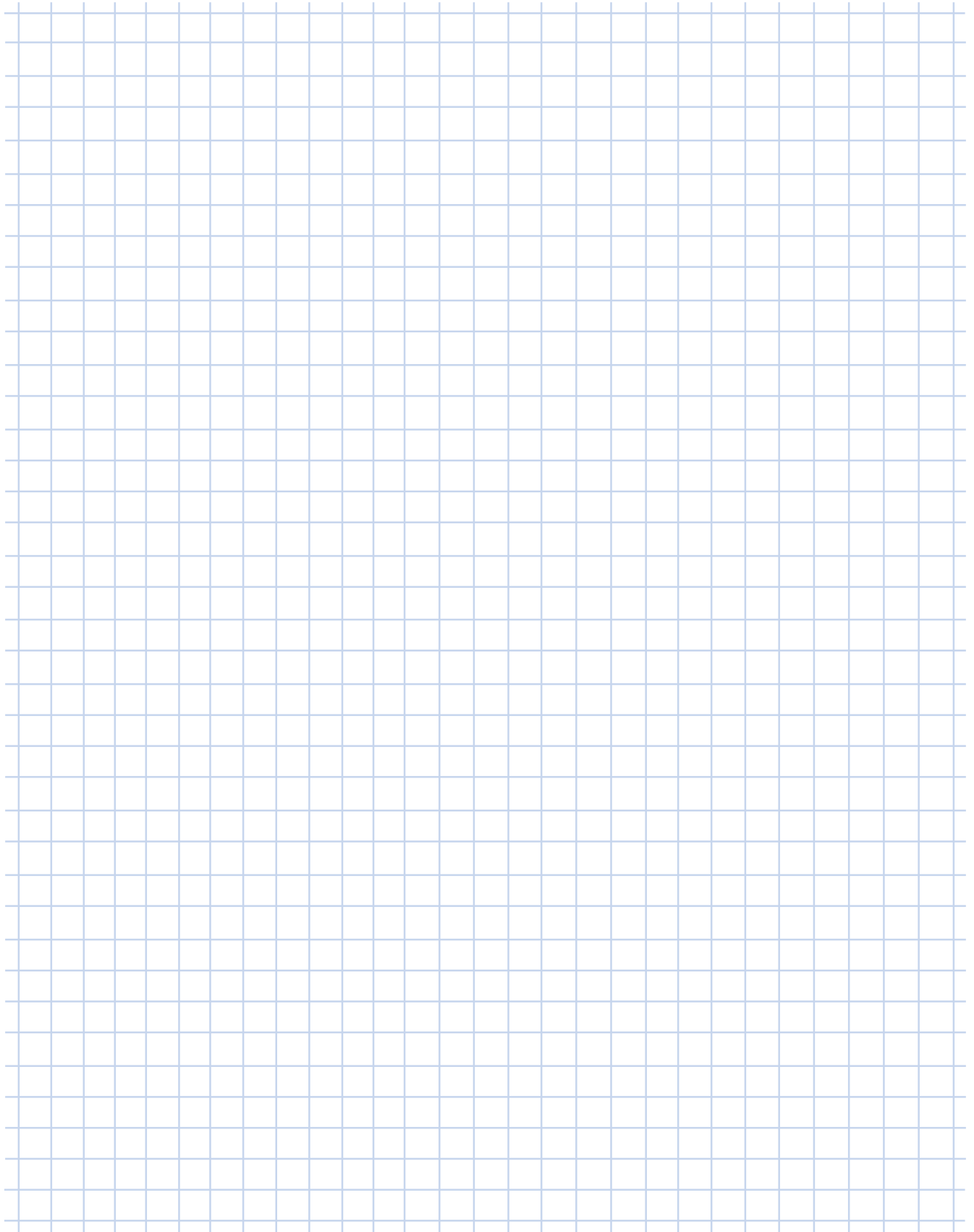
## NEMA C-face BRE

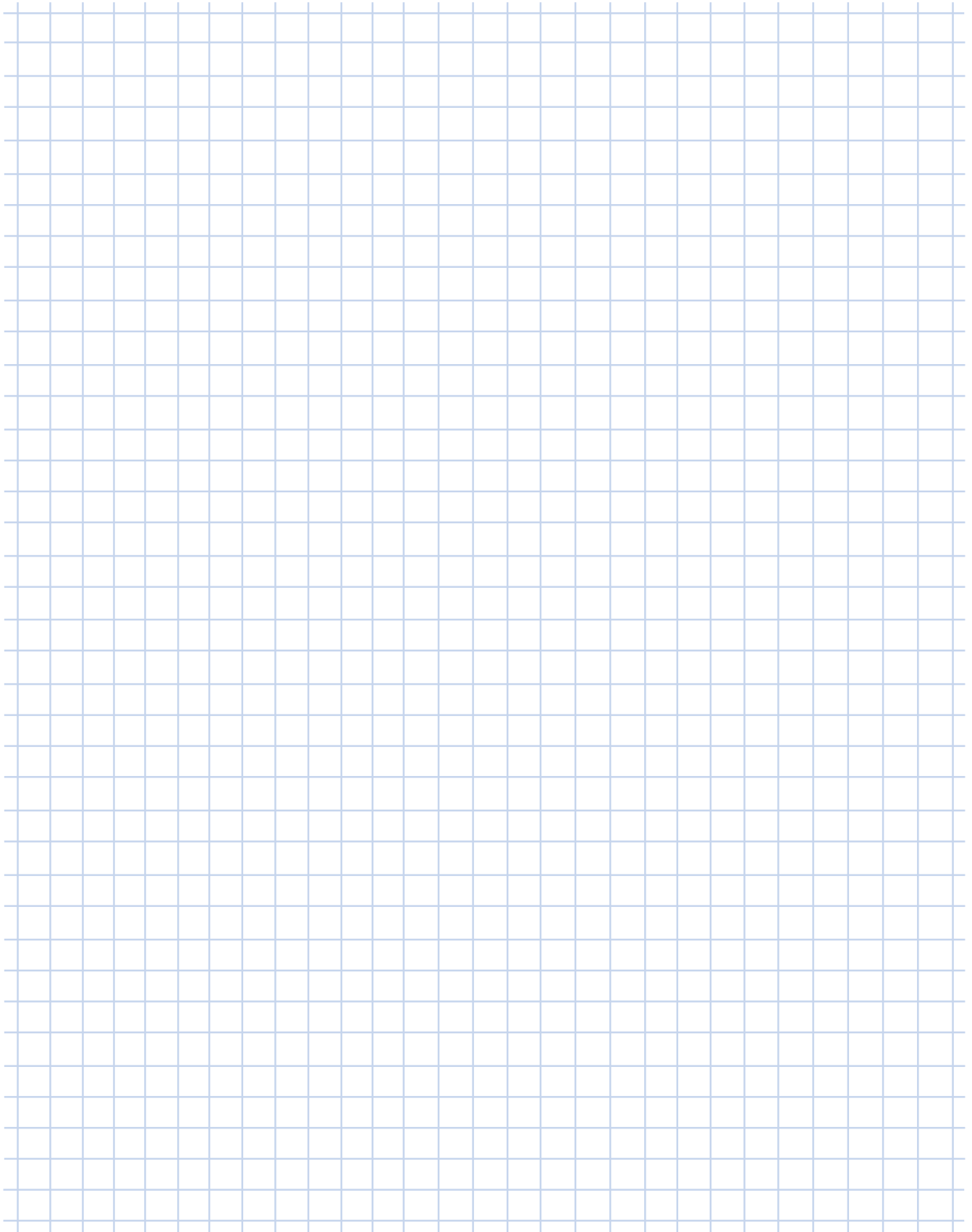


Typ	LA	M	N	P	S	T	AC	AD	AG	HH	L	LE	LL	D	DB	E	EB	F	GA
90F1/8, 90F2/8	10	184,2	215,9	228,6	3/8-16	6,4	162	121	105	44	389	70	105	28,57	M10	70	57,2	6,35	31,4
90F3/8, 90F4/8	10	184,2	215,9	228,6	3/8-16	6,4	162	121	105	44	429	70	105	28,57	M10	70	57,2	6,35	31,4

# Notes

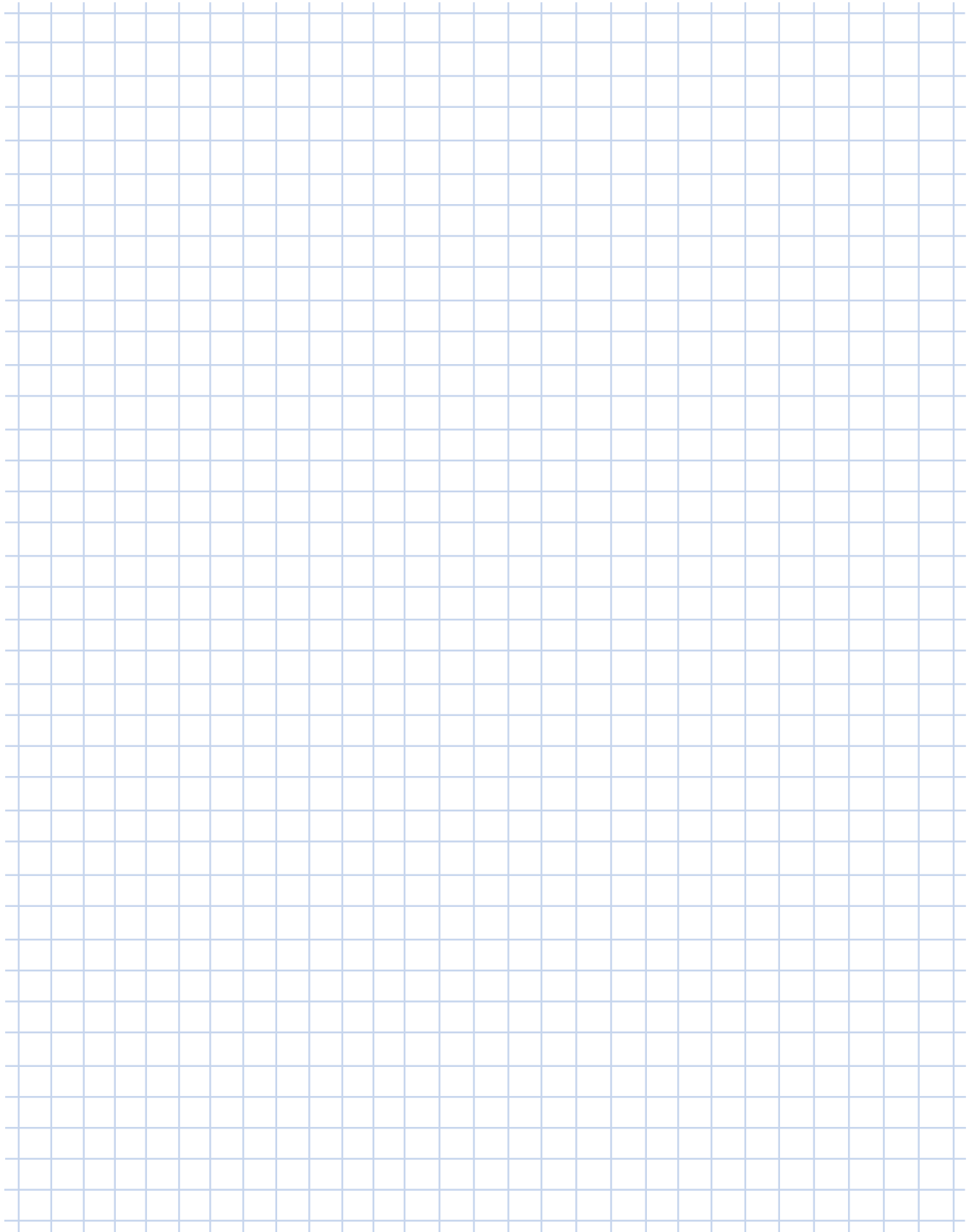
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A large grid of light blue lines covering most of the page, intended for taking notes.

A large grid area for taking notes, consisting of a 20x30 grid of light blue lines.

# Notes

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A large grid area for taking notes, consisting of a grid of light blue lines on a white background.

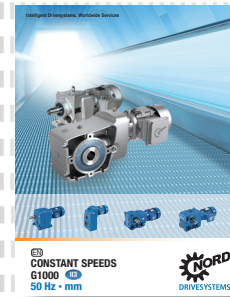


# Selections from the NORD® range

## G1000 Fixed speeds

### UNICASE housing 50 / 60 Hz

- NORDBLOC.1® helical in-line geared motor
- Helical geared motors
- Parallel shaft geared motors
- Bevel geared motors
- Helical worm geared motors



## G4014 Electronic variable speed gear units

- NORDBLOC.1® helical in-line geared motor
- Helical geared motors
- Parallel shaft geared motors
- Bevel geared motors
- Helical worm geared motors



## G1050 MAXXDRIVE® industrial gear units

### UNICASE housing 50 / 60 Hz

- Helical gear units
- Helical bevel gear units



## G1035 UNIVERSAL worm gear units

- SI and SMI



**F3018\_E3000** Frequency inverter SK 180E

**F3020\_E3000** Frequency inverter SK 200E

**F3060\_E3000** NORDAC PRO frequency inverter SK 500P



**EN**

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