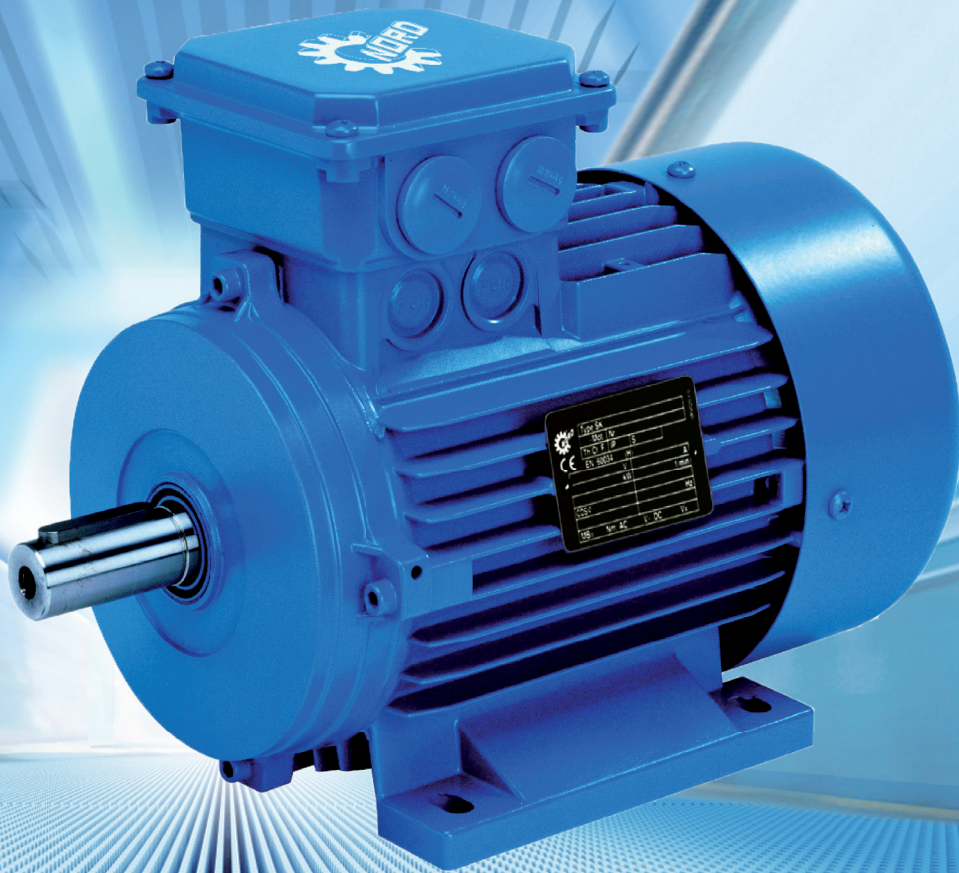


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EN

MOTORS

M7000

IE1
Standard

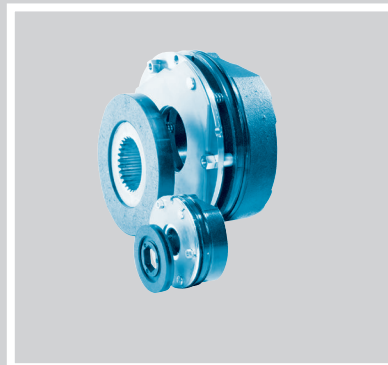
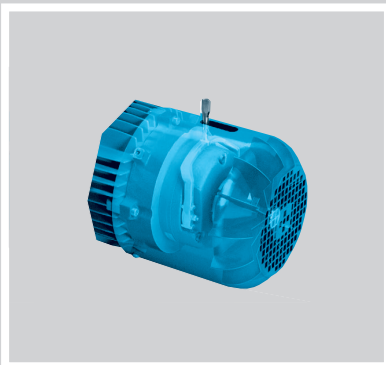
IE2

IE3


DRIVESYSTEMS

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DRIVESYSTEMS

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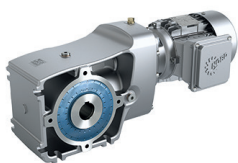


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Mechanical products

Gear units



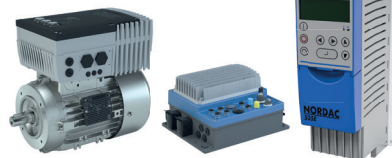
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Motors



Electronic products

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Gear unit production



Motor production



Inverter production

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Introduction

Asynchronous low voltage motors

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

The catalogue only contains motors which we manufacture ourselves, in the power range from 0.12 to 30 kW. Information about motors with powers > 30kW as well as special motors such as explosion-protected motors, submersible motors or encapsulated motors can be supplied on request.

NORD IE1/Standard-Motors

The motors which were previously marked with the EFF2 logo are still available from NORD. Their use must be checked with regard to national regulations. Special ambient conditions or operating modes result in exempting circumstances, which permit the use of these motors.

Usually, IE1 motors for S1 operation are permitted for export to countries which prescribe IE1 and countries in which there are no corresponding regulations.

IEC60034-30	European Union (50Hz) to 15.6.2011	60Hz (USA, ...)	
IE1	comparable to EFF2	comparable to South America standards	Efficiency increase
IE2	comparable to EFF1	equal to NEMA Energy Efficiency / EPACT	
IE3		equal to NEMA Premium Efficiency	
IE4 <small>in planning</small>		equal to Super Premium Efficiency	

Efficiency classes IE1, IE2, IE3

The standard IEC 60034-30:2008 specifies efficiency classes and therefore forms the basis for the various national efficiency requirements. At the same time, the standard IEC 60034-2-1:2007 harmonises the procedures for the measurement of efficiencies.



As of 16.06. 2011, only motors of efficiency class IE2 or better may be used for S1 operation of three-phase squirrel-cage motors with 0.75 kW and more in the European Union. The basis for this is ErP 2009/125/EU VO640-2009. You must decide in good time (delivery time + project planning time), whether you need to use IE2 motors for your application or whether any of the exemptions apply to your application.

You can find assistance for your decision in this catalogue from ⇒ [A5](#).

The new NORD motor catalogue M700 has been supplemented with information about the new efficiency classes IE1, IE2 and IE3.

Differences throughout the world

The new efficiency classes have different designations, specifications and exceptions in various regions of the world. You can find all the details of these from ⇒ [A5](#).

Name plates

The operating mode of standard / IE1 motors is always indicated on the name plate of the gear, not on the name plate of the motor.

Global NORD Motor

We have developed our modular system for global use on the basis of NORD IE2 motors. This ensures great flexibility and short delivery times. Taking global efficiency requirements and the different regional conditions into account, NORD offers you a global solution approach.

Please enquire if this is required.

IE2/IE3 - Technical differences

Efficiency class IE2 and IE3 motors have essential differences compared with the previously common IE1/EFF2 motors. The increased efficiency is achieved by the use of additional material of higher quality as well as new production methods and design solutions. These definitely comply with the legal requirements and often exceed them.

The change from the previous motors to IE2/IE3 motors is also made easy by the fact that both NORD motor series normally have the same external dimensions. The previous motor dimensions are different in only a few cases.

The tables from ⇒ [C24](#) provide an overview.

The changed characteristics of the motors must also be taken into account during planning (e.g. greater starting torques, greater breakdown torques, higher speeds, greater power reserves and greater weight). Exactly how the higher starting and breakdown torques can be used to your advantage in combination with the extended operating range is explained below.

NORD IE2 motors with improved characteristics

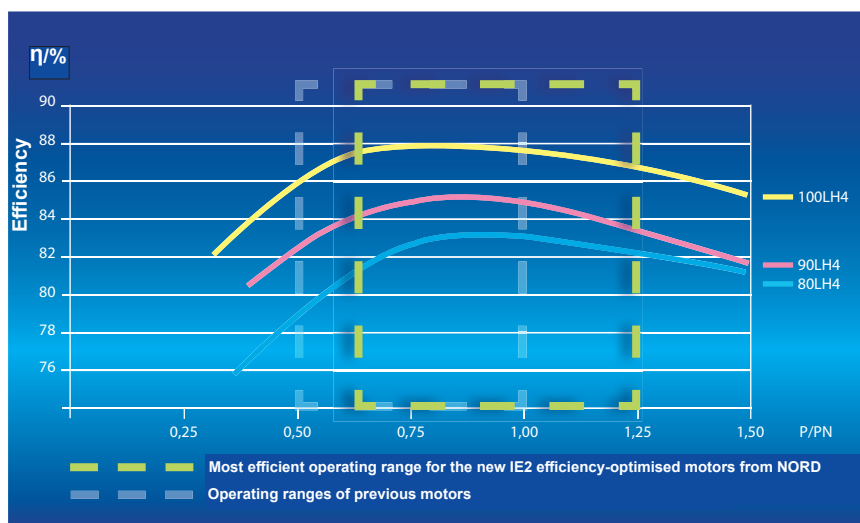
NORD IE2 motors have new characteristics. Thermal reserves now enable new design of the drive units, whereby the partial load range can be shifted upwards.

Thanks to symmetrization of the rating point, efficient operation is also possible above the rating point. The lower losses of IE2 motors allow operation above the rated power power, which is also not thermally critical in continuous use ⇒ [A22](#) - Extended operation range.

For our customers this means that this operating range can also be included in the planning for the application. As the start-up and breakdown torque has also been increased, it is recommended that the design is optimised and safety factors reduced or removed entirely, as the motor has permanent reserves. If these reserves are consistently utilised economic benefits result, as in many cases smaller sizes may be used.

For motors with several rated voltages, the regulation requires that the efficiency for the most unfavourable measurement point is stated.

NORD 4-pole IE2 motors have sufficient reserves so that they can still be supplied for a wide voltage range.



The graphs show the principle efficiency characteristics of asynchronous motors

IE3 - Premium

Motors of efficiency class IE3 achieve an even further improvement of efficiency.

Because of this, the thermal reserves and the fields of use are also increased.

With IE3, NORD also remains true to standard sizes for standard powers. This is possible through the use of selected materials and innovative production methods. Stamping of the wide voltage range has been omitted. Even so, with IE2 motors this mode of operation remains possible. However, in this case we can no longer guarantee IE3 efficiency.

4-pole IE3 motors are suitable for 50 and 60 Hz, so that they can be used anywhere in the world.

Exactly where and when these efficiency classes must be used is explained in this catalogue from ⇒ [A5](#).

You can find the electrical data from ⇒ [C2](#).

IE4 - The next level

Motors of efficiency class IE4 achieve an even further improvement of efficiency.

At present, NORD is developing permanently excited synchronous motors for inverter operation in the power range up to 5.5kW.

Further documentation about IE4 motors is in the course of preparation. Please enquire if this is required.

Please enquire if this is required.

Up to date and careful

This catalogue has been produced with the greatest care on the basis of the current legal situation.

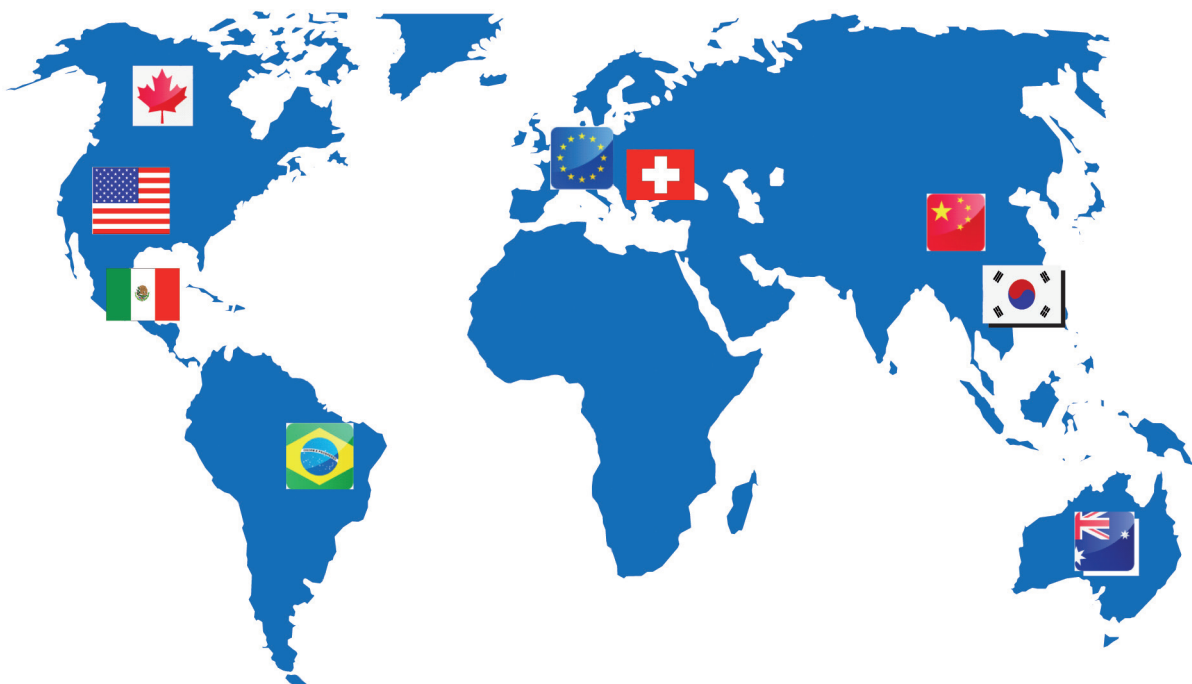
However, we cannot accept liability for technical changes.

The following tables summarize the essential facts about IE2 and IE3 motors for the global market. Motors listed under the sub-heading “Exceptions” are those for which the use of class IE2 or IE3 motors is not mandatory.

In addition, the regulations for IE2 and IE3 only apply to motors which are operated in S1 mode (continuous operation). The reason for this is that frequent starting of motors with high moments of inertia is not energy-efficient.







All overviews can be found under www.driveefficiency101.com



This catalogue has been produced with the greatest care on the basis of the current legal situation. However, we cannot accept liability for technical changes.





European Union

Directive	Preferred Voltages	Circuit	Frequency
ErP 2009/125/EC VO 640-2009	230/400 V 400/690 V	Δ/Y	50 Hz 50/60 Hz





Designation	IE2	IE3
Mandatory as of	16.06.2011	1.1.2015 for P \geq 7,5 kW 1.1.2017 for P<7,5 kW
Power range	0,75-375 kW	
Number of poles	2,4,6	
Relevant exceptions for IE2, IE3	<p>1. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Operating modes other than S1 as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S2-30min * • S3-70% * • S6-80% * <p>* In these modes must a higher power on the nameplate be specified. Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p> <p>2. Brake motors</p> <p>3. Switchable pole motors \Rightarrow  C7-11</p> <p>4. ATEX motors Motors for explosion protection (gas and dust) are exempted from the directive but may be classified according to IE.</p> <p>5. Ambient temperature The directive does not apply to motors which are rated for ambient temperatures >60°C or <30°C.</p> <p>6. Installation altitude The directive does not apply to motors which are rated for an installation altitude above 4000m above sea level.</p> <p>7. Single phase motors \Rightarrow  C12-13</p>	
Special features	<p>E2 +F1 IE2 motors which can be used with inverters may also be used as an alternative to IE3.</p>	

Type Plates (Geared motor)

IE2







 		
Type SK 90 LH/4		
3~ Mot.	No. 2005471179-400	12345678
Th.Cl.155 (F)	IP 55 S1	IEC 60034 (H)
50 Hz	230/400 V Δ/Y	60 Hz 265/460 V Δ/Y
\oplus	5,80/3,34 A	1,5 kW
	5,12/2,95 A	1,5 kW
\ominus	COS ϕ 0,79	1415 min ⁻¹
	COS ϕ 0,76	1725 min ⁻¹
220-240/380-420 V Δ/Y		254-277/440-480 V Δ/Y
5,86-5,95/3,39-3,40 A		5,16-5,25/2,98-3,03 A
IE2=82,2%		IE2=84,4%
		
		www.nord.com

IE3

 		
Type SK 90 LP/4		
3~ Mot.	No. 2005471179-600	12345678
Th.Cl.155 (F)	IP 55 S1	IEC 60034 (H)
50 Hz	230/400 V Δ/Y	60 Hz 265/460 V Δ/Y
\oplus	6,4/3,7 A	1,5 kW
	4,9/2,8 A	1,5 kW
\ominus	COS ϕ 0,7	1430 min ⁻¹
	COS ϕ 0,76	1730 min ⁻¹
V		V
A		A
IE3=85,3%		IE3=87%
		
		www.nord.com

Switzerland




Directive	Preferred voltages	Circuit	Frequency
Energy Ordinance AS2009	230/400 V 400/690 V	Δ/Y	50 Hz 50/60 Hz

Designation	IE2	IE3
Mandatory as of	01.07.2011	open
Power range	0,75-375 kW	
Number of poles	2,4,6	
Relevant exceptions • IE2, IE3	<p>1. Intermittent operation / Short term operation The directive only applies to motors in continuous operation S1 or S3>80%. Operating modes other than S1 as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S3-70% • S6-80% • S9 <p>Explanation of operating modes ⇒  A19 Motor data ⇒  C2 and above</p> <p>2. Switchable pole motors ⇒  C7-11</p> <p>3. Frequency inverter operation Special motors for frequency inverter operation as per standard IEC 60034-25 of the International Electrical Engineering Commission.</p> <p>4. ATEX motors Motors for explosion protection (gas and dust) are exempted from the directive but may be classified according to IE.</p> <p>5. Ambient temperature The directive does not apply to motors which are rated for ambient temperatures >60°C or <30°C (up to 600W) or <-15°C.</p> <p>6. Installation altitude The directive does not apply to motors which are rated for an installation altitude above 4000m above sea level.</p> <p>7. Single phase motors ⇒  C12-13</p>	
Special features	Motor data ⇒  C14 and above	Motor data ⇒  C20 and above




Type Plates

(Geared motor)


IE2






IE2	
 	
Type SK 90 LH/4	
3~ Mot. No. 2005471179-400	12345678
Th.Cl.155 (F)IP 55 S1	IEC 60034 (H)
50 Hz 230/400 V Δ/Y	60 Hz 265/460 V Δ/Y
5,80/3,34 A 1,5 kW	5,12/2,95 A 1,5 kW
COS ϕ 0,79 1415 min ⁻¹	COS ϕ 0,76 1725 min ⁻¹
220-240/380-420 V Δ/Y	254-277/440-480 V Δ/Y
5,86-5,95/3,39-3,40 A	5,16-5,25/2,98-3,03 A
IE2=82,2%	IE2=84,4%
 www.nord.com	

IE3

IE3	
 	
Type SK 90 LP/4	
3~ Mot. No. 2005471179-600	12345678
Th.Cl.155 (F)IP 55 S1	IEC 60034 (H)
50 Hz 230/400 V Δ/Y	60 Hz 265/460 V Δ/Y
6,4/3,7 A 1,5 kW	4,9/2,8 A 1,5 kW
COS ϕ 0,7 1430 min ⁻¹	COS ϕ 0,76 1730 min ⁻¹
V A	
IE3=85,3%	IE3=87%
 www.nord.com	







USA

Directive	Preferred voltages	Circuit	Frequency
EISAct 2007	230/460 V ⇨  A48	YY/Y	60 Hz







Designation	High / energy efficient	Premium
Mandatory as of	1997	19.12.2010
Power range	0,75-375 kW / 1,0-500 hp	0,75-150 kW / 1,0-200 hp
Number of poles	2,4,6,8	2,4,6
Relevant exceptions • High/energy efficient, Premium	<ol style="list-style-type: none"> Special shafts NORD gear motors (direct attachment) TEAO, TENV totally enclosed air-over and unventilated motors Switchable pole motors ⇨  C7-11 Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Other operating modes are exempted from the directive, e.g.: <ul style="list-style-type: none"> • S2 • S3 • S6 Explanation of operating modes ⇨  A19 Single phase motors ⇨  C12-13 	
Relevant exceptions • Premium (High efficiency erforderlich)		<ol style="list-style-type: none"> 1. Flange version motors 3. Vertical shaft outlet 3. NEMA Design C Motoren 4. Motors with voltages less than 600V and other than 230 or 460V including +/-10% tolerance 0 - 206V & 254 - 413V & 507 - 600V => high efficiency 207 - 253V & 414 - 506V => premium efficiency
Special features	Motor data ⇨  C14 and above	Motor data ⇨  C20 and above

Type Plates

HIGH / energy efficient







HIGH / energy efficient											
     											
Type SK 90 LH/4 CUS TF											
3~ Mot. No. 34714711			FIN 12345678								
INS F	NEMA	IP55	S1	AMB 40 °C	TEFC	DP					
60Hz	230/460 V	YY/Y	Hz	V YY/Y							
6.30/3.15 A	2 HP	A		1,5kW							
PF 0,71	1745 rpm	PF	rpm								
EFF 84%	CODE K	EFF	CODE								
SF1.15	sf	A	SF	sf							
V		V									
A SF		A SF									
Over Temp Prot-2 Class F											
www.nord.com											

Premium

Premium											
     											
Type SK 90 LP/4 CUS TF											
3~ Mot. No. 34714712			FIN 12345678								
INS F	NEMA	IP55	S1	AMB 40 °C	TEFC	DP					
60Hz	230/460 V	YY/Y	Hz	V YY/Y							
5.60/2.80 A	2 HP	A		1,5kW							
PF 0,78	1730 rpm	PF	rpm								
EFF 87%	CODE K	EFF	CODE								
SF1.15	sf	A	SF	sf							
V		V									
A SF		A SF									
Over Temp Prot-2 Class F											
www.nord.com											








Canada

Directive	Preferred voltages	Circuit	Frequency
Energy Efficiency Regulations 1997 Updated Bulletin on Amending the Standards June 2010	332/575 V	Δ/Y	60 Hz 50/60 Hz








Designation	HIGH / energy efficient	Premium
Mandatory as of	1997	19.12.2010
Power range	0,75-375 kW / 1,0-500 hp	0,75-150 kW / 1,0-200 hp
Number of poles	2,4,6,8	2,4,6
Relevant exceptions • High/energy efficient, Premium	<p>1. TENV unventilated motors</p> <p>2. Switchable pole motors ⇒  C7-11</p> <p>3. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Other operating modes are exempted from the directive, e.g.:</p> <ul style="list-style-type: none"> • S2 • S3 • S6 <p>Explanation of operating modes ⇒  A19 Motor data ⇒  C2 and above</p> <p>4. Single phase motors ⇒  C12-13</p>	
Relevant exceptions • Premium (High efficiency erforderlich)		<p>1. Gear motors</p> <p>2. Flange version motors</p> <p>3. Vertical shaft outlet</p> <p>4. NEMA Design C or IEC Design H NORD IE2 or “high efficiency” motors have IEC Design H characteristics.</p>
Special features	Motor data ⇒  C14 and above	Motor data ⇒  C20 and above

Type Plates

HIGH / energy efficient





     											
Type SK 90 LH/4 CUS TF											
3~ Mot. No. 200847111-0300			FIN 12345678								
INS F	NEMA	IP55	S1	AMB 40 °C	TEFC	DP					
60Hz	332/575 V Δ/Y	Hz		V Δ/Y							
4.24/2.54 A		2 HP		A		1,5 kW					
PF 0,73	1740 rpm	PF		rpm							
EFF 84%	CODE K	EFF		CODE							
SF1.15	Sf	A	SF	Sf							
V		V									
A SF		A SF									
Over Temp Prot-2 Class F											
											

Premium

     											
Type SK 90 LP/4 CUS TF											
3~ Mot. No. 200847111-0400			FIN 12345678								
INS F	NEMA	IP55	S1	AMB 40 °C	TEFC	DP					
60Hz	332/575 V Δ/Y	Hz		V Δ/Y							
3.88/2.24 A		2 HP		A		1,5 kW					
PF 0,78	1730 rpm	PF		rpm							
EFF 87%	CODE K	EFF		CODE							
SF1.15	Sf	A	SF	Sf							
V		V									
A SF		A SF									
Over Temp Prot-2 Class F											
											








Mexico

Directive	Preferred voltages	Circuit	Frequency
NOM-016-ENER-2010	127/220 V 440 V	Δ/Y	60 Hz




Designation	MEPS
Mandatory as of	19.12.2010
Power range	0,75-373 kW / 1,0-500 hp
Number of poles	2,4,6,8
Relevant exceptions • MEPS	<p>1. Switchable pole motors \Rightarrow  C7-11</p> <p>2. Single phase motors \Rightarrow  C12-13</p> <p>3. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Other operating modes are exempted from the directive, e.g.:</p> <ul style="list-style-type: none"> • S2 • S3 • S6 <p>Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p>
Special features	The efficiencies correspond to IE3 Premium Efficiency. However, the permissible tolerances for the efficiency are considerably larger than in other regions. Because of this, IE3 Premium Efficiency motors can be used which are rated for 460V / 60 Hz.

Type Plates

CUS (Premium)





     											
Type SK 90 LP/4 CUS TF											
3~ Mot.		No. 34714712				FIN 12345678					
INS F	NEMA	IP55	S1	AMB 40 °C	TEFC	DP					
60Hz	230/460 V YY/Y		Hz	V YY/Y							
Φ	5.60/2.80 A	2 HP		A	1,5 kW		Φ				
PF	0,78	1730 rpm		PF	rpm						
EFF 87%	CODE K		EFF	CODE							
SF1.15	sF	A SF		sF	V						
V		A SF		A SF							
Over Temp Prot-2 Class F											
											

IE3 (Geared motor)

 											
Type SK 90 LP/4											
3~ Mot.		No. 2005471179-600				12345678					
Th.Cl.155 (F)	IP 55	S1	IEC 60034 (H)								
50 Hz	230/400 V Δ /Y		60 Hz	265/460 V Δ /Y							
Φ	6,4/3,7 A	1,5 kW		4,9/2,8 A	1,5 kW		Φ				
COS ϕ 0,7	1430 min ⁻¹		COS ϕ 0,76	1730 min ⁻¹							
V		A		V							
IE3=85,3%		IE3=87%		A							
											




Brazil

Directive	Preferred voltages	Circuit	Frequency
Decreto nº 4.508	220/380 V 440 V	Δ/Y	60 Hz

Designation	ALTO RENDIMENTO
Mandatory as of	08.12.2009
Power range	0,75-185 kW
Number of poles	2,4,6,8
Relevant exceptions • ALTO RENDIMENTO	<p>1. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Operating modes other than S1 and S3 $\geq 80\%$ as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S3-70% • S6-80% • S9 <p>Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p> <p>2. Switchable pole motors \Rightarrow  C7-11</p> <p>3. 6-pole motors with powers above 150kW</p> <p>4. 8-pole motors with powers above 110kW</p> <p>5. Single phase motors \Rightarrow  C12-13</p>
Special features	





Type Plates

ALTO RENDIMENTO

  ALTO Rendimento 08122019	
Type SK 90 SH/4 AR	
3~ Mot.	No. 2005471178-100 12345678
Th.Cl. 155 (F) IP 55 S1	IEC 60034 (H)
60Hz 220/380 V Δ/Y	60Hz 440 VY
Φ 4,00/2,31 A 1,1 kW	Φ 2,13 A 1,1 kW
$\cos\phi$ 0,85 1710 min ⁻¹	$\cos\phi$ 0,78 1735 min ⁻¹
REND.=84,3%	REND.=85,9%
NBR 7094	Squirrel Cage induction motor
CAT N	SF 1,15
 nord.com	





Australia

Directive	Preferred voltages	Circuit	Frequency
MEPS AS/NZS 1359.5	230/400 V	Δ/Y	50 Hz

Designation	MEPS	High efficiency
Mandatory as of	01.04.2006	Voluntary
Power range	0,73-185 kW	
Number of poles	2,4,6,8	
Relevant exceptions • MEPS, High efficiency	<p>1. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Operating modes other than S1 as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S3-70% • S6-80% • S2-30min <p>Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p> <p>2. Motors for frequency inverter operation</p> <p>3. Switchable pole motors \Rightarrow  C7-11</p> <p>4. Single phase motors \Rightarrow  C12-13</p>	
Special features		

Type Plates (Geared motor)





MEPS

Type SK 90 LH/4	
3~ Mot.	No. 2005471179-400 12345678
Th.Cl.155 (F) IP 55 S1	IEC 60034 (H)
50 Hz	230/400 V Δ/Y 60 Hz 265/460 V Δ/Y
\oplus 5,80/3,34 A	1,5 kW 5,12/2,95 A 1,5 kW \oplus
COS ϕ 0,79	1415 min ⁻¹ COS ϕ 0,76 1725 min ⁻¹
220-240/380-420 V Δ/Y	254-277/440-480 V Δ/Y
5,86-5,95/3,39-3,40 A	5,16-5,25/2,98-3,03 A
IE2=82,2%	IE2=84,4%
  	
 www.nord.com	

Standards, regulations nomenclature




China

Directive	Preferred voltages	Circuit	Frequency
GB 18613-2012	230/400 V max. 690 V	Δ/Y	50 Hz

Designation	Grade 3	Grade 2		Grade 1
Mandatory as of	01.09.2012	01.09.2016	01.09.2017	Voluntary
Power range	0,75-375 kW	7,5-375 kW	0,75-7,5 kW	
Number of poles	2,4,6			
Relevant exceptions • Grade 3, Grade 2	<p>1. Intermittent operation / Short term operation The directive only applies to motors in continuous operation. Operating modes other than S1 and S3\geq80% as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S3-70% • S6-80% • S9 <p>Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p> <p>2. Switchable pole motors \Rightarrow  C7-11</p> <p>3. Single phase motors - GB 25958-2010 \Rightarrow  C12-13</p> <p>4. Brake motors</p>			
Special features	corresponds IE2	corresponds IE3		





Type Plates (Geared motor)

Grade 3

Type SK 90 LH/4	
3~ Mot.	No. 2005471179-400 12345678
Th.Cl.155 (F) IP 55 S1	IEC 60034 (H)
50 Hz 230/400 V Δ/Y	60 Hz 265/460 V Δ/Y
5,80/3,34 A 1,5 kW	5,12/2,95 A 1,5 kW
COS ϕ 0,79 1415 min ⁻¹	COS ϕ 0,76 1725 min ⁻¹
220-240/380-420 V Δ/Y	254-277/440-480 V Δ/Y
5,86-5,95/3,39-3,40 A	5,16-5,25/2,98-3,03 A
IE2=82,2%	IE2=84,4%
  	
www.nord.com	




South Korea

Directive	Preferred voltages	Circuit	Frequency
MKE's Notification 2009-317	220/380 V 440 V	Δ/Y	60 Hz

Designation	MEPS
Mandatory as of	01.07.2007 37 - 200 kW
Power range	01.01.2010 15 - 37 kW
	01.07.2010 0,75 - 15 kW
Number of poles	2,4,6,8 *
Relevant exceptions • MEPS	<p>1. The directive only applies to motors in continuous operation. Operating modes other than S1 as per IEC 60034-1 are exempted from the regulations. e.g.:</p> <ul style="list-style-type: none"> • S3-70% • S6-80% • S9 <p>Explanation of operating modes \Rightarrow  A19 Motor data \Rightarrow  C2 and above</p> <p>2. Switchable pole motors \Rightarrow  C7-11</p> <p>3. TENV unventilated motors</p> <p>4. 6-pole motors with powers above 160kW</p> <p>5. 8-pole motors with powers above 110kW</p> <p>6. Single phase motors \Rightarrow  C12-13</p> <p>* The statutory MEPS comes into effect at a later date for 8-pole motors: from 01.01.2010 37 - 110kW from 01.01.2011 0.75 - 37kW</p>
Special features	

Type Plates (Geared motor)

MEPS

Type SK 90 SH/4 KR	
3~ Mot.	No. 2005471178-200 12345678
Th. Cl. 155 (F) IP 55 S1	IEC 60034 (H)
60Hz 220/380 V Δ/Y	60Hz 440 V Y
\oplus 4,00/2,31 A 1,1 kW	\oplus 2,13 A 1,1 kW
\ominus COS ϕ 0,85 1710 min ⁻¹	\ominus COS ϕ 0,78 1735 min ⁻¹
V	V
A	A
IE2=84,3%	IE2=85,9%
  	
nord.com	

Motor power labelling

Axle height 63, 71, 80, 90, 100, 112, 132, 160, 180, 200

Power code	S, M, L	Standard power (except efficiency class IEx)
	SA, MA, LA, MB, LB	increased power power (except efficiency class IEx)
	MX, LX	Standard power with lower axle height (except efficiency class IEx)
	S_, M_, L_	Standard power with efficiency class IEx
	X_	Standard power with lower axle height with efficiency class IEx
	A_	Increased power „L“ with efficiency class IEx

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

⚠ 2- and 6-pole **on request!**

Number of poles Standard: 2, 4, 6, 8, 4-2, 6-2, 6-4,... with **IE2 + IE3**: only 4-pole

Motor type **Labelling only for motors with special characteristics**

CUS	UL and CSA approved motors
AR	Energy efficient motors for Brazil „Alto Rendimento“ (high efficiency)
KR	Energy efficient motors for Korea
2G	Explosion protected motors with ignition protection type „e“ or „de“ (Zone 1)
3G	Explosion protected motors with ignition protection type „n“ (Zone 2)
2D	Dust explosion protected motors, Zone 21
3D	Dust explosion protected motors, Zone 22
EAR1	Single phase motors with operational and start-up capacitor
EHB1	Single phase motors with operational capacitor
ECR	Single phase motors with operational and start-up capacitor 60 Hz
EST	Single phase motors with operational capacitor and Steinmetz circuit


Option ⇨ A15, A29

Example

100 L H / 4 CUS RD = Axle 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 kW	180 LX/4	180 LH/4	180 LP/4
30 kW	200 LX/4	200 XH/4	

Options

Abbreviation	Significance	Abbreviation	Significance
BRE +	Brake / braking torque + sub-option	OL	without fan
DBR +	Double brake + sub-option	OL/H	without fan, without cover
Suboption (⇒  B13-14)	RG * Corrosion protected version	KB	Condensation drainage hole
	SR * Dust and corrosion protected version	MS	Plug-on motor coupling
	IR * Current relay	EKK	One-piece terminal box
	FHL * Lockable manual release	KKV	Terminal box, encapsulated
	HL Manual brake release	FEU	Moisture protection insulation
	MIK Micro switch	TRO	Tropicalised insulation
	AS55 Outdoor installation	MOL	Dairy version
	(* not with DBR)	VIK	Regulation "Vereinigung Industrieller Kraftwirtschaft" (Association of the Industrial Power Industry)
BSH	Anti condensation heater / Brake	F	External fan
NRB1/2	Noise-reduced brake	RLS	Back stop
ERD	External earth terminal	IG1 (IG11, 12)	Pulsed incremental encoder 1024
TF	Thermistor, PTC resistor	IG2 (IG21,22)	Pulsed incremental encoder 2048
TW	Thermostat, bimetallic switch	IG4 (IG41,42)	Pulsed incremental encoder 4096
SH	Anti condensation heater	IG.K	Encoder with terminal box
WU	Silumin rotor	MG	Magnet-Incremental encoder
Z	Heavy fan, cast-iron fan	IG	Incremental encoder
WE +	2. shaft end	AG	Absolute encoder
HR	Handwheel	SL	Sensor bearings
RD	Protective shield	RE	Resolver
RDT	Protective shield, textile fan cowl		
RDD	Double fan-cowl		
AS66	Outdoor installation		

Versions


Versions as per DIN EN 60034-7

The following versions have the same dimensions:

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 list above (universal version) The installation orientation must be stated for versions with a condensation hole (KB). We recommend the version with a protective cover (RD) for versions IM V5, IM V1, IM V18. For explosion protected motors the protective cover version (RD) is mandatory for versions with the shaft end pointing downwards (⇒  C25).

For geared motors, the installation orientation stamped on the gear unit must be complied with.

Designation of dimensions as per DIN EN 50347

⇒  C24-43 Fittings:

D, DA	≤ 30	j 6
	> 30	k 6
N	≤ 250	j 6
	> 250	h 6
H		-0,5

Keyways + keys as per **DIN 6885/1**

Threaded holes DB +DC as per **DIN 332/2**

Assignment of power, shaft ends and flanges;
parallelism of shaft / foot surfaces; concentricity of shaft;
axial run-out / shaft as per **DIN EN 50347**

Standards, regulations nomenclature

- **NORD motors**
 - are constructed as standard to be compliant with **IEC 60034** Parts 1, 2, 5 ... 9, 11, 12, 14, 30 and bear the **CE** mark.
 - They are enclosed, self-ventilated three or single phase squirrel cage motors.
 - They are also available according to the following standards, recommendations and classifications:

NEMA



EAC



VIK

• NORD energy efficient motors

IE1, IE2, IE3	Efficiency classes according IEC 60034-30
CC 092A	EISAct Efficiency classification (USA) - ee
AR	Efficiency classification Brazil
KR	Efficiency classification Korea



China Compulsory Certification
Nr.: 200 701 040 125 842 9

EAC

EAC certificate for the import of motors into Eurasian Customs Union



CE labelling of products which conform with EU directives

NEMA

Regulation of the **National Electrical Manufacturers Association**

VIK

Motors compliant with the recommendations of the **Verband der Industriellen Energie-und Kraftwirtschaft e.V.**



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



energy verified

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



CSA and CUS approved motors
63 S - 180 LX
File No.: 1293961 (LR112560)
Master Contract: 189340

Information about explosion protected motors (ATEX 94/9/EU) can be found:

- In the special NORD catalogue: **G2122** and
- In Internet: http://www2.nord.com/cms/de/documentation/dop_documentation.jsp



Painting

Type	TFD total [µm]	Similar to corrosivity category *	Recommended use
F1	60 - 100		For top-coat to be applied by customer
F2 (Standard)	50 - 90	C2	For indoor installation
F3.0	110 - 150	C2	"For indoor and protected outdoor installation with low environmental contamination, e.g. open, unheated halls"
F3.1	160 - 200	C3	For outdoor installation, city and industrial atmosphere with low contamination
F3.2	210 - 250	C4	For outdoor installation, city and industrial atmosphere with moderate environmental contamination
F3.3 + Z	200 - 240	C5	For outdoor installation, city and industrial atmosphere with high environmental contamination
F3.4	100 - 140		For moderate exposure to chemicals
F3.5	100 - 140		Machinery for foodstuffs packaging
A			additional antimicrobial coating for all finishes except F3.4 and F3.5
Z			Compensation of contour depressions and crevices with seam sealer on polyurethane basis

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

Motor selection

Selecting a suitable motor

A number of factors must be taken into account for the selection of a motor. These include, e.g. its power, speed, speed range, torque and size, as well as the required motor options and the prevailing ambient conditions. The following list provides some assistance for the selection of a suitable motor.

Designation of motors

Motors are designated according to their axle height and their nominal power. The axle height is the distance between the centre of the output shaft and the foot surface of a foot-mounted motor. According to DIN EN 50347, motors are stamped with a nominal power. Compliance with this standard means that motor powers increase in standardised steps, e.g. for 4-pole motors from 0.12kW to 0.18kW to 0.25kw etc. The power which a motor can actually deliver in compliance with its heat class is generally higher than the nominal power, but lower than the next highest power level.

Determination of approximate speed

Due to the versions, this catalogue differentiates between 2, 4, 6 and 8-pole motors. The rounded idling speed of these motors is shown in the following table.

Number of poles	2	4	6	8
Idling speed [min ⁻¹] (rounded upwards)	3000	1500	1000	750

4-pole motors are used most often. Due to its commonness, this motor has the shortest delivery time and has a good power to weight ratio and price.

For geared motors, the output speed of the gear unit is determined by the speed of the motor and the gear ratio.

The following relationship applies:

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

Motor speeds change slightly under load. The higher the load (torque to be produced), the lower the speed. This effect is more pronounced with smaller motors. Nominal values described in this catalogue and on the type plate, always relate to a speed at the nominal power.

The following section describes the extended operating points for IE2 motors, at which higher powers can be obtained from the motors. The speed at this operating point differs from the nominal speed. In addition, switchable pole motors with 2 nominal speeds are described.

Selection of motor power

The power or torque which the machine requires is important for the selection of the motor.

In this catalogue, the power is stated in kilowatts [kW] and the torque in Newton-metres [Nm]. Calculation of the required power or torque is complex, depending on the application.

The following descriptions and technical data support a drive design which is carried out with calculation programmes such as the drive design program NORD-AAP or with the aid of collections of technical formulae. The power stamped on the motor type plate depends on the operating mode of the motor.

Operating modes

Explanation of the most important operating modes

S1

Continuous operation under constant load

S2

Short term operation under constant load

A thermal steady state is not achieved.

The motor is only switched on again if the motor has cooled to a maximum of 2K above the temperature of the cooling air.

Example: S2-10min.

Recommended values for the determination: 10, 30 min

S3

Intermittent operation, consisting of identical load cycles with phases of constant load and then pauses.

The frequency and size of the load on start-up must not have a significant influence on heating. Unless otherwise agreed a cycle time of 10 min is assumed.

The relative switch-on period is given by the proportion of the operating time to the cycle time.

Example: S3-40% switch-on time: 4 min. load - 6 min. pause

Recommended values for the determination: 70 %
Differing values on request

S4

Cyclic operation with frequent switching
see ⇒  A33 "External fan (F)"

S6

Continuous operation with intermittent load, consisting of identical load cycles with phases of constant load and then idling.

The cycle time and relative switch-on time are as for S3.

Example: S6 - 40% switch-on time

Recommended values for the determination: 80 %
Differing values on request

S9

Continuous operation with non-periodic changes of torque and motor speed.

Operation during which in general, the load and speed changes in a non-periodic manner within the permissible operating range.

In this mode there are frequent overloads, which must be far below the maximum load.

Example: S9

Details of an average power.

Continuous operation

The listed values for NORD motors in this catalogue are valid for continuous operation (S1). In practice, motors must often only operate for short periods or with frequent interruptions.

Power increase in short-term and intermittent operation

In short-term (S2) and intermittent operation (S3), electric motors may be subjected to greater loads than in continuous operation (S1). The factors for the permissible increase in power compared with the rated power (P_N) are contained in the following table. However, in principle, the power may only be increased to the level 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, larger factors than those stated in the table may result. These will be stated on request.

S2	Permissible power	S3	Permissible power	S6	Permissible power
10min	$1,40 \times P_N$	25%	$1,33 \times P_N$	25%	$1,45 \times P_N$
30min	$1,15 \times P_N$	40%	$1,18 \times P_N$	40%	$1,35 \times P_N$
		60%	$1,08 \times P_N$	60%	$1,15 \times P_N$

The design of the motor and categorisation of the operating mode should be carried out by NORD in cases of higher switch-on frequency and heavy starting loads.

For this, details must be provided about:

- The relative switch-on time
- Switch-on frequency
- External moment of inertia
- Graph of the load torque against speed
- Type of braking

Motor selection

Total torque

The total torque necessary to drive a machine is comprised of the

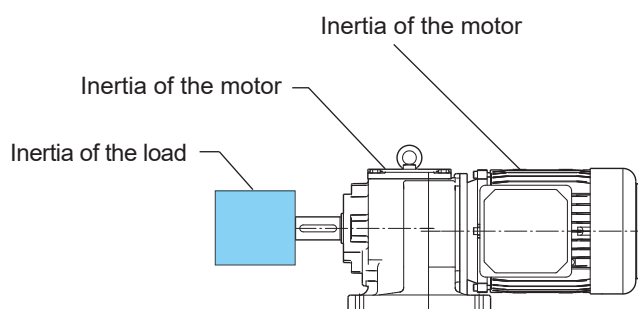
- static torque
- and the dynamic torque

Static torque

The static torque is necessary in order to operate a machine at constant load and speed. The static load is calculated according to the machine to be driven, taking friction, efficiency, lifting loads etc. into account.

Dynamic torque

Torque is also required in order to accelerate inertial masses. The inertial mass is comprised of the mass to be accelerated and the rotating mass of the motor itself (rotor).



To calculate the acceleration and braking characteristics of a drive, all are added to accelerating moments of inertia for the motor shaft.

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

J_x external moment of inertia reduced onto the motor shaft [kgm²]

J_L moment of inertia of the load [kgm²]

i_{Ges} Gear ratio

If a gear unit is used between the load and the motor, the calculated moment of inertia is reduced by the square of the gear 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 by means of 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 onto the motor shaft J , the required change in speed Δn and the required acceleration time t_a .

⚠ For mains operation, the acceleration time must not exceed 4 sec. in order not to overheat the motor.

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

Due to the torque curve from standstill to the nominal speed, approx. 90% of the starting torque can be used during the acceleration period (see ⇨ [A21](#) Graph of the torque curve).

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

Power, torque, speed

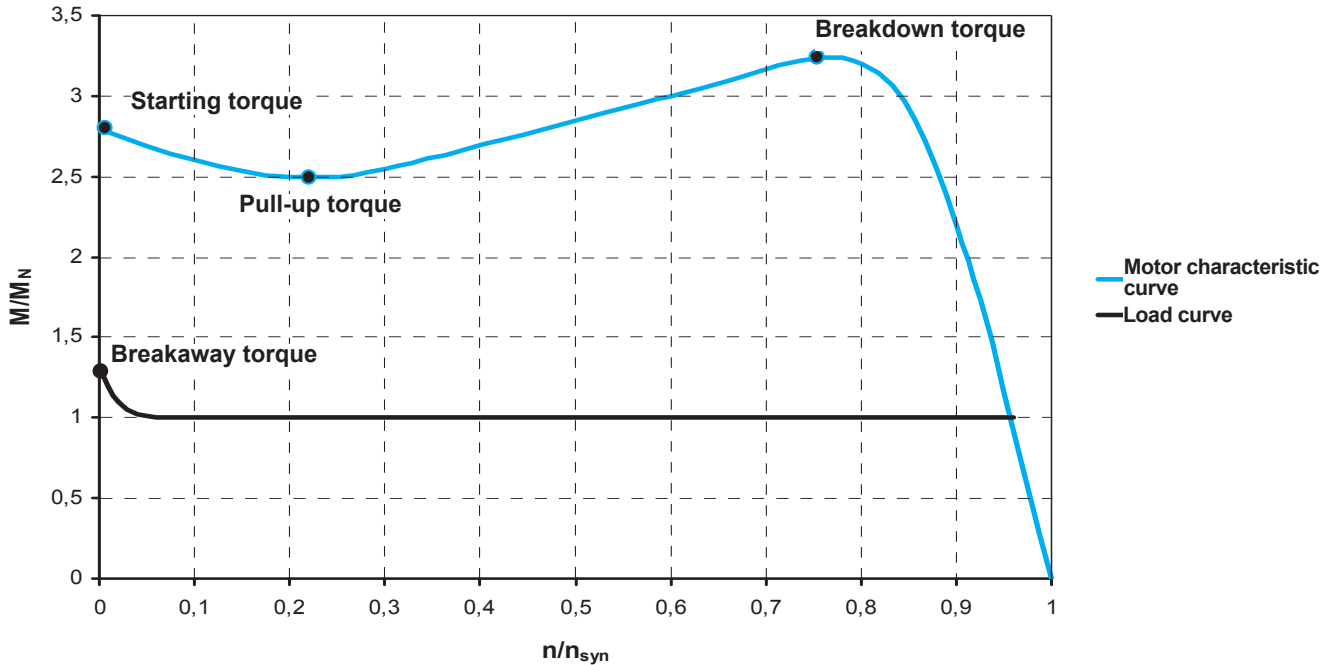
The relationship between power, torque and speed is described by the following formula, in which for geared motors the output speed and the output torque of the gear unit or alternatively, for motors, the speed of the motor and the motor torque can be entered. The motor power which is stamped on the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

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

P₁	Power	[kW]
M₂	Torque	[Nm]
n₂	Speed	[min ⁻¹]
η	Efficiency of the gear unit	[%]

The illustration shows the example of the torque graph for a 90kW asynchronous motor with mains operation. The load characteristic curve may vary according to the application. The intersection of the load curve and the motor curve represents the operating point of the motor. The operating point usually differs from the nominal point, which explains the deviation between the actual speed in the application and the nominal speed according to the catalogue.

Torque curve



Load graph and motor characteristic curve (starting with mains)

Comparison of the torques of NORD motors

Years of experience with the selection of motors for practical applications has resulted in knowledge, which can only be roughly transferred to the new IE2 motors. In spite of mainly unchanged dimension, the motors differ with regard to their torques. The nominal torque M_N has largely remained unchanged, as the rated power remains constant and the rated speeds have also hardly changed.

NORD motors have high starting and breakdown torques. For the most part, NORD IE2 motors have even higher values. These high starting torques can be used to support start-up processes in which, e.g. in order to change from static friction to dynamic friction, or in order to start pumps.

Motor selection

Comparison of NORD EFF2 motors with IE2

In order to achieve the higher efficiency of IE2 motors, amongst other things, more sheet metal is used in the stator and the rotor, which in turn increases the moment of inertia of the motor in comparison with an EFF2 motor. This is more than compensated by the starting torque, which is also increased. Usually, in mains operation and without load, IE2 motors accelerate about 10% faster than EFF2 motors. This is more or less pronounced in individual motors.

The following table provides the exact values in the column "Start-up time without load". Negative values mean a shorter start-up time, while positive values mean a longer starting time, expressed in % of the start-up time.

Motor (4-pole)	Starting torque			Breakdown torque			Moment of inertia			Start-up time without load
	P_{Nom} [kW]	EFF2 M_A/M_N	IE2 M_A/M_N	Deviation in percent %	EFF2 M_K/M_N	IE2 M_K/M_N	Deviation in percent %	EFF2 [kgm ²]	IE2 [kgm ²]	Deviation in percent %
0,75	2,0	3,0	50	2,10	3,10	48	0,0015	0,0019	31	-12
1,10	2,3	3,1	35	2,60	3,50	35	0,0024	0,0034	45	7
1,50	2,3	3,3	43	2,60	3,50	35	0,0031	0,0039	25	-10
2,20	2,3	3,7	61	3,00	4,30	43	0,0045	0,0075	67	10
3,00	2,5	3,1	24	2,90	3,50	21	0,0060	0,0075	25	2
4,00	2,3	3,1	35	2,80	3,60	29	0,0110	0,0140	27	-3
5,50	2,1	3,1	48	2,70	3,50	30	0,0240	0,0320	33	-3
7,50	2,5	3,3	32	2,80	3,90	39	0,0320	0,0350	9	-19
11,00	2,4	2,9	21	2,90	3,40	17	0,0500	0,0670	34	13
15,00	2,9	3,0	3	3,50	3,50	0	0,0670	0,0920	37	35
18,50	3,2	2,9	-9	3,80	3,20	-16	0,0800	0,1300	63	86
22,00	3,3	2,8	-15	3,80	3,10	-18	0,0920	0,1600	74	109

The large thermal reserves of IE2 motors can be taken into account in the design of the gear unit. The following table describes the maximum permissible continuous thermal load. Overloads as per IEC 60034-1 are also permissible.

1500 / 1800 1/min
50 / 60 Hz

Extended operation range

Type	P_N [kW]	f [Hz]	P_{S1max} [kW]	U [V]	ΔU [%] +/-	P_{S1max}^*				
						n_N [1/min]	M_N [Nm]	I_N [A]	cos ϕ	η [%]
80 SH/4	0,55	50	0,75	400	5	1355	5,28	1,80	0,79	75,0
		60	0,8	460	10	1675	4,58	1,63	0,78	79,0
80 LH/4	0,75	50	1,1	400	5	1325	7,9	2,50	0,84	75,0
		60	1,125	460	10	1670	6,5	2,12	0,82	81,0
90 SH/4	1,1	50	1,5	400	10	1390	10,4	3,11	0,86	81,2
		60	1,5	460	10	1715	8,4	2,67	0,84	84,4
90 LH/4	1,5	50	2,2	400	5	1345	15,5	4,67	0,86	79,3
		60	2,25	460	10	1680	12,8	4,02	0,84	83,8
100 LH/4	2,2	50	3,3	400	10	1395	22,7	6,64	0,87	82,7
		60	3,3	460	10	1720	18,4	5,63	0,86	85,9
100 AH/4	3	50	3,5	400	10	1395	24,1	7,39	0,82	83,0
		60	4	460	10	1700	22,6	6,96	0,84	85,7
112 MH/4	4	50	5	400	10	1425	33,7	9,79	0,86	86,0
		60	5,5	460	10	1730	26,3	9,21	0,86	87,8
132 SH/4	5,5	50	7,5	400	10	1440	50,2	14,1	0,89	87,3
		60	8,25	460	10	1740	45,6	13,3	0,89	88,2
132 MH/4	7,5	50	9,5	400	10	1445	63,4	18,2	0,84	87,3
		60	11,25	460	10	1740	62,3	18,8	0,86	87,9
132 LH/4	9,2	50	10	400	10	1440	66,9	21,1	0,78	88,6
		60	11,5	460	10	1740	63,5	20,3	0,80	89,6
160 SH/4	9,2	50	11	400	10	1460	72,7	19,8	0,90	89,6
		60	13	460	10	1755	71,4	20,2	0,90	90,0
160 MH/4	11	50	15	400	10	1445	100	27,5	0,90	88,2
		60	16,5	460	10	1750	91	25,8	0,90	89,3
160 LH/4	15	50	18,5	400	10	1455	122	33,7	0,89	89,7
		60	22,5	460	10	1750	123	35,1	0,89	89,9
180 MH/4	18,5	50	22,5	400	10	1470	147	41,2	0,87	91,3
		60	27,5	460	10	1765	149	43,9	0,88	91,5
180 LH/4	22	50	26	400	10	1465	170	47,1	0,88	91,1
		60	30	460	10	1770	163	46,7	0,89	91,7
200 XH/4	30	50	35	400	10	1460	230	66,5	0,84	90,3
		60	40	460	10	1760	218	64,6	0,86	91,1

* Supplements to the motors ⇒ C14

Inverter operation

Frequency inverter operation

In comparison with simple mains operation, the possibilities of use of three-phase motors and geared motors are considerably extended by the use of frequency inverters.

The advantages at a glance:

- Continuous speed regulation over a wide range
- automatic matching of speed to load due to slip compensation with vector inverters
- Programmable acceleration ramp for gentle starting, which results in less stress on the gear unit and the application and high starting currents are avoided.
- Controlled, adjustable deceleration to a standstill (in some cases only a holding brake is required)
- Many software-based functions are available for the control and monitoring of the drive unit, up to dynamic positioning with NORD inverters.
- Possibility of energy savings due to adaptation of the process, optimisation, and energy saving functions of NORD inverters

NORD three-phase motors (non pole-switchable) are suitable for operation with normal frequency inverters. Due to the use of double-lacquered wire and phase isolation, the windings are protected against damage due to rapid voltage increase speeds, such as occur with modern inverters with pulse-width modulation. The use of du/dt or sinus filters is necessary for the inverter operation of motors in excess of 500V.

With inverter operation, the motors can continuously produce their full nominal power.

In general, there are no restrictions to the motor options for inverter operation. The motor brake and external fan must not be supplied from the motor power supply.

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

In general it is recommended that each speed-regulated drive unit is equipped with temperature sensors which are evaluated by the frequency inverter. This protects the motor against overheating.

Operation with frequency inverters - characteristic curves and planning

Here, we would like to present and answer a few important questions which contribute to the optimal use of frequency inverter drive units, for example:

- lowest possible frequency or speed,
- frequency increase above 50 Hz,
- power increase of three-phase motors by means of the 87Hz characteristic curve,
- extended speed adjustment range due to the 100Hz characteristic curve.

In principle, a three-phase asynchronous motor can be operated from 0 to twice the nominal speed. The maximum speed is determined by mechanical constraints.

Lowest possible frequency or speed

At low speeds, cooling by the motor fan is considerably reduced. As a result, the typical thermal losses of the motor are no longer adequately dissipated and overheating may occur in continuous operation. For operation at the nominal load, this range begins at speeds < 1/2 of the rated speed (25Hz).

This can be remedied by the use of an external fan, which rules out thermal problems.

Continuous operation is then possible with the lowest speeds (2 x 5Hz slip frequency).

Alternatively, the motor can be dimensioned larger.

With this, the drive unit is operated at a reduced motor load. Therefore, there is less power loss and an additionally increased thermal reserve due to the increased size of the motor.

Possible torques, overload and smooth running precision essentially depend on the performance of the frequency inverter used. If necessary, a low required speed or speed "0" is only possible by means of speed feedback from a rotary encoder.

Motor selection

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

Adjustment range 1 : 10 (5 - 50 Hz)

Three-phase asynchronous motors are designed for a nominal operating point (e.g. 400V/50Hz). The motor can output its nominal torque up to its nominal frequency.

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

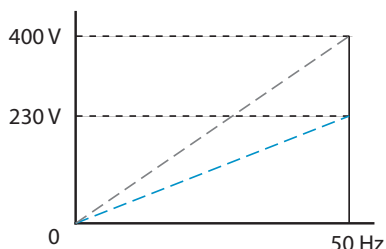
$$n_{Hz} = [(1500 \text{ U/min} \cdot f_{Hz}) / 50\text{Hz}] - \text{Slip speed}$$

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

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

A reduction of speed <50Hz does not result in an increased torque, as is the case with adjustable gear units, but rather to a reduction in power. In this case, the current remains constant for a constant torque and the voltage reduces with the frequency.

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



Above the nominal frequency the available torque reduces, as the voltage is no longer increased at higher frequencies. The magnetic flux reduces. This range is known as the field weakening range.

Physical conditions for constant torque:

$$M = \text{constant} \Rightarrow \Phi = \text{constant} \Rightarrow U/f = \text{constant}$$

Torque Magnetic flux Voltage/Frequency

The condition $V/F = \text{constant}$ can maximally only be realised by the frequency inverter up to the nominal operating point ($V_{nom}/f_{nom} = \text{constant}$). A further voltage increase above that of the mains voltage is technically impossible.

The torque reduces according to the relationship

$$1/x \Rightarrow M_{AB}/M_{NOM} = f_{Nenn}/f_{AB}$$

minus further losses due to the increased frequency

Example:

1,4 nominal frequency = 70 Hz

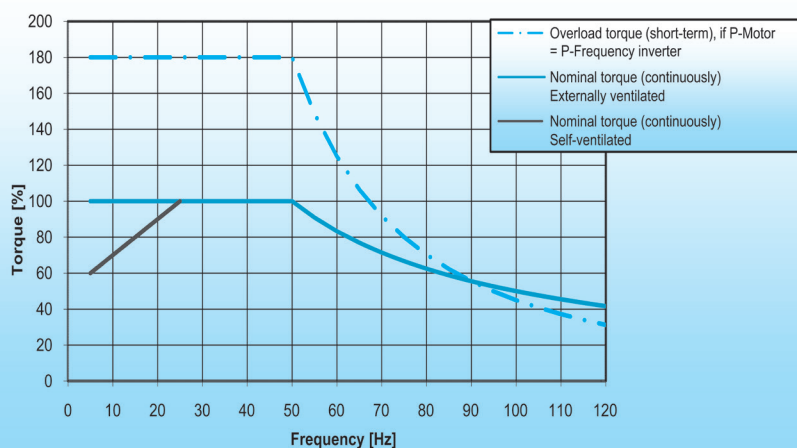
$$M_{70Hz} = \frac{f_{NOM}}{f_{AB}} \cdot M_{NOM} = \frac{50\text{Hz}}{70\text{Hz}} \cdot M_{NOM} = 71\% \cdot M_{NOM}$$

Under certain circumstances, the field weakening range begins before the actual point for the type is reached.

Possible causes of this are voltage losses due to the frequency inverter itself, as well as chokes or long cables.

In the field weakening range, the reduced overload capacity of the drive must be especially taken into account, as the field weakening has a greatly reduces the breakdown torque of the motor.

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



The thermal limit only applies for continuous operation.

The usual start-up and overload torques are still available from the frequency inverter for short-term operation.

This must be taken into consideration if the application does not require a constant torque over the entire adjustment range.

For example, centrifugal pumps and fans have a torque characteristic curve which increases in a quadratic function, which favours operation at low speeds.

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

Adjustment range 1 : 17 (5 - 87 Hz)

Advantages of this design are an increase in the motor power and speed above the nominal value for the motor, with a constant torque. Therefore there is a larger adjustment range of 1:17 or greater, or a smaller motor may be selected for a given power and adaptation of the gear ratio.

This is also accompanied by an improvement in efficiency.

Disadvantages are louder (fan) noise and the possible need for an additional gear stage.

With the 87Hz characteristic curve, the same thermal limits as for the 50Hz design apply to the low speed range ⇒ [A24](#).

However, the field weakening only starts above the break frequency of 87Hz.

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

- The motor must be connected for voltages from 3~230V, i.e. a → delta circuit for 230/400V motors (motors with 400/690V windings are not suitable for this type of operation and mains with 230V per phase)
- The frequency inverter must have an operating voltage from 3~400V and the nominal output current must at least correspond to the delta current of the motor. As a result:

$$\frac{\text{Inverter power}}{\text{Nominal motor power}} > 1,73$$

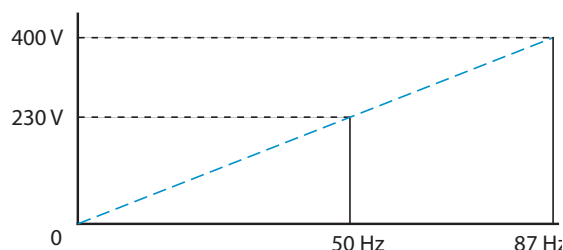
- Due to the higher maximum motor speeds it may be necessary to re-determine the reduction ratio of the gear unit

Note

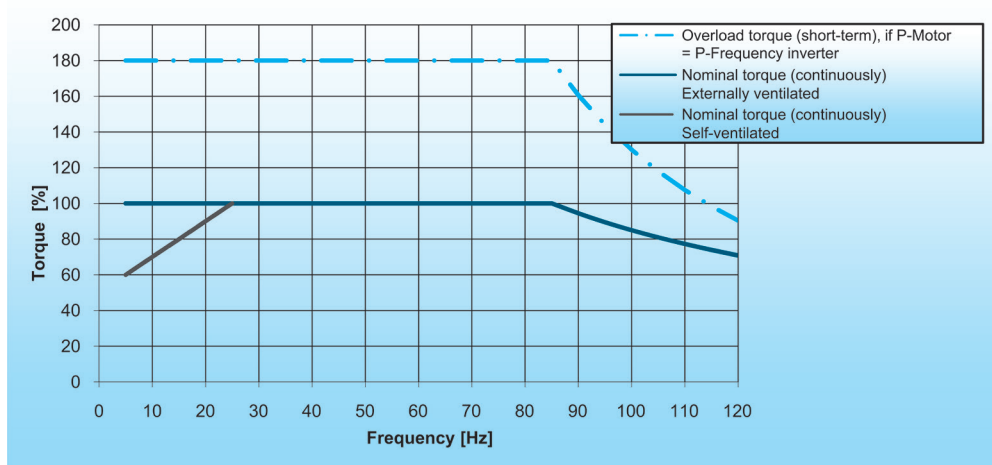
With this configuration of a **230V/50Hz motor on a frequency inverter with 400V**, the nominal operating point is at 230V/50Hz and the extended operating point is at 400V/87Hz.

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

Operation of a 230 V motor with 400 V is totally uncritical as the motor windings are designed for test voltages of > 2,000V.



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



It should be noted that the nominal torque of the motor does not increase. In particular, this does not alter the characteristics in the range from 0 to 50Hz. The normal adjustment range is 1:17 or higher.

Motor selection

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

Adjustment range 1 : 20 (5 - 100 Hz)

The field weakening range includes the entire range up to the 100Hz point, which results in a very large adjustment range. Smaller speeds can be better used, as the three-phase motor is operated with a reduced torque.

This means that the motor is not operated at its thermal limit, but in spite of this works on a vector-controlled frequency inverter using precisely matched motor data.

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

- The motor must be connected for voltages of 3~230V, i.e. for 230/400V motors this is a → delta circuit
- New 100Hz motor data must be calculated → 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 it may be necessary to re-determine the reduction ratio of the gear unit

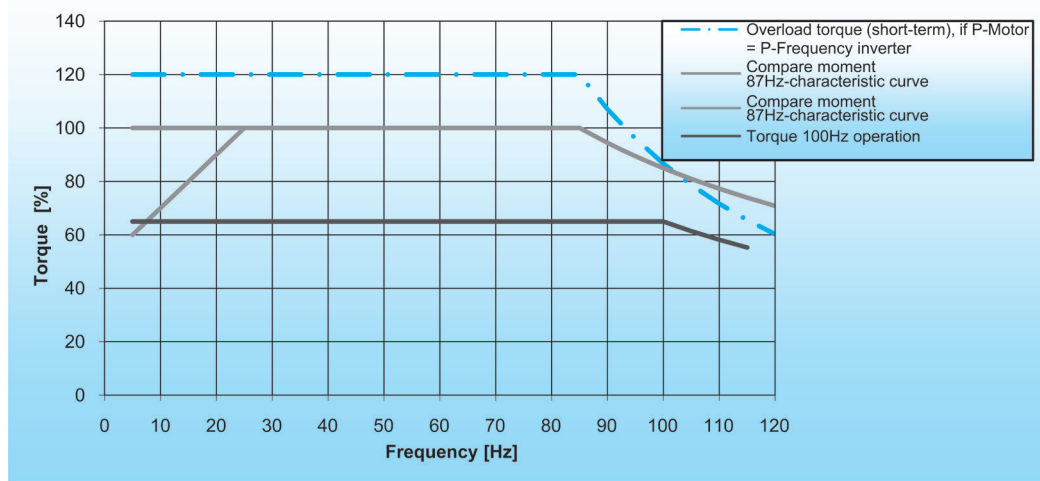
Note

In this configuration the nominal operating point of the DS standard motor is at 400V/100Hz. This is possible with the recalculation of the motor data by us.

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

According to the size of the motor, the reduction of the output torque is between 30 and 40%, however this is compensated by a larger gear reduction for the same output speed.

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



Selection of the frequency inverter and motor

The frequency inverter is selected according to the mains voltage and the nominal current of the motor (taking the characteristic curves into account), whereby: **Nominal inverter output current \geq Nominal motor current**. For 4-pole motors, the selection is usually according to the performance data.

4-pole asynchronous motors have become established as the market standard. However, in principle motors with other numbers of poles can be operated on frequency inverters. In this case, the inverter must be selected according to the current and the speed adjustment range must be planned separately.

In addition to the control cabinet inverters SK500E and SK700E (see brief catalogues F3050 and F3070), NORD also supplies decentralised SK200E frequency inverters with high protection classes for direct mounting on the motor (\Rightarrow brief catalogue F3020). The description above is also valid in this case, although several special features should be noted with regard to the motor options, e.g. direct brake control by the frequency inverter. For further details please refer to the brief catalogues F3020 and F3070 as well as the operating instructions BU200 and BU750.

Design with the operating point at 70Hz

A further variant to obtain an increased adjustment range is provided by a design with the operating point at 70Hz. The procedure uses the 50Hz characteristic curve, but sets the gear ratio so that the maximum speed is achieved at 70Hz. An additional gear stage is rarely necessary for this. There are no changes to the frequency inverter and the motor in comparison with the 50Hz characteristic curve.

Advantages:

- the adjustment range increases to 1 : 14 (5 - 70 Hz)
- higher torques over large areas of the adjustment range, especially 5 - 50 Hz

Due to the field weakening, above a frequency > 70 Hz the torque reduces to a greater extent than it increases due to the higher gear ratio.

Calculation of torque

Typical geared motor, mains operation	Typical geared motor on frequency inverter
<ul style="list-style-type: none"> • $n_2 = 100$ U/min • $M_2 = 100$ Nm • $f = 50$ Hz 	<ul style="list-style-type: none"> • $n_2 = 10 - 100$ U/min • $M_2 = 100$ Nm • $f = 7 - 70$ Hz (approx.)
$P = (100 \text{ Nm} / 9550) \cdot 100 \text{ U/min}$ $P = 1,05 \text{ kW}$, selected = 1,1 kW motor 90S/4	$P = (100 \text{ Nm} / 9550) \cdot 100 \text{ U/min}$ $P = 1,05 \text{ kW}$, selected = 1,1 kW motor
$i = 1500 \text{ U/min} / 100 \text{ U/min} = 15$	$i = 2100 \text{ U/min} / 100 \text{ U/min} = 21$
$M_{N(50\text{Hz})} = (1,1 \text{ kW} \cdot 9550) / (1500 \text{ U/min} / 15)$	$M_{N(50\text{Hz})} = (1,1 \text{ kW} \cdot 9550) / (1500 \text{ U/min} / 21)$
$M_{N(50\text{Hz})} = 105 \text{ Nm}$	$M_{N(50\text{Hz})} = 147 \text{ Nm}$ $M_{N(70\text{Hz})} = 105 \text{ Nm}$
$M_A = 2,3 \cdot 105 \text{ Nm} = 240 \text{ Nm}$ $2,3 = M_A / M_N$ with 90S/4 motor	$M_A = 1,7 \cdot 147 \text{ Nm} = 250 \text{ Nm}$ with assumed 1.7 x inverter overload

Maximum motor speeds

Motors have a maximum speed of 4200rpm or $f_{\text{max}} = 140\text{Hz}$.


⚠ Special measures (Viton sealing rings on the A + B side) are recommended above the speeds described below. All details relate to the operating mode S1, continuous operation. For short periods, the motors can deliver higher speeds 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	Significance	Unit
ED	Relative switch-on time	[%]
P_N	Nominal power	[kW]
n_N	Nominal speed	[min ⁻¹]
n_{syn}	Synchronous speed:	[min ⁻¹]
I_A	Start-up current	[A]
I_N	Nominal current	[A]
I_A / I_N	Start-up current / nominal current (Relationship of start-up current to nominal current)	[-]
$\cos \varphi$	Power factor	[-]
η	Efficiency	[%]
M_A	Starting torque	[Nm]
M_N	Nominal torque	[Nm]
M_A / M_N	Starting torque / nominal torque (relationship of starting torque to nominal torque)	[-]
M_K	Breakdown torque	[Nm]
M_K / M_N	Breakdown torque / nominal torque (relationship of breakdown torque to nominal torque)	[-]
M_B	Braking torque	[Nm]
J	Moment of inertia	[kgm ²]
J_x	external moment of inertia reduced onto the motor shaft	[kgm ²]
J_L	Moment of inertia of the load	[kgm ²]
U	Voltage	[V]
L_{PA}	Noise level	[dB(A)]
L_{WA}	Noise level	[dB(A)]
t_E	Heat-up time in blocked condition (Exe motors)	[s]
Z_o	Switching frequency without load	[1h]
S_F	Service-factor (only for NEMA)	[-]
T_{amb}	Ambient temperature	[°C]
Code Letter	The Code Letters are a measure of the mains load for direct switch-on of the motor. These are defined in the context of the NEMA standard and are coded with a letter from A to V (only for NEMA).	



			Standard / IE1	IE2 / IE3	AR	KR	CUS
Abbreviation	Significance	⇒ 					
BRE +	Brake / braking torque + sub-option	B2-19	X	X	X	X	X
DBR +	Double brake + sub-option	B15	X	X	X	X	X
RG *	Corrosion protected version	B13	X	X	X	X	X
SR *	Dust and corrosion protected version	B13	X	X	X	X	X
IR *	Current relay	B14	X	X	X	X	
FHL *	Lockable manual release	B13	X	X	X	X	X
HL 1)	Manual brake release	B13	X	X	X	X	X
MIK	Micro switch	B13	X	X	X	X	X
AS55	Outdoor installation	A52	X	X	X	X	X
* not with DBR							
BSH	Anti condensation heater / Brake	B14	X	X	X	X	X
NRB1/2	Noise-reduced brake	B14	X	X	X	X	
ERD	External earth terminal	A30	X	X	X	X	
TF	Thermistor, PTC resistor	A30,50	X	X	X	X	X
TW	Thermostat, bimetallic switch	A30,50	X	X	X	X	X
SH	Anti condensation heater	A30	X	X	X	X	X
WU	Silumin rotor	A30	X				X
Z	Heavy fan, cast-iron fan	A31	X	X**			X
WE +	2. shaft end	A31	X	X	X	X	X
HR	Handwheel	A30	X	X	X	X	
RD	Protective shield	A30	X	X	X	X	X
RDT	Protective shield, textile fan cowl	A31	X	X	X	X	X
RDD	Double fan-cowl	A30	X	X	X	X	X
AS66	Outdoor installation	A51,52	X	X	X	X	X
OL	Without fan	A32	X				X
OL/H	Without fan, without cover	A32	X				X
KB	closeable condensation hole	A30	X	X	X	X	X
MS	Plug-on motor coupling	A39	X	X	X	X	X
EKK	One-piece terminal box	A31	X	X	X	X	X
KKV	Terminal box, encapsulated	A31	X	X	X	X	X
FEU	Moisture protection insulation	A30	X	X	X	X	X
TRO	Tropicalised insulation	A31	X	X	X	X	
MOL	Dairy version	A31	X	X	X	X	
VIK	Regulation - Vereinigung Industrieller Kraftwirtschaft [Association of the Industrial Power Industry]	A30	X	X	X	X	
F	External fan	A33	X	X	X	X	X
RLS	Back stop	A32	X	X	X	X	X
IG1 (IG11, 12)	Pulsed incremental encoder 1024	A36	X	X	X	X	X
IG2 (IG21, 22)	Pulsed incremental encoder 2048		X	X	X	X	X
IG4 (IG41, 42)	Pulsed incremental encoder 4096		X	X	X	X	X
MG	Magnet-Incremental encoder	A34	X	X	X	X	X
SL	Sensor bearings	A35	X	X	X	X	X
IG	Incremental encoder	A36	X	X	X	X	X
IG.P	Incremental encoder with plug	A37	X	X	X	X	X
IG.K	Incremental encoder with terminal box	A37	X	X	X	X	
AG	Absolute encoder	A38	X	X	X	X	X
RE	Resolver	A38	X	X	X	X	X

** Option Z not available for efficiency class IE3/PE in Size 63 and Size 71

1) Option HL must be swiveled in certain circumstances - see WN-0-900-03



External earth terminal (ERD)

A corrosion-resistant earth terminal in the form of a flat terminal or terminal strap is fastened to the motor housing.

E.g.: 112 M/4 **ERD**

Thermal motor protection (⇒ A50)

NORD can supply two heat protection components for an extra charge.

- **TW** = Bimetal temperature sensor
- **TF** = Thermistor temperature sensor

Protective cover (RD)

Protection against rain and entry of foreign bodies for vertical installation with the shaft pointing downwards. For explosion protected motors as per DIN 50014 the protective cover is generally mandatory for vertical installation with the shaft pointing downwards.

E.g.: 112 MH/4 **RD IM V5** (⇒ C24 and above)

Double fan cowl (RDD)

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

E.g.: 132 SH/4 **RDD IM V5** (⇒ C24 and above)

Condensation drain hole (KB)

According to the installation position, condensation drain holes are provided at the lowest point of the A or B bearing cover. These are closed with cheese head screws.

The version must be stated!

E.g.: 71 S/4 **KB IM B3** (⇒ C24 and above)

Before commissioning and during operation, the condensation drain holes must be opened regularly in order to drain the condensation.

Standstill heating (SH)

A standstill heater must be used in case of severe temperature fluctuations, high humidity or extreme climatic conditions. This prevents condensation inside the motor.

The standstill 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

Please state the required connection voltage!

E.g.: 100 LH/4 **SH 230V**

Increased moisture and acid protection (EP)

Measures: The windings, stator hole and rotor are treated with a special lacquer.

Silumin rotor (WU)

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

Not possible for IE2 motors!

Handwheel (HR)

Motors with a handwheel mounted on the 2nd end of the shaft; e.g.: 132 MH/4 **HR** (⇒ C38)

Moisture protection insulation (FEU)

For motors which are to be used in a damp environment, we recommend the use of the version with moisture protection insulation.

E.g.: 71L/4 **FEU**

VIK version (VIK)

Motors compliant with the technical requirements of the "Verband der Industriellen Energie- und Kraftwirtschaft".

Only available as geared motor!

E.g.: 100 LH/4 **VIK** Please enquire!



2. shaft end (WE)

Motors with a second shaft end on the B side. For motors with and without a brake. This option cannot be combined with the options; (⇒ C25-C35)

- External fan (F)
- Attached rotary encoder (IG)
- Protective cover (RD)
- Protective cover, textile fan cowl (RDT)
- Double fan cowl (RDD)

Please ask about the power which can be transferred and the permissible radial forces on the 2nd end of the shaft.

E.g.: 112 MH/4 WE

Protective cover, textile fan cowl (RDT)

These motors have a fan cowl which is specially designed for use in the field of textiles. The lack of a normal ventilation grille prevents the build-up of flakes and fluff, which could impair the cooling of the motor.

- ⚠ possible for motor types 63 to 132;
e.g.: 80 S/4 RDT IM V5 (⇒ C24 and above)

Tropicalisation (TRO)

For motors used under extreme climatic conditions (tropics) we recommend the tropicalised versions.

E.g.: 71 L/4 TRO

Dairy version (MOL)

Motor with cooling ribs

Measures:

- Condensation drain hole (KB)
- Encapsulated terminal box (KKV)
- Knurled screws for fastening the fan cowl
- V2A stainless steel type plate

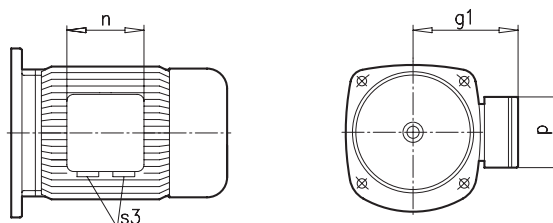
- ⚠ The version must be stated!
E.g.: 80 S/4 MOL IM B6 (⇒ C24 and above)

One-piece terminal box (EKK)

Version with a small, one-piece terminal box. Note the cable gland (⇒ A50).

E.g.: 63 L/6 EKK (⇒ C40)

Not possible with 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)

Terminal box base encapsulated in direction of interior.

E.g.: 80 LH/4 KKV

Cast iron fan (Z)

Motor with cast iron fan, for more gentle starting with mains operation.

Type	Power Code	Moment of inertia J _Z [kgm ²]
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 (at the 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

E.g.: 90 S/8-2 Z

Motor length as for brake motors!



Back stop (RLS)

Back stops are used in order to prevent reverse rotation due to the load while the motor is switched on.

With a back stop, the drive can only be in the direction of rotation. The required direction of rotation of the drive must be stated with the order.

E.g.: 100 LH/4 **RLS CW**

⚠ Caution with motors with larger pole numbers (>4) and FI operation: the lift off speed must be complied with! The back stop only works without wear above the lift off speed.

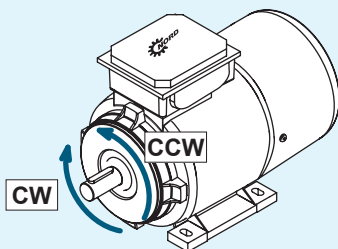
Type	RLS [Nm]	Lift of speed n [min ⁻¹]	Motor extension x _{RLS} [mm]
80	130	860	64
90	130	860	75
100	130	860	91
112	370	750	93
132	370	750	107
160	890	670	135
180 .X	890	670	135
180	1030	630	127
200	1030	630	127
225	1030	630	180
250 .W	3600	400	180

See brake motors for motor lengths!

⚠ The required direction of rotation of the drive must be stated with the order!

CW = Clockwise - Clockwise direction of rotation, **Right-hand rotation**

CCW = CounterClockwise - Counter clockwise direction of rotation, **Left-hand rotation**



Without fan (OL) IC410 TENV Without fan / without fan cover (OL/H)

With these versions, the motor is supplied without a fan (OL) or without a fan and without a fan cover.

E.g.: 63 S/4 **OL/H** (⇒ C40)

Advantages: There is no noise from the fan, the installation length is reduced with OL/H. For confined installation spaces.

⚠ Reduction in power or only for operating mode S3-40%
Not possible for efficiency class IE2!

Motor protection switch

Motors can be monitored by motor protection switches fitted by the customer. Due to their functional principle, such devices are especially suitable for protecting motors against starting against a blockage or a load with is too large.

⚠ If the nominal current of the motor changes, e.g. due to the change to an IE2 motor, this must be taken into account for the setting of the motor protection switch.



External fan (F) IC416 TEBC

Typical cases of use are drive units which are controlled by a **frequency inverter**, which are under full torque at low speeds for long periods of time, or drive units in cyclical operation with high switching frequencies (operating mode S4). The external fan is integrated into the fan cowl of the three-phase motor.

For the dimensions of the extension, please refer to ⇒ C36-37.

Care must be taken that the external fan is connected separately from the three-phase motor. The motor should also be equipped with a temperature sensor to protect it against failure of the external fan.

Type suffix **F** = External fan with protection class IP66 with separate terminal box (⇒ A50 Cable glands)

External fan are suitable for 50 Hz and 60 Hz, it is to noted the specified voltage (note the type plate from external fan).

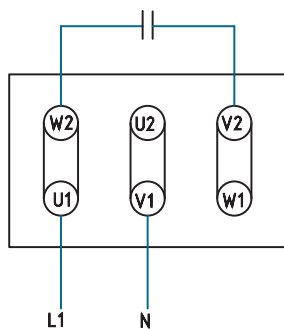
For single phase operation			For three-phase operation		
Steinmetz circuit	230V - 277V	50 + 60 Hz	Star circuit	346V - 525V	50 Hz
			Delta circuit	200V - 303V	50 Hz
			Star circuit	380V - 575V	60 HZ
			Delta circuit	220V - 332V	60 HZ

As standard, external fans for sizes 63 - 90 are connected for single phase operation. For sizes 100 and larger, they are connected for three-phase operation.

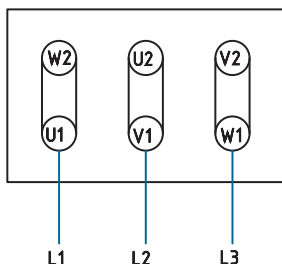
Type	1~, 50 Hz				3~, 50 Hz Δ / Y					
	U_N [V]	I_N [mA]	P_N [W]	n_N [min ⁻¹]	$U_{N\Delta}$ [V]	$I_{N\Delta}$ [mA]	U_{NY} [V]	I_{NY} [mA]	P_N [W]	n_N [min ⁻¹]
63	230 - 277	88 - 106	19 - 27	2830 - 2875	200 - 303	60 - 116	346 - 525	35 - 66	16 - 28	2630 - 2900
71	230 - 277	90 - 104	20 - 27	2768 - 2866	200 - 303	62 - 112	346 - 525	36 - 64	15 - 31	2680 - 2875
80	230 - 277	99 - 107	22 - 29	2625 - 2780	200 - 303	66 - 109	346 - 525	38 - 62	18 - 31	2582 - 2818
90	220 - 277	215 - 293	41 - 65	2885 - 2923	200 - 303	180 - 379	346 - 525	104 - 219	36 - 91	2860 - 2931
100	220 - 277	223 - 282	46 - 66	2820 - 2888	200 - 303	182 - 372	346 - 525	105 - 215	43 - 91	2800 - 2906
112	220 - 277	252 - 284	54 - 71	2705 - 2845	200 - 303	191 - 353	346 - 525	110 - 204	50 - 97	2730 - 2880
132	230 - 277	220 - 281	41 - 61	1450 - 1460	200 - 303	189 - 376	346 - 525	109 - 209	31 - 81	1435 - 1466
160	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
180	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
200	230 - 277	351 - 446	64 - 93	1438 - 1460	200 - 303	318 - 622	346 - 525	184 - 346	51 - 118	1415 - 1456
225	-	-	-	-	200 - 400	490 - 1100	346 - 525	290 - 350	142 - 285	1330 - 1455
250	-	-	-	-	200 - 400	490 - 1100	346 - 525	290 - 350	142 - 285	1330 - 1455

External fans cool the motor regardless of the motor speed and with appropriate circuitry also when the motor is switched off.

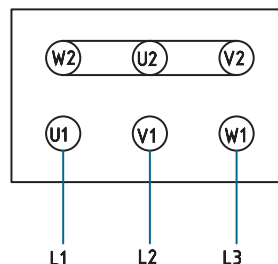
Circuit diagrams for external fans



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



Encoders

Magnet-Incremental encoder (MG)

A competitively priced, robust, and flexible incremental encoder system will be offered for NORD engines with a 63 to 180 motor frame. The system operates based on a contactless, magnetic measuring principle and does not require its own storage. This makes it very vibration-resistant and insensitive to shocks that affect the power unit. The installation of the sensor occurs on the B-side of the engine. The magnet sensor is attached to the wave and the evaluation sensor attached to the fan cover using a threaded hole. The system's alignment tolerates +/- 1mm in all 3 axes. A special design of the magnetic system also enables its implementation in the vicinity of electric brakes. The sensor delivers 2 output channels (channels A and B) that give off the impulse edges, offset by 90°. This enables rotational direction recognition and impulse quadrupling.

As its lowest resolution, NORD offers an encoder with 1 impulse/revolution (1ppr), which outputs a „1“ and then a „0“ per 180° on the engine shaft. This enables cost-effective monitoring that does not require a fast PLC or meter input. For the version with 512 ppr, it must be taken into account that the absolute accuracy is lower than for a conventional encoder system due to assembly tolerances. The impulse times can vary slightly, as the absolute accuracy is typically around 200ppr.

Wire allocation / Color	Function allocation
red	Voltage supply (+)
black	Voltage supply (-)
brown	Channel A
orange	Channel B

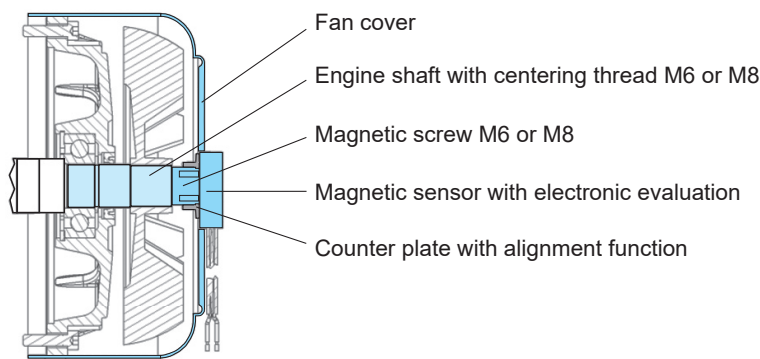
Technical Data	Value Range	
Standard resolutions	1 ppr, 32 ppr, 512 ppr (Pulse/revolution)	
Output signals (Line A and B)	HTL level push-pull / max. 40 mA / short circuit protected	
Supply voltage and power consumption without load	10-30 VDC / < 30 mA	
EMV and ESD- strength	EN 55022: Class B (30...1000 MHz) EN 61000-4-2: Contact 4 kV/Air 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 the connecting line and sheath cross-section	1000 mm / Ø 4,9 mm	
Number of wires and cross-section	4x Ø 0,34 mm ² (AWG22)	
Engine dimensional change	max. 20 mm longer	

Construction of the magnetic encoder system

The magnetic encoder system's assembly process is kept very simple using an automatic alignment function. The alignment occurs automatically when the screws are tightened on the fan cover and the sensor casing.

Only the cams still grind down on the counter plate during the subsequent test run. The connection line will subsequently be fixed to the fan cover and the sensor casing.

Sectional drawing/line length



⚠ Motor extension at magnetic encoder ⇒ C39.



Type code	Options
MG = Magnet-Incremental encoder 01 = 1 impulse 20 = 32 impulse 50 = 512 impulse O = loose cable ends (Standard)	<ul style="list-style-type: none"> MG ... M 4-pole, A-encoded M12 flange plug on the terminal box MG ... N 4-pole, A-encoded M12 coupling plug MG ... V 4-pole line connector for line extension
E.g. MG 50 O Magnet-Incremental encoder (MG) with 512 impulse (50) and loose cable ends (O)	

Allocation Coupling plug / Line connector	Function allocation	M12 plug allocation	Function allocation
Pin 1 / red	Voltage supply (+)	Pin 1 / brown	Voltage supply (+)
Pin 2 / brown	Channel A	Pin 2 / white	Channel A
Pin 3 / orange	Channel B	Pin 3 / blue	Channel B
Pin 4 / black	Voltage supply (-)	Pin 4 / black	Voltage supply (-)

Sensor bearing (SL)

Upon request, for NORD engines with the frame size 63 to 132, a design with sensor bearing (SB) can also be delivered. When doing so, the engine-side floating bearing will be exchanged for a ball bearing with a magnetic ring on the inner ring and evaluation electronics (hall sensor) on the outer ring. The connecting line runs inside the engine through the changing room into the terminal box. The sensor bearing generates 2 rectangular signals phase-shifted by 90°, which enable the determination of the rotational direction. The number of impulses 32, 48, 64 or 80 is dependent on the number of poles on the magnetic ring. The pulse number rises along with the bearing size.

Due to the small amount of space on the sensor bearing, the electronics do not have any short-circuit proof driver outputs. The sensor bearing also possesses open collector-outputs, which require external Pull-up resistors.

The rotational direction orientation also changes during the evaluation of A+B lines, depending on the floating bearing position in the engine (A- or B-side). NORD recommends the implementation of an additional protective circuit which would be housed in the terminal box.

Wire allocation / Wire color	Function allocation
red	Voltage supply (+)
black	Voltage supply (-)
white	Channel A
blue	Channel B

The combination sensor bearing with brake must be checked in each individual case on its viability.

Technical Data	Value Range
Resolution depends on the warehouse size	32ppr / 48ppr / 64ppr / 80ppr
Output signals (Line A and B)	Open collector level / max. 20mA Not short circuit-protected; Additional protective circuit available
Supply voltage and power consumption without load	10-24VDC / < 15mA
EMV and ESD strength	EN 61000-4-2: Contact 4 kV/Air 8 kV EN 61000-4-3: 10V/m EN 61000-4-8: 30A/m
Temperature range	-20 ... 100°C
Speed range	0 ... 5000 min ⁻¹
Protection class	IP68
Connecting line length	internally conducted to the terminal box
Number of wires and cross-section	4 x Ø 0,14 mm ² (AWG26)

Options

- Protective circuit integrated in the terminal box
- 4-pole, A-encoded M12 flange plug on the terminal box

M12 plug allocation	Function allocation
Pin 1 / brown	Voltage supply (+)
Pin 2 / white	Channel A
Pin 3 / blue	Channel B
Pin 4 / black	Voltage supply (-)



Encoders

Incremental encoder (IG)

Modern drive applications often require a speed feedback. Incremental encoders, which convert the rotary movement into electrical signals are usually used for this. These signals are read and processed by frequency inverters or other control devices.

Incremental encoders function according to the photoelectric principle by scanning a disc with line divisions.

The integrated electronics convert the measurement signals into a digital square wave signal for TTL or HTL logic. Types with different resolutions or numbers of lines are available. The standard encoder produces 4096 pulses per rotation.

The following requirements can be implemented with NORD frequency inverters:

- Speed control with wide range of adjustment
- High speed precision, independent of the load
- Synchronous control
- Positioning control
- Standstill torques
- High overload reserves

Technical Data	Type / Puls number		
	IG1 / 1024	IG11 / 1024	IG12 / 1024
	IG2 / 2048	IG21 / 2048	IG22 / 2048
	IG4 / 4096	IG41 / 4096	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]	- 40...+70		
Protection class	IP66		
Max. current consumption [mA]	90	90	150

Connection assignment for rotary encoders

PIN	Colour	Signal	Flange socket assignment
1	pink	B\	<p>The shield lies on the housing</p>
2	blue	+ U _B Sensor	
3	red	0	
4	black	0\	
5	brown	A	
6	green	A\	
7	violet	Vacant	
8	grey	B	
9		Vacant	
10	white / green	0 V	
11	white	0 V Sensor	
12	brown / green	U _B	



Attachment of incremental encoders

Rotary encoders can be attached to motors of sizes 63 to 200.

The motors may be either self ventilated or externally ventilated, and with or without brakes. The NORD hollow shaft push-on rotary encoder is mounted directly on the B side end of the motor shaft, where it is protected by the fan cover. This ensures a secure, torsion-free coupling of the encoder.


Electrical connection is by means of a pre-assembled cable (standard: 1.5 m long with open cable ends. Other lengths or versions with plugs are possible).

Cable	Bending radius (standard)
Fixed attachment	26 mm
Flexible attachment	78 mm

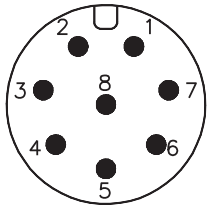
Incremental encoders without plugs

⚠ The end of the cable is sealed with the ESD shield. This protects the cable against electrostatic voltages. The connection must be made in an ESDF compliant manner!

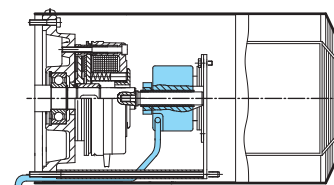
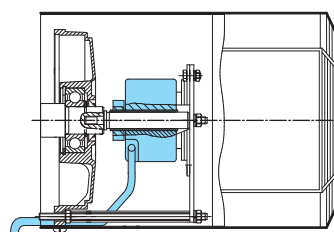
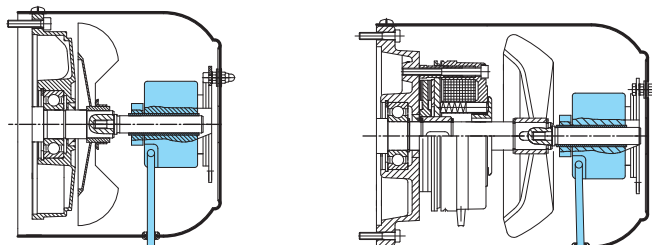
IG1K, IG2K or IG4K

Alternatively, connection in a separate terminal box is possible with the options IG1K, IG2K or IG4K (extra charge) ⇒  A50 Cable glands M20x1,5.

Incremental encoder with 8-pin plug (IG.P)

PIN	Color	Signal	
1	white	0V	
2	brown	+ U _B	
3	green	A	
4	yellow	A\	
5	gray	B	
6	pink	B\	
7	blue	0	
8	red	0\	

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



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

NORDAC frequency inverter series	Incremental encoder logic
SK700E with SK XU1-ENC or SK XU1-POS	TTL with 5V supply or 10 – 30V supply
SK520E, SK530E, SK535E	* TTL with 10 – 30V supply
SK200E, SK205E, SK210E, SK215E, SK220E, SK225E, SK230E, SK235E	HTL with 10 – 30V supply

Further details can be found in the frequency inverter operating instructions, e.g. BU 0500E.

An external electronic module to convert HTL signals to TTL signals (connection of encoder to 700E with very long cables) is available from NORD.

* HTL-Signal level is also possible, up to a_{max}. Frequency of 16 kHz



Encoders

Absolute encoder (AG)

Absolute encoders are transponders for rotary motion, which output absolute position information within the range of a single revolution of the motor (360°, single turn) or in addition, the number of revolutions related to a zero point (multiturn).

Typical values are 8192 (13Bit) steps per revolution and with multiturn encoders, additionally 4096 (12Bit) differentiation of the number of revolutions.

Single turn encoders are mounted on the output side of the system (typically: rotating platforms), while **multiturn encoders** can be mounted on the system drive unit or directly on the motor. With an absolute encoder, measurement of the number of revolutions is carried out either entirely electromagnetically or mechanically, by reducing the speed by means of small gear stages with additional barcode discs.

Advantages for positioning applications in comparison with incremental encoders

The position information is always up-to-date, even in case of position changes with the voltage switched off or in case of lost or corrupt pulses.

Absolute encoders cannot be used to control speed (with NORDAC inverters). However, combined encoders with absolute and additional incremental encoder signals are available.

Absolute encoders with different data protocols are available, e.g. SSI, CANopen or Profibus. Selection depends on the electronics used for evaluation!

Overview of multiturn absolute encoders

(only certain CANopen rotary encoders are approved for use with the SK500E and SK200E series)

Encoder type	Multiturn Absolute encoder with incremental signals	Multiturn Absolute encoder	Multiturn Absolute encoder without bus cover	Multiturn Absolute encoder with incremental signals	Multiturn Absolute encoder with incremental signals	Multiturn Absolute encoder with incremental signals
for inverter type	SK 700E + POS	SK 2xxE, SK 53xE	SK 53xE	SK 53xE	SK 2xxE	SK 53xE
Single turn 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)	4096 (12 Bit)	65536 (16 Bit)
Interface	SSI Gray Code	CANopen profile DS406 V3.1	CANopen profile DS406 V3.1	CANopen profile DS406 V3.1	CANopen Profil DS406 V3.1	CANopen profile DS406 V3.0
CAN address/ baud rate	-	adjustable	Fixed address 51, baud rate 125K	adjustable	adjustable	adjustable
Bus cover	-	Yes	No	Yes	Yes	Yes
Incremental encoder output	TTL / RS422 2048 Impulse	No	No	TTL / RS422 2048 Impulse	HTL 2048 Impulse	TTL / RS422 2048 Impulse
Power supply	10 – 30 VDC	10 – 30 VDC	10 – 30 VDC	10 – 30 VDC	10 - 30 VDC	10 – 30 VDC
Referencing	SET - Input	via CANopen	via CANopen	via CANopen	via CANopen	via CANopen
Scanning principle	optical / mechanical	optical / mechanical	optical / mechanical	optical / mechanical	optisch / mechanical	optical / magnetic
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	Cable end 2.0 m	M12 socket	M12 connector	Terminal IG: M12 connector
Temperature range	-30°C to +75°C	40°C to +80°C	-30°C to +75°C	-40°C to +80°C	-40°C bis +80°C	25°C to +85°C
IP protection class	IP 67	IP 67	IP 67	IP 67	IP 67	IP 66

Resolver (RE)

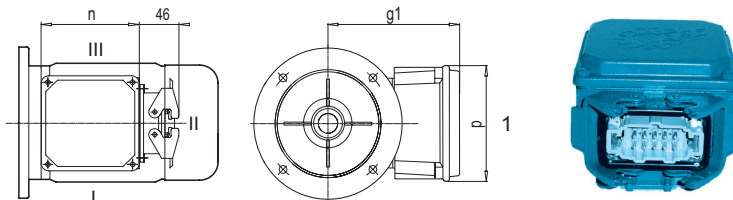
Resolvers can be fitted to NORD motors. **Please ask!**



Motor plug connectors (MS)

Normal version

Terminal box for 1, plug connector for II (to fan cover),
Plug connector possible for I + III



Type	63	71	80	90	100	112	132
g1 / g1 Bre	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, size 63 - 132 three-phase (brake) motors can also be supplied with motor plug connectors (type suffix: **MS**).

The plug connector is mounted on the side of the terminal box. The normal version points towards the fan cover with II Plugs for I or III are possible. Housings with 2-clamp transverse locking are used.

With motor sizes 63 - 112 a pin version type HAN 10 ES is fitted to the motor. The customer must provide a type HAN 10 ES plug socket (manufactured by Harting). Above motor size 132 the motor has a type HAN C modular pin version.

A fixed assignment of contacts is available for single-speed and switchable pole motors (separate windings and Dahlander pole switching). Contacts for thermistor temperature sensors or temperature monitors and the brake connection voltage are also assigned.

The motor plug connector is supplied without a mating plug and is protected from dirt by means of a protective cover.

Technical data for sizes 63 - 112

Connector: Han 10 ES/Han 10 ESS
 Number of contacts: 10
 Current: 16 A max.
 Voltage: 500 V max.
 (600 V max. according UL/CSA)
 Cage-clamp terminals

Technical data for sizes 132

Connector: Han C-Modular
 Number of contacts: 9
 Current: 22 A max.
 Voltage: 690 V max.
 Crimp connections

Please ask for detailed information!

See circuit diagrams ⇒ [A44 - 45](#)



ATEX (RL 94/9 EU) compliant motors

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

The term **ATEX** which is often used for explosion protection, come from the initial letters of the title of an older French directive “**AT**mosphères **Exp**losives” Based on this, in March 1994, the European Parliament adopted the EEC Directive 94/9/EEC to harmonize the legal regulations for devices and protective systems for correct use in explosion-protected areas.

In the design of mechanical and electrical equipment the objective is to prevent ignition or to restrict its effects. For this, the explosion protection regulations come into effect.

Gas explosion protection for Zone 1 and Zone 2

- Increased safety Ex e II
- pressure resistant encapsulation, increased safety terminal box Ex de IIC

Dust explosion protection

- **Zone 21** and **Zone 22**

Zone categorisation for inflammable gases and aerosols

Zone 1:

The area in which an explosive atmosphere consisting of air and inflammable gases, vapours or aerosols can **occasionally** form during normal operation.

Zone 2:

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

Categorisation of zones for inflammable dust

Zone 21:

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

Zone 22:

The area in which an explosive atmosphere in the form of a cloud of air and inflammable dust **normally does not occur**, or only occurs **for a short time**.

Increased safety (Ex e)

For motors of device categories 2G and 3G, i.e. the Ex-Zones 1 and 2, sparking and impermissible temperatures are prevented as per ignition protection type “**e**” (Increased Safety). This is achieved by the design of the fans and fan cowlings, the 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 are large air gaps between the rotating parts and large air gaps and leakage tracks in terminal boxes.

For the selection of the model it should be noted that in comparison with the corresponding standard motor, drive units with ignition protection type “**e**” often have a reduced output power. These motors have windings which are different to comparable motors for non-explosive areas. This results in a real reduction in power. These motors are usually used up to **Temperature Class T3**.

Pressure resistant encapsulation (Ex d and Ex de)

The ignition protection class “**de**” is based on a different protection concept. The construction withstands explosions in the interior of the motor and prevents the explosion from spreading to the surrounding atmosphere. These motors have increased wall thicknesses to protect them against the excess pressure which results from ignition. Among other things, these systems also require fans with protection class “**e**”.

The drive units provide the same rated power as motors which are not explosion protected and can be used in the same manner as 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**.

For further information, please refer to the ATEX catalogues

- G1001 Explosion protected drive units
Category 2G, Zone 1, gas
- G1022 Explosion protected drive units
Category 3D, Zone 22, dust



These catalogues can also be found under www.nord.com (Documentation/Catalogues)

Intelligent Drivesystems, Worldwide Services




ATEX
konform
II 2G

Ex

DE GB FR
G1001

Explosionsgeschützte Antriebe, Kategorie 2G, Zone 1, Gas
Explosion protected drive units, category 2G, zone 1, gas
Entraînements antidéflagrants, catégorie 2G, zone 1, gaz



Intelligent Drivesystems, Worldwide Services




ATEX
konform

Ex

DE GB FR
G1022



Explosionsgeschützte Antriebe, Kategorie 3D, Zone 22, Staub
Explosion protected drive units, category 3D, zone 22, dust
Entraînements antidéflagrants, catégorie 3D, zone 22, poussière



Motor inquiry form



Motor Inquiry

Company	<input type="text"/>		NORD DRIVESYSTEMS Rudolf-Diesel-Straße 1 D-22941 Bargteheide Fon +49(0) 4532/401-0 Fax +49(0)4532/401-254 E-Mail info@nord.com www.nord.com
Street	<input type="text"/>		
Town	<input type="text"/>		
Zip code	<input type="text"/>		
Contact	<input type="text"/>		
Fon	<input type="text"/>	Customer No.	<input type="text"/>
Fax	<input type="text"/>	Application	<input type="text"/>
E-Mail	<input type="text"/>	Project	<input type="text"/>

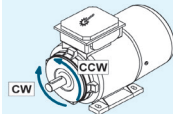


Quantity	<input type="text"/>	Type	<input type="text"/>
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Motor Parameters		Motor Parameters		
Mount		Frame	Size	Poles
<input type="radio"/> IEC B3 <input type="radio"/> IEC B5 <input type="radio"/> IEC B14 <input type="radio"/> NEMA C-Face <input type="radio"/> NEMA Foot <input type="radio"/> Integral Flange ø <input type="text"/> Pos. <input type="text"/>		<input type="radio"/> 63 <input type="radio"/> 71 <input type="radio"/> 80 <input type="radio"/> 90 <input type="radio"/> 100 <input type="radio"/> 112 <input type="radio"/> 132 <input type="radio"/> 160 <input type="radio"/> 180 <input type="radio"/> 200 <input type="radio"/> 225 <input type="radio"/> 250 <input type="radio"/> 280 <input type="radio"/> 315	<input type="radio"/> S <input type="radio"/> SH <input type="radio"/> M <input type="radio"/> MA <input type="radio"/> MH <input type="radio"/> MX <input type="radio"/> L <input type="radio"/> LA <input type="radio"/> LB <input type="radio"/> AH <input type="radio"/> LH <input type="radio"/> LX <input type="radio"/> XH <input type="radio"/> RH	<input type="radio"/> 4 <input type="radio"/> 2 <input type="radio"/> 6 <input type="radio"/> 4-2 <input type="radio"/> other <input type="text"/>
Enclosure		Operation Mode		
<input type="radio"/> IP 54 <input type="radio"/> IP 55 <input type="radio"/> IP 65 <input type="radio"/> IP 66 <input type="radio"/> IP 67 <input type="radio"/> IP 68		<input type="radio"/> S1 <input type="radio"/> S2 <input type="text"/> min <input type="radio"/> S3 <input type="text"/> % <input type="radio"/> S4 <input type="text"/> % <input type="radio"/> S6 <input type="text"/> % <input type="radio"/> S9		
Power		Isulation Class		
Power <input type="text"/> [kW]		<input type="radio"/> F <input type="radio"/> H		
Efficiency				
<input type="radio"/> IE1 <input type="radio"/> IE2 <input type="radio"/> IE3				
Coil				
<input type="radio"/> Standard <input type="radio"/> UL <input type="radio"/> CSA <input type="radio"/> CUS <input type="radio"/> CCC				

Motor Inquiry



Motor Parameters		Motor Parameters		
Voltage and Frequency <input type="radio"/> 230 / 400 V 50 Hz <input type="radio"/> 400 / 690 V 50 Hz <input type="radio"/> 115 / 230 V 60 Hz <input type="radio"/> 220 / 380 V 60 Hz <input type="radio"/> 332 / 575 V 60 Hz <input type="radio"/> 230 / 460 V 60 Hz <input type="radio"/> Other [] [V] [] [Hz]	Electrical Options <input type="radio"/> Normal Motor (3~ Motor) <input type="radio"/> ECR (1~ Motor) <input type="radio"/> EAR1 (1~ Motor) <input type="radio"/> EHB1 (1~ Motor) <input type="radio"/> EST (1~ Motor - Steinmetz) <input type="radio"/> TW <input type="radio"/> TF Temp [] [°C] <input type="radio"/> 2TF Temp [] [°C]	Mechanical Options <input type="radio"/> No Handwheel or 2nd Shaft Extension <input type="radio"/> HR <input type="radio"/> WE ø [] x [] [mm]	Mechanical Options <input type="radio"/> No RLS <input type="radio"/> RLS CW <input type="radio"/> RLS CCW 	
Frequency characteristic <input type="radio"/> 50 Hz Min. Freq. [] [Hz] <input type="radio"/> 87 Hz Max. Freq. [] [Hz] <input type="radio"/> 100 Hz Max. Freq. [] [Hz]	<input type="checkbox"/> SH <input type="radio"/> 110 V <input type="checkbox"/> ERD <input type="radio"/> 230 V <input type="checkbox"/> <input type="radio"/> 500 V	Encoder <input type="checkbox"/> IG <input type="radio"/> TTL <input type="radio"/> 5 V <input type="radio"/> HTL <input type="radio"/> 10 - 30 V <input type="radio"/> Sin / Cos Resolution <input type="radio"/> 512 <input type="radio"/> 1024 <input type="radio"/> 2048 <input type="radio"/> 4096	<input type="checkbox"/> AG Resolution Turns [] Step [] Bussystems <input type="radio"/> SSI <input type="radio"/> CANopen <input type="radio"/> ProfiBus <input type="radio"/> other [] <input type="checkbox"/> additional incremental signal (see IG)	
ATEX <input type="radio"/> No ATEX <input type="radio"/> ATEX (Please use separate Form)	Mechanical Options <input type="radio"/> No special Isulation <input type="radio"/> FEU <input type="radio"/> TRO <input type="radio"/> EP <input type="checkbox"/> KB <input type="checkbox"/> KKV <input type="checkbox"/> F <input type="checkbox"/> Z <input type="checkbox"/> EKK <input type="checkbox"/> MS	Brake Parameters <input type="radio"/> No-Brake <input type="radio"/> Normal Brake [] [Nm] <input type="radio"/> <input type="radio"/> Double Brake 2x [] [Nm]		
Mechanical Options <input type="radio"/> With Fan & Cover <input type="radio"/> RD <input type="radio"/> RDD <input type="radio"/> RDT <input type="radio"/> OL <input type="radio"/> OL/H	<input type="radio"/> Holding Brake/Emergency Brake <input type="radio"/> Working Brake <input type="radio"/> No Hand Release <input type="radio"/> NRB 1 <input type="radio"/> HL <input type="radio"/> NRB 2 <input type="radio"/> FHL <input type="checkbox"/> IP 66 <input type="radio"/> SR <input type="checkbox"/> MIK <input type="radio"/> RG <input type="checkbox"/> BSH <input type="radio"/> GP [] <input type="checkbox"/> IR <input type="radio"/> G [] V			Brake Supply <input type="radio"/> 24 VDC <input type="radio"/> 115 VAC <input type="radio"/> 200 VAC <input type="radio"/> 230 VAC <input type="radio"/> 400 VAC <input type="radio"/> 460 VAC <input type="radio"/> Other []
Remarks				

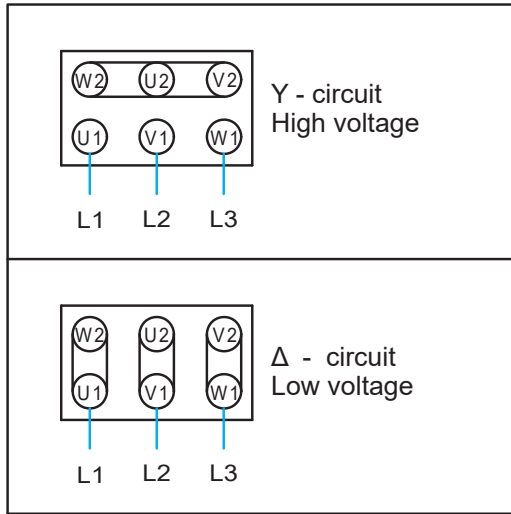


Motor enquiry forms are available www.driveefficiency101.com

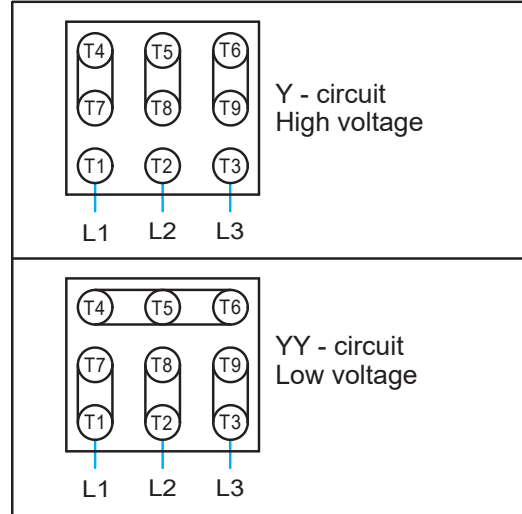
Circuit diagrams



Three-phase motor

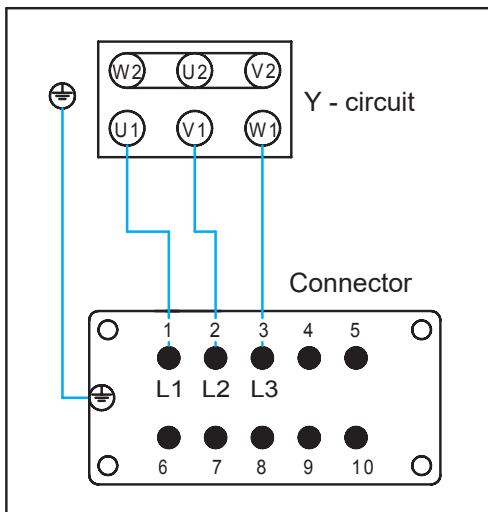


Three-phase motor NEMA (230 / 460V)

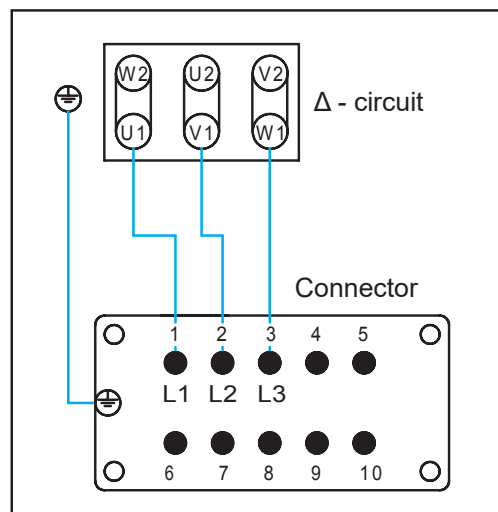


with motor plug connector (MS)

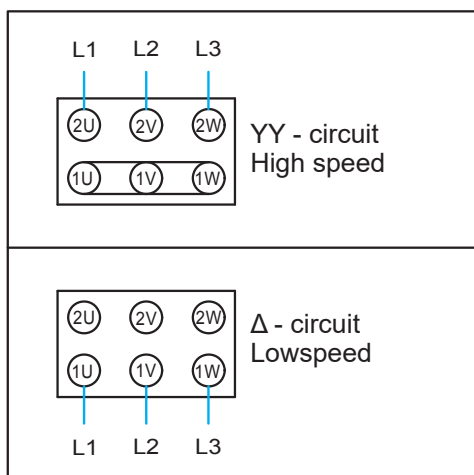
400 V - Star circuit Y



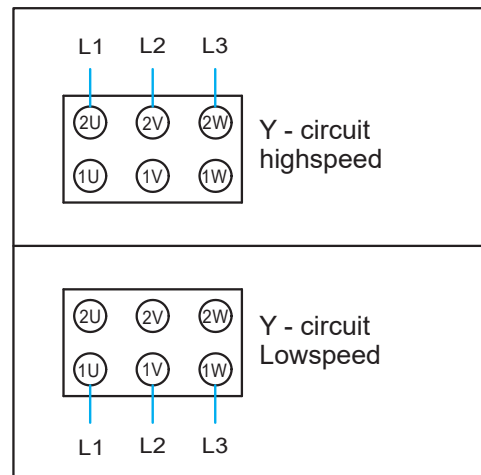
400 V - Delta circuit Δ



Three-phase motor, switchable pole Dahlander pole switching



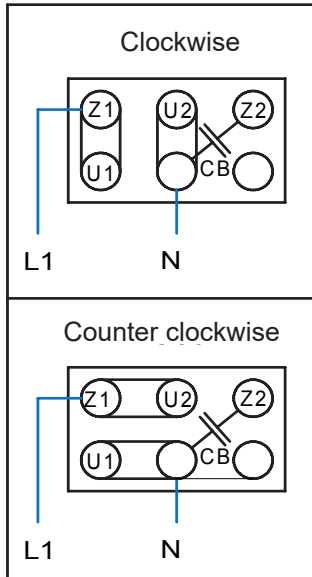
Three-phase motor, switchable pole separated windings



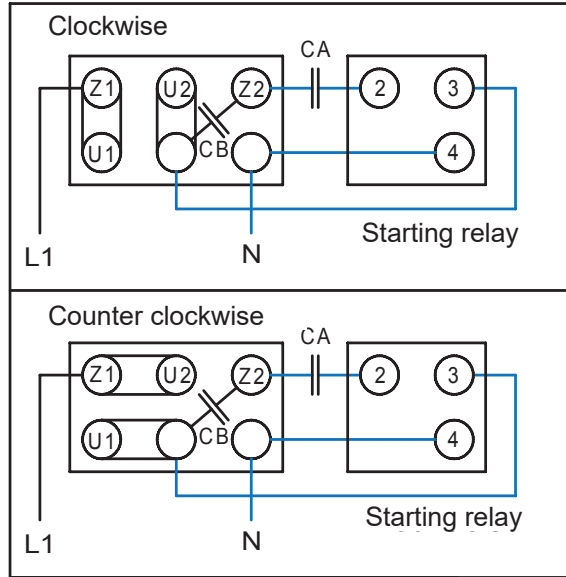


Circuit diagrams

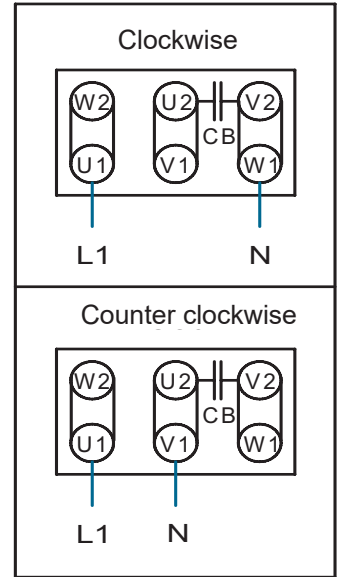
**Single phase motor
EHB1**



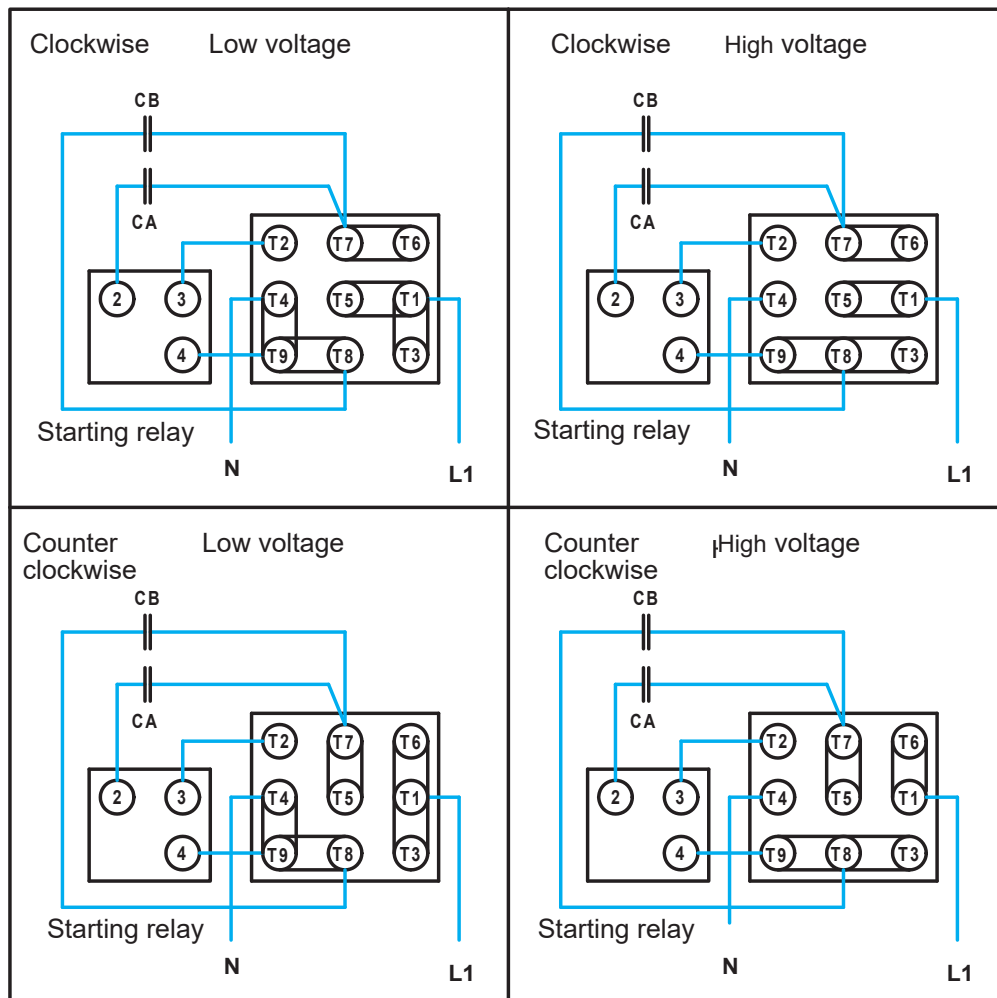
**Single phase motor
EAR1**



**Single phase motor
EST
(Steinmetz circuit)**



**Single-phase motor
ECR
NEMA (115 / 230V) ECR**





Efficiency

The following table shows the specifications for the efficiency, corresponding to the efficiency class and dependent on the motor power

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

A direct comparison of efficiencies is not possible as the measurement methods differ.

		CEMEP		IEC	CEMEP		IEC	Australia New Zealand	IEC	China		
50Hz		EFF2		IE1	EFF1		IE2	AS/NZS 1359.5:2004 Level 1B	IE3	GB 18613-2006 Level 3	GB 18613-2006 Level 2	GB 18613-2006 Level 1
[kW]	HP	η setpoint [%]	η min [%]	η setpoint [%]	η setpoint [%]	η min [%]	η setpoint [%]	η setpoint [%]	η setpoint [%]	η setpoint [%]	η setpoint [%]	η setpoint [%]
0,55	-	-	-	-	-	-	-	-	-	71	80,7	-
0,73	-	-	-	-	-	-	-	82,2	-	-	-	-
0,76	1	-	-	72,1	-	-	79,6	82,2	82,5	73	82,3	-
1,1	1,5	76,2	72,6	75	83,8	81,4	81,4	83,8	84,1	76,2	83,8	-
1,5	2	78,5	75,3	77,2	85	82,8	82,8	85	85,3	78,5	85	-
2,2	3	81	78,2	79,7	86,4	84,4	84,3	86,4	86,7	81	86,5	-
3	4	82,6	80,0	81,5	87,4	85,5	85,5	87,4	87,7	82,6	87,4	-
3,7	5	-	-	-	-	-	-	-	-	-	-	-
4	-	84,2	81,8	83,1	88,3	86,5	86,6	88,3	88,6	84,2	88,3	89,9
4,5	6	-	-	-	-	-	-	-	-	-	-	-
5,5	7,5	85,7	83,6	84,7	89,2	87,6	87,7	89,2	89,6	85,7	89,2	90,7
7,5	10	87	85,1	86	90,1	88,6	88,7	90,1	90,4	87	90,1	91,5
9,2	12,5	-	-	-	-	-	-	-	-	-	-	-
11	15	88,4	86,7	87,6	91	89,7	89,8	91	91,4	88,4	91	92,2
15	20	89,4	87,8	88,7	91,8	90,6	90,6	91,8	92,1	89,4	91,8	92,9
18,5	25	90	88,5	89,3	92,2	91,0	91,2	92,2	92,6	90	92,2	93,3
22	30	90,5	89,1	89,9	92,6	91,5	91,6	92,6	93	90,5	92,6	93,6
30	40	91,4	90,1	90,7	93,2	92,2	92,3	93,2	93,6	91,4	93,2	94,2

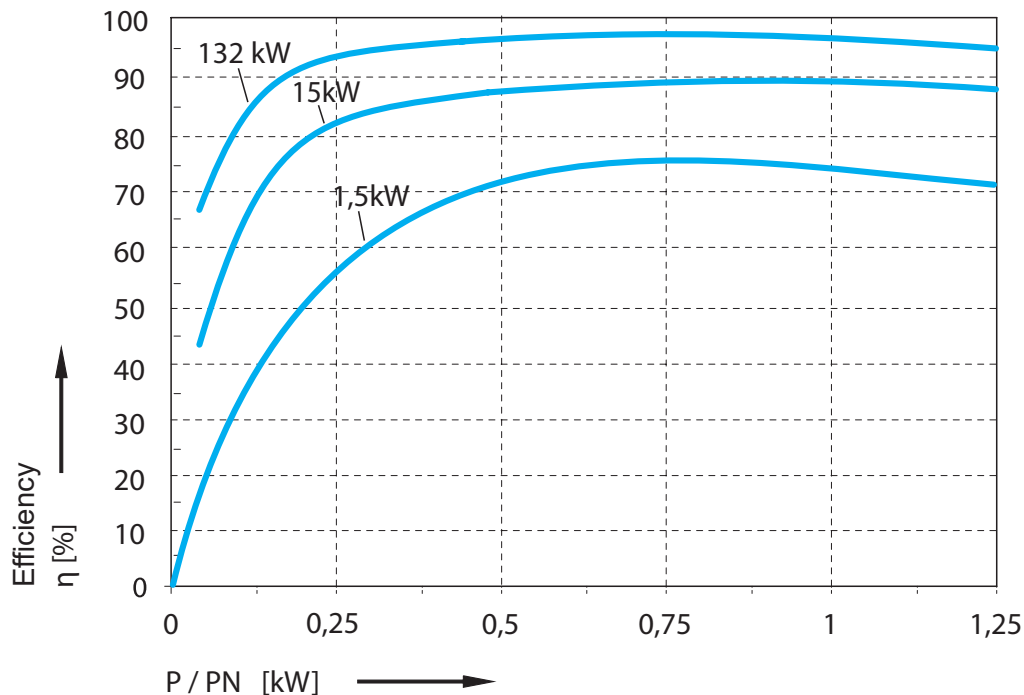
The actual efficiency of the motor is stamped on the motor type plate. For wide voltage ranges, the efficiency which is stamped is that for the most unfavourable operating point. At the nominal voltage, the efficiency is then better than that which is stamped on the type plate.

Type SK 90 LH/4					
3~ Mot.		No. 2005471179-400		12345678	
Th.Cl.155 (F)		IP 55 S1		IEC 60034 (H)	
50 Hz		230/400 V Δ /Y		60 Hz 265/460 V Δ /Y	
5,80/3,34 A		1,5 kW		5,12/2,95 A 1,5 kW	
COS ϕ 0,79		1415 min ⁻¹		COS ϕ 0,76 1725 min ⁻¹	
220-240/380-420 V Δ /Y		254-277/440-480 V Δ /Y			
5,86-5,95/3,39-3,40 A		5,16-5,25/2,98-3,03 A			
IE2=82,2%				IE2=84,4%	



Relationship of efficiency and mains load

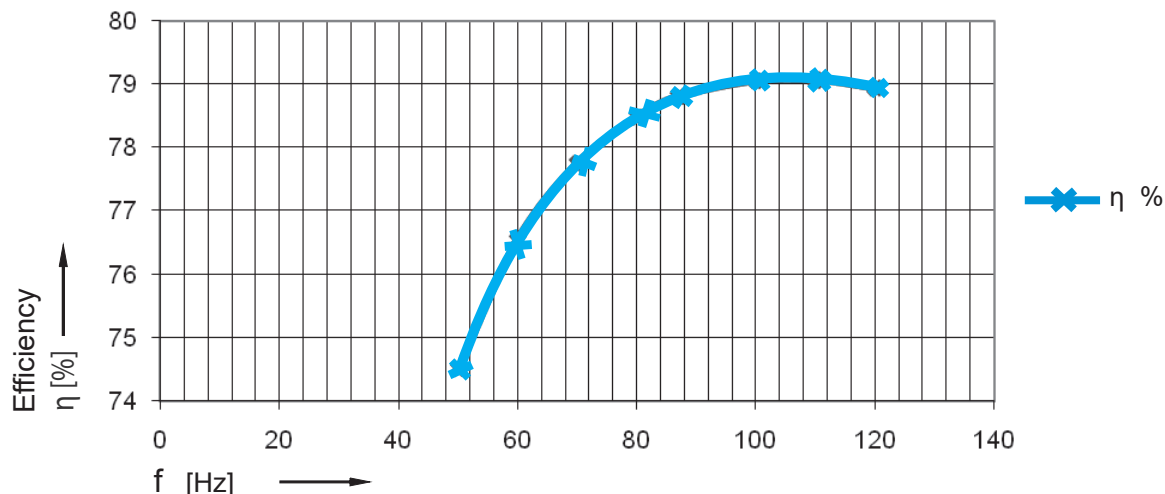
For efficient utilisation of a motor it is advisable to operate it close to its nominal power. Depending on the motor power, operation under partial load can be inefficient - especially with smaller motors.



Relationship between efficiency and FI frequency range

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

The following diagram shows this relationship on the basis of a 90SH/4 motor. For geared motors it should be noted that higher input speeds result in increased gear losses.





Mains connection / Rated voltages / Voltage fluctuations

Voltage tolerance as per DIN IEC 60038

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

Previous mains voltages	Current mains voltages
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 as per DIN EN 60034-1

AC machines must operate reliably at their rated voltage or within their rated voltage range $\pm 5\%$ and within their rated frequency range $\pm 2\%$. Their heat-up must not exceed the limiting values for their heat class (F) by more than 10K. The voltage or voltage range stamped on the motor type plate are the rated voltages or rated voltage ranges to which the voltage tolerance relates.

Permissible voltage deviation as per NEMA CSA

According to NEMA and CSA, the permissible voltage deviation is $\pm 10\%$ from the stamped rated voltage or the stamped rated voltage range.

According to ANSI C84.1, in North America, a differentiation is made between nominal system voltages (Nominal System Voltage - 120V, 208V, 240V, 480V, 600V) and the corresponding utilization voltages (Nominal Utilization Voltage - 115V, 200V, 230V, 460V, 575V). According to this, consumers must be stamped with the nominal utilisation voltage. Stamping of electric motors with 120V, 208V, 240V, 480V oder 600V does not comply with the standard and is not usual in North America.

System voltage	Device/consumer voltage
600 V	575 V
480 V	460 V
240 V	230 V
208 V	200 V

Rated voltages of NORD motors

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

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

As per DIN EN 60 034, they operate reliably in continuous operation with $\pm 5\%$ of these voltage ranges. Therefore, reliable operation within the recommended range of the standard IEC voltages of 230V, 400V and 690V +/-10% is ensured.

NORD motors which are compliant with NEMA, CSA (cCSAus) are only stamped with the rated voltage and not with a rated voltage range. Their permissible voltage deviation is $\pm 10\%$ of the stamped rated voltage.

Voltage and frequency

NORD three-phase motors are wound as follows:

- up to nominal power < 3.0 kW for 230/400V Δ/Y 50Hz
- above a nominal power of 3.0 kW for 400/690V Δ/Y 50Hz

As standard, NORD motors are wound as follows:

No. of poles	Motor type	Nominal 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

Guide values for conversion factors for the listed values

50 Hz	60 Hz	n_N^* approx.	P_N	M_N	I_N	$\frac{M_A/M_N}{M_K/M_N}$	I_A/I_N
230V	230V	1,2	1,0	0,83	1,0	0,8	0,8
400V	400V	1,2	1,0	0,83	1,0	0,8	0,8
400V	460V	1,2	1,0	0,83	0,9	1,1	1,1
400V	460V	1,2	1,15	0,96	1,0	1,0	1,0
500V	500V	1,2	1,0	0,83	1,0	0,8	0,8
500V	575V	1,2	1,0	0,83	0,9	1,1	1,1
500V	575V	1,2	1,15	0,96	1,0	1,0	0,9

* The actual speed relationship depends on the type of motor.

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



NORD single-phase motors

EAR1, EHB1

The EAR1, EHB1 series supersedes the EAR, EHB series.

It features:

- increased breakdown torque
- wide voltage range 220-240V (additionally as per EN60034 +/-5%)
- increased reliability

Single-phase motors have only 2 temperature sensors - one each for the main and auxiliary windings.

EST

A low cost solution with Steinmetz circuit for simple demands.

⚠ Operation at low load can result in increased noise in the drive chain. Please contact us about applications which require a very low noise level.

Special ambient conditions

Heat class 155 (F)

The windings of NORD motors use Class F insulating materials 155 (F). At cooling temperatures up to 40°C and installation altitudes up to 100 m, the highest permissible temperature increase is 105 K. The highest permissible winding temperature is 155° C.

This table contains guide values which cover the entire range of motors, including those with high thermal utilisation. Somewhat higher values apply for motors with low or moderate thermal utilisation. The values for motors for explosion protection areas also deviate.

	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%

For Motors with extended temperature range (T_{amb} -20 ... 45°C) is as follows table:

	45°C	50°C	55°C	60°C	65°C
1000 m	100%	96%	91%	85%	79%
1500 m	97%	93%	88%	82%	77%
2000 m	94%	90%	84%	79%	74%
2500 m	90%	85%	81%	76%	71%
3000 m	86%	82%	78%	74%	69%
3500 m	83%	79%	75%	71%	67%
4000 m	80%	77%	73%	69%	65%

ECR (60Hz)

The ECR series is intended for demanding operation on 60Hz mains with 115V or 230V. The permissible voltage range is 115/230V +/-10% without additional tolerance. If the voltage tolerance is utilised, these motors may be continuously overloaded by 35% (S_F 1.35).

Combination of inverters with single-phase supply and three-phase motors

For lower powers, three-phase motors may be used as an alternative to single-phase motors in single-phase networks which are supplied by inverters with single-phase supplies. NORD can supply frequency inverters up to a power of 2.2 kW for single-phase networks.

Heat class 180 (H)

The 4-pole NORD Standard/IE1 motors are available in a modified variant for ambient temperatures up to 60 °C. The windings have insulation class 180 (H), and temperature-critical components are replaced with suitable ones. For planning, you can refer to the values on pages C2/C3.

⚠ Not all options are possible. Get in touch with us!

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

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

- **Outdoor installation** ⇒  A51, 52

- **Drive submerged or temporarily flooded**

If motors or geared motors are to be operated temporarily or continuously in a submerged state, they must be selected with regard to the type of application. For this, the information listed below is necessary in order to make an offer. Submerged drives are not the subject of this catalogue, but rather are individually planned and offered.

- Operation in surfaced or submerged state
- Immersion depth
- Medium in which submerged
- Medium is contaminated with abrasive substances (sand etc.)
- Temperature of the medium in which submerged
- Required cable length
- Application requires organic oil or organic paint
- Operating hours per year
- Direct mounting of the motor to the gear unit is allowed (preferred)



Thermal motor protection

A good selection of the motor protects it against overheating due to the application or ambient conditions. Factors which may cause the motor to overheat are e.g. high ambient temperatures, restricted flow of cooling air and low motor speeds as a result of inverter operation. NORD can supply two heat protection components for an extra charge

- **TW** = Bimetal temperature sensor
- **TF** = Thermistor temperature sensor

These are used to directly monitor the temperature of the windings with full utilisation of the motor power.

Three (one in each line) series-connected temperature sensors or thermistors are located at the hottest parts of the windings. Their connections are made to 2 terminals in the terminal box.

⚠ For frequency inverter operation, heavy starting, switched operation, high ambient temperatures restricted cooling etc. the use of a temperature sensor or thermistor is urgently recommended.

Thermostat (TW)

(Other common designations: thermal opener, Klixon, bi-metal opener)

The temperature sensor is and encapsulated, miniature bi-metal switch, which is normally designed as an opener.

It must be connected so that the self-holding of the motor circuit breaker is interrupted when the switching temperature is reached. The circuit breaker then triggers and switches the motor off.

The temperature sensor only closes its contacts again after there has been a considerable reduction in temperature.

Triggering temperature: 155° C

Nominal current: 1.6 A at 250 V

Switch version: opener (terminals TB1 + TB2)

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

Temperature sensor (TF)

(Other common designations: Thermistor, thermistor temperature sensor, PTC thermistor)

The resistance of the temperature sensor increases suddenly by almost 10 x when the nominal triggering temperature is reached.

The thermistor temperature sensor can only fulfil its protective function if it is connected to a triggering device!

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

Triggering temperature: 155° C

Max. voltage 30 V

Terminals TP1 + TP2

Also available as 2 x **TF** for warning and shut-down.

E.g.: 130°C = **Warning** , 155°C = **Shut-down**

NORD Three-phase motors

Standard NORD three-phase motors are self-cooled (with fan)

- Cooling type IC411 as per EN 60034-6

Overview of cooling types:

Designation	English abbreviation
IC410 without fan	TENV
IC411 Self-ventilated	TEFC
IC416 Externally ventilated	TEBC

For installation with restricted air supply, the following minimum distances must be complied with:

Length of motor + protective cover (LS) minus length of motor (L)
⇒ C24

For foot-mounted motors (version IM B3) **size 63** the feet are cast onto the housing. In this case, there is only one possible location for the 2nd terminal box (opposite to the feet). (⇒ C24 and above).

Please ask in case of series requirement for terminal box position 1 or 3.

With **size 71 - 180** the feet are screwed on. Here, the terminal box location 2 is the standard version, however locations 1 or 3 are possible.

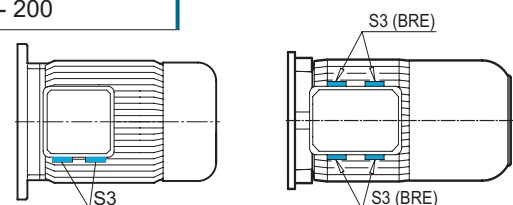
⚠ According to the version, if possible the cable gland into the terminal box should enter from below!

Vibration level A as per DIN EN 60034-14

NORD three-phase motors are made to the vibration level A.

Cable glands

Standard motor	Brake motor
Type 63 - 200	Type 63 - 132
Brake motor	
Type 160 - 200	



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	M40 x 1,5
180	M40 x 1,5	M40 x 1,5
200	M40 x 1,5	M40 x 1,5

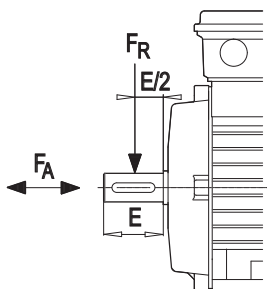


Permissible radial and axial forces for IEC / NEMA motors

The listed values apply for a calculated bearing life of $L_h = 20,000$ hours, for 4-pole motors in 50Hz operation.

F_R = permissible radial force with $F_A = 0$

F_A = permissible axial force with $F_R = 0$



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

⚠ These values do not apply to the 2nd shaft end.

Please ask about the power which can be transferred and the permissible radial force!

⚠ Motors which are directly mounted on the housing are subjected to radial and axial forces from the 1st gear stage and therefore may be equipped with reinforced bearings.

Bearings and shaft sealing

NORD motors have lubricated-for-life roller bearings. The B side bearing is a fixed bearing.

Greased shaft sealing rings without springs are used on the A and B side.

Oil-tight motors with various flanges are available on request for direct mounting on the gear unit (⇒ [C42](#)).

Replacement of roller bearings: see operating and maintenance manual B1091.

When option AS66-Outdoor installation is ordered then special sealed ball-bearings (2RSR) are fitted.

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	6312.2Z.C3	6311.2Z.C3

Noise emission

• Sound pressure level and sound power level

According to DIN EN ISO 3745/44, the noise pressure level L_{PA} is measured in an echo-free room with the test sample idling. The measurement area dimension L_s [dB] is calculated from the dimensions of the test sample. The sound power level L_{wA} is determined by addition of the measurement surface dimension to the noise pressure level. A slightly increased noise level is to be expected with inverter operation due to magnetic hum or whistling. The fan noise increases at higher speeds with frequencies above 50Hz or 60 Hz. External fans are supplied directly from the mains. Their cooling effect and noise emission depend on the speed of the motor.

Sound pressure level measurement area and sound power level with mains operation

Tolerance ± 3db(A)	Self-cooled				with external fan					
	50Hz		60Hz		50Hz		60Hz			
	1500/min		1800/min							
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	-	-	40	52	44	56	47	59	50	62
71 S/L	-	-	45	57	49	57	51	63	53	65
80 S	80 SH	-	47	59	51	63	56	68	59	71
80 L	80 LH	80 LP								
90 S	90 SH	90 SP	49	61	53	65	61	73	65	77
90 L	90 LH	90 LP								
100 L	100 LH	100 LP	51	64	55	68	59	72	63	76
100 LA	100 AH	100 AP								
112 M	112 MH	112 MP	54	66	58	70	61	74	64	77
132 S	132 SH	-	60	73	64	77	57	70	60	73
-	132 MH	132 MP								
-	132 LH	-								
-	160 SH	160 SP	66	79	70	83	60	73	64	77
160 M	160 MH	160 MP								
160 L	160 LH	160 LP								
180 MX	-	-	66	79	70	83	60	73	64	77
180 LX	-	-								
-	180 MH	180 MP	62	75	66	79	60	73	64	77
-	180 LH	180 LP								
200 LX	200 XH	-	62	75	66	79	60	73	64	77



Protection classes as per DIN EN 60034-5

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

1st code number	Protection class	
	Brief description	Explanation according to standard IEC60034-5
5	Protection against touching, foreign bodies and dust	Complete protection against touching. Harmful quantities of dust cannot enter.
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 jets from all directions. Harmful quantities of water cannot enter.
6	Protection against water	Protection against heavy seas and strong water jets from all directions. Harmful quantities of water cannot enter.

Motors for indoor installation

NORD recommends the following options for indoor installation:

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

Motor 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

Option KKV (encapsulated terminal box) can be supplied for both types of installation if required.

Outdoor installation of AS66 or AS55

For outdoor installation or use of motors in damp environments, we recommend **Option AS66** or **AS55**.

Measures AS66	Measures AS55 - only for brake motors
• IP66 Protection class	• IP55 protection class
• Terminal box, encapsulated	• Brake IP55 RG (corrosion-protected version)
• Motor bearings with sealing discs (2RS)	• Painting 2 or 3 (⇒ A17)
• IP66 brake	
• Painting 2 or 3 (⇒ A17)	

⚠ For outdoor installation of vertical versions (e.g. IM V1 or IM V5 ⇒ C24 and above) we **urgently** recommend the **option “double fan cover”** (RDD).

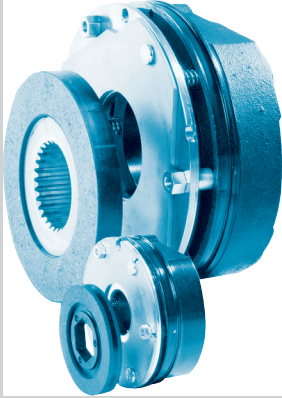
According to the version, if possible the cable gland into the terminal box should enter from below!

Heating of the motor with current through the stator windings

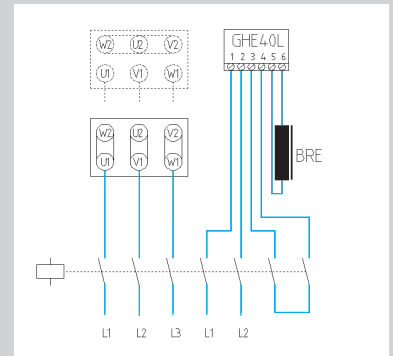
If moisture forms in the motor because it is not equipped with standstill heating, there is an alternative, by which the motor can be heated while at a standstill. For this, 4-10% of the nominal motor voltage is applied to the stator terminals U1 and V1 by means of a transformer.

20-30% of the nominal motor current are sufficient to provide adequate heating during standstill.

The motor must not be heated while it is running! If there are no empirical values for the selection of the necessary transformer, please consult NORD about the required power.



- TECHNICAL EXPLANATIONS
- TECHNICAL DATA
- SWITCHING VARIANTS





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 service brake or for emergency stop).

Environment

The brake linings are asbestos-free.

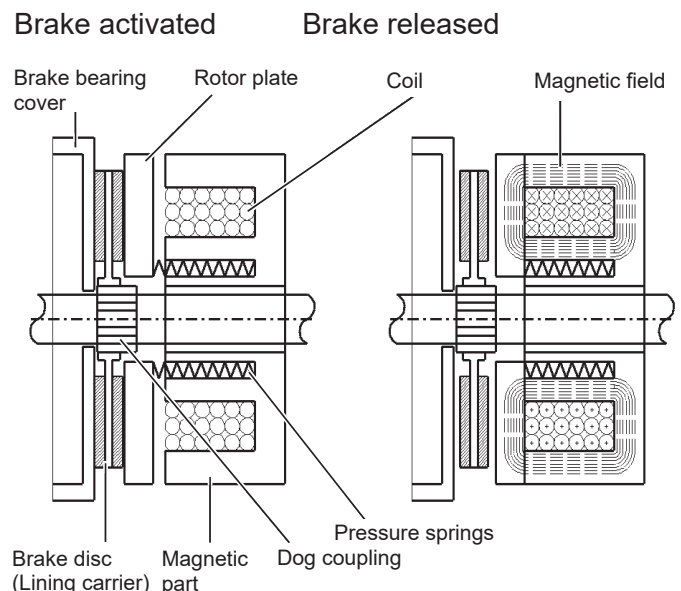
Safety

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.



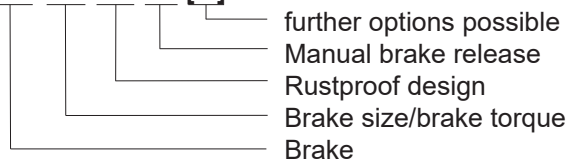
Power-to-apply principle

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



Brake type codes

BRE 100 RG HL [...]

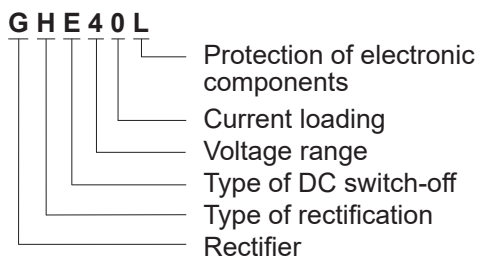


Example

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

Type code for brake rectifiers

Example



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

- 0:** 0.5A (75°C)
- 1:** 1.5A (75°C)

6th place:

Protection of electronic components

- against vibration and moisture
- L:** Paint coating
- V:** Fully encapsulated


Switching variants ⇨  B16 and above

Brake torque (M_B)

According to DIN VDE 0580-2011, the switching torque as a characteristic of the braking torque is defined for a sliding speed of 1m/s relative to the average friction radius.

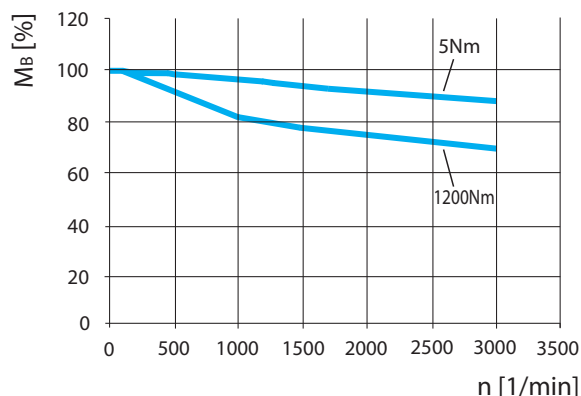
This applies to brakes which have been run in. The effective braking torque is not identical to the switching torque, this should be considered as a guideline value.

The magnitude of the actual effective braking torque depends on the temperature, speed (rubbing speed), ambient conditions (dirt, moisture) and the degree of wear. This must be taken into account during planning.

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

The rubbing surfaces of the brake must be dry. **Under no circumstances must they come into contact with grease or oil! Grease or oil on the rubbing surfaces greatly reduces the braking torque.**

Dependency of the braking torque on speed



Average values between the characteristic curves,

- upper curve - small brakes (5Nm and above)
- lower curve - large brakes (400...1200Nm)



Brakes - Standard configuration for 4-pole motors

Type			BRE 5	BRE 10	BRE 20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400
IE1	IE2	IE3	M_B [Nm]								
63 S/L**	-	SP/LP	5	10 *1)							
71 S/L**	-	SP/LP	5	10 *							
80 S **	SH **	SP	5 4)	10	20 *						
80 L	LH	LP	5	10	20 *						
90 S	SH	SP		10	20	40 *					
90 L	LH	LP									
100 L	LH	LP			20 4)	40	60 *1)				
100 LA	AH	AP			20	40	60 *1)				
112 M	MH	MP			20	40	60				
132 S	SH	SP					60	100	150 *		
132 M	MH	MP					60	100	150 *		
132 MA	LH	-					60	100	150 *		
160 -	SH	SP						100	150	250	
160 M	MH	MP						100	150	250	
160 L	LH	LP						100	150	250	
180 MX	-	-							150	250	
180 LX	-	-							150	250	
180 -	MH	MP								250	400 *1)
180 -	LH	LP								250	400 *1)
200 LX	XH	-								250	400 *1)
Extra weight [kg]			2	3	5,5	7	10	16	22	32	50
J [10 ⁻³ kgm ²]			0,015	0,045	0,153	0,45	0,86	1,22	2,85	6,65	19,5

Brake torques in bold type: Standard version

- * IP66 is not possible
- ** Please enquire for low price, non-adjustable BRH-type holding brakes with lower torques.
- 1) Manual release not possible!
- 4) For operation as a service brake with high switching precision we recommend the use of the next larger size of brake, with the torque adapted to the application.

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-C23](#)).

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 (⇒ [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 • Service brake • Emergency stop brake

The differentiation between a "holding brake", a "service brake" and an "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 or is near to standstill, from starting to move.

As soon as a brake needs to produce a significant amount of friction it is known as a service brake. The relevant friction and the switching frequency must be determined and taken into account for the selection of the brake (⇒ [B10-11](#)).

For the emergency stop function of a brake, very large masses must be braked once and the brake correspondingly large 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 (⇒ [B11](#) "Friction depending on switching frequency").



Adjustment of braking torque

If required, we can supply brakes with reduced braking torques.

Reduction of the braking torque is carried out by removing pressure springs or by means of an adjustment ring.

Even finer adjustment of the braking torque is possible by rotating an adjustment ring (only BRE 5 to BRE 40).

⚠ The switching times change for reduced braking torques!

Release is faster - application takes longer

Number of springsn	BRE 5	BRE 10	BRE 20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400
	M_B [Nm]								
8								250	400
7	5	10	20	40	60	100	150		
6								187	300
5	3,5	7	14	28	43	70	107		
4	3	6	12	23	34	57	85	125	200
3	2	4	8	17	26	42	65		

Reduction of braking torque with the adjustment ring	BRE 5	BRE 10	BRE 20	BRE 40
	M_B [Nm]			
• for each division of the adjustment ring	0,2	0,2	0,3	1
• Smallest achievable braking torque	0,8	1,6	4,4	5

Wear

The brake lining are subject to different amounts of wear according to their use. Wear of the material reduces the thickness of the brake disc and increases the air gap.

This must be adjusted once the air gap has reached its maximum permissible value. Once the brake disc thickness has reduced to the minimum permissible value, it must be replaced by a new one.

⚠ The brake release time increases as the air gap becomes larger!



Electrical design

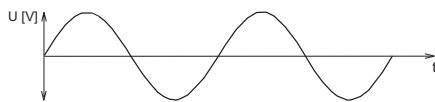
The brake windings are designed for continuous operation. At the rated voltage they heat up in a continuously released state according to heat class 130(B) (Temperature increase $\leq 80\text{K}$). The brakes are supplied with DC current. For this, current from the AC mains is rectified.

Half wave and bridge rectifiers are available as well as rapid switching rectifiers whose function will be described

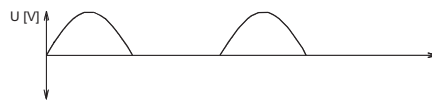
in the following sections. Selection of the rectifier should be made according to the requirements of the application.

Please note the section 'Excess voltages' for DC supplies without a rectifier \Rightarrow B7!

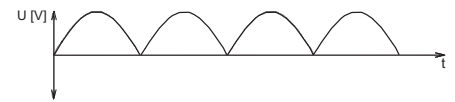
To protect against freezing, the brakes can be electrically heated, \Rightarrow B14 "Anti condensation heater of brakes (Option BSH)" **Please ask!**



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.

Activation 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

\Rightarrow 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).

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.


Brass foil

A further possibility for very rapid activation of the brake is the use of a brake with brass foil. The brass foil is located between the rotor plate and the magnetic part of the brake and is 0.3mm thick. This introduces a large magnetic resistance in the magnetic circuit of the brake, which only allows a weakened field to build up. The application behaviour of a brake with a magnetic field which is weakened in this way is the same as for the behaviour with under-excitation. Release of a brake with brass foil is slower than for release without the brass foil. The reserve for wear is reduced by the thickness of the brass foil. It is recommended that brakes with brass foil are only used for over-excitation in combination with a quick switching rectifier, if the full braking torque is required. Brakes with brass foil in combination with standard rectifiers should only be used with the brake torque reduced to approx. 50%.

Use in combination with quick switching rectifiers for under-excitation is not recommended!

Releasing the brake

- **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!

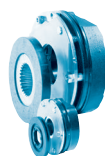
Excess voltages

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.

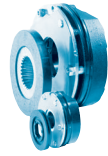
Other circuits, primarily for the supply of brakes from an external voltage source, can be equipped with additional protection. Please ask!

Technical data



NORD brake rectifiers		
Technical data		
Bridge rectifiers	GVE20L/V	
Rated voltage	230V _{AC}	
Max. permissible voltage range	110V...275V+10%	
Output voltage	205V _{DC} ($U_{DC} = U_{AC} \times 0.9$)	
Rated current up to 40°C	2.0A	
Rated current up to 75°C	1.0A	
DC switch-off	by external contact or current measuring relay possible	
Half-wave rectifier	GHE40L/V	GHE50L/V
Rated voltage	480V _{AC}	575V _{AC}
Max. permissible voltage range	230V...480V+10%	230V...575V+10%
Output voltage	216V _{DC} ($U_{DC} = U_{AC} \times 0.45$)	259V _{DC} ($U_{DC} = U_{AC} \times 0.45$)
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} ($U_{DC} = U_{AC} \times 0.45$)	216V _{DC} ($U_{DC} = U_{AC} \times 0.45$)
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} ($U_{DC} = U_{AC} \times 0.45$)	216V _{DC} ($U_{DC} = U_{AC} \times 0.45$)
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.



Brake connection voltages

The brakes are available with the following coil voltages:

24VDC, 105VDC, **180VDC**, **205VDC**, 225VDC, 250VDC (preferred voltages are printed bold.)

Supply 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

Supply 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

Supply voltage [V _{AC}]	Quick 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



Brake switching times (average values, valid with nominal air gap)

Rectifier	V _{AC} Rectifier	V _{DC} Brake	Switch-off	[ms]																			
				BRE5		BRE10		BRE20		BRE40		BRE60		BRE100		BRE150		BRE250		BRE400			
				t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}	t _{tr}	t _{av}		
GHE 4...	230	103	AC	35	130	60	150	85	200	100	180	120	200	150	230	270	300	300	520	400	650		
GHE 4...	400	180																					
GHE 5...	500	225																					
GVE 2...	230	205																					
GHE 4...	230	103	DC extern	35	18	60	20	85	25	100	20	120	22	150	24	270	28	300	38	400	65		
GHE 4...	400	180																					
GHE 5...	500	225																					
GVE 2...	230	205																					
GPU 2...	230	205	DC intern	35	30	60	34	85	37	100	34	120	35	150	37	270	39	300	46	400	85		
GPU 2...	230	103																					
GPU 4...	400	180																					
GPU 4...	480	225																					
GPE 2...*	230	103	DC extern	18	5	24	5	38	8	55	8	70	12	85	20	120	25	140	34	-	-		
GPE 4...*	400	180																					
GPE 4...*	480	225																					
GPE 2...*	230	103	DC IR	18	23	24	23	38	24	55	25	70	31	85	34	120	40	140	50	-	-		
GPE 4...*	400	180																					
GPE 4...*	480	225																					

* Brake with brass foil ⇒ B7

Definitions

M_B = Braking torque

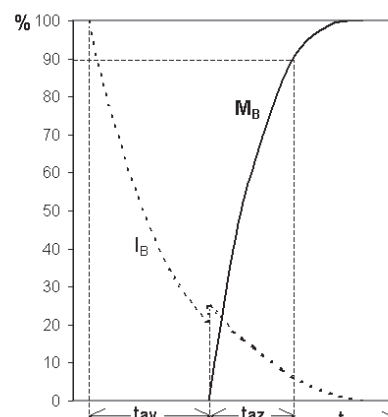
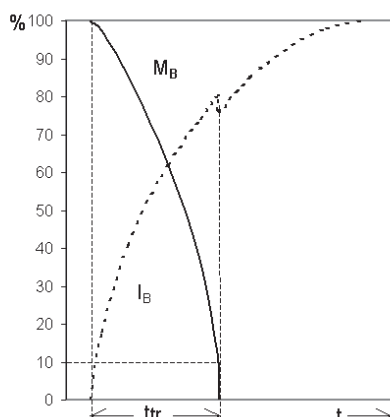
I_B = Coil current

t_{av} = Delay in brake application, time from switching off the current until the start of the increase in braking torque.

t_{az} = Build-up time. Time from the start of build-up of the braking torque until 90% of the nominal value is reached.

Among other things, the build-up time of the brake torque depends on the speed and can therefore only be roughly predicted.

t_{tr} = Release time. The time from switching on the current until reduction of the braking torque to 10% of the nominal value.





*** Technical data of brakes with protection class IP55**

Technical data of brakes with protection class IP66 are available on request

			BRE5	BRE10	BRE20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400
Braking torque	M_a	[Nm]	5	10	20	40	60	100	150	250	400
Nominal air gap		[mm]	0,2	0,2	0,3	0,3	0,3	0,4	0,4	0,5	0,5
Adjustment of air gap		[mm]	0,6	0,8	0,8	0,9	1	1,1	1,1	1,2	1,2
Max. wear before rotor replacement		[mm]	3	3	2,8	3	3	3,5	3,5	2,5	3,5
Min. permissible lining thickness		[mm]	4,5	5,5	7,5	9,5	11,5	12,5	14,5	16,5	16
** Max. permissible friction per braking operation	W_{max}	[Jx10 ³]	1,5	3	6	12,5	35	50	75	105	150
** Friction before adjustment.	W_{RN}	[Jx10 ⁷]	5	12	20	35	60	125	200	340	420
Max. permissible thermal load	P_R	[W]	80	100	130	160	200	250	300	350	400
*** Coil current with 24V _{DC}	I_N	A_{DC}	0,92	1,17	1,42	1,69	2,18	3,33	3,2	4,14	6,0
Coil current with 105V _{DC}	I_N	A_{DC}	0,21	0,32	0,39	0,46	0,6	0,88	0,88	1,14	1,38
Coil current with 180V _{DC}	I_N	A_{DC}	0,12	0,16	0,19	0,25	0,3	0,46	0,4	0,6	0,78
Coil current with 205V _{DC}	I_N	A_{DC}	0,11	0,13	0,15	0,24	0,28	0,44	0,34	0,54	0,68
Coil current with 225V _{DC}	I_N	A_{DC}	0,09	0,13	0,16	0,20	0,22	0,35	0,34	0,44	0,63
Coil current with 250V _{DC}	I_N	A_{DC}	0,09	0,11	0,14	0,18	0,19	0,31	0,3	0,38	0,57

* These values do apply for a speed range of 1200 - 1800 min⁻¹

** These values do not apply for the options RG or SR ⇒  B13

*** 24V_{DC} must be available from the application

 **Values printed bold** - The maximum permissible current ratings of the rectifier must be complied with ⇒  B8!

These values for the maximum permissible friction per braking cycle apply for the rare cases of emergency braking. For frequent braking cycles we recommend that the friction is less than 10% of the stated value in order to achieve good wearing times for the brake linings. Please consult us in case of values above 10% of the stated friction per braking cycle.

Calculation of brake size



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)

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

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

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

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

$$M_{\text{dyn}} = \frac{\Sigma J \times n}{9.55 \times \text{tr}}$$

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

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

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

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.

⚠ Motors from various series, e.g. 8-2 pole travelling motors have considerably lower rated torques than standard 4-pole motors. We urgently recommend that great care is taken in the selection of brakes for travelling or similar applications. It is usually advisable to utilise the possibility of brake torque reduction (⇒ B5 Brake torque adjustment)

Definition of abbreviations

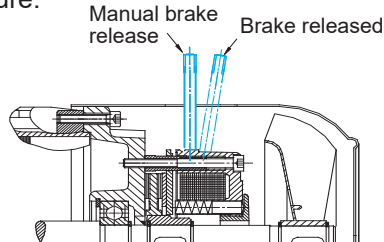
c/h	=	Number of braking actions per hour
ΣJ [kgm ²]	=	Sum of all driven moments of inertia, related to the motor speed
i	=	Gear ratio
K	=	Safety factor ⚠ related to the application, selection according to individual design specifications.
	-	Guide values: 0,8...3,0
	-	Lifting equipment: >2
	-	Lifting 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



Manual release - HL

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.

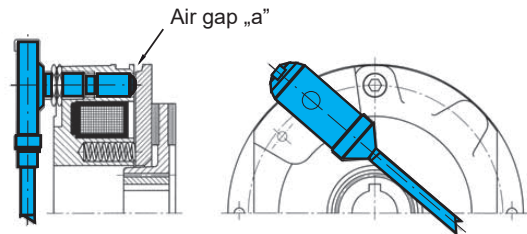


Micro switch - MIK

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

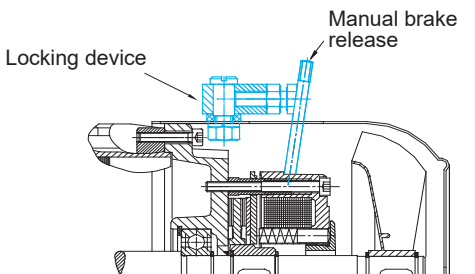
A micro switch should be used if movement monitoring is necessary or required. The motor circuit breaker is triggered by the micro switch when the rotor disc is in contact with the magnetic part.

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.



Lockable manual release - FHL

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

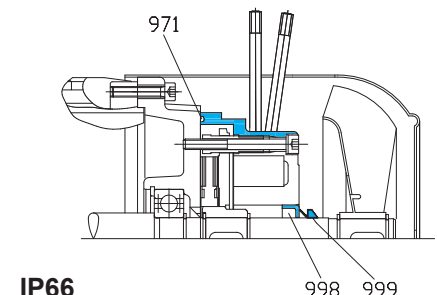
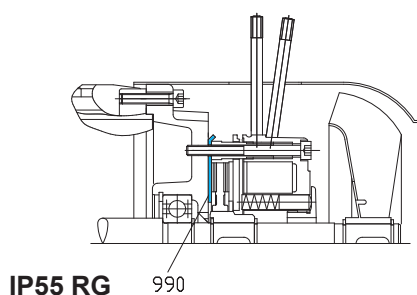
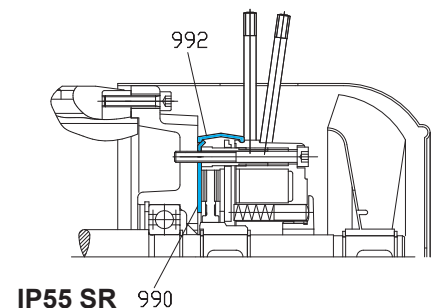
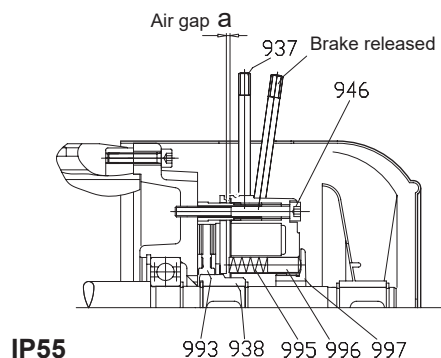


Protection against corrosion • Dust • Dirt • Moisture - RG, SR

- | | |
|--|---|
| <p>1) B bearing cover painted and stainless friction disc - Option RG (only possible with protection class IP55)</p> <p>2) B bearing cover painted and dust protection ring - Option SR including stainless friction disc (only possible with protection class IP55)</p> | <p>3) Protection class IP66, note motor protection type, please ask!</p> <p>4) Protection class IP67 (Sea water brake), note motor protection type, please ask!</p> |
|--|---|

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





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

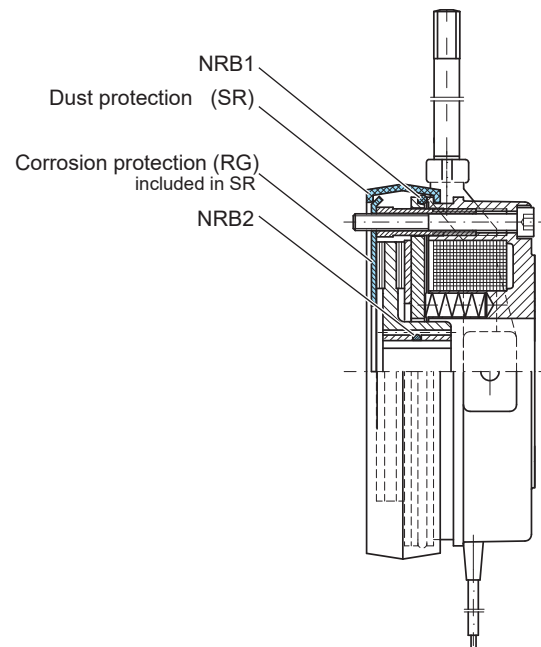
Noise-reduced brake - NRB1

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.



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



Double brake for theatre applications - DBR

Combinations of 2 brakes for theatre safety 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.

According to DIN 56950, brakes must be activated by spring pressure, i.e. they are open when current is flowing and closed automatically if there is no voltage (idling current principle) A redundancy of the brakes is also necessary. In our range, this corresponds to the double brake DBR.

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

The double brakes are mounted on the B bearing cover of the motor, which basically results in a longer version - please ask. The design of a theatre brake is usually carried out according to the load torque.

According to DIN 56950, 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.

Our theatre brakes achieve their full braking torque on the first braking action. It is not necessary to break in the brake linings.

⚠ The coil voltages correspond to the values stated in this catalogue. Two rectifiers are required for the double brake. These are usually installed in the control cabinet. The brake cables are connected to free terminals in the brake terminal box.

Combination with voltage reduction is not possible.

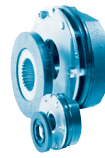
Note:

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!

Theatre brake

Type				Double brake DBR	Full braking torque	Reduced braking torque	
IE1	IE2	IE3	M_B [Nm]				
63 S/L	-	-	6	2 x 6	2 x 4	2 x 3,5	
71 S/L	-	-	6	2 x 6	2 x 4	2 x 3,5	
80 S	SH	-	6	2 x 6	2 x 4	2 x 3,5	
80 L	LH	LP	12	2 x 12,5	2 x 8,5	2 x 7	
90 S	SH	SP	12	2 x 12,5	2 x 8,5	2 x 7	
90 L	LH	LP	25	2 x 25	2 x 17,5	2 x 14	
100 L	LH	LP	25	2 x 25	2 x 17,5	2 x 14	
100 LA	AH	AP	50	2 x 50	2 x 35	2 x 28	
112 M	SH	-	50	2 x 50	2 x 35	2 x 28	
112 -	MH	MP	75	2 x 75	2 x 52	2 x 42	
132 S	SH	SP	75	2 x 75	2 x 52	2 x 42	
132 M	MH	MP	125	2 x 125	2 x 89	2 x 70	
132 MA	LH	-	187	2 x 187	2 x 132	2 x 107	
160 -	SH	-	187	2 x 187	2 x 132	2 x 107	
160 M	MH	MP	187	2 x 187	2 x 132	2 x 107	
160 L	LH	LP	300	2 x 300	2 x 225	2 x 150	
180 MX	MH	MP	300	2 x 300	2 x 225	2 x 150	
180 LX	LH	LP	300	2 x 300	2 x 225	2 x 150	
200 LX	XH	-	500	2 x 500	2 x 375	2 x 250	

Switching variants



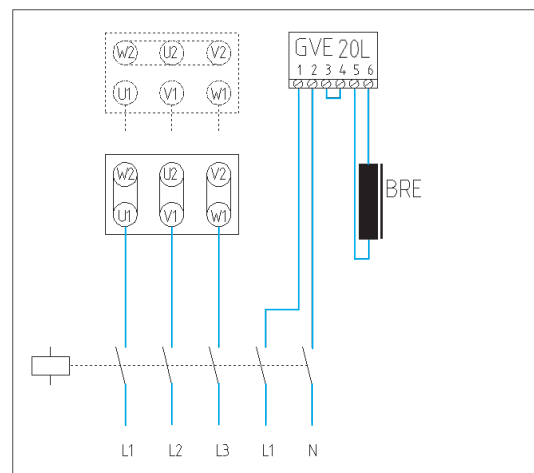
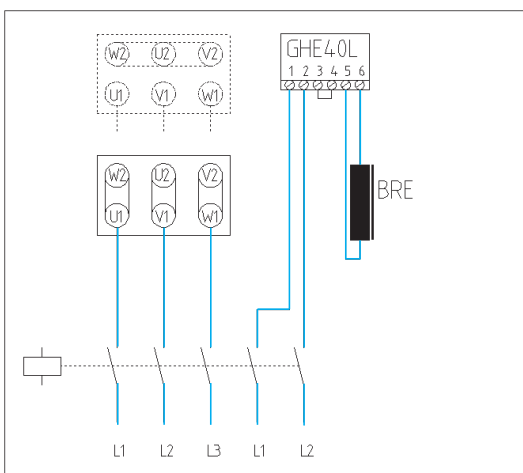
Switching variants for brake motors (Examples)

The following selection shows the most 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 B8](#).

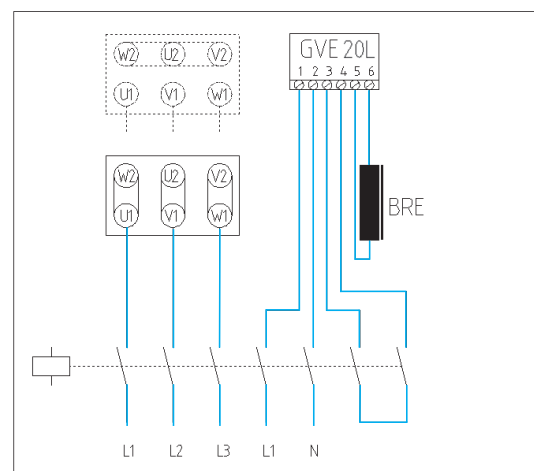
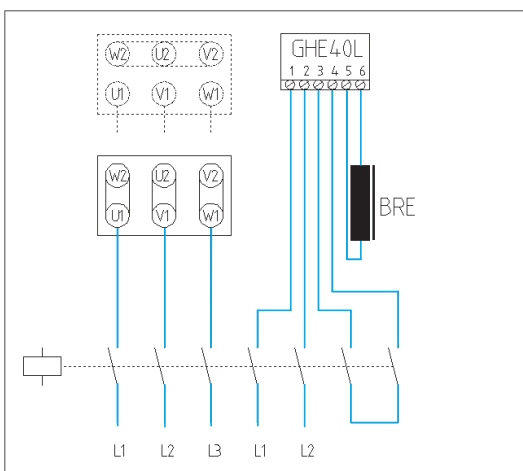
- Motor Δ circuit: 400V_{AC}
 Alternative Y - circuit: 400V_{AC}
 Half-wave rectifier: GHE40L
 Separate supply: 400V_{AC}
 Brake: 180V_{DC}
 Switch-off: AC

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



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

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

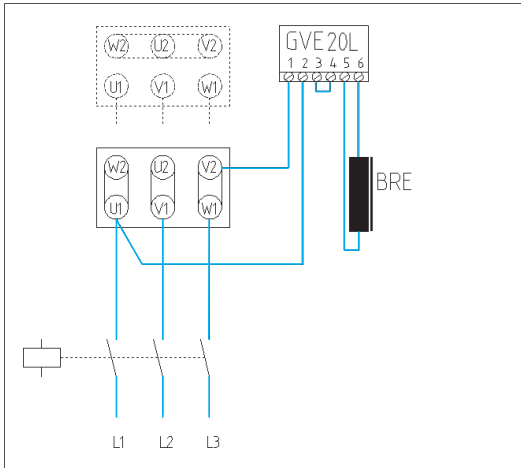




Switching variants

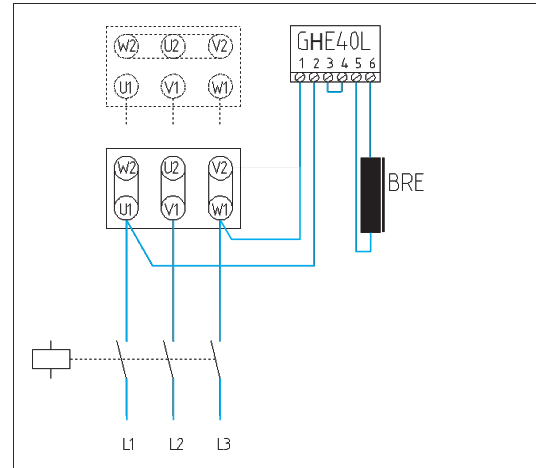
5. Motor Δ circuit: 230V_{AC} Δ
 Alternative Y - circuit: 400V_{AC}
 Bridge rectifier: GVE20L
 Supply via the motor terminals: 230V_{AC}
 Brake: 205V_{DC}
 Switch-off: AC

Brake applies very slowly!



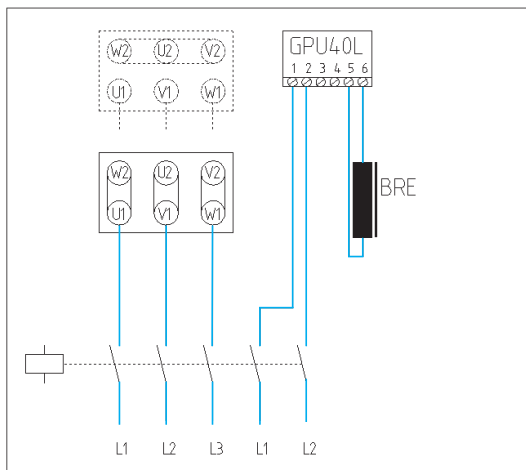
6. Motor Δ circuit: 400V_{AC}
 Alternative Y - circuit: 400V_{AC}
 Half-wave rectifier: GHE40L
 Supply via the motor terminals: 400V_{AC}
 Brake: 180V_{DC}
 Switch-off: AC

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

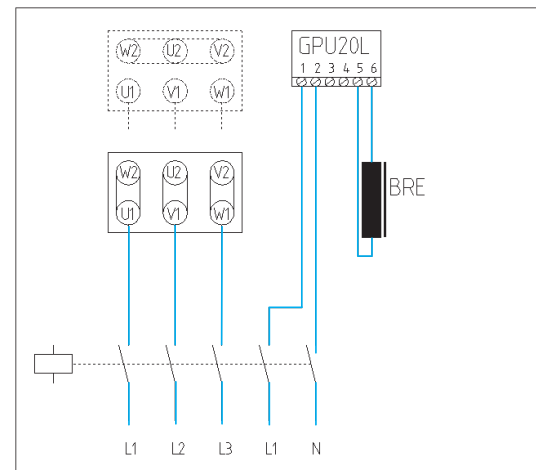
Switching variants for rapid release



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



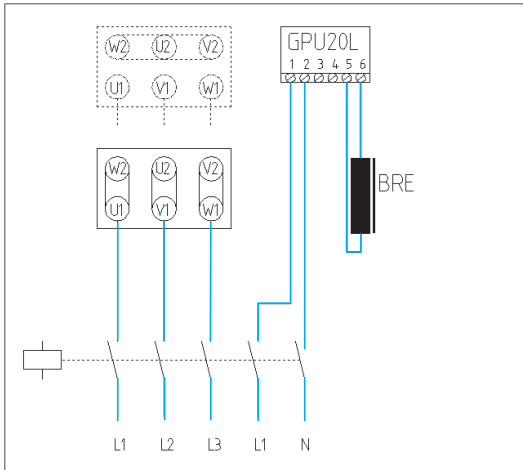
Typical for FI operation

Switching variants



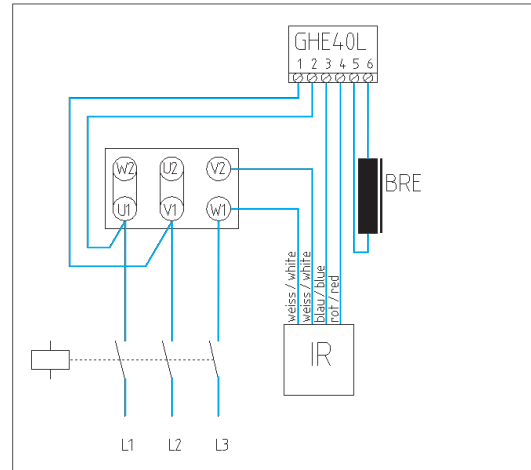
9. Motor Δ circuit: 400V_{AC}
 Alternative Y - circuit: 400V_{AC}
 Quick-switching rectifier: GPU20L
 Brake: 205V_{DC}
 Separate supply: 230V_{AC}
 Switch-off: DC, internal

Switching variant for rapid application



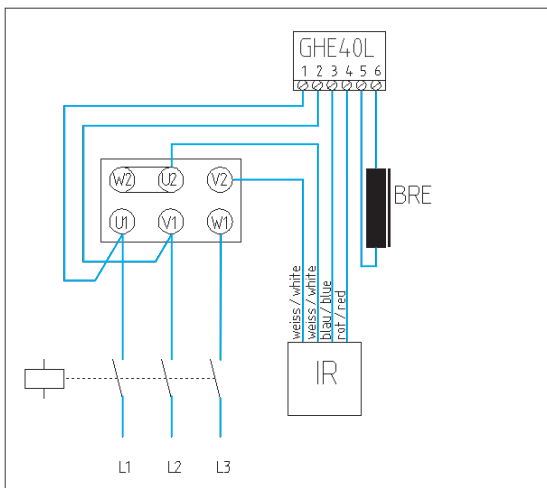
10. Motor Δ circuit: 400V_{AC}
 Half-wave rectifier: GHE40L
 Brake: 180V_{DC}
 Supply via the motor terminals: 400V_{AC}
 Switch-off: DC via current measuring relay

Switching variant for rapid application



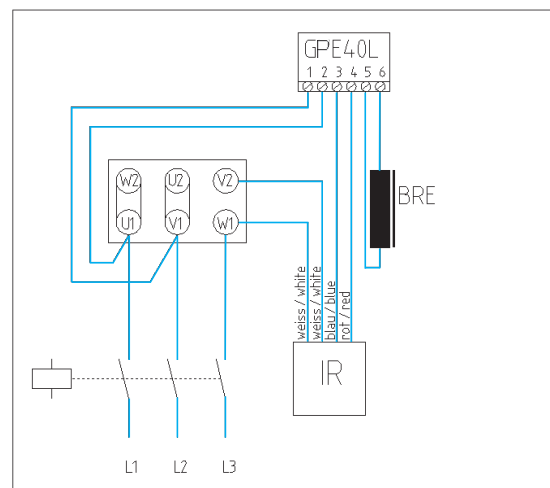
11. Motor Y - circuit: 400V_{AC}
 Half-wave rectifier: GHE40L
 Brake: 180V_{DC}
 Supply via the motor terminals: 400V_{AC}
 Switch-off: DC via current measuring relay

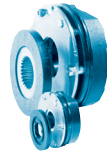
Switching variant for rapid application



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 variants for rapid release and application

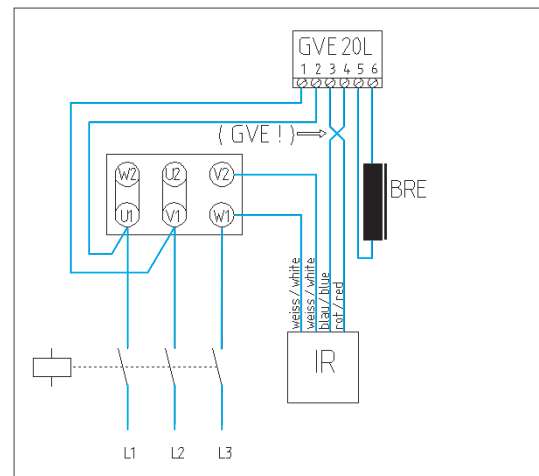
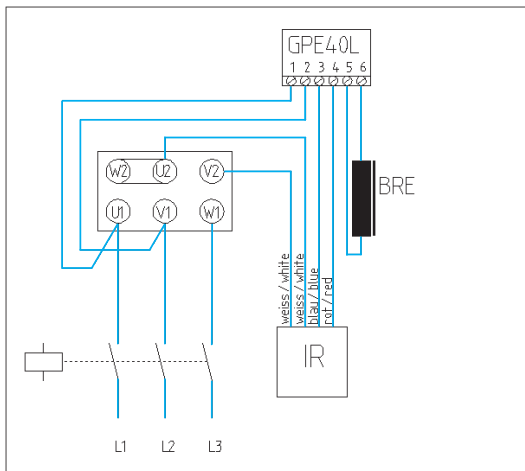




13. Motor Y - circuit: 400V_{AC}
 Quick switching rectifier: GPE40L
 Brake: 180V_{DC}
 Supply via the motor terminals: 400V_{AC}
 Switch-off: **DC via current measuring relay**

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 variants for rapid release and application



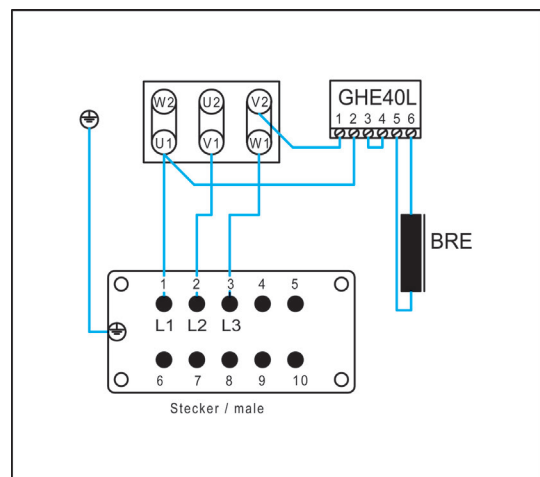
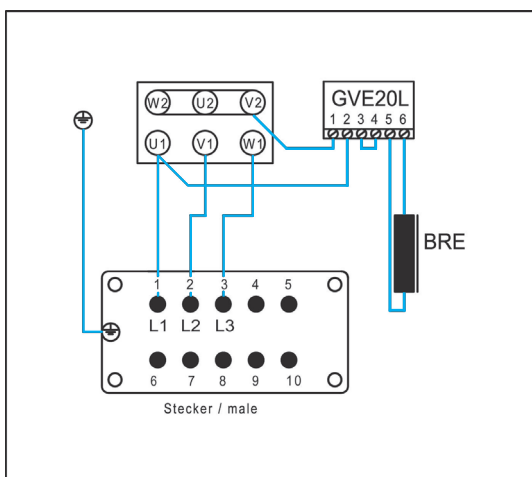
Switching variant for rapid application, Note the connection of the current measuring relay to the rectifier!

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

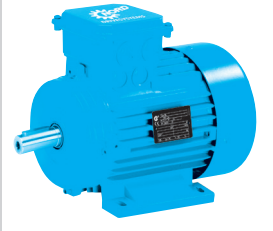
16. Motor Δ circuit: 400V_{AC}
 Half-wave rectifier: GHE40L
 Brake: 180V_{DC}
 Supply via the motor terminals: 400V_{AC}
 Switch-off: **AC**

Switching variant for connection via motor plug connector (MS)

Switching variant for connection via motor plug connector (MS)



Notes



MOTOR DATA

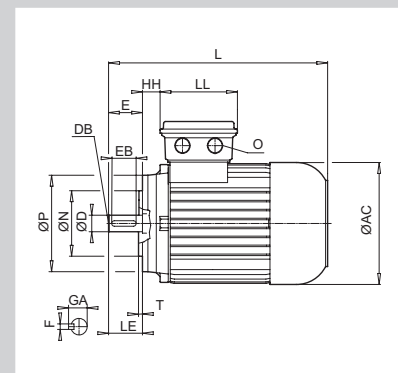
Standard + IE1	C 2 - 13
IE2	C 14 - 19
IE3	C 19 - 20
IE4	C 21
ATEX Standard	C 22
ATEX IE2	C 23

DIMENSIONED DRAWINGS OF MOTORS

B3	C 24 - 25
B5	C 26 - 27
B14	C 28 - 29
B3-BRE	C 30 - 31
B5-BRE	C 31 - 33
B14-BRE	C 34 - 35
Options	C 36 - 42
NEMA	C 43

1000 1/min 230/400
50 Hz


Type	$T_{amb} -20 \dots +45^{\circ}C$				
	P_N S1, S9 [kW]	η_N [1/min]	I_N 400 V [A]	$\cos \phi$	λ
63 S/6	0,09	850	0,49	0,67	
63 L/6	0,12	865	0,65	0,62	
71 S/6	0,18	910	0,71	0,67	
71 L/6	0,25	920	0,92	0,67	
80 S/6	0,37	930	1,22	0,7	
80 L/6	0,55	920	1,54	0,74	
90 S/6	0,75	915	2,22	0,73	
90 L/6	1,1	910	2,97	0,77	




1800 1/min
60 Hz

265/460 V / 460 V Δ
4 - pole

T_{amb} -20 ... +45°C

Noise emission (⇒ )
self-cooled motors


Type	P _N	n _N	I _N	cos	η			M _N	M _A /M _N	M _K /M _N	I _A /I _N	60 Hz 1800/min		J	
	S1, S9		460 V	φ	1/2xP _N	3/4xP _N	4/4xP _N					L _{PA}	L _{WA}	[kgm ²]	*
	[kW]	[1/min]	[A]		[%]	[%]	[%]	[Nm]							[kg]
63 S/4	0,14	1635	0,54	0,63	45,4	53,6	57,6	0,82	2,6	2,6	2,8	44	56	0,00021	3,6
63 L/4	0,21	1660	0,65	0,64	52,3	59,3	61,5	1,21	2,4	2,5	3,1	44	56	0,00028	4,2
71 S/4	0,29	1675	0,76	0,8	65	70	70,8	1,65	1,9	1,9	3,1	49	57	0,00072	5,4
71 L/4	0,43	1680	1,05	0,72	65	70,1	70,9	2,44	1,9	2,3	3,5	49	57	0,00086	6,3
80 S/4	0,63	1690	1,5	0,76	71	74,7	74,5	3,56	1,9	1,9	3,2	51	63	0,00109	8
80 L/4	0,86	1650	2,1	0,74	72,6	76,2	75,9	4,98	1,9	2	3,4	51	63	0,0014	9
90 S/4	1,27	1675	2,81	0,74	74,4	78	78,1	7,24	2,2	2,5	4,2	53	65	0,00235	12
90 L/4	1,73	1675	3,55	0,8	78,1	80,7	80,4	9,86	2,2	2,5	4,6	53	65	0,00313	14
100 L/4	2,55	1730	5,2	0,77	78,3	81,4	81,4	14,1	2	2,7	4,7	55	68	0,0045	18
100 LA/4	3,45	1700	6,35	0,84	81,6	83,5	82,4	19,4	2,2	2,6	5	55	68	0,006	21
112 M/4	4,6	1735	8,31	0,8	85,1	86,7	86,1	25,3	2,2	2,7	5,2	58	70	0,011	30
132 S/4	6,3	1730	10,9	0,81	83,1	85,8	86,2	34,8	2	2,6	5,3	64	77	0,024	44
132 M/4	8,6	1735	14,6	0,84	85,8	87,8	87,6	47,3	2,4	2,7	5,3	64	77	0,032	55
132 MA/4	10,6	1740	18,8	0,8	86	87,9	87,6	58,2	2,5	3	5,7	64	77	0,035	62
160 M/4	12,6	1750	20,4	0,88	89,2	90,0	89,2	68,8	2,1	2,50	6,2	70	83	0,050	78
160 L/4	17,3	1760	27,9	0,86	90,3	91,1	90,6	93,9	2,3	2,80	6,6	70	83	0,067	93
180 MX/4	21,3	1760	33,9	0,87	90,7	91,4	90,8	116	2,8	3,30	7,6	70	83	0,080	107
180 LX/4	25,3	1760	41,7	0,83	91,1	91,7	91,1	137	3,3	3,60	7,0	70	83	0,092	122
200 LX/4	34,5	1765	56	0,85	92,6	92,5	91,7	186	2,6	2,8	7,0	66	79	0,160	155

* Version B5, without options

3000 1/min
50 Hz

230/400 V & 400/690 V
2 - polig

$T_{amb} -20 \dots +45^{\circ}\text{C}$


	P_N	n_N	I_N	cos	η	M_N	M_A/M_N	M_K/M_N	I_A/I_N	J	
Type	S1, S9		400 V	φ	$4/4 \times P_N$						*
	[kW]	[1/min]	[A]		[%]	[Nm]				[kgm ²]	[kg]
63 S/2	0,18	2715	0,52	0,84	59,5	0,63	2,5	2,5	3,4	0,00021	3,6
63 L/2	0,25	2720	0,7	0,87	59,4	0,88	2,4	2,6	3,5	0,00028	4,2
71 S/2	0,37	2835	1,06	0,75	66,3	1,25	1,9	2,5	4	0,00035	5,4
71 L/2	0,55	2825	1,25	0,83	76,3	1,86	2,7	2,7	5,2	0,00046	6,7
80 S/2	0,75	2780	1,73	0,87	71,9	2,58	2,3	2,3	4,8	0,00067	8
80 L/2	1,1	2825	2,48	0,84	76,1	3,72	3,3	3,4	5,6	0,00089	9
90 S/2	1,5	2820	3,14	0,88	78,4	5,08	2,1	2,3	5,2	0,0014	12
90 L/2	2,2	2820	4,5	0,9	78,8	7,45	2	2,6	5,9	0,0018	14
100 L/2	3	2860	6,81	0,78	81,1	10	2,2	2,6	4,8	0,0028	18
112 M/2	4	2880	7,79	0,87	85,1	13,3	2,3	2,3	4,8	0,0055	26
132 S/2	5,5	2870	11,4	0,82	84,9	18,3	2,3	2,3	4,8	0,01	37
132 SA/2	7,5	2920	14,7	0,85	84,6	24,5	3,4	3,8	6,9	0,013	44
132 M/2	11	2885	19,5	0,92	88,7	36,4	2,0	2,2	5,3	0,019	55

* Version B5, without options

3600 1/min
60 Hz

265/460 V & 460 V D
2 - polig

$T_{amb} -20 \dots +45^{\circ}\text{C}$

	P_N	n_N	I_N	cos	η	M_N	M_A/M_N	M_K/M_N	I_A/I_N	J	
Type	S1, S9		460 V	φ	$4/4 \times P_N$						*
	[kW]	[1/min]	[A]		[%]	[Nm]				[kgm ²]	[kg]
63 S/2	0,21	3300	0,53	0,85	60,4	0,61	2,3	2,3	3,3	0,00021	3,6
63 L/2	0,29	3320	0,7	0,87	59,8	0,83	2,3	2,5	3,4	0,00028	4,2
71 S/2	0,43	3460	1,06	0,75	65,9	1,19	1,8	2,4	3,9	0,00035	5,4
71 L/2	0,63	3440	1,21	0,83	78,8	1,75	2,6	2,6	5	0,00046	6,7
80 S/2	0,86	3380	1,73	0,87	71,8	2,43	2,2	2,2	4,6	0,00067	8
80 L/2	1,27	3390	2,48	0,84	76,6	3,58	3,3	3,3	5,4	0,00089	9
90 S/2	1,73	3385	3,23	0,88	78,1	4,88	2,5	2,5	5	0,0014	12
90 L/2	2,55	3380	4,33	0,9	82,1	7,2	1,9	2,4	5,7	0,0018	14
100 L/2	3,45	3455	6,81	0,82	81,3	9,54	2,1	2,3	4,4	0,0028	18
112 M/2	4,6	3480	7,5	0,87	88,6	12,6	2,4	2,4	4,9	0,0055	26
132 S/2	6,3	3445	12	0,82	80,5	17,5	2,2	2,2	4,6	0,01	37
132 SA/2	8,6	3530	14,7	0,89	82,7	23,2	3,2	3,8	7,2	0,013	44
132 M/2	12,6	3460	20,7	0,92	83,1	34,8	1,9	2,1	5,1	0,019	55

* Version B5, without options

**1000 1/min
50 Hz**

**230/400 V & 400/690 V
6 - polig**

$T_{amb} -20 \dots +45^{\circ}\text{C}$

	P_N	n_N	I_N	cos	η	M_N	M_A/M_N	M_K/M_N	I_A/I_N	J	$\overset{\text{kg}}{\square}$
Type	S1, S9		400 V	φ	$4/4 \times P_N$						*
	[kW]	[1/min]	[A]		[%]	[Nm]				[kgm ²]	[kg]
63 S/6	0,09	850	0,49	0,67	39,6	1,01	2	2	1,8	0,00028	4,2
63 L/6	0,12	865	0,65	0,62	42,8	1,32	2	2,1	1,9	0,00035	4,9
71 S/6	0,18	910	0,71	0,67	54	1,89	2,2	2,3	2,8	0,00091	5,4
71 L/6	0,25	920	0,92	0,67	58,5	2,59	2,5	2,6	3,2	0,0012	6,7
80 S/6	0,37	930	1,22	0,7	62,5	3,8	2,4	2,6	3,7	0,0022	8,9
80 L/6	0,55	920	1,54	0,74	69,7	5,71	1,8	2	3,3	0,0028	9,8
90 S/6	0,75	915	2,22	0,73	66,8	7,83	2,2	2,3	3,8	0,0037	12
90 L/6	1,1	910	2,97	0,77	69,4	11,5	1,9	2,2	3,6	0,005	14
100 L/6	1,5	940	3,83	0,74	76,4	15,2	2,4	2,7	4,6	0,01	21
112 M/6	2,2	950	5,37	0,74	80,9	22,1	2,3	2,8	4,7	0,018	31,9
132 S/6	3	965	7,3	0,72	82,4	29,7	1,6	2,2	4,1	0,031	42,7
132 M/6	4	960	9,1	0,76	83,5	39,8	2,2	2,8	5,5	0,038	48,9
132 MA/6	5,5	945	12,4	0,80	80,0	55,6	2,0	2,6	4,6	0,045	56,2

* Version B5, without options

**1200 1/min
60 Hz**

**265/460 V & 460 V D
6 - polig**

$T_{amb} -20 \dots +45^{\circ}\text{C}$

	P_N	n_N	I_N	cos	η	M_N	M_A/M_N	M_K/M_N	I_A/I_N	J	$\overset{\text{kg}}{\square}$
Type	S1, S9		460 V	φ	$4/4 \times P_N$						*
	[kW]	[1/min]	[A]		[%]	[Nm]				[kgm ²]	[kg]
63 S/6	0,1	1020	0,47	0,67	39,9	0,94	2,1	2,1	1,8	0,00028	4,2
63 L/6	0,14	1065	0,68	0,62	54,8	1,26	2,1	2,2	1,9	0,00035	4,9
71 S/6	0,21	1100	0,73	0,67	54,5	1,82	1,8	1,9	2,7	0,00091	5,4
71 L/6	0,29	1105	0,96	0,67	56,7	2,51	2,4	2,4	2,9	0,0012	6,7
80 S/6	0,43	1105	1,36	0,71	56	3,72	2,3	2,5	3,5	0,0022	8,9
80 L/6	0,63	1105	1,61	0,74	68,7	5,44	1,8	1,9	3,2	0,0028	9,8
90 S/6	0,86	1100	2,32	0,73	64	7,47	2,1	2,3	3,6	0,0037	12
90 L/6	1,27	1135	2,89	0,68	76,1	10,7	2	2,3	3,7	0,005	14
100 L/6	1,73	1130	3,7	0,77	79,4	14,6	2,1	2,3	4,4	0,01	21
112 M/6	2,55	1140	5	0,76	84,2	21,4	2,4	2,9	4,6	0,018	31,9
132 S/6	3,45	1160	7,45	0,72	80,8	28,4	1,5	2,2	3,7	0,031	42,7
132 M/6	4,6	1150	9	0,76	84,5	38,2	2,3	2,8	5,0	0,038	48,9
132 MA/6	6,3	1150	12	0,80	82,5	52,3	2,3	2,8	4,7	0,045	56,2

* Version B5, without options

1500 / 3000 1/min
50 Hz

400 V D/YY
4 - 2 pole

switchable poles
S1

Type	P_N	n_N	M_N	I_N	$\cos \varphi$	η	M_A/M_N	M_K/M_N	I_A/I_N	J	$\overset{\text{kg}}{\square}$
	[kW]	[1/min]	[Nm]	400 V [A]		[%]				[kgm ²]	[kg]
63 S/4-2	0,1	1415	0,67	0,64	0,58	38,9	3,3	3,6	2,5	0,00021	3,6
	0,15	2840	0,50	0,73	0,68	43,6	3,2	3,8	2,8		
63 L/4-2	0,15	1400	1,02	0,95	0,57	40,0	2,9	3,1	2,3	0,00028	4,2
	0,19	2850	0,64	0,95	0,66	43,7	3,3	3,9	3		
71 S/4-2	0,21	1410	1,42	0,66	0,73	62,9	2,1	2,3	3,6	0,00072	5,4
	0,28	2780	0,96	0,80	0,86	58,7	2,5	2,7	3,9		
71 L/4-2	0,3	1385	2,07	0,98	0,75	58,9	2,1	2,1	3,3	0,00086	6,3
	0,45	2715	1,58	1,30	0,88	56,8	1,6	1,8	3,4		
80 S/4-2	0,48	1390	3,30	1,30	0,77	69,2	1,7	1,8	3,3	0,00109	8
	0,6	2785	2,06	1,66	0,82	63,6	1,8	2	3,6		
80 L/4-2	0,7	1355	4,93	1,84	0,79	69,5	1,6	1,7	3,3	0,0014	9
	0,85	2770	2,93	2,34	0,8	65,5	2	2	3,6		
90 S/4-2	1,1	1400	7,50	2,68	0,84	70,5	1,5	2,1	3,9	0,00235	12
	1,4	2780	4,81	3,50	0,88	65,6	1,6	2,1	3,9		
90 L/4-2	1,5	1380	10,4	3,50	0,81	76,4	2	2,1	3,9	0,00313	14
	1,9	2775	6,54	4,70	0,82	71,2	2,3	2,3	4,2		
100 L/4-2	2	1400	13,6	4,60	0,75	83,7	1,8	2	3,7	0,0045	18
	2,4	2830	8,10	5,50	0,85	74,1	2	2,2	4,5		
100 LA/4-2	2,6	1380	18,0	5,62	0,87	76,8	1,8	2,1	3,9	0,006	21
	3,1	2825	10,5	6,71	0,88	75,8	2,1	2,2	4,9		
112 M/4-2	3,7	1435	24,6	7,90	0,84	80,5	2	2,6	4,9	0,011	32
	4,4	2905	14,5	9,60	0,83	79,7	2,4	3	6		
112 MA/4-2	4	1455	26,3	8,72	0,78	84,9	2,5	3,2	5,7	0,0128	32
	5,1	2900	16,8	11,9	0,77	80,3	2,8	3,3	6,4		
132 S/4-2	4,7	1465	30,6	9,30	0,84	86,8	1,9	2,5	4,9	0,024	44
	5,9	2905	19,4	12,0	0,88	80,6	2,3	2,7	5,8		
132 M/4-2	6,5	1450	42,8	13,0	0,83	87,0	2,2	2,6	5,4	0,032	55
	8	2915	26,2	18,0	0,79	81,2	2,6	2,9	6,2		
132 MA/4-2	7,3	1455	47,9	14,3	0,84	87,7	2,7	3,2	7	0,035	62
	9	2930	29,3	18,7	0,83	83,7	2,7	3,5	7,6		
160 M/4-2	9,3	1450	61,2	18,0	0,88	84,7	2,2	2,5	5	0,05	78
	11,5	2935	37,4	22,4	0,91	81,4	2,2	3	6,2		
160 L/4-2	13	1460	85,0	24,1	0,88	88,5	2,7	3,2	7,5	0,067	93
	17	2945	55,1	31,1	0,93	84,8	2,6	3,4	7,4		


* Version B5, without options

Standard CUS - switchable poles

1800 / 3600 1/min
60 Hz

230/460/575 V
4 - 2 pole

switchable poles CUS S1

Type	P _N		η _N	M _N	I _N			cos	η	M _A /M _N	M _K /M _N	I _A /I _N	J	
	[HP]	[kW]	[1/min]	[Nm]	230 V	460 V	575 V	φ						*
					[A]	[A]	[A]		[%]				[kgm ²]	[kg]
63 S/4-2	0,13	0,1	1700	0,56	1,28	0,64	0,53	0,58	33,8	3,8	3,9	2,4	0,00021	3,6
	0,2	0,15	3410	0,42	1,46	0,73	0,61	0,68	37,9	3,3	4	2,6		
63 L/4-2	0,2	0,15	1680	0,85	1,90	0,95	0,76	0,57	34,8	3,3	3,4	2,2	0,00028	4,2
	0,25	0,19	3420	0,53	1,90	0,95	0,76	0,66	38,0	3,6	4,3	2,9		
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	3,5	0,00072	5,4
	0,37	0,28	3335	0,80	1,60	0,80	0,67	0,86	51,1	2,8	3	3,6		
71 L/4-2	0,4	0,3	1660	1,73	1,96	0,98	0,82	0,75	51,2	2,3	2,3	3,2	0,00086	6,3
	0,6	0,45	3260	1,32	2,60	1,30	1,09	0,88	49,4	1,7	2	3,3		
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	3,1	0,00109	8
	0,82	0,6	3340	1,72	3,32	1,66	1,39	0,82	55,3	2,2	2,2	3,5		
80 L/4-2	0,95	0,7	1625	4,11	3,68	1,84	1,54	0,79	60,4	1,8	1,9	3,1	0,0014	9
	1,145	0,85	3325	2,44	4,68	2,34	1,95	0,8	57,0	2,2	2,3	3,5		
90 S/4-2	1,5	1,1	1680	6,25	5,36	2,68	2,24	0,84	61,3	1,7	2,3	3,9	0,00235	12
	1,9	1,4	3335	4,01	7,00	3,50	2,92	0,88	57,1	1,8	2,3	3,9		
90 L/4-2	2	1,5	1655	8,65	7,00	3,50	2,92	0,81	66,4	2,2	2,4	3,7	0,00313	14
	2,5	1,9	3330	5,45	9,40	4,70	3,92	0,82	61,9	2,6	2,5	4		
100 L/4-2	2,7	2	1680	11,4	9,20	4,60	3,85	0,75	72,8	2,1	2,4	3,5	0,0045	18
	3,2	2,4	3395	6,75	11,0	5,50	4,6	0,85	64,4	2,4	2,6	4,4		
100 LA/4-2	3,5	2,6	1655	15,0	11,2	5,62	4,7	0,87	66,7	1,8	2,1	3,5	0,006	21
	4,2	3,1	3390	8,73	13,4	6,71	5,6	0,88	65,9	2,1	2,3	4,5		
112 M/4-2	5	3,7	1750	20,2	13,8	6,90	6,6	0,82	82,1	2	2,7	5,2	0,011	32
	5,9	4,4	3505	12,0	16,4	8,20	8	0,81	83,1	2,5	3,1	6,5		
132 S/4-2	6,3	4,7	1760	25,5	18,6	9,30	7,8	0,84	75,5	2,1	2,8	4,7	0,024	44
	7,9	5,9	3485	16,2	24,0	12,0	10	0,88	70,1	2,5	3	5,6		
132 M/4-2	8,7	6,5	1740	35,7	26,0	13,0	10,9	0,83	75,6	2,4	2,9	5,1	0,032	55
	10,7	8	3500	21,8	36,0	18,0	15	0,79	70,6	2,9	3,2	5,9		

* Version B5, without options

Standard - switchable poles

750 / 3000 1/min
50 Hz

400 V Y/Y
8 - 2 pole

switchable poles
S3-40%

Type	P_N	n_N	M_N	I_N	$\cos \varphi$	η	M_A/M_N	M_K/M_N	I_A/I_N	J	$\overset{\text{kg}}{\square}$
	[kW]	[1/min]	[Nm]	400 V [A]		[%]				[kgm ²]	[kg]
71 S/8-2 WU	0,045	650	0,66	0,44	0,58	25,5	2,6	2,6	1,3	0,00072	5,4
	0,22	2520	0,83	0,60	0,9	58,8	1,8	1,9	2,5		
71 L/8-2 WU	0,06	655	0,87	0,51	0,61	27,8	2,3	2,3	1,6	0,00086	6,3
	0,3	2450	1,17	0,88	0,9	54,7	1,4	1,4	2,3		
80 S/8-2 WU	0,1	650	1,47	0,70	0,57	36,2	2	2	1,6	0,00109	8
	0,45	2695	1,59	1,40	0,76	61,0	2	2	2,7		
80 L/8-2 WU	0,13	585	2,12	0,74	0,7	36,2	1,4	1,5	1,6	0,0014	9
	0,55	2620	2,00	1,47	0,88	61,4	2,1	2	3,3		
90 S/8-2 WU	0,2	665	2,87	1,07	0,57	47,3	2,1	2,2	2	0,00235	12
	0,8	2770	2,76	2,37	0,74	65,8	2,9	2,6	3,5		
90 L/8-2 WU	0,3	640	4,48	1,31	0,6	55,1	1,9	1,9	2	0,00313	14
	1,2	2770	4,14	3,05	0,79	71,9	2,1	2,3	3,5		
100 L/8-2 WU	0,4	685	5,58	1,70	0,58	58,6	1,1	2,2	2,4	0,0045	18
	1,6	2790	5,48	3,60	0,86	74,6	2	2,3	4		
100 LA/8-2 WU	0,55	680	7,72	2,28	0,56	62,2	2,1	2,3	2,5	0,006	21
	2,2	2810	7,48	4,87	0,83	78,6	2,5	2,6	4,6		
112 M/8-2 WU	0,75	695	10,3	3,05	0,53	67,0	2,3	2,6	2,8	0,011	30
	3	2875	9,96	6,37	0,83	81,9	2,3	3,3	5,6		
132 S/8-2 WU	1	630	15,2	4,00	0,53	68,1	1,8	2	2,6	0,024	44
	4	2710	14,1	8,55	0,93	72,6	2,3	2,3	4,8		
132 M/8-2 WU	1,4	700	19,1	5,10	0,6	66,0	1,9	2,3	2,8	0,032	55
	5,5	2835	18,5	10,6	0,93	80,5	2,3	2,5	5,3		

* Version B5, without options

Standard CUS - switchable poles

900 / 3600 1/min
60 Hz

230/460/575 V Y/Y
8 - 2 pole

switchable poles CUS S3-40%

Type	P _N		n _N	M _N	I _N			cos	η	M _A /M _N	M _K /M _N	I _A /I _N	J	kg
	[HP]	[kW]	[1/min]	[Nm]	230 V	460 V	575 V	φ					[kgm ²]	[kg]
					[A]	[A]	[A]		[%]					
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	5,4
	0,3	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	6,3
	0,4	0,3	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	0,1	825	1,16	1,36	0,68	0,59	0,50	37,0	1,70	1,50	1,80	0,0011	8
	0,6	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	0,0015	9
	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	0,2	830	2,30	2,04	1,02	0,88	0,50	49,3	2,20	2,20	2,30	0,0023	12
	1,07	0,8	3400	2,25	4,18	2,09	1,90	0,71	67,7	3,20	3,00	4,40		
90 L/8-2 WU	0,4	0,3	815	3,52	2,42	1,21	1,04	0,53	58,8	2,00	1,40	1,80	0,0031	14
	1,6	1,2	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	0,4	845	4,52	3,18	1,59	1,40	0,51	62,0	1,80	2,10	2,40	0,0045	18
	2,15	1,6	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	0,006	21
	3	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	0,75	850	8,43	5,70	2,85	2,48	0,47	70,4	2,90	2,40	3,30	0,0119	30
	4	3	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	865	11,04	6,68	3,34	2,87	0,53	71,0	2,60	2,30	2,90	0,0233	44
	5,4	4	3470	11,01	13,7	6,84	5,61	0,91	80,8	2,90	2,40	5,20		
132 M/8-2 WU	1,9	1,4	860	15,55	9,16	4,58	3,89	0,53	72,5	2,50	2,20	3,60	0,0317	55
	7,4	5,5	3455	15,20	18,1	9,07	7,33	0,93	81,9	2,90	2,40	4,70		

Standard S_F = 1,15

Standard - switchable poles

750 / 1500 1/min
50 Hz

400 V D/YY
8 - 4 pole

switchable poles
S1

Type	P_N [kW]	n_N [1/min]	M_N [Nm]	I_N [A]	cos φ	η [%]	M_A/M_N	M_K/M_N	I_A/I_N	J [kgm ²]	$\overset{\text{kg}}{\square}$ [kg]
				400 V							*
71 S/8-4	0,12	670	1,71	0,72	0,69	34,9	1,4	1,8	1,7	0,00091	5,4
	0,18	1410	1,22	0,50	0,79	65,8	1,7	2,3	3,8		
71 L/8-4	0,18	620	2,77	0,90	0,78	37,0	1,6	1,7	2,0	0,0012	6,7
	0,25	1410	1,69	0,64	0,82	68,8	1,8	2,0	3,9		
80 S/8-4	0,25	690	3,46	1,24	0,75	38,8	1,5	1,7	2,6	0,0022	8,9
	0,37	1380	2,56	1,14	0,71	66,0	1,5	1,6	3,8		
80 L/8-4	0,37	680	5,20	1,71	0,76	41,1	1,7	1,9	2,3	0,0028	9,8
	0,55	1380	3,81	1,43	0,76	73,0	1,8	2,0	3,8		
90 S/8-4	0,4	700	5,46	1,81	0,8	39,9	1,6	1,7	2,7	0,0037	12
	0,75	1380	5,19	2,00	0,82	66,0	1,5	1,9	3,6		
90 L/8-4	0,55	700	7,50	2,47	0,7	45,9	1,8	2,0	3,1	0,005	14
	1	1400	6,82	2,47	0,78	74,9	1,6	1,8	3,9		
100 L/8-4	0,7	710	9,41	2,85	0,75	47,3	1,7	1,9	3,3	0,0045	18
	1,4	1400	9,55	3,61	0,88	63,6	1,4	1,5	3,8		
100 LA/8-4	1	690	13,8	3,88	0,61	61,0	1,4	2,1	2,5	0,006	21
	1,6	1400	10,9	3,62	0,89	71,7	1,4	2,2	4,2		
112 M/8-4	1,5	700	20,5	5,23	0,61	67,9	1,6	1,8	3,6	0,018	32
	2,5	1410	16,9	5,23	0,85	81,2	1,5	1,7	4,0		
132 S/8-4	2,2	725	29,0	7,70	0,54	76,4	2,2	2,8	4,5	0,031	42,7
	3,4	1455	22,3	7,20	0,82	83,1	2,2	3,0	6,5		
132 M/8-4	2,9	730	37,9	10,2	0,5	82,1	2,1	3,2	3,7	0,038	48,9
	4,4	1460	28,8	9,40	0,83	81,4	2,2	3,3	6,0		


* Version B5, without options

Standard Single phase motors


1500 1/min
50 Hz

230 V
4 pole


Standard EHB1 - Single phase motor with capacitor S1

Type	P_N	n_N	M_N	I_N	cos φ	M_A/M_N	M_K/M_N	I_A/I_N	J	 *
	[kW]	[1/min]	[Nm]	[A]					[kgm ²]	[kg]
63 L/4 EHB1	0,12	1405	0,82	1,22	0,95	0,9	2,3	2,5	0,00028	4,5
63 LA/4 EHB1	0,18	1405	1,22	1,71	0,91	1,0	2,1	2,6	0,00035	5,2
71 L/4 EHB1	0,25	1430	1,67	1,96	0,95	0,6	2,2	3,4	0,00086	6,6
71 LA/4 EHB1	0,37	1425	2,48	2,9	0,9	0,7	2,2	3,5	0,00115	8,1
80 L/4 EHB1	0,55	1440	3,65	3,87	0,9	0,3	2,2	3,9	0,00145	9,3
80 LA/4 EHB1	0,75	1435	4,99	5,1	0,9	0,4	1,9	3,5	0,00195	10,5
90 L/4 EHB1	1,1	1445	6,61	7,54	0,87	0,2	2,0	4,2	0,00313	14,4
90 LB/4 EHB1	1,5	1425	10,05	9,02	0,94	0,3	1,9	4,0	0,00391	17,2

Standard EAR1 - Single phase motor with operational and start-up capacitor S1

Type	P_N	n_N	M_N	I_N	cos φ	M_A/M_N	M_K/M_N	I_A/I_N	J	 *
	[kW]	[1/min]	[Nm]	[A]					[kgm ²]	[kg]
63 L/4 EAR1	0,12	1405	0,82	1,22	0,95	2,3	2,3	3,2	0,00028	4,5
63 LA/4 EAR1	0,18	1405	1,22	1,71	0,91	2,4	2,1	3,2	0,00035	5,2
71 L/4 EAR1	0,25	1430	1,67	1,96	0,95	2,1	2,2	4,1	0,00086	6,6
71 LA/4 EAR1	0,37	1425	2,48	2,9	0,9	2,1	2,2	4,6	0,00076	8,1
80 L/4 EAR1	0,55	1440	3,65	3,87	0,9	2,1	2,2	4,3	0,00145	9,3
80 LA/4 EAR1	0,75	1435	4,99	5,1	0,9	2,2	1,9	4,3	0,00165	10,5
90 L/4 EAR1	1,1	1445	6,61	7,54	0,87	2,2	2,0	4,8	0,00235	14,4
90 LB/4 EAR1	1,5	1425	10,05	9,02	0,94	2,2	1,9	5,3	0,00313	17,2

Standard EST - Single phase motor with Steinmetz circuit 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	J	 *
	[kW]	[1/min]	[Nm]	[A]		[%]				[kgm ²]	[kg]
63 S/4 EST	0,09	1390	0,62	0,97	0,98	41,2	0,8	1,9	1,6	0,00021	3,9
63 L/4 EST	0,12	1405	0,82	1,19	0,98	44,7	0,7	2,2	1,9	0,00028	4,5
71 S/4 EST	0,18	1425	1,21	1,54	0,98	51,9	0,7	2,0	2,5	0,00072	5,7
71 L/4 EST	0,25	1420	1,68	1,94	0,98	57,2	0,5	1,9	2,7	0,00086	6,6
80 S/4 EST	0,37	1425	2,48	2,62	0,96	64,0	0,4	1,5	2,6	0,00109	8,3
80 L/4 EST	0,55	1420	3,70	3,6	0,96	69,2	0,5	1,3	2,6	0,00145	9,3
90 S/4 EST	0,75	1435	4,99	4,6	0,96	73,8	0,4	1,6	3,6	0,00235	12,4
90 L/4 EST	1,1	1435	7,32	6,46	0,96	77,1	0,3	1,6	3,4	0,00313	14,4

* Version B5, without options

1800 1/min
60 Hz

115/230 V
4 pole

Standard CUS / ECR - Single phase motor with operational and start-up capacitor S1

Type	P _N		S _F	n _N		M _N		I _N		cos φ		M _A /M _N		M _K /M _N		I _A /I _N		J	kg
	[HP]	[kW]		115V	230V	115V	230V	115V	230V	115V	230V	115V	230V	115V	230V	115V	230V		
				[1/min]		[Nm]		[A]											
63 LA/4 ECR	0,16	0,12	1,35	1740	1740	0,66	0,66	3,3	1,57	0,66	0,7	2,5	2,5	3,5	3,6	3,4	3,6	0,00035	5,2
71 L/4 ECR	0,25	0,18	1,35	1760	1750	0,98	0,98	3,46	1,89	0,89	0,92	2,1	2,4	3,3	3,3	4,5	5,2	0,00086	6,6
71 LA/4 ECR	0,33	0,25	1,35	1750	1750	1,36	1,36	5,4	2,65	0,69	0,71	2,1	2,2	3,0	2,9	4,5	4,7	0,00115	8,1
80 L/4 ECR	0,5	0,37	1,35	1765	1765	2,00	2,00	6,55	3,4	0,8	0,79	2,4	2,2	3,4	3,3	5,6	5,7	0,00145	9,3
80 LA/4 ECR	0,75	0,55	1,35	1760	1760	2,98	2,98	9,4	4,7	0,71	0,72	2,6	2,7	2,9	2,8	5,1	5,2	0,00195	10,5
90 L/4 ECR	1	0,75	1,35	1770	1770	4,05	4,05	11,85	5,94	0,79	0,78	2,3	2,3	2,9	3,1	6,3	6,8	0,00313	14,4
90 LB/4 ECR	1,5	1,1	1,35	1765	1760	5,95	5,97	15,25	7,62	0,85	0,84	2,0	2,1	2,8	2,9	5,7	6,5	0,00391	17,2
90 LX/4 ECR	2	1,5	1,2		1735		8,26		10,4		0,83		1,5		2,3		5,2	0,00391	17,2

* Version B5, without options

1800 1/min
60 Hz

230 V
4 pole

Standard CUS / EST - Single phase motor with Steinmetz circuit 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	J	kg
											*
	[kW]	[1/min]	[Nm]	[A]		[%]				[kgm ²]	[kg]
63 S/4 EST	0,09	1665	0,52	0,96	0,98	41,6	0,9	1,9	1,8	0,00021	3,9
63 L/4 EST	0,12	1695	0,68	1,2	0,98	44,4	0,8	2,0	1,9	0,00028	4,5
71 S/4 EST	0,18	1710	1,01	1,63	0,98	49,0	0,6	2,1	2,1	0,00063	5,7
71 L/4 EST	0,25	1700	1,40	2,09	0,98	53,1	0,6	1,8	2,3	0,00076	6,6
80 S/4 EST	0,37	1720	2,05	2,38	0,98	69,0	0,2	1,3	2,4	0,00128	8,3
80 L/4 EST	0,55	1700	3,09	3,49	0,98	69,9	0,3	1,3	2,2	0,00165	9,3
90 S/4 EST	0,75	1730	4,14	4,62	0,98	72,0	0,4	1,5	3,1	0,00235	12,4
90 L/4 EST	1,1	1725	6,09	6,31	0,98	77,3	0,1	1,4	3,2	0,00313	14,4

* Version B5, without options

1500 1/min
 50 Hz

 230/400 V & 400/690 V
 4 pole
IE2
S1

Type	P _N [kW]	n _N [rpm]	M _N [Nm]	I _N		cos φ	η				M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	k _g [kg]
				230/400 V	400/690 V		η ¹⁾								
				[A]	[A]		1/2xP _N [%]	3/4xP _N [%]	4/4xP _N [%]	4/4xP _N [%]					
80 SH/4	0,55	1420	3,7	2,44/1,41	1,41/0,81	0,7	77,7	80,7	80,8	80,4	3,2	3,2	5,1	0,0014	9
80 LH/4	0,75	1415	5,06	3,05/1,76	1,76/1,02	0,75	81,6	83	82,4	81,6	3	3,1	5,2	0,0019	10,2
90 SH/4	1,1	1435	7,32	4,19/2,42	2,42/1,40	0,8	80,9	82	81,8	81,4	3,1	3,5	6,1	0,0034	15,1
90 LH/4	1,5	1415	10,1	5,8/3,35	3,35/1,93	0,79	81,3	82,4	82,8	82,8	3,3	3,5	5,8	0,0039	16,8
100 LH/4	2,2	1445	14,5	8,05/4,65	4,65/2,68	0,79	85,2	86,7	86,6	85,3	3,7	4,3	7,3	0,0075	25,2
100 AH/4	3	1425	20,1	11,4/6,59	6,59/3,80	0,77	86,4	86,7	85,6	85,5	3,1	3,5	6,3	0,0075	25,2
112 MH/4	4	1440	26,5	13,9/8,02	8,02/4,63	0,83	87,4	87,6	86,7	86,6	3,1	3,6	7,5	0,014	35,5
132 SH/4	5,5	1460	36	18,5/10,7	10,7/6,18	0,84	87,6	88,5	88,2	87,7	3,1	3,5	7,6	0,032	55
132 MH/4	7,5	1460	49	26,0/15	15/8,7	0,81	88,5	89,5	89,3	88,7	3,3	3,9	7,5	0,035	62
132 LH/4	9,2	1450	60,6	33,9/19,6	19,6/11,3	0,77	87,6	89,7	89,3	η ²⁾	3,4	3,8	7,4	0,035	62
160 SH/4	9,2	1465	60	29,4/17	17/9,8	0,87	90,9	91,4	91,3	90,9	3,3	3,6	8,2	0,067	93
160 MH/4	11	1465	71,7	35,7/20,6	20,6/11,9	0,86	90,8	91,3	91,2	90,9	2,9	3,4	7,4	0,067	93
160 LH/4	15	1465	97,8	47,6/27,5	27,5/15,9	0,87	91,7	92,4	92	91,7	3	3,5	7,9	0,092	122
180 MH/4	18,5	1475	120	59,9/34,6	34,6/20	0,84	92,2	92,6	92,2	92	2,9	3,2	7,7	0,13	137
180 LH/4	22	1475	142	69,8/40,3	40,3/23,3	0,86	92,7	92,9	92,2	91,9	2,8	3,1	7,7	0,16	155
200 XH/4	30	1470	195	102/59	59/34,1	0,8	92,8	92,8	92,4	92,3	2,8	3,1	7,1	0,16	155
225 SH/4	37	1480	239	120/69,5		0,85	94,4	94,2	93,7	93,3	2,6	3,0	6,9	0,49	315
225 MH/4	45	1480	290	141/81,4		0,84	94,4	94,5	94	94	2,6	2,7	6,9	0,60	340
250 WH/4	55	1480	355	172/99,3		0,84	94,2	94,4	94	94	2,7	3,0	7,4	0,74	380

 1800 1/min
 60 Hz

 265/460 V & 460 V D
 4 pole
IE2
S1

Type	P _N [kW]	n _N [rpm]	M _N [Nm]	I _N		cos φ	η				M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	k _g [kg]
				265/460 V	460 V		η ¹⁾								
				[A]	[A]		1/2xP _N [%]	3/4xP _N [%]	4/4xP _N [%]	4/4xP _N [%]					
80 SH/4	0,55	1730	3,04	2,15/1,24	1,24	0,66	77,6	81,6	82,7	82,5	3,7	3,9	6,1	0,0014	9
80 LH/4	0,75	1730	4,14	2,7/1,56	1,56	0,72	81,9	84,4	84,9	84,4	3,4	3,9	6,4	0,0019	10,2
90 SH/4	1,1	1745	6,02	3,72/2,15	2,15	0,76	80,1	83,2	84	84	3,7	4,3	7,5	0,0034	15,1
90 LH/4	1,5	1725	8,3	5,11/2,95	2,95	0,76	81,5	83,7	84,4	84	3,9	4	6,8	0,0039	16,8
100 LH/4	2,2	1755	12	7,2/4,16	4,16	0,76	84,8	87,2	87,8	87,5	4	4,9	8,2	0,0075	25,2
100 AH/4	3	1740	16,5	9,84/5,68	5,68	0,75	88,1	88,7	88,2	87,9	3,6	4,3	7,7	0,0075	25,2
112 MH/4	4	1750	21,8	12,1/6,98	6,98	0,81	87,1	88,5	88,4	88,2	3,6	4,3	8,2	0,014	35,5
132 SH/4	5,5	1765	29,8	16,2/9,34	9,34	0,82	87,9	89,3	89,5	89,5	3,9	4,2	8,7	0,032	55
132 MH/4	7,5	1765	40,6	22,7/13,1	13,1	0,79	88	89,8	90,2	89,5	4,1	4,4	8,8	0,035	62
132 LH/4	9,2	1755	50,1	29,1/16,8	16,8	0,76	88,7	90	90	η ²⁾	4,1	4,7	8,2	0,035	62
160 SH/4	9,2	1770	49,6	26,0/15	15	0,85	88,8	91	91,3	91,2	3,9	4,2	9,7	0,067	93
160 MH/4	11	1770	59,3	31,2/18	18	0,84	90	91,4	91,7	91,6	3,2	3,8	8,7	0,067	93
160 LH/4	15	1765	81,2	41,6/24	24	0,88	91	92,4	92,6	92,4	3,5	4,2	8,8	0,092	122
180 MH/4	18,5	1780	99,2	52,0/30	30	0,84	91,8	92,7	92,7	92,4	3,5	3,6	8,5	0,13	137
180 LH/4	22	1780	118	60,6/35	35	0,85	92,4	93,1	92,9	92,4	3,6	3,6	8,3	0,16	155
200 XH/4	30	1775	161	88,3/51	51	0,8	93,2	93,5	93,1	93	3,2	3,3	8	0,16	155
225 SH/4	37	1785	198	102/58,9	58,9	0,84	93,7	94,5	94,5	94	2,9	3,3	8,2	0,49	315
225 MH/4	45	1785	241	123/71,2	71,2	0,83	94,2	94,8	94,6	94,5	3,1	3,2	8,2	0,60	340
250 WH/4	55	1785	294	151/87,2	87,2	0,84	94,2	94,8	94,7	94,3	3,0	3,3	8,5	0,74	380

η¹⁾ worst value in the long range limitη²⁾ Motor without wide voltage range

⇒ A22 - Extended operation range

* Version B5, without options

1800 1/min
60 Hz

230/460/575 V
4 - pole

CUS - High Efficiency (EISAct) 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
	[HP]	[kW]			[1/min]	[Nm]	230 V								
80 LH/4	1	0,75	1750	4,09	3,88	1,94	1,5	0,59	82,5	4,6	4,3	6,0	K	0,0019	10,2
90 SH/4	1,5	1,1	1740	6,04	4,3	2,15	1,75	0,76	84	3,5	3,8	6,3	L	0,0034	15,1
90 LH/4	2	1,5	1745	8,21	6,3	3,15	2,45	0,71	84	4,3	4,5	6,7	K	0,0039	16,8
100 LH/4	3	2,2	1765	11,9	8,6	4,3	3,4	0,73	87,5	3,6	4,7	7,9	L	0,0075	25,2
112 MH/4	5	3,7	1770	20,0	14,4	7,2	5,6	0,74	87,5	4,0	4,8	8,1	L	0,0128	35,5
132 SH/4	7,5	5,5	1780	29,5	20,9	10,5	8,3	0,74	89,5	4,3	4,6	8,2	M	0,0317	55
132 MH/4	10	7,5	1770	40,5	27	13,5	10,8	0,78	89,5	3,2	4,0	7,4	M	0,0354	62
160 MH/4	15	11	1770	59,35	36	18	14,4	0,84	91,7	3,2	3,8	8,7	K	0,067	93
160 LH/4	20	15	1775	80,70	48	24	19,2	0,84	92,6	3,5	4,2	8,8	M	0,092	122
180 MH/4	25	18,5	1780	99,2	60	30	24	0,84	92,4	3,5	3,6	8,5	K	0,13	137
180 LH/4	30	22	1780	118,0	70	35	28	0,85	92,4	3,6	3,6	8,3	K	0,16	155

* Version B5, without options
** SF=1,15

Type Plate (Geared motor) IE2 S1

Type SK 90 LH/4		11	
3~ Mot.	No. 2005471179-400	12345678	
Th.Cl.155 (F)	IP 55 S1	IEC 60034 (H)	
50 Hz	230/400 V Δ/Y	60 Hz	265/460 V Δ/Y
5,80/3,34 A	1,5 kW	5,12/2,95 A	1,5 kW
COS φ 0,79	1415 min ⁻¹	COS φ 0,76	1725 min ⁻¹
220-240/380-420 V Δ/Y	254-277/440-480 V Δ/Y		
5,86-5,95/3,39-3,40 A	5,16-5,25/2,98-3,03 A		
IE2=82,2%		IE2=84,4%	
		15,1 kg	
		6205.2Z	
		6205.2Z	

Type Plate (IEC-motor) IE2 S1

Type SK 90 LH/4		11	
3~ Mot.	No. 2005471179-400	12345678	
Th.Cl.155 (F)	IP 55 S1	IEC 60034 (H)	
50 Hz	230/400 V Δ/Y	60 Hz	265/460 V Δ/Y
5,80/3,34 A	1,5 kW	5,12/2,95 A	1,5 kW
COS φ 0,79	1415 min ⁻¹	COS φ 0,76	1725 min ⁻¹
220-240/380-420 V Δ/Y	254-277/440-480 V Δ/Y		
5,86-5,95/3,39-3,40 A	5,16-5,25/2,98-3,03 A		
IE2=82,2%		IE2=84,4%	
		15,1 kg	
		6205.2Z	
		6205.2Z	

High Efficiency S1

Type SK 90 LH/4 CUS TF		11	
3~ Mot.	No. 34714711	FIN 12345678	
INS F	NEMA	IP55 S1	AMB 40 °C TEFC DP
60Hz	230/460 V YY/Y	Hz	V Δ/Y
6,30/3,15 A	2 HP	A	1,5kW
PF 0,71	1745 rpm	PF	rpm
EFF 84%	CODE K	EFF	CODE
SF1.15	sF	A	sF
V		V	
A SF		A SF	
Over Temp Prot-2 Class F			

High Efficiency S1

Type SK 90 LH/4 CUS TF		11	
3~ Mot.	No. 200847111-0300	FIN 12345678	
INS F	NEMA	IP55 S1	AMB 40 °C TEFC DP
60Hz	332/575 V Δ/Y	Hz	V Δ/Y
4,24/2,54 A	2 HP	A	1,5kW
PF 0,73	1740 rpm	PF	rpm
EFF 84%	CODE K	EFF	CODE
SF1.15	sF	A	sF
V		V	
A SF		A SF	
Over Temp Prot-2 Class F			

3000 1/min
50 Hz

230/400/690 V
2 - pole

IE2
S1

Type	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N			cos φ		η			M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	kg
				230 V	400 V	690 V	φ	1/2xP _N	3/4xP _N	4/4xP _N						
				[A]	[A]	[A]		[%]	[%]	[%]						
80 SH/2	0,75	2820	2,54	2,77	1,6	0,92	0,85	78,6	80,1	79,6	2,6	3	5,3	0,00067	8	
80 LH/2	1,1	2820	3,72	4,04	2,33	1,35	0,82	79,2	80,5	80,6	3,5	3,6	6,2	0,00089	9	
90 SH/2	1,5	2845	5,03	5,47	3,16	1,82	0,84	82,8	83,7	82,6	3	3,3	5,9	0,0014	12	
90 LH/2	2,2	2840	7,4	7,45	4,3	2,48	0,87	85,7	86,1	84,7	3,5	3,7	6,9	0,002	15	
100 LH/2	3	2880	9,95	9,87	5,7	3,29	0,88	87,2	88,1	87,3	3,3	4,2	7,7	0,0037	21	
112 MH/2	4	2905	13,2	12,9	7,43	4,29	0,88	88	88,5	87,7	3,3	3,8	7,9	0,0069	28	
132 SH/2	5,5	2925	18	17,3	10	5,77	0,9	87,4	88,7	88,6	3,1	3,7	8	0,013	42	
132 RH/2	7,5	2940	24,4	23,2	13,4	7,72	0,91	88,5	89,3	89	3,2	3,8	8,1	0,019	55	

* Version B5, without options

3600 1/min
60 Hz





230/460/575 V
2 - pole

IE2
S1

Type	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N			cos φ		η			M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	kg
				230 V	460 V	575 V	φ	1/2xP _N	3/4xP _N	4/4xP _N						
				[A]	[A]	[A]		[%]	[%]	[%]						
80 SH/2	0,75	3440	2,08	2,86	1,43	1,14	0,84	72,6	76,8	78,2	3,1	3,6	6,7	0,00067	8	
80 LH/2	1,1	3450	3,04	4,08	2,04	1,63	0,8	78,1	81,5	82,5	4,2	4,4	7	0,00089	9	
90 SH/2	1,5	3465	4,13	5,42	2,71	2,17	0,83	82,5	84,8	84,6	3,9	4	7,5	0,0014	12	
90 LH/2	2,2	3470	6,05	7,38	3,69	2,95	0,87	85,6	87	86,8	4,4	4,5	8,6	0,002	15	
100 LH/2	3	3500	8,18	9,82	4,91	3,93	0,87	84,7	87,6	88,7	4	4,8	8,7	0,0037	21	
112 MH/2	4	3520	10,8	13,2	6,61	5,29	0,88	86,2	87,8	87,8	3,8	4,4	8,9	0,0069	28	
132 SH/2	5,5	3540	14,8	17,4	8,68	6,94	0,89	85,2	88	88,8	3,5	4	8,8	0,013	42	
132 RH/2	7,5	3545	20,2	23,0	11,5	9,18	0,91	87,1	89,3	89,9	3,6	4,2	8,8	0,019	55	

* Version B5, without options

Type Plate

					
Type SK 90 LH/2					
3~ Mot.		No. 2005471179-200		12345678	
Th.Cl. 155 (F)		IP 55 S1		IEC 60034 (H)	
50Hz		230/400 V Δ/Y		60Hz 265/460 ' Δ/Y	
7,45/4,30 A		2,2 kW		6,39/3,69 A 2,2 kW	
COS φ 0,9		2840 min ⁻¹		COS φ 0,87 3470 min ⁻¹	
A			A		
IE2=84,7%			IE2=86,2%		
					

AR (ALTO Rendimento - Brazil)




1800 1/min
60 Hz

220/380 V & 440 V
4 - pole

AR S1	220/380 V								440 V									
	P _N	n _N	M _N	I _N		cos φ	η	n _N	M _N	I _N		cos φ	η	M _A /M _N	M _K /M _N	I _A /I _N	J	kg
				220 V	380 V					440 V								
Type	[kW]	[1/min]	[Nm]	[A]	[A]	φ	4/4xP _N	[1/min]	[Nm]	[A]		4/4xP _N	@220/380V				[kgm ²]	[kg]
80 LH/4	0,75	1.679	4,27	2,99	1,73	0,81	84,4	1.718	4,17	1,56	0,76	84,6	2,2	2,60	4,80	0,0019	10,2	
90 SH/4	1,1	1.710	6,14	4,00	2,31	0,85	84,3	1.735	6,05	2,13	0,78	85,9	2,5	2,90	5,60	0,0034	15,1	
90 LH/4	1,5	1.700	8,43	5,54	3,20	0,84	84,4	1.730	8,28	3,00	0,77	85,8	2,8	3,30	5,80	0,0039	16,8	
100 LH/4	2,2	1.725	12,2	7,83	4,52	0,84	87,3	1.745	12,0	4,20	0,78	88,3	2,7	3,30	6,20	0,0075	25,2	
100 AH/4	3,0	1.725	16,6	11,3	6,50	0,80	87,9	1.745	16,4	6,80	0,66	88,2	2,7	3,30	6,40	0,0075	25,2	
112 MH/4	3,7	1.735	20,4	13,2	7,60	0,84	88,2	1.755	20,1	7,10	0,77	89,4	3,1	3,70	7,40	0,014	35,5	
112 MH/4	4,5	1.730	24,8	15,5	8,95	0,86	89,0	1.750	24,6	8,45	0,78	89,9	2,8	3,30	6,80	0,014	35,5	
132 SH/4	5,5	1.760	29,8	19,1	11,0	0,84	90,0	1.770	29,7	10,5	0,76	90,3	3,3	3,50	7,50	0,032	55,0	
132 MH/4	7,5	1.755	40,8	26,3	15,2	0,82	91,3	1.770	40,5	15,1	0,73	91,4	3,4	3,70	7,80	0,035	62,0	
132 LH/4	9,2	1.740	49,5	31,3	18,1	0,85	89,5	1.775	49,5	17,4	0,77	89,6	2,63	3,43	6,80	0,035	62,0	
160 MH/4	11	1.765	59,5	36,4	21,0	0,88	92,0	1.775	59,2	19,2	0,82	92,1	2,6	3,10	7,40	0,067	93,0	
160 LH/4	15	1.770	80,9	49,4	28,5	0,87	92,7	1.775	80,7	26,7	0,80	92,8	3,1	3,70	7,90	0,092	122	
180 MH/4	18,5	1.780	99,2	61,5	35,5	0,86	92,8	1.780	99,2	35,0	0,75	92,9	3,3	3,40	8,20	0,13	137	
180 LH/4	22	1.775	118	72,2	41,7	0,86	93,3	1.782	118	39,0	0,78	93,3	3,0	3,00	8,00	0,16	155	
200 XH/4	30	1.770	162	102	58,9	0,81	93,1	1.770	162	51,0	0,81	93,0	2,93	2,97	7,60	0,16	155	

* Version B5, without options

Type Plate

		CE		ALTO Rendimento			
Type SK 90 SH/4 AR							
3~ Mot.		No. 2005471178-100			12345678		
Th.Cl. 155 (F)		IP 55 S1		IEC 60034 (H)			
60Hz		220/380 V Δ/Y		60Hz		440 V Y	
4,00/2,31 A		1,1 kW		2,13 A		1,1 kW	
COS φ 0,85		1710 min ⁻¹		COS φ 0,78		1735 min ⁻¹	
REND.=84,3%				REND.=85,9%			
NBR 17094				Squirrel Cage induction motor			
CAT N				SF 1,15			
							
nord.com							

IE2 - KR (Korea)





1800 1/min
60 Hz

220/380 V & 440 V
4 - pole

KR S1	220/380 V							440 V										
	P _N	n _N	M _N	I _N		cos φ	η	n _N	M _N	I _N		cos φ	η	M _A /M _N	M _K /M _N	I _A /I _N	J	kg
				220 V	380 V					440 V								
Type	[kW]	[1/min]	[Nm]	[A]	[A]	φ	[%]	[1/min]	[Nm]	[A]		[%]	@220/380V			*		
80 LH/4	0,75	1715	4,18	3,06	1,77	0,76	84,4	1740	4,12	1,78	0,65	84,5	2,9	3,3	5,9	0,0019	10,2	
90 SH/4	1,1	1710	6,14	4,00	2,31	0,85	84,3	1735	6,05	2,13	0,78	85,9	2,5	2,9	5,6	0,0034	15,1	
90 LH/4	1,5	1700	8,43	5,54	3,20	0,84	84,4	1730	8,28	3,00	0,77	85,8	2,8	3,3	5,8	0,0039	16,8	
100 LH/4	2,2	1730	12,1	7,95	4,59	0,81	87,6	1750	12,0	4,48	0,73	88,2	3,1	3,8	7	0,0075	25,2	
100 AH/4	3	1725	16,6	11,3	6,50	0,8	87,9	1745	16,4	6,80	0,66	88,2	2,7	3,3	6,4	0,0075	25,2	
112 MH/4	4	1730	22,1	14,2	8,20	0,85	87,9	1750	21,8	7,50	0,79	89,3	2,9	3,4	6,8	0,014	35,5	
132 SH/4	5,5	1760	29,8	19,1	11,0	0,84	90	1770	29,7	10,5	0,76	90,3	3,3	3,5	7,5	0,032	55	
132 MH/4	7,5	1755	40,8	26,3	15,2	0,82	91,3	1770	40,5	15,1	0,73	91,4	3,4	3,7	7,8	0,035	62	
160 SH/4	9,2	1765	49,8	30,1	17,4	0,89	91,3	1775	49,5	15,8	0,84	91,7	3,2	3,5	8,2	0,067	93	
160 MH/4	11	1765	59,5	36,4	21,0	0,88	92	1775	59,2	19,2	0,82	92,1	2,6	3,1	7,4	0,067	93	
160 LH/4	15	1770	80,9	49,4	28,5	0,87	92,7	1775	80,7	26,7	0,8	92,8	3,1	3,7	7,9	0,092	122	
180 MH/4	18,5	1780	99,2	61,5	35,5	0,86	92,5	1780	99,2	35,0	0,75	92,9	3,3	3,4	8,2	0,13	137	
180 LH/4	22	1780	118	71,9	41,5	0,87	92,4	1780	118	39,4	0,79	92,9	3,3	3,3	7,7	0,16	155	

* Version B5, without options

Type Plate

					
Type SK 90 SH/4 KR					
3~ Mot.		No. 2005471178-200		12345678	
Th.Cl.155 (F)		IP 55 S1		IEC 60034 (H)	
60 Hz		220/380 V Δ/Y		60 Hz 440 V Y	
4,00/2,31 A		1,1 kW		2,13 A 1,1 kW	
COS φ 0,85		1710 min ⁻¹		COS φ 0,78 1735 min ⁻¹	
V			V		
A			A		
IE2=84,3%				IE2=85,9%	
					
www.nord.com					

**1500 1/min
50 Hz**
**230/400 V & 400/690 V
4 - pole**

Type	IE3 S1														
	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N			cos φ	η			M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	J _{kg} [kg]
				230V [A]	400 V [A]	690 V [A]		4/4xP _N	1/2xP _N [%]	3/4xP _N [%]					
80 LP/4	0,75	1415	5,06	3,10	1,79	1,03	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	1,37	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	1,86	0,79	86,6	86,3	85,3	3,3	3,5	5,9	0,0039	16,8
100 LP/4	2,20	1465	14,3	7,40	4,27	2,47	0,83	88,7	89,6	88,1	2,6	3,9	8,2	0,0081	28
100 AP/4	3,00	1460	19,6	10,5	6,06	3,50	0,81	88,4	88,8	88,1	2,4	3,6	7,3	0,0081	28
112 MP/4	4,00	1440	26,5	13,6	7,85	4,53	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	6,29	0,8	90,6	91,5	90,9	3,9	4,1	8,6	0,032	55
132 MP/4	7,50	1460	49,0	27,3	15,7	9,06	0,77	90,2	90,5	90,4	3,9	4,2	7,5	0,035	62
160 SP/4	9,20	1470	59,8	28,9	16,7	9,65	0,88	90,4	91,1	91,0	2,9	3,3	8,1	0,067	93
160 MP/4	11,0	1465	71,7	35,5	20,5	11,8	0,85	91,6	92,0	91,4	2,9	3,4	7,4	0,067	93
160 LP/4	15,0	1465	97,8	48,3	27,9	16,1	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	19,6	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	22,7	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

**1800 1/min
60 Hz**
**265/460 V & 460 V D
4 - pole**

Type	IE3 S1														
	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N		cos φ	η			M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	J _{kg} [kg]	
				265 V [A]	460 V [A]		4/4xP _N	1/2xP _N [%]	3/4xP _N [%]						4/4xP _N [%]
80 LP/4	0,75	1730	4,14	2,72	1,57	0,7	84,4	86,1	86,1	3,4	3,8	6,5	0,0019	10,2	
90 SP/4	1,10	1740	6,04	3,64	2,1	0,76	86,3	87,4	86,9	4,2	4,9	8,4	0,0034	15,1	
90 LP/4	1,50	1730	8,28	4,85	2,8	0,78	86,3	87,4	87,0	3,9	4,3	7,6	0,0039	16,8	
100 LP/4	2,20	1770	11,9	6,65	3,84	0,79	88,2	89,8	90,0	3	4,5	9,2	0,0081	28	
100 AP/4	3,00	1765	16,2	8,82	5,09	0,79	88,7	89,9	89,9	2,7	4,1	8,8	0,0081	28	
112 MP/4	4,00	1750	21,8	11,85	6,84	0,82	89,2	90,4	90,2	3,7	4,3	9,0	0,014	35,5	
132 SP/4	5,50	1770	29,7	16,9	9,75	0,77	90,2	91,5	91,7	4,7	5,0	10,2	0,032	55	
132 MP/4	7,50	1765	40,6	23,2	13,4	0,77	90,7	91,6	91,7	4,7	5,0	9,6	0,035	62	
160 SP/4	9,20	1775	49,5	25,5	14,7	0,87	90	91,4	91,7	3,2	3,7	8,8	0,067	93	
160 MP/4	11,0	1770	59,3	30,8	17,8	0,84	91,2	92,5	92,5	3,2	3,8	8,8	0,067	93	
160 LP/4	15,0	1775	80,7	41,2	23,8	0,85	90,9	92,3	93,0	4,3	4,7	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	3,9	4,0	10,1	0,16	155	
180 LP/4	22,0	1780	118	60,3	34,8	0,85	93,6	94	93,6	3,3	3,4	8,8	0,16	155	

* Version B5, without options

Type Plate (Geared motor)

NORD CE	
Type SK 90 LP/4	
3~Mot. No. 2005471179-600	12345678
Th.Cl.155 (F) IP 55 S1	IEC 60034 (H)
50 Hz 230/400 VΔ/Y 60 Hz 265/460 VΔ/Y	
6,4/3,7 A 1,5 kW 4,9/2,8 A 1,5 kW	
COSφ0,7 1430 min ⁻¹ COSφ0,76 1730 min ⁻¹	
V A	
IE3=85,3%	
www.nord.com	

Type Plate (IEC-motor)

NORD CE	
Type SK 90 LP/4	
3~Mot. No. 2005471179-600	12345678
Th.Cl.155 (F) IP 55 S1	IEC 60034 (H)
50 Hz 230/400 VΔ/Y 60 Hz 265/460 VΔ/Y	
6,4/3,7 A 1,5 kW 4,9/2,8 A 1,5 kW	
COSφ0,7 1430 min ⁻¹ COSφ0,76 1730 min ⁻¹	
V A	
IE3=85,3%	
15,1 kg 6205.2Z 6205.2Z	
www.nord.com	

1800 1/min
60 Hz

230/460/575 V
4 - pole

CUS - 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 ⇒ IEC A28	J	kg
	[HP]	[kW]			[1/min]	[Nm]	230 V		460 V	575 V	4/4xP _N						
	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]	[A]
80 LP/4	1,0	0,75	1730	4,14	3,14	1,57	1,26	0,70	84,4	86,1	86,1	3,5	3,8	6,5	K	0,0019	10,2
90 SP/4	1,5	1,1	1740	6,04	4,20	2,10	1,68	0,76	86,3	87,4	86,9	4,2	4,9	8,4	L	0,0034	15,1
90 LP/4	2,0	1,5	1730	8,28	5,60	2,80	2,24	0,78	86,3	87,4	87,0	3,9	4,3	7,6	K	0,0039	16,8
100 LP/4	3,0	2,2	1770	11,9	7,68	3,84	3,07	0,79	88,2	89,8	90,0	3,0	4,5	9,2	L	0,0081	28
100 AP/4	4,0	3,0	1765	16,2	10,2	5,10	4,08	0,79	88,7	89,9	89,9	2,7	4,2	8,8	K	0,0081	28
112 MP/4	5,0	3,7	1755	20,1	13,0	6,50	5,20	0,80	89,2	90,4	90,3	4,1	4,6	9,5	L	0,014	35,5
132 SP/4	7,5	5,5	1770	29,7	19,5	9,75	7,80	0,77	90,2	91,5	91,7	4,7	5,0	10,2	M	0,032	55
132 MP/4	10,0	7,5	1765	40,6	26,7	13,4	10,7	0,77	90,7	91,6	91,7	4,7	5,0	9,6	M	0,035	62
160 MP/4	15,0	11,0	1770	59,3	35,6	17,8	14,2	0,84	91,2	92,5	92,5	3,2	3,8	8,8	K	0,067	93
160 LP/4	20,0	15,0	1775	80,7	47,6	23,8	19,0	0,85	90,9	92,3	93,0	4,3	4,7	10,8	M	0,092	122
180 MP/4	25,0	18,5	1780	99,2	60,6	30,3	24,2	0,82	92,5	93,4	93,6	3,9	4,0	10,1	L	0,16	155
180 LP/4	30,0	22,0	1780	118	69,6	34,8	27,8	0,85	93,6	94,0	93,6	3,3	3,4	8,8	K	0,16	155

* Version B5, without options

** SF=1,15

Type Plate

Type SK 90 LP/4 CUS TF	
3~ Mot. No. 34714712	FIN 12345678
INS F NEMA IP55 S1	AMB 40 °C TEFC DP
60Hz 230/460 V YY/Y	Hz V YY/Y
5.60/2.80 A 2 HP	A 1,5kW
PF 0,78 1730 rpm	PF rpm
EFF 87% CODE K	EFF CODE
SF1.15 sF A	SF sF
V	V
A SF	A SF
Over Temp Prot-2 Class F	

Type SK 90 LP/4 CUS TF	
3~ Mot. No. 200847111-0400	FIN 12345678
INS F NEMA IP55 S1	AMB 40 °C TEFC DP
60Hz 332/575 V Δ/Y	Hz V Δ/Y
3.88/2.24 A 2 HP	A 1,5kW
PF 0,78 1730 rpm	PF rpm
EFF 87% CODE K	EFF CODE
SF1.15 sF A	SF sF
V	V
A SF	A SF
Over Temp Prot-2 Class F	

IE4

Type	M _N [Nm]	P _N [kW]	n _N [rpm]	I at 400V [A]	η	M _{max} [Nm]	SK 180E	SK 200E*	SK 500E*
80T1/4	5,0	1,1	2.100	2,07	90,5	14,4	-111-323- -111-340-	-111-123- -111-340-	-111-323- -111-340-
80T1/4 Δ	4,8	1,5	3.000	3,44	90,4	14,4	-151-340-	-151-340-	-151-340-
90T1/4	6,8	1,5	2.100	2,82	88,9	21,0	-151-340-	-151-340-	-151-323- -151-340-
90T1/4 Δ	7,0	2,2	3.000	5,09	89,6	21,0	-221-340-	-221-340-	-221-340-
90T3/4	10,0	2,2	2.100	4,13	90,5	29,0	-221-340-	-221-340-	-221-323- -221-340-
90T3/4 Δ	9,5	3,0	3.000	6,84	92,3	29,0		-301-340-	-301-340-
100T2/4	13,6	3,0	2.100	5,4	91,4	42,0		-301-340-	-301-340-
100T2/4 Δ	12,7	4,0	3.000	8,9	92,1	42,0		-401-340-	-401-340-
100T5/4	18,2	4,0	2.100	7,1	92,1	57,0		-401-340-	-401-340-
100T5/4 Δ	17,5	5,5	3.000	11,9	92,2	57,0		-551-340-	-551-340-

* Please contact NORD for all combinations of IE4 Motors and SK200E or SK500E inverters

IE4 HM

Type	M _N [Nm]	P _N [kW]	n _N [rpm]	I at 400V [A]	η	M _{max} [Nm]	SK 180E	SK 500E
80T1/4 HM	3,41	0,75	2.100	1,46	90,5	13,5	-111-323- -111-340-	-750-323- -750-340-
90T3/4 HM	5,0	1,1	2.100	2,08	92,7	28,3	-151-340-	-111-323- -111-340-
100T5/4 HM	10,0	2,2	2.100	4,16	91,0	53,5		-221-323- -221-340-

ATEX Standard

ATEX 2D
ATEX 3D (non-conducting dust)

1500 1/min **230/400 V & 400/690 V**
50 Hz **4 - pole**

Ex II 2D IP 66 T 125°C
Ex II 3D IP 55 T 125°C

S1





Type	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N		cos φ	η 4/4xP _N [%]	M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	kg
				230/400 V [A]	400/690 V [A]							
63 S/4	0,12	1385	0,83	0,88/0,51		0,62	50,5	2,8	2,8	3,26	0,00021	3,6
63 L/4	0,18	1368	1,26	1,13/0,65		0,66	58,1	2,5	2,6	3,38	0,00028	4,2
71 S/4	0,25	1365	1,75	1,28/0,74		0,80	61,5	1,8	1,9	3,97	0,00072	5,4
71 L/4	0,37	1385	2,55	1,82/1,05		0,76	65,8	2,2	2,4	4,50	0,00086	6,3
80 S/4	0,55	1385	3,79	2,62/1,51		0,75	75,1	1,9	2	4,11	0,00109	8,0
80 L/4	0,75	1395	5,13	3,52/2,03		0,75	75,5	2	2,1	4,17	0,00145	9,0
90 S/4	1,1	1410	7,45	4,78/2,76		0,76	77,6	2,3	2,6	5,26	0,00235	12
90 L/4	1,5	1390	10,30	6,11/3,53		0,78	77,5	2,3	2,6	5,84	0,00313	14
100 L/4	2,2	1415	14,85	8,65/5,00	5,0/2,89	0,78	80,8	2,3	3	5,76	0,0045	18
100 LA/4**	3,0	1415	20,25	11,76/6,80	6,80/3,93	0,78	83,3	2,5	2,9	6,32	0,006	21
112 M/4	4,0	1430	26,71		8,24/4,76	0,83	85,1	2,3	2,8	7,15	0,011	30
132 S/4	5,5	1450	36,22		11,60/6,67	0,80	87,9	2,1	2,7	7,00	0,024	44
132 M/4	7,5	1450	49,39		15,50/8,96	0,79	87,7	2,5	2,8	7,59	0,032	55
132 MA/4**	9,2	1445	60,80		18,80/10,90	0,82	86,9	2,6	3,1	7,19	0,035	62

* Version B5, without options





** different surface temperature T 140°C

Type Plate

ATEX 2D S1

				Getriebebau NORD GmbH & Co. KG 22939 Bargteheide / GERMANY EN 60034 / EN 60079			
Type SK 80S/4 2D TF							
3~Mot. No. 201408582-300		20174276					
Th.Cl. 155 (F) IP 66 S1		Baujahr : 2014		(H)			
50 Hz		230/400 V Δ/Y		Hz		V	
2,62/1,51 A		0,55 kW		A		kW	
COS φ 0,75		1385 min ⁻¹		COS φ		min ⁻¹	
Ex II 2D Ex tb IIC T125°C Db				BVS 04 ATEX E037 X			
Kaltleiter fuer alleinigen Schutz PTC thermistors as sole protection							
							

ATEX 3D S1

				Getriebebau NORD GmbH & Co. KG 22939 Bargteheide / GERMANY EN 60034 / EN 60079			
Type SK 80L/4 3D TF							
3~Mot. No. 201408882-100		20186303					
Th.Cl. 155 (F) IP 55 S1		Baujahr : 2014		(H)			
50 Hz		230/400 V Δ/Y		Hz		V	
3,52/2,03 A		0,75 kW		A		kW	
COS φ 0,75		1395 min ⁻¹		COS φ		min ⁻¹	
Ex II 3D Ex tc IIB T125°C DcX							
Kaltleiter fuer alleinigen Schutz PTC thermistors as sole protection							
							

ATEX IE2 2D (conducting dust and non-conducting dust)

ATEX IE2 3D (non-conducting dust)

1500 1/min

230/400 V & 400/690 V

⚡ II 2D Ex tb III C T 125°C Db

50 Hz

4 - pole

⚡ II 3D Ex tc III B T 125°C Dc

IE2
S1

Type	P _N [kW]	n _N [1/min]	M _N [Nm]	I _N		cos φ	η			M _A /M _N	M _K /M _N	I _A /I _N	J [kgm ²]	kg
				230/400 V [A]	400/690 V [A]		1/2xP _N [%]	3/4xP _N [%]	4/4xP _N [%]					
80 SH/4	0,55	1415	3,71	2,39/1,38		0,73	77,7	80,7	80,8	3,1	3,2	5,5	0,0014	9,0
80 LH/4	0,75	1410	5,08	3,12/1,80		0,74	81,6	83,0	82,4	3,0	3,1	5,7	0,0019	10,2
90 SH/4	1,1	1430	7,35	4,26/2,46		0,79	80,9	82,0	81,8	3,1	3,5	6,5	0,0034	15,1
90 LH/4	1,5	1420	10,09	5,85/3,38		0,78	81,3	82,4	82,2	3,3	3,5	6,7	0,0039	16,8
100 LH/4	2,2	1445	14,54		4,79/2,76	0,77	85,2	86,7	86,6	3,7	4,3	8,2	0,0075	25,2
100 AH/4	3,0	1420	20,18		6,40/3,69	0,80	86,4	86,7	85,6	3,1	3,5	6,9	0,0075	25,2
112 MH/4	4,0	1440	26,53		8,12/4,69	0,83	87,4	87,6	86,7	3,1	3,6	8,0	0,014	35,5
132 SH/4	5,5	1455	36,10		10,82/6,24	0,83	87,6	88,5	88,2	3,1	3,5	8,1	0,032	55,0
132 MH/4	7,5	1460	49,23		15,19/8,77	0,80	88,5	89,5	89,3	3,3	3,9	8,2	0,035	62,0
132 LH/4	9,2	1450	60,59		19,70/11,39	0,77	87,6	89,7	89,3	3,44	3,84	7,7	0,035	62,0
160 MH/4	11	1465	71,70		20,5/11,8	0,85	90,8	91,3	91,2	2,9	3,4	9,1	0,067	93,0
160 LH/4	15	1465	97,75		27,5/15,9	0,87	91,7	92,4	92,0	3,0	3,5	9,6	0,092	122
180 MH/4	18,5	1475	120		34,9/20,2	0,84	92,2	92,6	92,2	2,9	3,2	8,3	0,13	137
180 LH/4	22	1475	142		40,8/23,6	0,86	92,7	92,9	92,2	2,8	3,1	8,4	0,16	155

* Version B5, without options

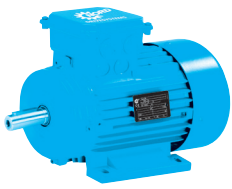
Type Plates

ATEX IE2 2D S1

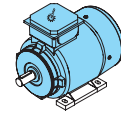
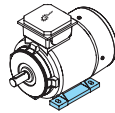
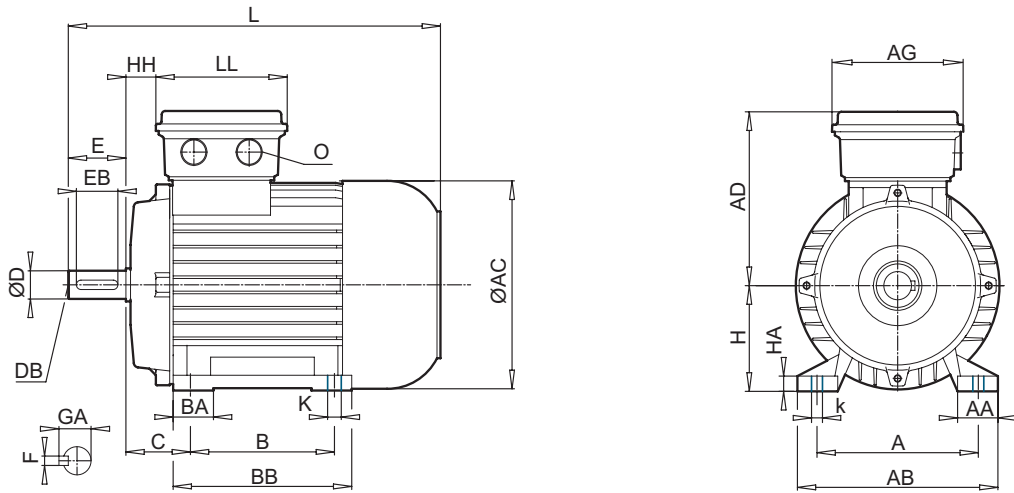
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Type SK 80 LH/4 2D TF							
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Th.Cl. 155(F)		IP66 S1		Baujahr : 2014		(H)	
50 Hz		230/400 VΔ/Y		Hz		V	
⊕		3,12/1,80 A		0,75 kW		A kW	
⊖		COS φ 0,75		1410 min ⁻¹		COS φ min ⁻¹	
⚡ II 2D Ex tb IIIC T125°C Db				BVS 04 ATEX E037 X			
Kaltleiter für alleinigen Schutz PTC thermistor as sole protection							

ATEX IE2 3D S1

		Getriebebau NORD GmbH & Co. KG D-22941 Bargteheide EN 60034 / EN 60079					
Type SK 90 LH/4 3D TF							
3~ Mot.		No. 2005471178-200		12345678			
Th.Cl.155(F)		IP55 S1		Baujahr : 2011		(H)	
50 Hz		230/400 VΔ/Y		Hz		V	
⊕		5,85/3,38 A		1,5 kW		A kW	
⊖		COS φ 0,79		1420 min ⁻¹		COS φ min ⁻¹	
⚡ II 3D Ex tc IIIB T125°C DcX							
Kaltleiter für alleinigen Schutz PTC thermistor as sole protection							

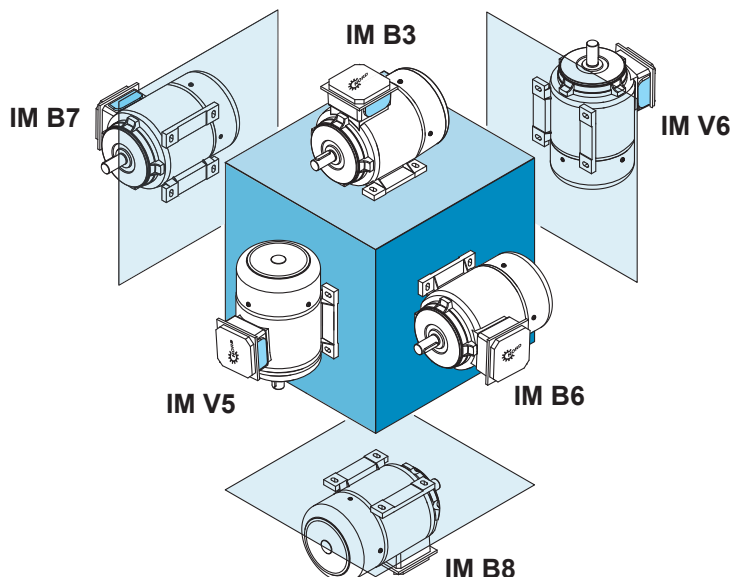


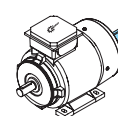
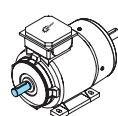
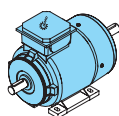
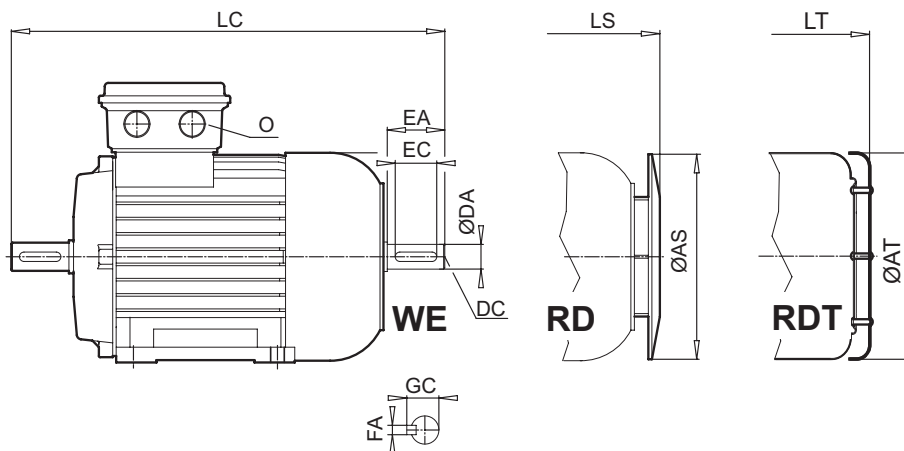
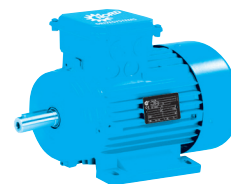
B3



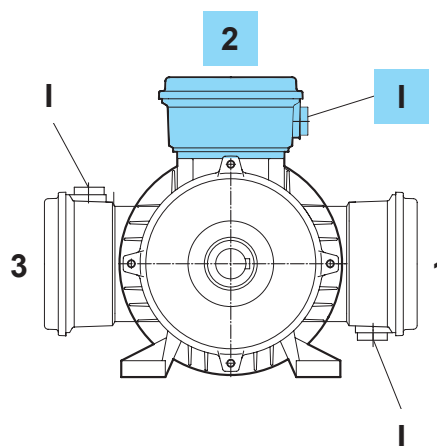
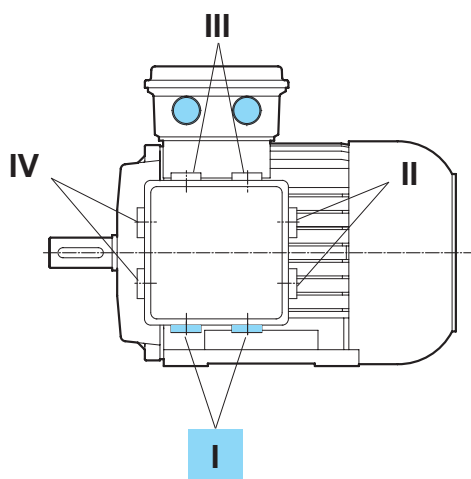
Type																				
IE1*	IE2	IE3		[mm]																
				A	AA	AB	B	BA	BB	HA	k	K	AC	AD	AG	C	H	HH	L	
63	S/L	-	-	100	21	120	80	27	105	9	12	7	123	115	100	40	63	12	215	
71	S/L	-	-	112	24	136	90	24	108	10	12	7	138	124	100	45	71	20	244	
80	S/L	SH/LH	LP	125	30	160	100	30	125	11	17	10	156	142	114	50	80	22	276	
90	S/L	SH/LH	SP/LP	140	34	174	125	35	155	12	17	10	176	147	114	56	90	26	326	
100	L/LA	LH/AH	LP/AP	160	37	192	140	30	175	15	22	12	194	169	114	63	100	32	366	
112	M	-	-	190	40	224	140	34	175	15	22	12	218	179	114	70	112	35	386	
112	-	MH	MP	190	40	224	140	34	175	15	22	12	218	179	114	70	112	35	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	M	MH	SP/MP	254	72	318	210	52	264	25	30	14,5	310	242	186	108	160	52	602	
160	L	-	-	254	72	318	254	52	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	-	MH	MP	279	88,5	340	241	-	281	27	30	14,5	348	259	186	121	180	54	726	
180	-	LH	LP	279	88,5	340	279	-	319	27	30	14,5	348	259	186	121	180	54	726	
225	-	-	RP	356	79	443	286	66	359	20	25	20	443	347	245	149	225	94	882	
225	-	SH	SP	356	79	443	286	66	359	20	25	20	443	347	245	149	225	94	882	
225	-	MH	MP	356	79	443	311	66	359	20	25	20	443	347	245	149	225	94	882	

* + Standard

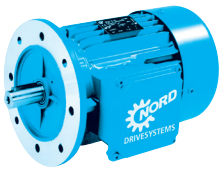




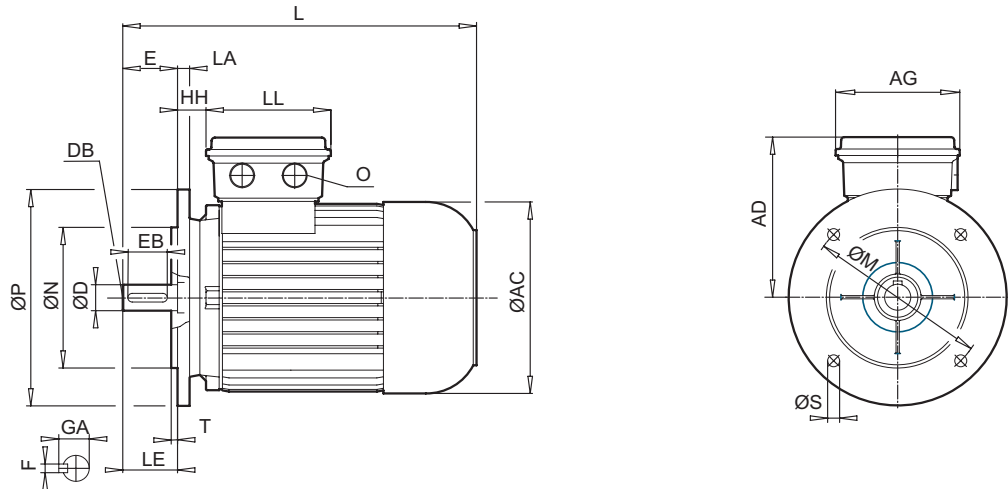
[mm]	LC	LL	AS	AT	LS	LT	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
	238	100	123	123	226	233	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
	268	100	138	138	255	258	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
	309	114	156	156	291	229	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
	373	114	176	176	341	345	M25 x 1,5	24	M8	50	40	8	27,0	19	M6	40	32	6	21,5
	422	114	194	194	381	388	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
	440	114	218	218	401	411	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
	465	114	218	218	426	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	64,0	55	M20	110	100	16	59,0



⇒ A50

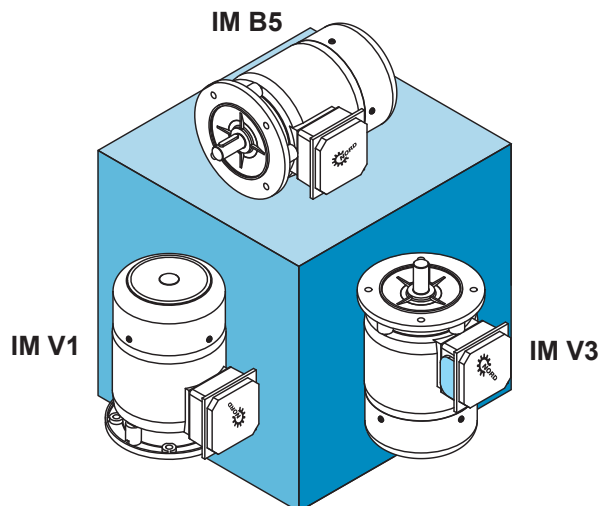


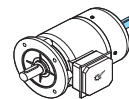
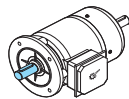
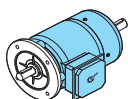
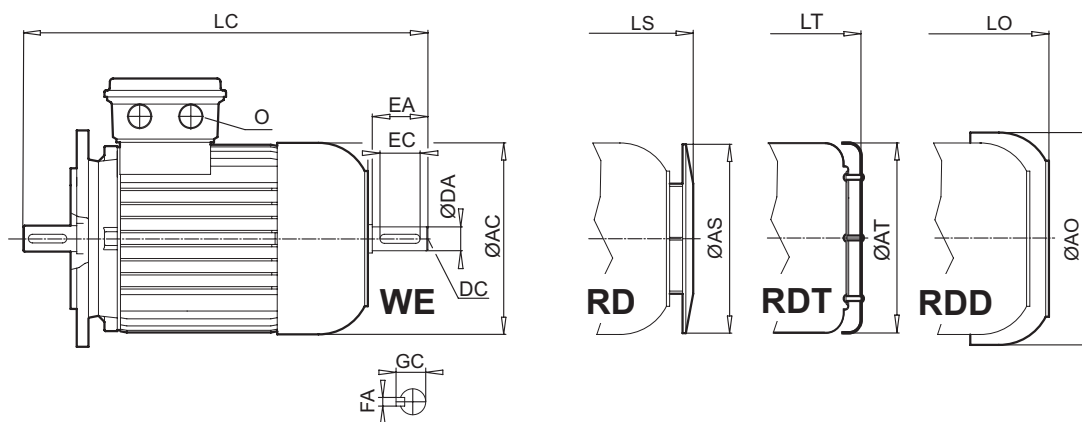
B5



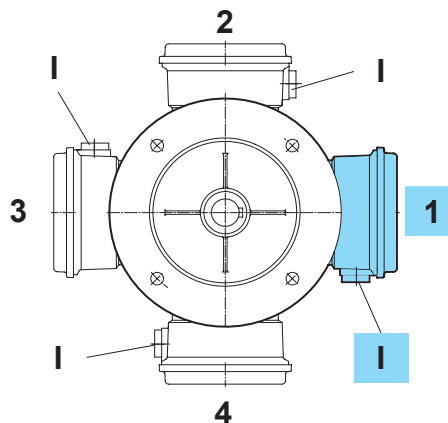
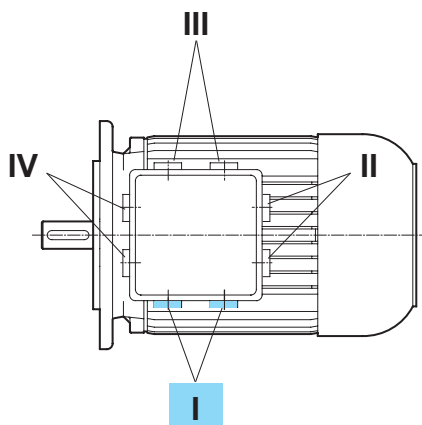
Type	Type			[mm]													
	IE1*	IE2	IE3	LA	M	N	P	S	T	AC	AD	AG	HH	L	LC	LE	LL
63	S/L	-	-	10	115	95	140	9	3,0	123	115	100	12	215	238	23	100
71	S/L	-	-	10	130	110	160	9	3,5	138	124	100	20	244	268	30	100
80	S/L	SH/LH	LP	11	165	130	200	11	3,5	156	142	114	22	276	309	40	114
90	S/L	SH/LH	SP/LP	11	165	130	200	11	3,5	176	147	114	26	326	373	50	114
100	L/LA	LH/AH	LP/AP	15	215	180	250	13,5	4,0	194	169	114	32	366	422	60	114
112	M	-	-	15	215	180	250	13	4,0	218	179	114	35	386	440	60	114
112	-	MH	MP											411	465		
132	S/M/MA	SH/MH/LH	SP/MP	20	265	230	300	13	4,0	258	204	122	47	491	589	80	122
160	M/L	MH	SP/MP	20	300	250	350	17,5	5,0	310	242	186	52	602	721	110	186
160	-	LH	LP											646	765		
180	MX	-	-	20	300	250	350	17,5	5,0	310	242	186	52	602	721	110	186
180	LX													646	765		
180	-	MH/LH	MP/LP	14	300	250	350	17,5	5,0	348	259	186	54	726	843	110	186
200	LX	XH	-	14	350	300	400	17,5	5,0	348	259	186	54	726	843	110	186
225	-	-	RP	20	400	350	450	17,5	5,0	443	347	245	94	882	1002	140	245
225	-	SH	SP														
225	-	MH	MP														

* + Standard





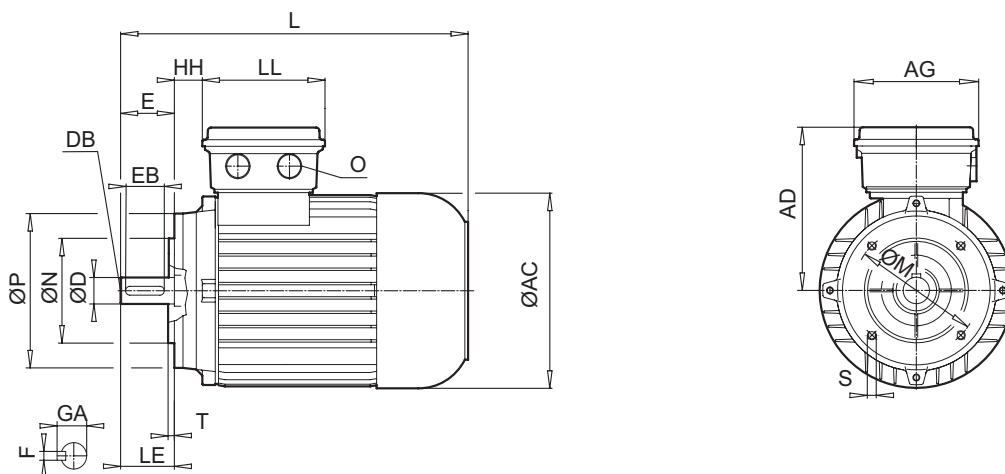
[mm]	AS	AT	AO	LS	LT	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
	123	123	138	226	233	243,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
	138	138	156	255	258	268	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
	156	156	176	291	296	302	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
	176	176	194	341	345	357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



⇒ A50

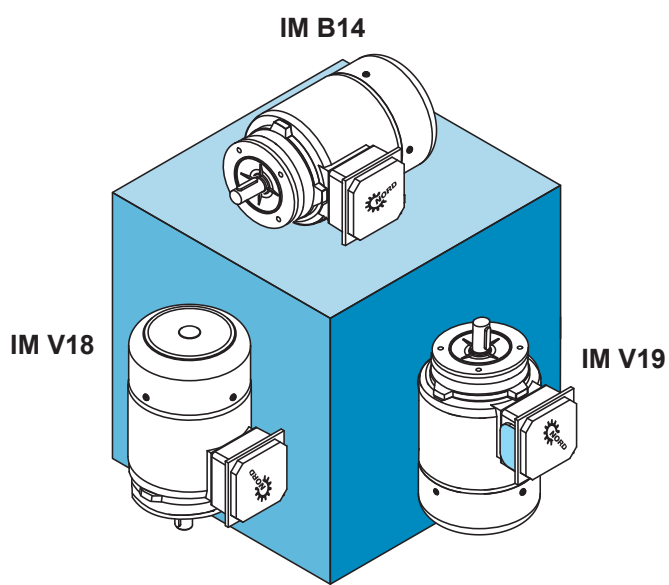


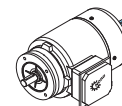
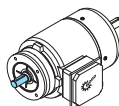
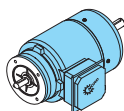
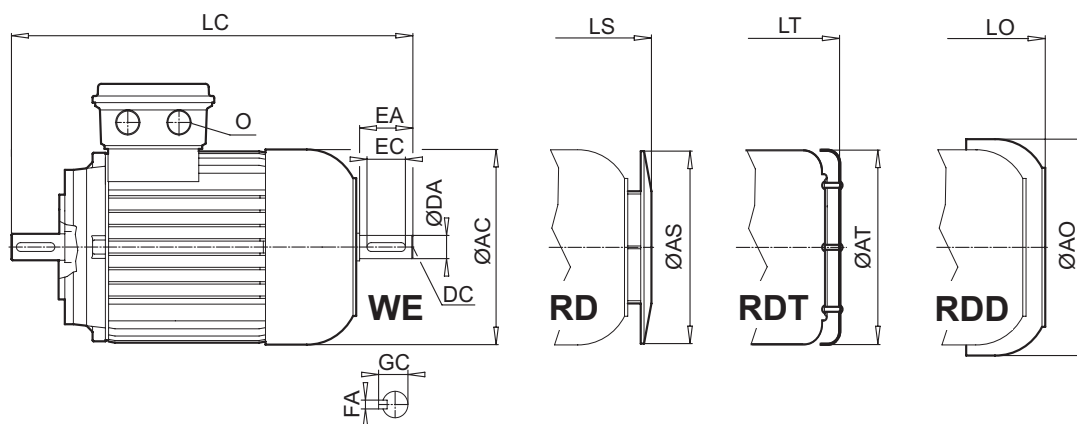
B14



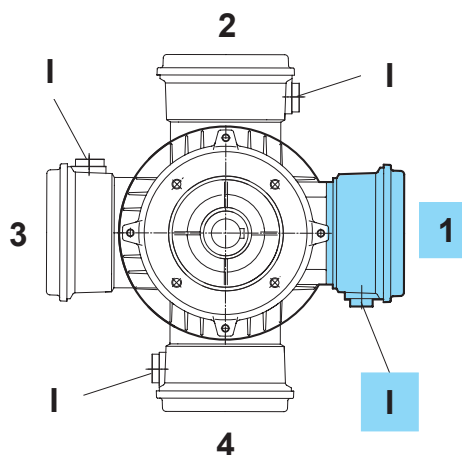
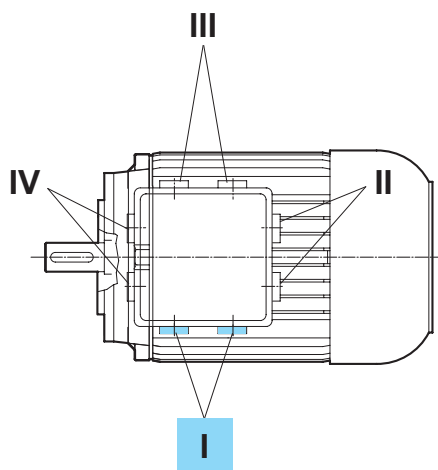
Type	Type			Type												
	IE1*	IE2	IE3	M	N	P	S	T	AC	AD	AG	HH	L	LC	LE	LL
63	S/L	-	-	75	60	90	M5 x 8	2,5	123	115	100	12	215	238	23	100
71	S/L	-	-	85	70	105	M6 x 12	2,5	138	124	100	20	244	268	30	100
80	S/L	SH/LH	SP	100	80	120	M6 x 12	3,0	156	142	114	22	276	309	40	114
90	S/L	SH/LH	SP/LP	115	95	140	M8 x 15	3,0	176	147	114	26	326	373	50	114
100	L/LA	LH/AH	LP/AP	130	110	160	M8 x 16	3,5	194	169	114	32	366	422	60	114
112	M	-	-	130	110	160	M8 x 12	3,5	218	179	114	35	386	440	60	114
112	-	MH	MP	130	110	160	M8 x 12	3,5	218	179	114	35	411	465	60	114
132	S/M/MA	SH/MH/LH	SP/MP	165	130	200	M10 x 18	3,5	258	204	122	47	491	589	80	122
160	M/L	MH	SP/MP	165	130	200	M10 x 20	3,5	310	242	186	52	602	721	110	186
160	-	LH	LP	165	130	200	M10 x 20	3,5	310	242	186	52	646	765	110	186
180	MX	-	-	165	130	200	M10 x 20	3,5	310	242	186	52	602	721	110	186
180	LX	-	-	165	130	200	M10 x 20	3,5	310	242	186	52	646	765	110	186

* + Standard

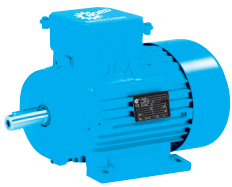




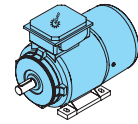
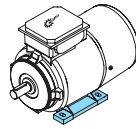
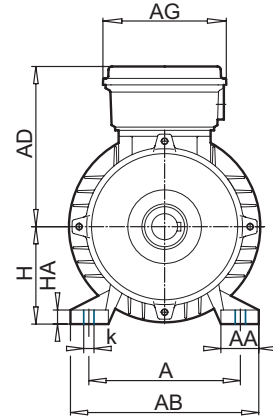
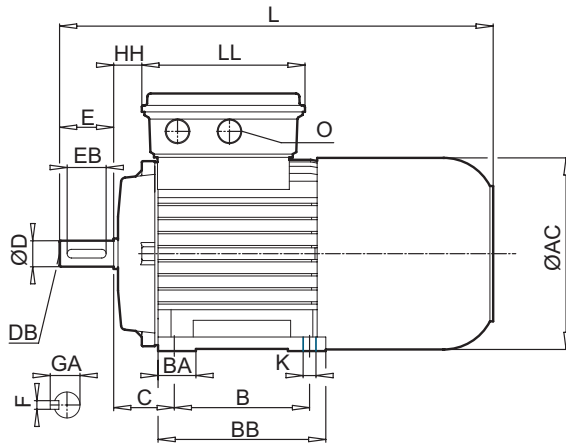
[mm]	AS	AT	AO	LS	LT	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
	123	123	138	226	233	243,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
	138	138	156	255	258	268	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
	156	156	176	291	296	302	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
	176	176	194	341	345	357	M25 x 1,5	24	M8	50	40	8	27,0	19	M6	40	32	6	21,5
	194	194	218	381	388	394	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0
	218	218	258	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	508	534	532	M32 x 1,5	38	M12	80	70	10	41,0	32	M12	80	70	10	35,0
	310	-	367	619 663	-	647 691	M40 x 1,5	42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
	310	-	367	619 663	-	647 691	M40 x 1,5	48	M16	110	100	14	51,5	42	M16	110	90	12	49,0



⇒  A50

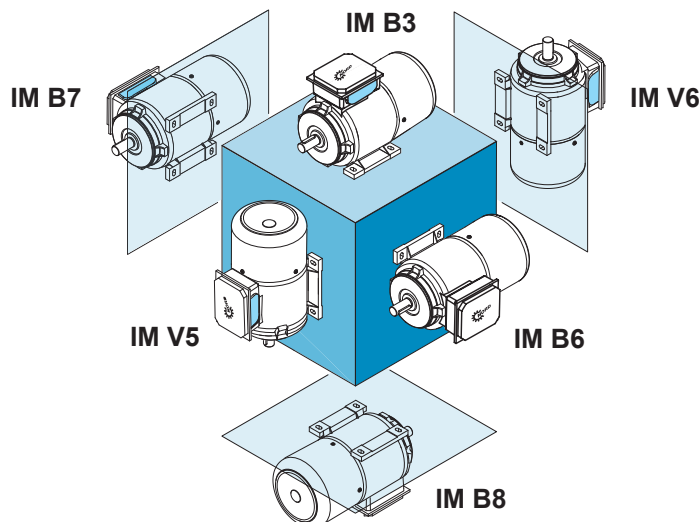


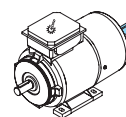
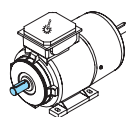
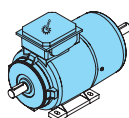
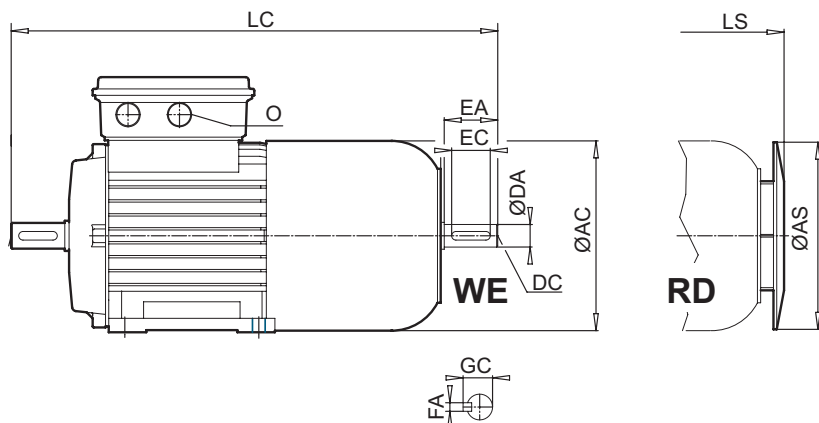
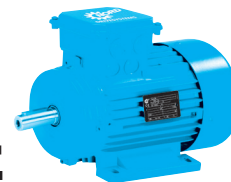
B3-BRE



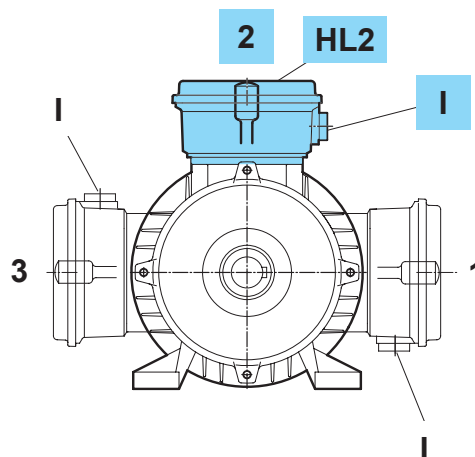
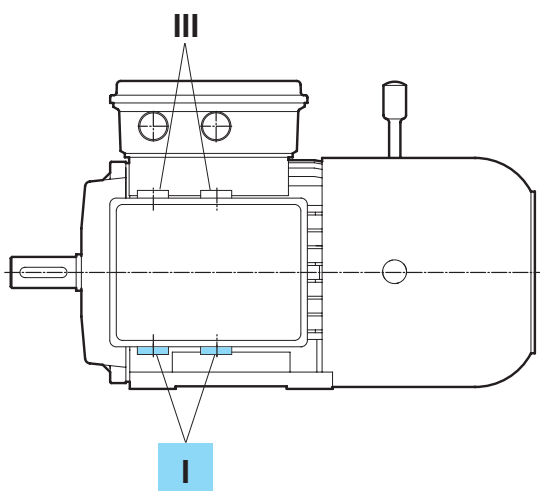
Type																				
IE1*	IE2	IE3	BRE [Nm]		A	AA	AB	B	BA	BB	HA	k	K	AC	AD	AG	C	H	HH	L
63	S/L	-	-	5	100	21	120	80	27	105	9	12	7	123	123	89	40	63	19	271
71	S/L	-	-	5	112	24	136	90	24	108	10	12	7	138	132	89	45	71	27	302
80	S	SH	-	5	125	30	160	100	30	125	11	17	10	156	142	108	50	80	26	340
80	L	LH	LP	10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

* + Standard





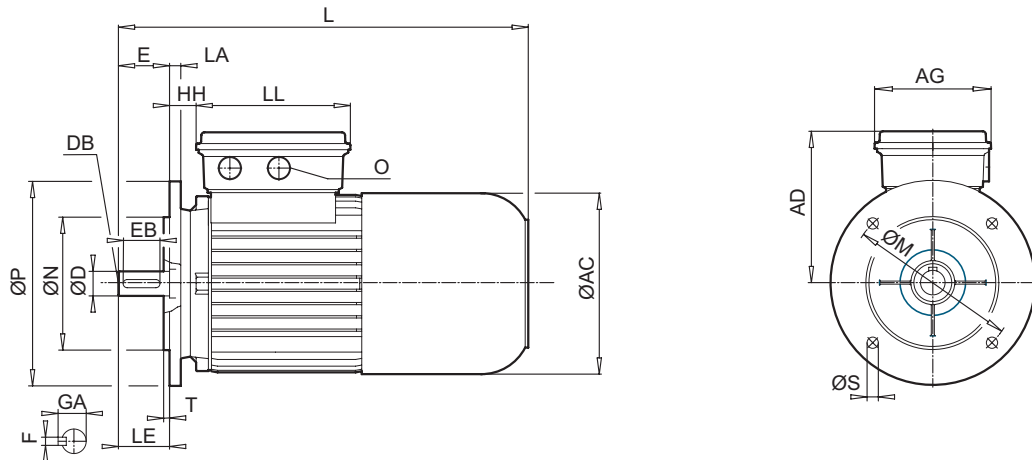
[mm]	LC	LL	AS	LS	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
	298	134	123	282	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
	329	134	138	313	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
	374	153	156	355	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
	439	153	176		M25 x 1,5	24	M8	50	40	8	27,0	14	M5	30	20	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
	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 48 55	M20	110	100	16	59,0



⇒ A50

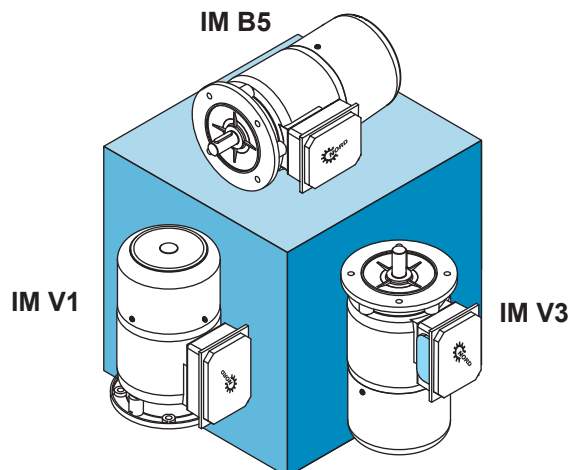


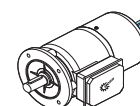
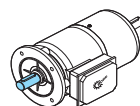
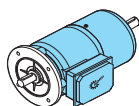
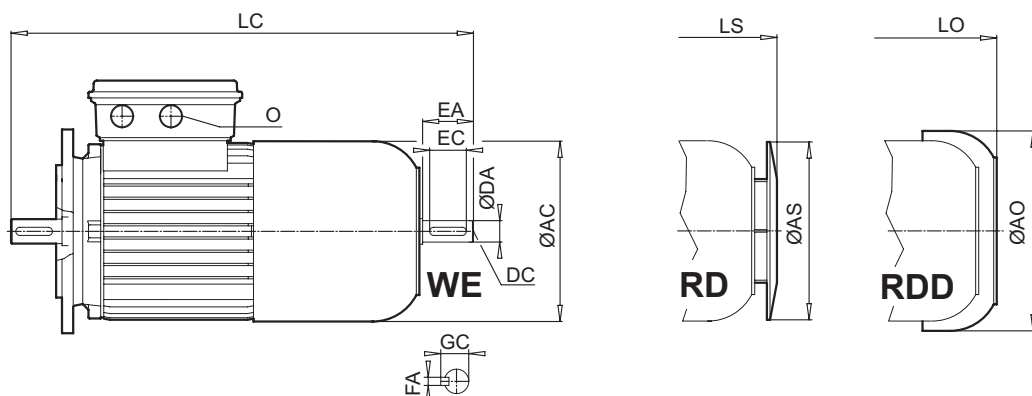
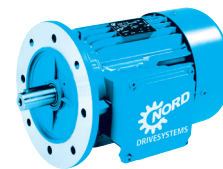
B5-BRE



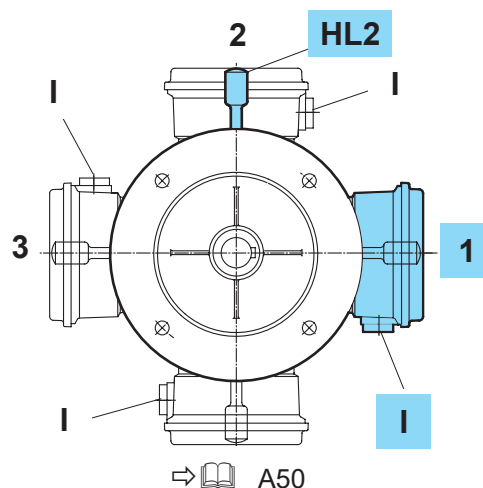
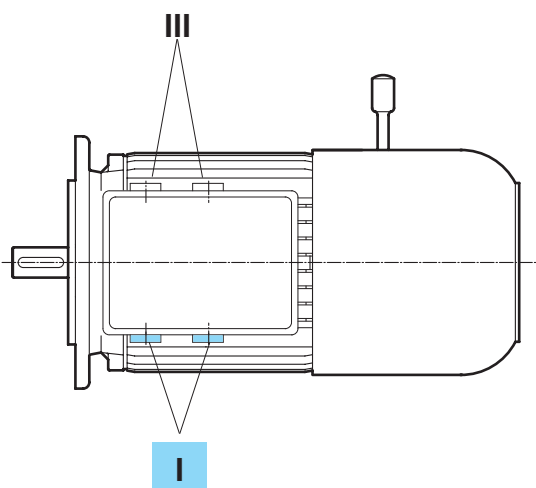
Type																
IE1*	IE2	IE3	BRE [Nm]		LA	M	N	P	S	T	AC	AD	AG	HH	L	
				[mm]												
63	S/L	-	-	5	10	115	95	140	9	3,0	123	123	89	19	271	
71	S/L	-	-	5	10	130	110	160	9	3,5	138	132	89	27	302	
80	S	SH	-	5	11	165	130	200	11	3,5	156	142	108	26	340	
	L	LH	LP	10												
90	S/L	SH/LH	SP/LP	20	11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

* + Standard



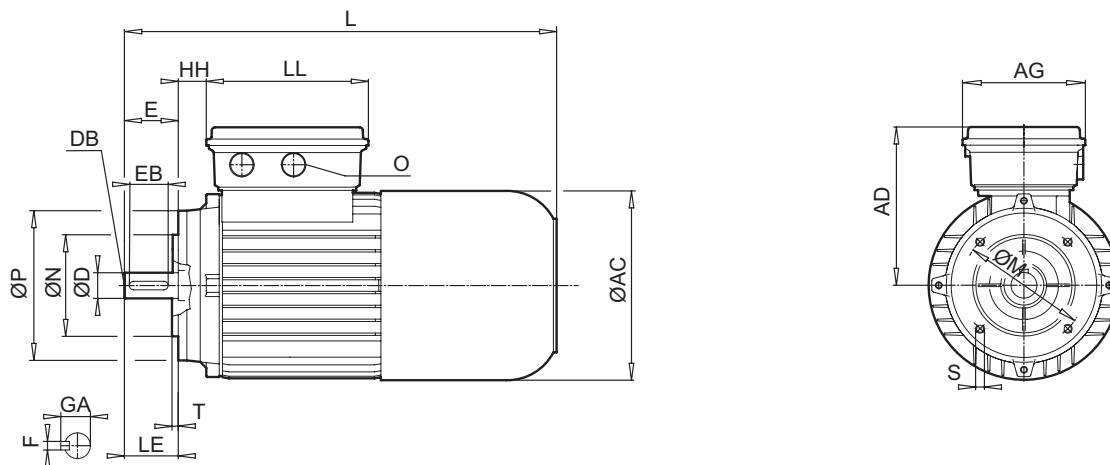


[mm]	LC	LE	LL	AS	AO	LS	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC						
	298	23	134	123	138	282	294,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5						
	329	30	134	138	156	313	326	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5						
	374	40	153	156	176	355	366	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	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						
	537	60	153	218	258	495	518	M32 x 1,5	28	M10	60	50	8	31,0	24	M8	50	40	8	27,0						
	562	60	153	218	258	520	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					754	782	M40 x 1,5	42	M16	110	90	12	45,0	28	M10	60	50	8	31,0						
	856	110	186	310	367	754	782								42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
	900	110	186	310	367	798	826								42	M16	110	90	12	45,0	42	M16	110	90	12	45,0
	856	110	186	310	367	754	782	M40 x 1,5	48	M16	110	100	14	51,5	42	M16	110	90	12	49,0						
	900	110	186	310	367	798	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	48 55 55	M20	110	100	16	59,0						



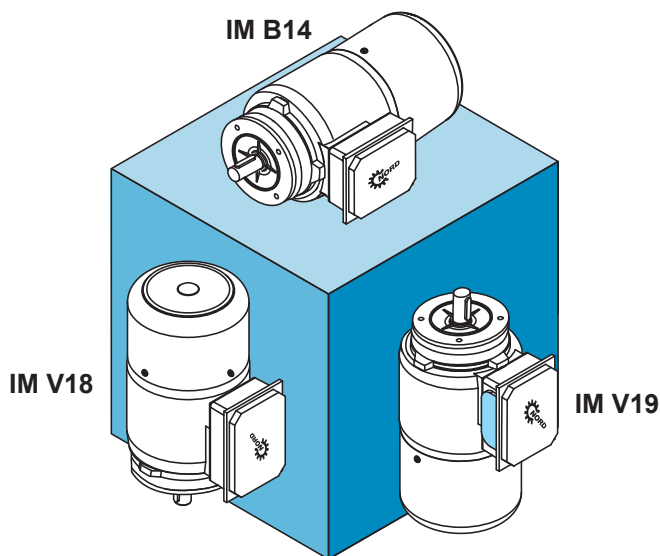


B 14-BRE



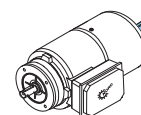
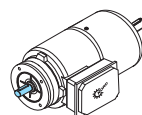
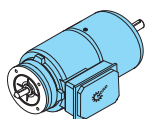
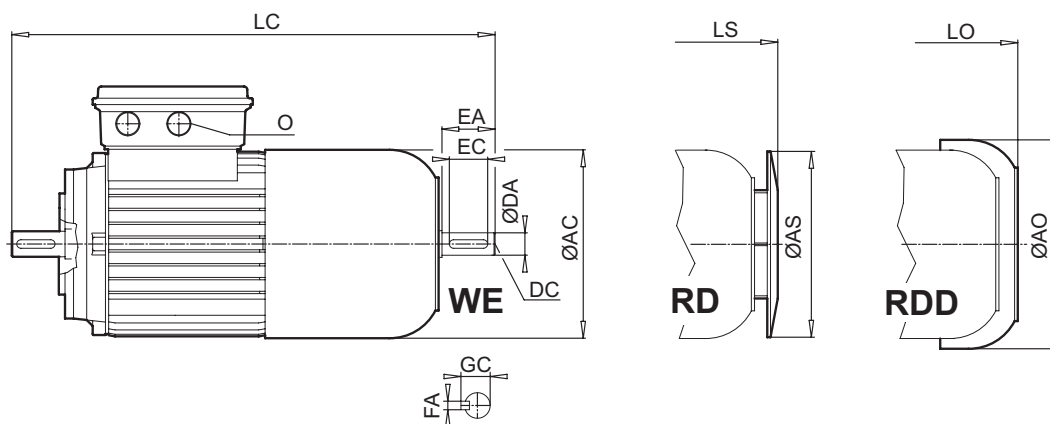
Type	IE1*	IE2	IE3	BRE [Nm]										
					M	N	P	S	T	AC	AD	AG	HH	L
63	S/L	-	-	5	75	60	90	M5 x 8	2,5	123	123	89	19	271
71	S/L	-	-	5	85	70	105	M6 x 13	2,5	138	132	89	27	302
80	S	SH	-	5	100	80	120	M6 x 12	3,0	156	142	108	26	340
	L	LH	LP	10										
90	S/L	SH/LH	SP/LP	20	115	95	140	M8 x 15	3,0	176	147	108	30	401
100	L	LH	LP	20	130	110	160	M8 x 16	3,5	194	172	108	36	457
	LA	AH	AP	40										
112	M	-	-	60	130	110	160	M8 x 12	3,5	218	182	108	39	480
112	-	MH	MP	60										
132	S	SH	SP	60	165	130	200	M10 x 18	3,5	258	201	139	40	598
132	M	MH	MP	100										
132	MA	LH	-	150										
160	M	MH	SP/MP	100	165	130	200	M10 x 20	3,5	310	242	186	52	737
160	L	-	-	150										
160	-	LH	LP	250										
180	MX	-	-	250	165	130	200	M10 x 20	3,5	310	242	186	52	737
180	LX	-	-	250										

* + Standard

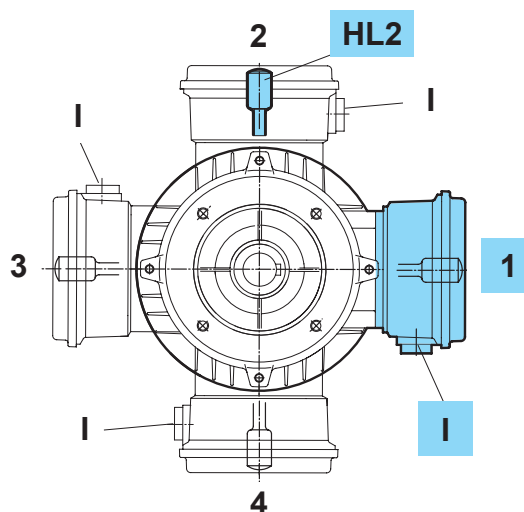
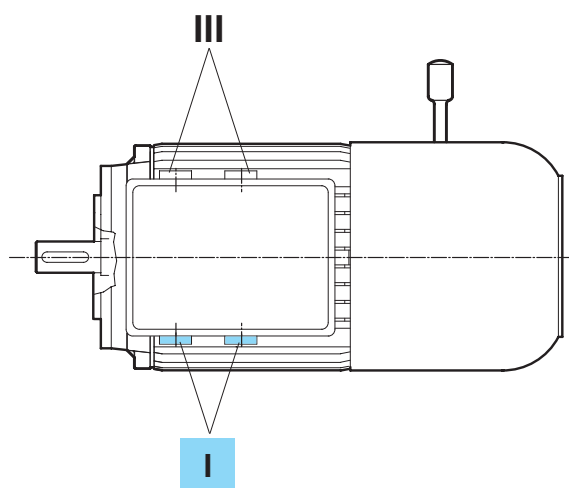




B14-BRE

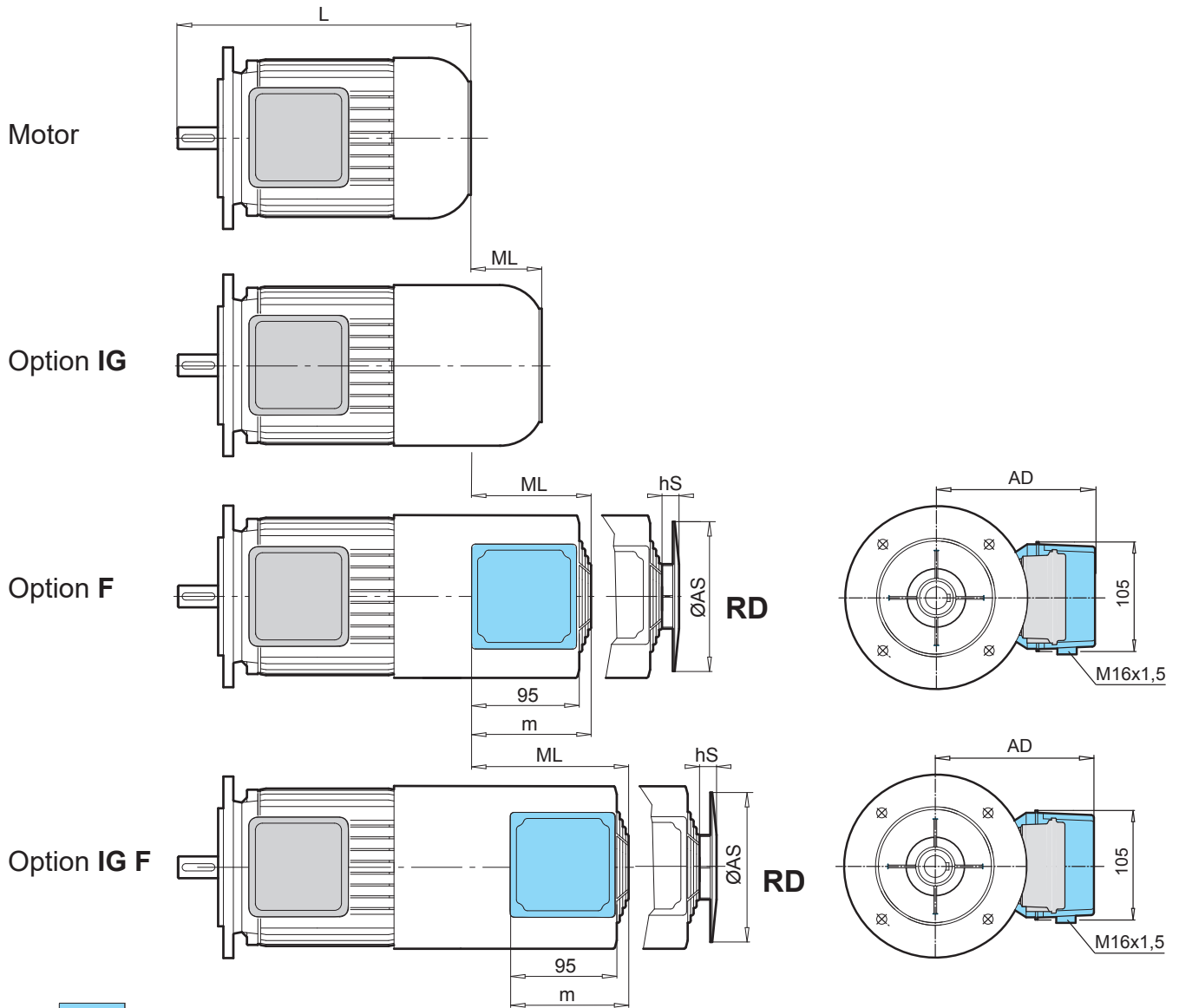


LC	LE	LL	AS	AO	LS	LO	O	D	DB	E	EB	F	GA	DA	DC	EA	EC	FA	GC
298	23	134	123	138	282	294,5	M20 x 1,5	11	M4	23	16	4	12,5	11	M4	23	16	4	12,5
329	30	134	138	156	313	326	M20 x 1,5	14	M5	30	20	5	16,0	11	M4	23	16	4	12,5
374	40	153	156	176	355	366	M25 x 1,5	19	M6	40	32	6	21,5	14	M5	30	20	5	16,0
439	50	153	176	194	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
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





IG, F, IGF

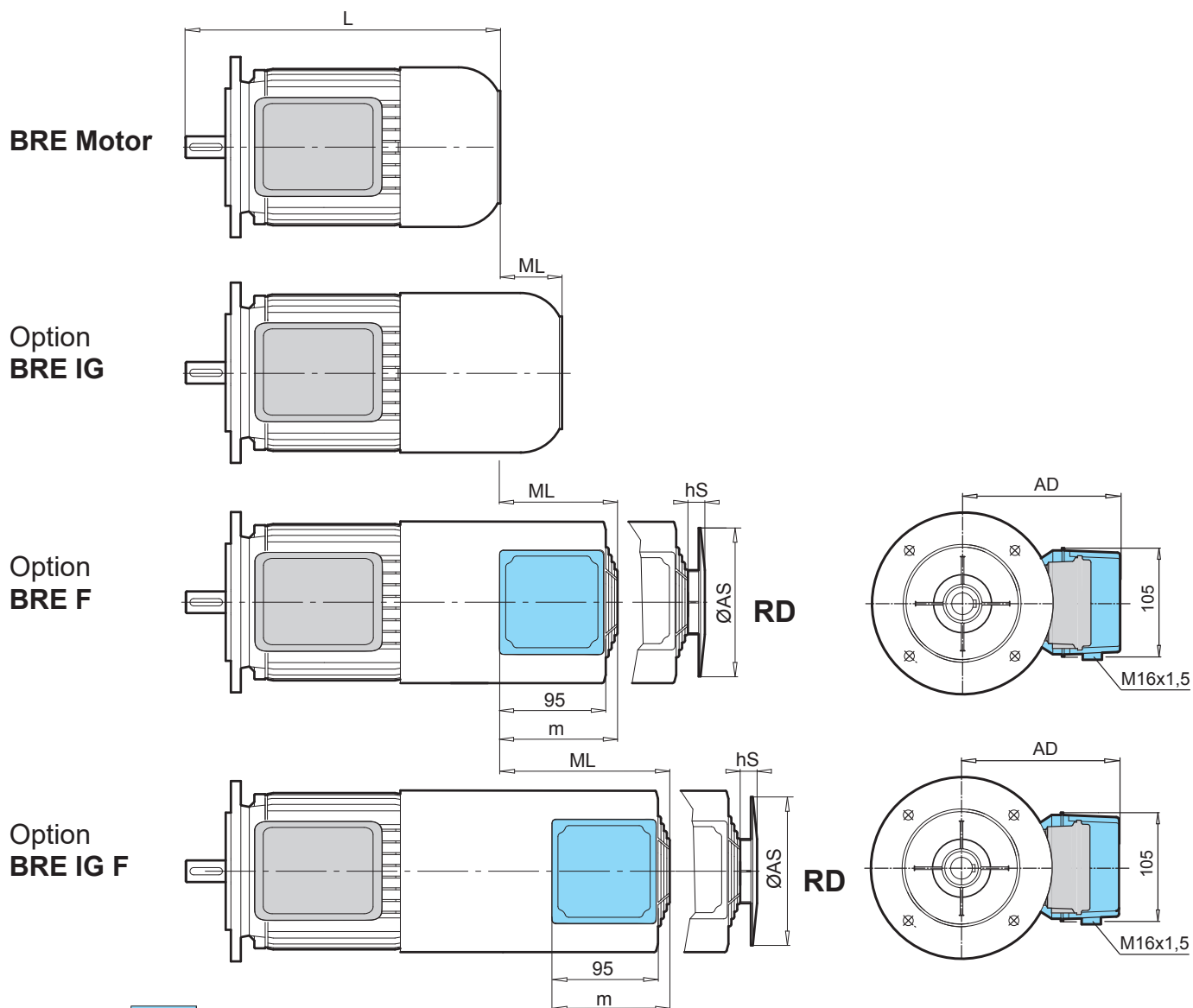


Type	IE1*			L	IG	F	IGF	F RD / IG F RD			
	IE2	IE3	h					AS	hS	AD	m
63	S/L	-	-	215	55	88	158	133	37	114	107
71	S/L	-	-	244	56	89	144	150	37	123	107
80	S/L	SH/LH	LP	276	61	90	140	170	40	132	107
90	S/L	SH/LH	SP/LP	326	72	104	149	188	30	142	117
100	L/LA	LH/AH	LP/AP	366	69	95	155	210	28	151	117
112	M	-	-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

* + Standard



IG, F, IGF



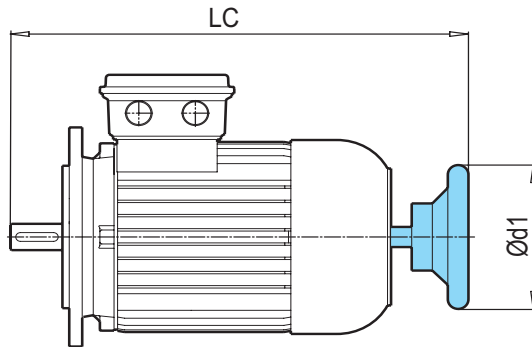
Type	BRE			IG				F RD / IG F RD			
	IE1*	IE2	IE3	L	ML	ML	ML	AS	hS	AD	m
63	S/L	-	-	271	62	90	125	133	37	114	107
71	S/L	-	-	302	74	94	139	150	37	123	107
80	S/L	SH/LH	LP	340	57	90	140	170	40	132	107
90	S/L	SH/LH	SP/LP	401	70	100	145	188	30	142	117
100	L/LA	LH/AH	LP/AP	457	70	105	140	210	28	151	117
112	M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

* + Standard



HR, MS

HR

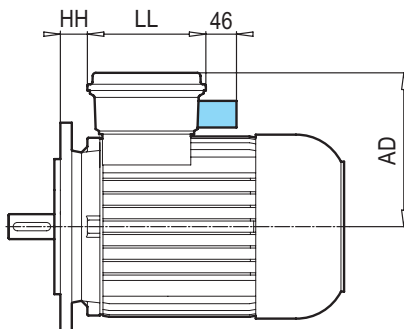


Type	IE Class			d1 [mm]	LC [mm]	LC + BRE [mm]
	IE1*	IE2	IE3			
63	S/L	-	-	100	254	314
71	S/L	-	-	100	284	345
80	S/L	SH/LH	LP	100	325	390
90	S/L	SH/LH	SP/LP	160	393	459
100	L/LA	LH/AH	LP/AP	160	442	537
112	M	-	-	160	460	557
112	-	MH	MP	160	485	582
132	S/M/MA	SH/MH/LH	SP/MP	200	610	709
160	M/L	MH	SP/MP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

* + Standard

MS

→ A39



Type	IE Class			AD [mm]	HH [mm]	LL [mm]
	IE1*	IE2	IE3			
63	S/L	-	-	140	5	114
71	S/L	-	-	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

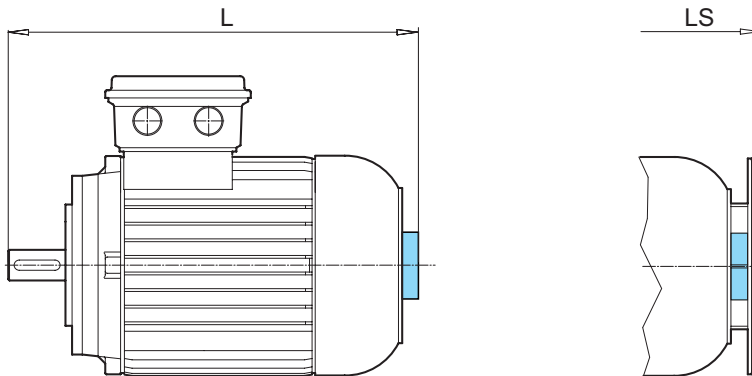
* + Standard



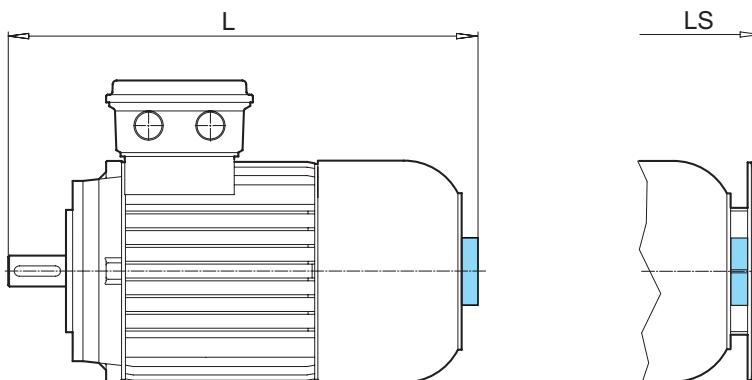
MG

MG

⇒ A34



BRE MG



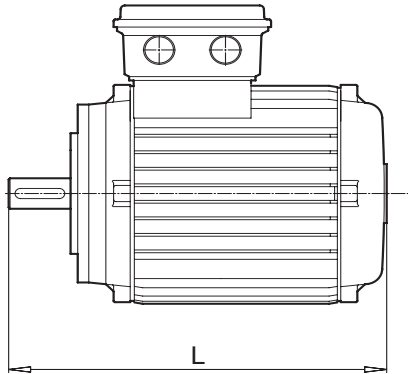
Type	IE1*	IE2	IE3	[mm]			
				L	L + BRE	LS	LS + BRE
63	S/L	-	-	226	286	237	297
71	S/L	-	-	256	319	267	330
80	S/L	SH/LH	LP	286	352	295	361
90	S/L	SH/LH	SP/LP	340	414	349	423
100	L/LA	LH/AH	LP/AP	379	470	387	479
112	M	-	-	398	493	407	502
112	-	MH	MP	423	518	432	526
132	S/M/MA	SH/MH/LH	SP/MP	501	607	512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

* + Standard



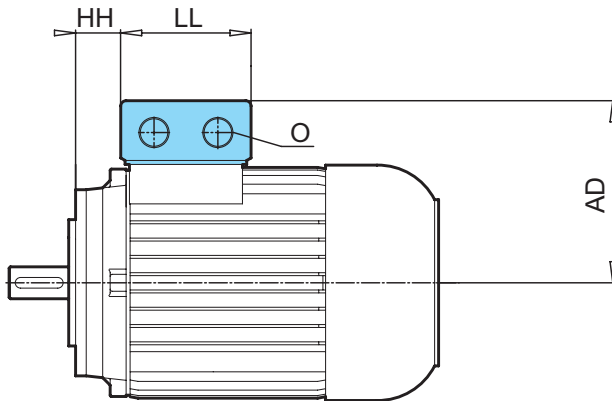
OL/H, EKK

OL/H



Type		L [mm]
IE1 + Standard		
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	MX	527
180	LX	571
200	LX	619

EKK

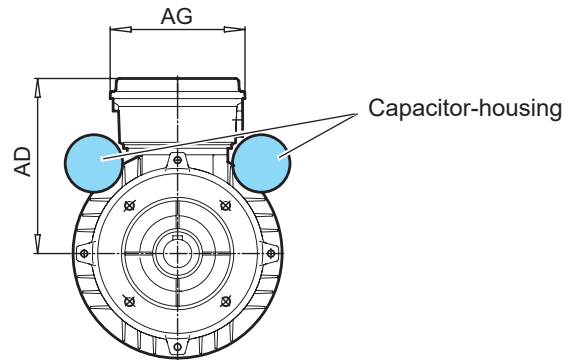
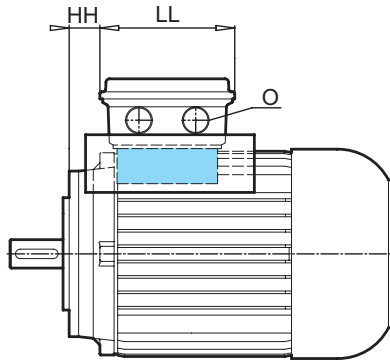


Type	IE1	IE2	IE3	[mm]			
				AD	LL	O	HH
63	S/L	-	-	100	75	M16 x 1,5	25
71	S/L	-	-	109	75	M16 x 1,5	33
80	S/L	SH/LH	LP	124	92	M20 x 1,5	33
90	S/L	SH/LH	SP/LP	129	92	M20 x 1,5	37
100	L/LA	LH/AH	LP/AP	140	92	M20 x 1,5	43
112	M	MH	MP	150	92	M20 x 1,5	56
132	S/M/MA	SH/MH/LH	SP/MP	174	104	M25 x 1,5	56

* + Standard

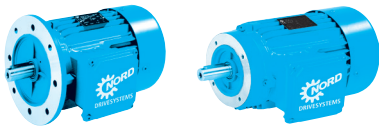


EAR, EHB, EST, ECR



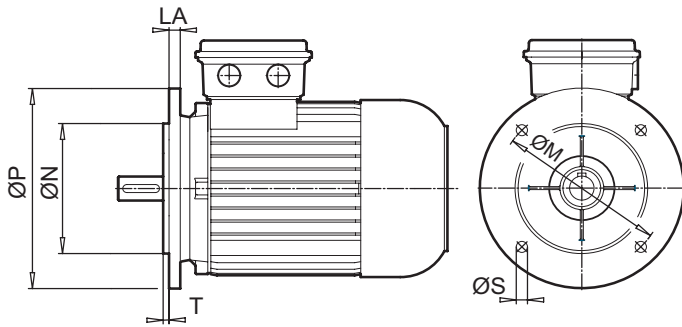
Type		BRE									
		AD	AG	HH	LL	O	AD	AG	HH	LL	O
63 L/LA	EAR1	123	89	19	134	M20 x 1,5	140	108	9	153	M25 x 1,5
71 L/LA	EAR1	132	89	27	134	M20 x 1,5	149	108	17	153	M25 x 1,5
80 L/LA	EAR1	142	108	26	153	M25 x 1,5	142	108	26	153	M25 x 1,5
90 L/LB	EAR1	147	108	30	153	M25 x 1,5	147	108	30	153	M25 x 1,5
63 L/LA	EHB1	115	100	12	100	M20 x 1,5	123	89	19	134	M20 x 1,5
71 L/LA	EHB1	124	100	20	100	M20 x 1,5	132	89	27	134	M20 x 1,5
80 L/LA	EHB1	142	114	22	114	M25 x 1,5	142	108	26	153	M25 x 1,5
90 L/LB	EHB1	147	114	26	114	M25 x 1,5	147	108	30	153	M25 x 1,5
63 S/L	EST	115	100	12	100	M20 x 1,5	123	89	19	134	M20 x 1,5
71 S/L	EST	124	100	20	100	M20 x 1,5	132	89	27	134	M20 x 1,5
80 S/L	EST	142	114	22	114	M25 x 1,5	142	108	26	153	M25 x 1,5
90 S/L	EST	147	114	26	114	M25 x 1,5	147	108	30	153	M25 x 1,5
63 LA	ECR *	123	89	19	134	M20 x 1,5	140	108	9	153	M25 x 1,5
71 L/LA	ECR *	132	89	27	134	M20 x 1,5	149	108	17	153	M25 x 1,5
80 L/LA	ECR *	142	108	26	153	M25 x 1,5	143	108	26	153	M25 x 1,5
90 L/LA/LX	ECR *	147	108	30	153	M25 x 1,5	147	108	30	153	M25 x 1,5

* with capacitor-housing

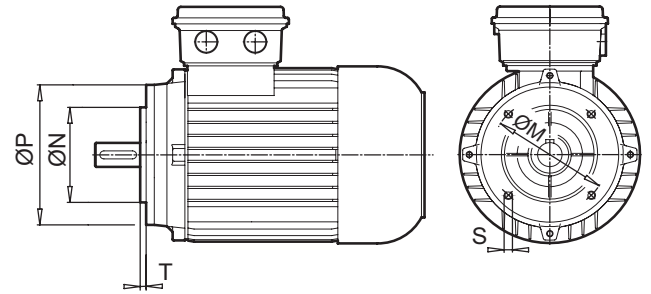


B5, B14

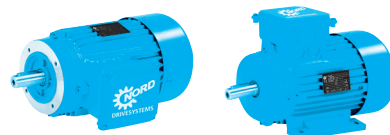
B5



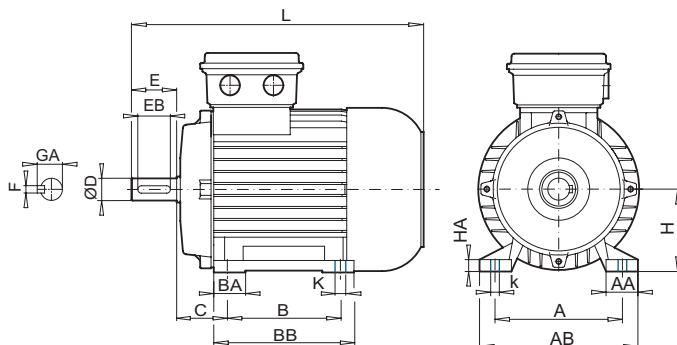
B14



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	13	4,0
160	B14	-	165	130	200	M10 x 20	3,5
180 .X	B5	20	265	230	300	13,5	4,0
	180 .X	B5	14	300	250	350	17,5
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

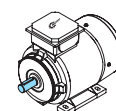
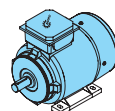
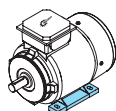


B3



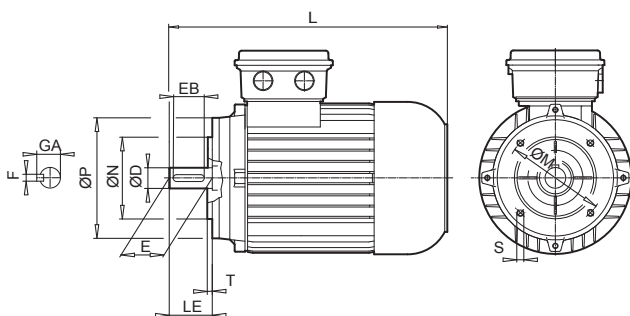
IE3 \triangle PE Premium Efficiency

Type	IE3	NEMA
B3		

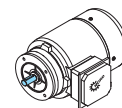
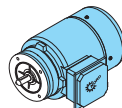
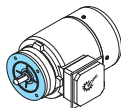


			[mm]																
			A	AA	AB	B	BA	BB	HA	k	K	C	H	L	D ⁰ _{-0,013}	E	EB	F	GA
71	SP/LP	56	123,95	36,5	148	76,2	19,5	94	12	13,7	8,7	69,9	88,9	280	15,875	47,6	42,9	4,78	17,9
80	SP/LP	56 143 T	123,95 139,70	32,0 39,5	154 170	76,2 101,6	26,5 38	102 127	14 14,5	17,5	8,7	69,9 37,2	88,9	292 294	15,875 22,225	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

B14



Type	IE3	NEMA
B14		



			[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	LP AP	182 TC 184 TC	184,2	215,9	229	1/2 - 13	6,4	377	66,5	28,575	69,9	57,2	6,35	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

An overview of the NORD range

G1000 Fixed speeds

UNICASE housing 50 Hz, 60 Hz

- NORDBLOC.1 Helical geared motors
- Helical geared motors
- Parallel geared motors
- Bevel geared motors
- Helical worm geared motors

G4014 Electronic variable speed drives

- NORDBLOC.1 Helical geared motors
- Helical geared motors
- Parallel geared motors
- Bevel geared motors
- Helical worm geared motors

G1050 NORDBLOC Industrial gear units

UNICASE housing 50 / 60 Hz

- Parallel-Axis
- Right-Angle

G1035 UNIVERSAL Schneckengetriebe

- SI and SMI

F3018 Frequency inverter SK180E

F3020 Frequency inverter SK200E





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