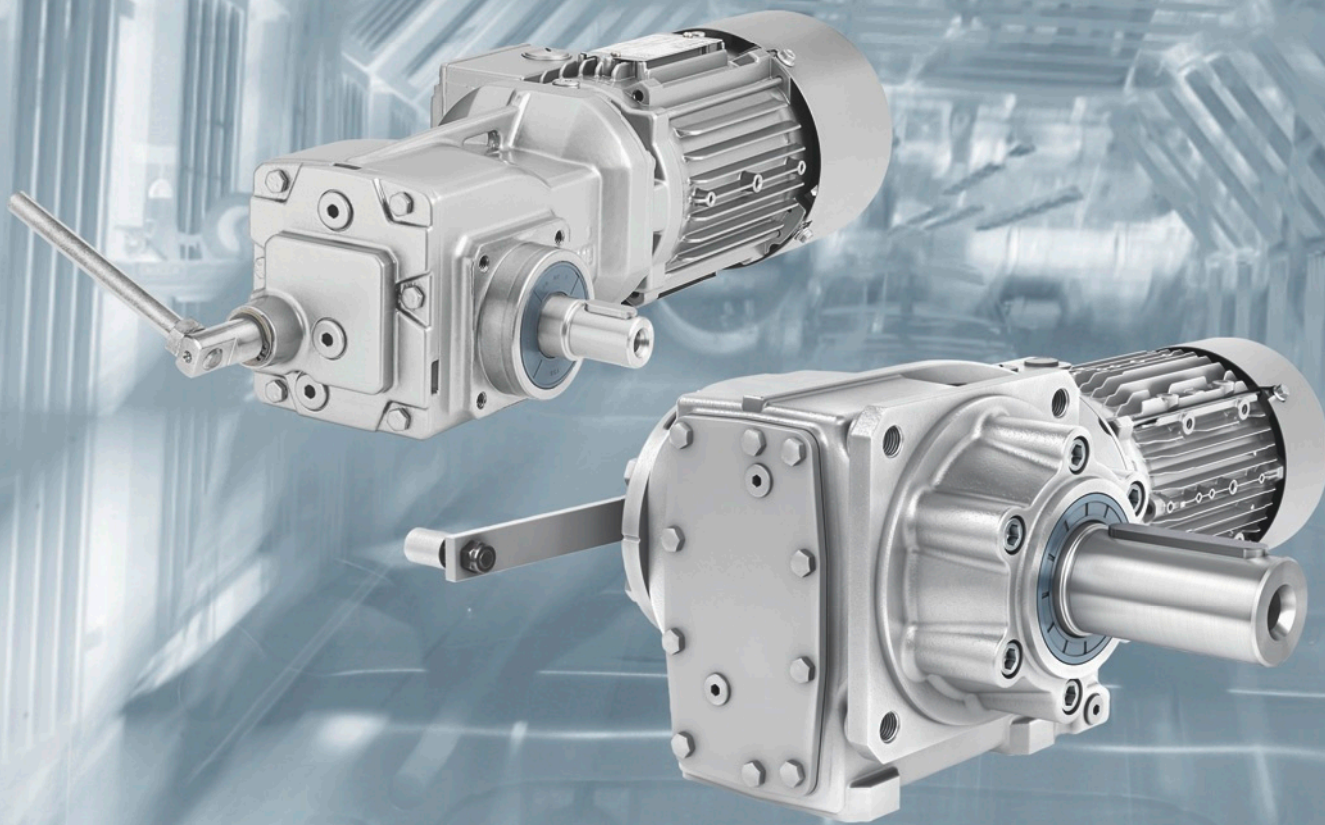


SIEMENS



Motion Control

SIMOGEAR

Electric-monorail geared motors
Light-load and heavy-load applications

Catalog
MD 50.8


Edition
2017

[siemens.com/gearedmotors](https://www.siemens.com/gearedmotors)

Related catalogs


SIMOGEAR MD 50.1
Geared Motors
 Helical, parallel shaft, bevel, helical worm and worm geared motors

E86060-K5250-A111-A5-7600




SIMOGEAR MD 50.11
 Gearboxes with adapter

E86060-K5250-A211-A3-7600




SIMOTICS GP, SD, XP, DP D 81.1
Low-Voltage Motors
 Type series 1FP1, 1LE1, 1MB1 and 1PC1
 Frame sizes 71 to 315
 Power range 0.09 to 200 kW
 E86060-K5581-A111-A9-7600




FLENDER Couplings MD 10.1
 Standard Couplings

E86060-K5710-A111-A5-7600



FLENDER SIP MD 31.1
 Standard Industrial Planetary Gear Units

E86060-K5731-A111-A5-7600




Motion Control Drives D 31
 SINAMICS Inverters for Single-Axis Drives and SIMOTICS Motors

E86060-K5531-A101-A2-7600



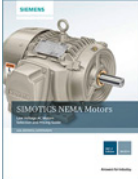
Industrial Communication IK PI
 SIMATIC NET

E86060-K6710-A101-B8-7600



SIMOTICS NEMA Motors D 81.2
 Low Voltage AC Motors
 Selection and Pricing Guide

Further details available on the Internet at:
www.usa.siemens.com/motors



Additional documentation

You will find all information material, such as brochures, catalogs, manuals and operating instructions for standard drive systems up-to-date on the Internet at the address:

www.siemens.com/gearedmotors

You can order the listed documentation or download it in common file formats (PDF, ZIP).



SIEMENS

SIMOGEAR

Electric-monorail geared motors

Light-load and heavy-load applications

Catalog MD 50.8 · 2017

Dear Customer,

We are happy to present you with the new Catalog MD 50.8 Edition 2017.

This catalog describes the new electric-monorail geared motors from our SIMOGEAR product range.

The catalog includes the new product range:

- BH. geared motors for light-load applications with a maximum radial force up to 15 000 N
- KH. geared motors for heavy-load applications with a maximum radial force up to 40 000 N

We hope that you often use our new Catalog MD 50.8 and find it helpful.

We will be glad to receive your suggestions and recommendations for improvement under catalogs.industry@siemens.com (please make reference to the catalog name).

As a supplement to this catalog, the Drive Technology Configurator (DT Configurator) will help you when selecting the optimum geared motor. You can call up the 2D and 3D data in all of the usual file formats and directly process it further.

The DT Configurator can be used on the Internet without requiring any installation.

The DT Configurator can be found in the Siemens Industry Mall at the following address:

www.siemens.com/dt-configurator

Please contact your local Siemens office for additional information.

Up-to-date information about SIMOGEAR geared motors is available on the Internet at:

www.siemens.com/gearedmotors

With kind regards,

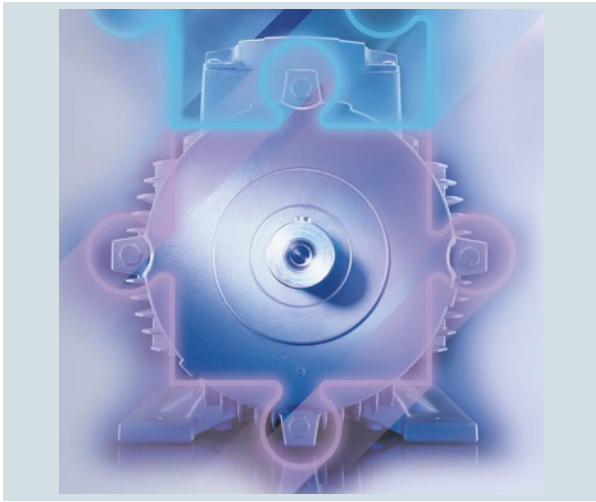


Volker Schacher
Head of Product Management
Siemens AG, Digital Factory Division, Motion Control, Geared Motors

SIMOGEAR

Electric-monorail geared motors

Motion Control



Catalog MD 50.8 · 2017

Refer to the Industry Mall for current updates of this catalog:

www.siemens.com/industrymall

The products contained in this catalog can also be found in the Interactive Catalog CA 01.

Article No.: E86060-D4001-A510-D7-7600

Please contact your local Siemens branch.

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Configuring guide	2
Electric-monorail geared motors Light-load and heavy-load applications	3
Motors	4
Gearbox options	5
Motor options	6
General options	7
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The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with EN ISO 9001 (Certified Registration No. DE-409908 QM08). The certificate is recognized by all IQNet countries.

Integrated Drive Systems

Faster on the market and in the black with Integrated Drive Systems

SIMOGEAR is an important element of a Siemens Integrated Drive System, contributing significantly to increased efficiency, productivity, and availability in industrial production processes.

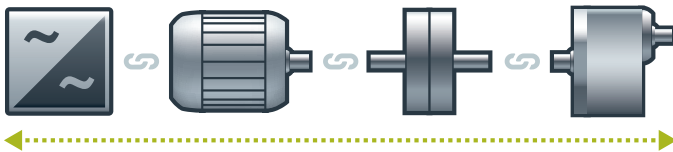
Integrated Drive Systems are Siemens' trendsetting answer to the high degree of complexity that characterizes drive and automation technology today. The world's only true one-stop solution for entire drive systems is characterized in particular by its threefold integration: Horizontal, vertical,

and lifecycle integration ensure that every drive system component fits seamlessly into the whole system, into any automation environment, and even into the entire lifecycle of a plant.

The outcome is an optimal workflow – from engineering all the way to service that entails more productivity, increased efficiency, and better availability. That's how Integrated Drive Systems reduce time to market and time to profit.

Horizontal integration

Integrated drive portfolio: The core elements of a fully integrated drive portfolio are frequency converters, motors, couplings, and gear units. At Siemens, they're all available from a single source. Perfectly integrated, perfectly interacting. For all power and performance classes. As standard solutions or fully customized. No other player in the market can offer a comparable portfolio. Moreover, all Siemens drive components are perfectly matched, so they are optimally interacting.



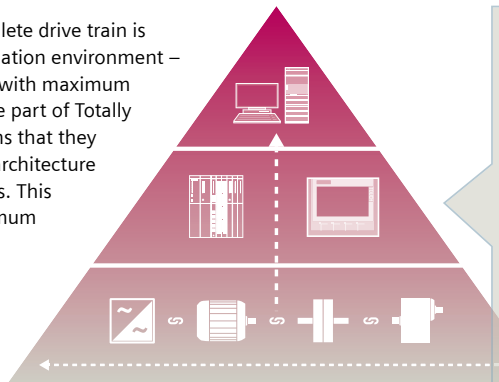
You can boost the availability of your application or plant to up to

99%*

*e.g., conveyor application

Vertical integration

Thanks to **vertical integration**, the complete drive train is seamlessly integrated in the entire automation environment – an important prerequisite for production with maximum value added. Integrated Drive Systems are part of Totally Integrated Automation (TIA), which means that they are perfectly embedded into the system architecture of the entire industrial production process. This enables optimal processes through maximum communication and control.



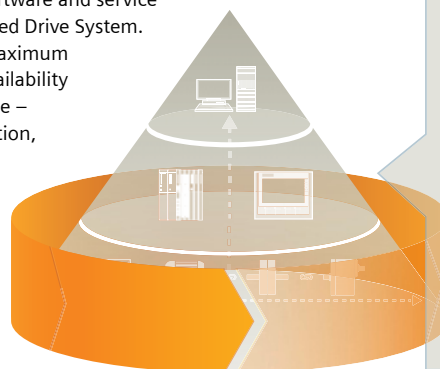
With TIA Portal you can cut your engineering time by up to

30%

Lifecycle integration

Lifecycle integration adds the factor of time: Software and service are available for the entire lifecycle of an Integrated Drive System. That way, important optimization potential for maximum productivity, increased efficiency, and highest availability can be leveraged throughout the system's lifecycle – from planning, design, and engineering to operation, maintenance, and all the way even to modernization.

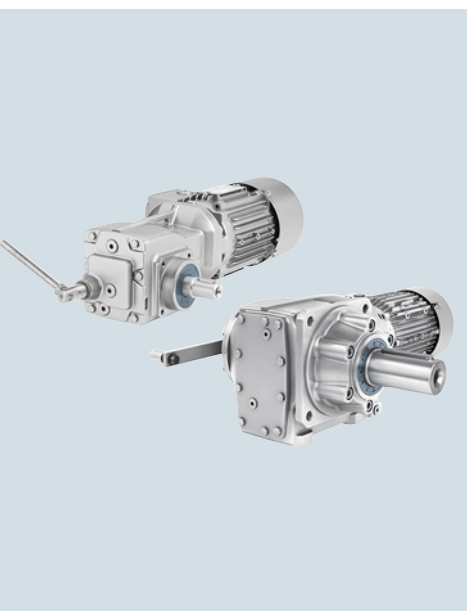
With Integrated Drive Systems, assets become important success factors. They ensure shorter time to market, maximum productivity and efficiency in operation, and shorter time to profit.



With Integrated Drive Systems you can reduce your maintenance costs by up to

15%

Introduction



1/2	Orientation
1/2	Overview
1/2	• Electric-monorail geared motors
1/2	• Benefits
1/3	Electric-monorail systems
1/4	Configuring
1/4	• Drive Technology Configurator within CA 01
1/4	• Drive Technology Configurator
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Introduction

Orientation

Overview

Electric-monorail geared motors

SIMOGEAR electric-monorail geared motors form part of our SIMOGEAR product range.

SIMOGEAR electric-monorail geared motors have been developed in cooperation with the conveyor technology and automation industries (particularly the automotive sector).

The result of this development process is a finely scaled program of geared motors with high permissible wheel loads.

State-of-the-art production technology and improved testing methods ensure the highest degree of quality and reliability.

SIMOGEAR electric-monorail geared motors have been designed using high-efficiency bevel gearboxes. The gearboxes for light-load applications are two-stage bevel gearboxes. The drives for heavy-load applications are three-stage bevel gearboxes.

BH.29 and BH.39 geared motors are suitable for use as an electric-monorail drive in accordance with VDI guideline 3643.

Further information about design in accordance with VDI guideline 3643 can be found in chapter "Configuring guide" on page 2/4.

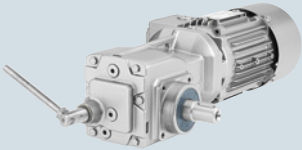
Gearbox type	Gearbox designation	Maximum output torque T_{2N} Nm	Transmission ratio i -	Maximum motor power P_1 kW	Maximum radial force F_{R2} N	Flange mm	Shaft mm
Light-load applications							
	BH.29	90	8.85 ... 50.26	0.12 ... 1.1	7 500	FT95	25 x 35
	BH.39	200	7.32 ... 60.21	0.12 ... 3	12 000 15 000	FT95	25 x 35 30 x 50

Fig. 1/1 Bevel geared motor BH

Heavy-load applications							
	KHF49	420	10.27 ... 200.25	0.12 ... 7.5	18 500	200 250	30 x 60 35 x 70
	KHF69	600	10.91 ... 196.59	0.12 ... 7.5	25 000	250	45 x 90
	KHF79	820	11.39 ... 244.25	0.12 ... 7.5	40 000	250	55 x 110

Fig. 1/2 Bevel geared motor KHF

Benefits

High energy efficiency for a fast return on investment

When developing SIMOGEAR geared motors, significant emphasis was placed on achieving the highest possible energy efficiency.

Using the plug-on pinion principle in the first SIMOGEAR gearbox stage, higher transmission ratios are achieved when compared to gearboxes with slip-on pinion.

Two-stage SIMOGEAR bevel geared motors B have a mechanical efficiency of $\geq 96\%$. With a range of transmission ratios from $i = 8.5$ to 60.21 , they have been specifically designed to address the requirements in conveyor technology.

Together with the Siemens 1LE1 motors for efficiency classes IE2 (High Efficiency) and IE3 (Premium Efficiency), SIMOGEAR geared motors allow a high amount of energy to be saved and reduce the stress on our environment.

Harmoniously coordinated modular system to provide the optimum solution for your particular drive task

The fine size graduations of SIMOGEAR gearboxes provide you with the optimum drive for every application regarding gearbox type, rated output torque and transmission ratio.

When developing SIMOGEAR geared motors, significant emphasis was placed on achieving well-balanced gearbox properties.

With SIMOGEAR geared motors you can depend on harmonized and coordinated properties regarding:

- Maximum output torque
- Permissible radial force
- Output shaft diameter
- Bearing service life
- Housing stiffness
- Gearing reliability (fatigue endurable)
- Shaft strength (fatigue endurable)
- Smooth running

The MODULOG modular principle for outstanding flexibility

The motors used for the SIMOGEAR geared motors have a modular design using our well-proven MODULOG modular principle.

At the heart of the system is a basic motor dimensioned for international line supply conditions with power ratings extending from 0.09 to 7.5 kW (2/4/6/8-pole).

At the non-drive end (NDE), you have an individually configurable MODULOG modular system, e.g. for brakes, backstop, rotary pulse encoder, separately driven fan and canopy.

Electric-monorail systems

Electric-monorail systems (suspended monorail) are a modern and cost-effective transport system for handling internal material flows.

Typical applications for these systems include the transport of light loads (such as components used in the assembly of domestic appliances) and the movement of heavy loads (vehicles in the automotive industry, for example).

Electric-monorail systems are already well established in many industrial sectors:

- Automotive industry
- Domestic appliance industry
- Storage and distribution centers
- Passenger transport
- Food processing technology

Thanks to electric-monorail systems, it is possible to utilize the "third dimension", i.e. the ceiling area. As a result, the floor area remains unobstructed so that many hazards associated with material transport can be avoided. They also offer a host of other advantages:

- Flexible routing
- Fast, flexible transport speed
- High availability; each vehicle has its own independent drive
- Low maintenance costs due to minimal wear
- Easy expansion of plant by addition of further trolleys
- High overall efficiency

Electric-monorail systems comprise the following components:

- Electric-monorail geared motor with or without distributed inverter technology
- Controller
- Frequency inverter

SIMOGEAR electric-monorail bevel geared motors are based on the modular system of SIMOGEAR geared motors. As a result, the motors can be equipped with a large number of options.

A special feature of SIMOGEAR electric-monorail drives which essentially differentiates them from other products in the range is their mechanical clutch that releases the traction between the drive and the conveyor system. The mechanical clutch can be used to perform the following tasks:

- To commission the plant in the early stages before electrical power is available. In this case, the trolleys can be moved manually in the uncoupled state along the conveyor rails.
- To move or redirect the trolley manually in the event of a fault to prevent a collision with the next trolley.
- To move the trolley along steep upward or downward gradients, e.g. using a chain conveyor.

SIEMENS electric-monorail systems are mainly characterized by the seamless integration of their components and a host of other advantages at product level.

Further information about electric-monorail systems can be found at:

www.siemens.com/conveyor-technology

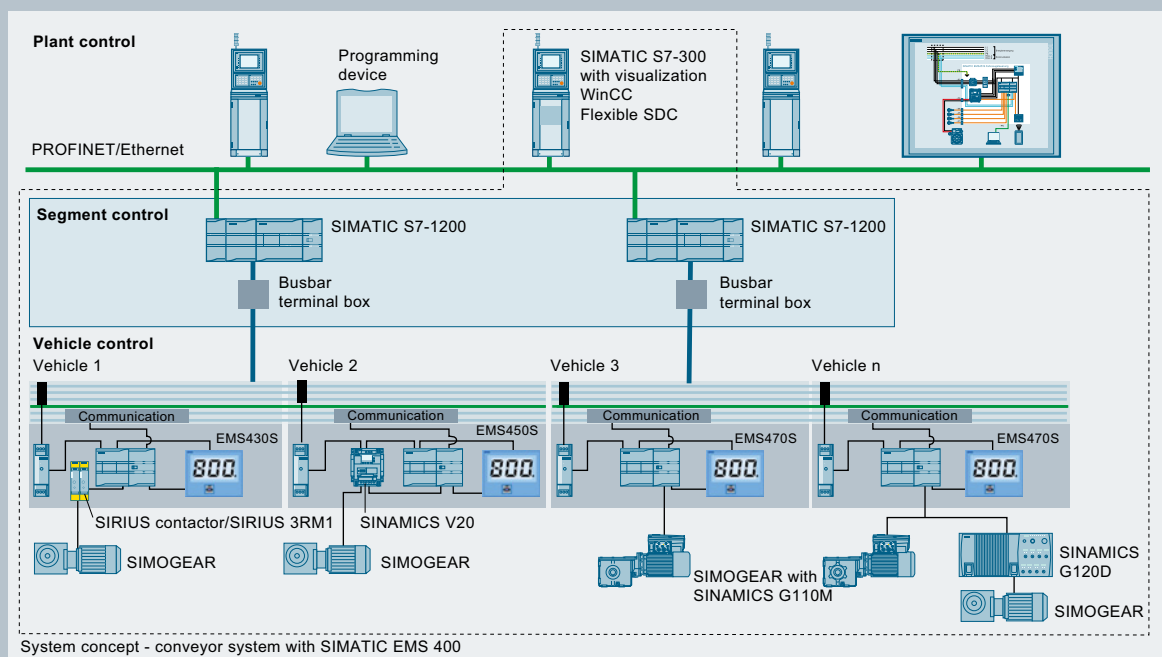


Fig. 1/3 Conveyor technology system concept

Introduction

Orientation

1

Configuring

Drive Technology Configurator (DT Configurator) within the CA 01

The Interactive Catalog CA 01 – the offline Industry Mall of Siemens on DVD-ROM – contains over 100 000 products with approximately 5 million possible drive system product variants. The Drive Technology Configurator (DT Configurator) has been developed to facilitate selection of the correct geared motor and/or inverter from the wide spectrum of drives. It is integrated as a selection tool in Catalog CA 01.

Description	Article No.
Interactive Catalog CA 01 on DVD-ROM including Drive Technology Configurator, English	E86060-D4001-A510-D7-7600

Drive Technology Configurator (DT Configurator)

The Drive Technology (DT) Configurator supports you when configuring the optimum drive technology products for your application – from gearboxes, motors, inverters as well as the associated options and components through to controllers, software licenses and connection systems. With or without detailed knowledge of products: Preselected product groups, targeted navigation through selection menus and direct product selection through entry of the article number support quick, efficient and convenient configuration.

In addition to all this, comprehensive documentation comprising technical data sheets, 2D dimensional drawings/3D CAD models, operating instructions, certificates, etc. can be selected in the DT Configurator. Immediate ordering is possible by simply transferring a parts list to the shopping cart of the Industry Mall.

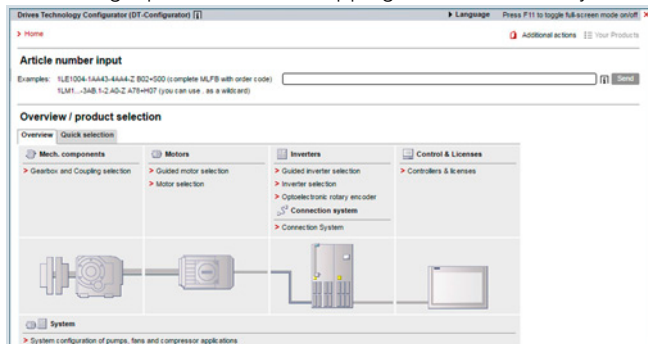


Fig. 1/4 DT Configurator

Drive Technology Configurator for efficient drive configuration with the following functions

- Fast, efficient configuration of drive products and associated components – gearboxes, motors, inverters, controllers, connection systems
- Configuration of drive systems for pump, fan and compressor applications from 1 kW to 2.6 MW
- Displayable documentation for configured products and components, such as
 - Data sheets in PDF or RTF format
 - 2D dimensional drawings/3D CAD models in various formats
 - Terminal box drawings and terminal connection diagrams
 - Operating instructions
 - Certificates
 - Start-up calculation for SIMOTICS motors
- Support with retrofitting in conjunction with Spares On Web (www.siemens.com/sow)
- Ability to order products directly in the Siemens Industry Mall

Online DT Configurator

In addition, the DT Configurator can be used on the Internet without requiring any installation. The DT Configurator can be found in the Siemens Industry Mall at the following address: www.siemens.com/dt-configurator

STARTER commissioning tool

The STARTER commissioning tool (V4.3 SP3 and higher) simplifies the commissioning and maintenance of the SINAMICS G110M motor integrated frequency inverter. The operator guidance combined with comprehensive, user-friendly functions for the relevant drive solution allow you to commission the device quickly and easily.

Additional information about the STARTER commissioning tool is available on the Internet at: www.siemens.com/starter

SINAMICS Startdrive commissioning tool

SINAMICS Startdrive is a tool for configuring, commissioning, and diagnosing the SINAMICS family of drives and is integrated into the TIA Portal. SINAMICS Startdrive can be used to implement drive tasks with the SINAMICS G110M (SINAMICS Startdrive V13 and higher), SINAMICS G120, SINAMICS G120C, SINAMICS G120D and SINAMICS G120P inverter series. The commissioning tool has been optimized with regard to user friendliness and consistent use of the TIA Portal benefits of a common working environment for PLC, HMI and drives.

The SINAMICS Startdrive commissioning tool is available free on the Internet at: www.siemens.com/startdrive

SIZER for Siemens Drives

For the project engineering of SIMOGEAR geared motors operating on SINAMICS frequency inverters, the engineering tool "Sizer for Siemens Drives" should be used. This ensures that all the relevant aspects are taken into consideration (line voltage, type of DC link (regulated/unregulated), utilization of the motor in accordance with temperature class B or F, motor current for inverter operation in Y circuit or D circuit, calculation of the regenerative power, dimensioning of the braking resistor with reference to the entered cyclic operation, etc.)

The SIZER for Siemens Drives engineering tool is available free on the Internet at: www.siemens.com/sizer

Overview

The Article No. comprises a combination of digits and letters. To obtain a better overview, the Article No. is split up into three hyphenated blocks.

Example:

2KJ3804-11CE11-9HH1-Z
N6C+K01+D11+L00+K07+K24+M55+K50

The first block (data positions 1 to 7) designates the gearbox type; the second (data positions 8 to 12) designates the output shaft and the motor type; and additional design characteristics are coded in the third block (data positions 13 to 16).

Ordering data

- Complete Article No. with a **-Z** suffix, and order code(s) or plain text.
- If a quotation has been requested, please specify the quotation number in addition to the Article No.
- When ordering a complete geared motor as a replacement unit, the serial number of the original geared motor must be specified.

Structure of the Article No.

Position of the Article No.	1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	15	16	-	Z
SIMOGEAR geared motors																				
1st to 5th position:	Electric-monorail gearbox					2	K	J	3	8										
Digit, letter, letter, digit, digit																				
6th to 7th position:	Gearbox size	29				0	3													
Digit, digit		39				0	4													
		49				0	6													
		69				0	7													
		79				0	8													
8th position:	Output shaft																			
Digit																				
9th to 10th position:	Motor frame size																			
Letter, letter																				
11th position:	Induction motor LA											1								
Digit	Induction motor LE General Purpose (aluminum)											2								
12th position:	Motor with improved efficiency (Standard Efficiency IE1)												1							
Digit	Motor with high efficiency (High Efficiency IE2)												2							
	Motor with premium efficiency (Premium Efficiency IE3)												3							
13th position:	Frequency, voltage																			
Digit																				
14th position:	Foot-mounted design																			A
Letter	Housing flange design																			H
	Flange-mounted design																			F
15th to 16th position:	Transmission ratio																			
Letter, digit																				
Special versions																				
Coded	Order code required																			- Z
Non-coded	Plain text required																			

Introduction

Guidelines for selection and ordering

Article No. code

Overview (continued)

Ordering example

An electric-monorail geared motor is required:

- Gearbox type, size BHZ39
- Motor 0.37 kW, 4-pole with 50 Hz line frequency
- Output speed 73, transmission ratio $i = 18.74$
- Solid shaft V30 x 60
- Mounting position M1
- Output side A
- Terminal box position 1A
- HAN Q8 motor plug with 0.5 m cable

This results in the following Article No. with order codes:

Position of the Article No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Z	+	Order codes					
Selection criteria	Requirements																								
Gearbox type	Electric-monorail bevel gearbox, 2-stage	2	K	J	3	8				
Gearbox size	Size 39	2	K	J	3	8	0	4																	
Output shaft	Solid shaft V30 x 60	2	K	J	3	8	0	4	-	1															
Motor frame size	Frame size 71; 0.37 kW; 4-pole	2	K	J	3	8	0	4	-	1	C	E													
Motor type	Induction motor LA	2	K	J	3	8	0	4	-	1	C	E	1												
Motor efficiency	Standard Efficiency IE1	2	K	J	3	8	0	4	-	1	C	E	1	1											
Line voltage, frequency	400 V Δ / 50 Hz	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9				+ N6 C					
Mounting type	Housing flange	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9	H				+ N6 C				
Transmission ratio	$i = 18.74$	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9	H	H	1		+ N6 C				
Mounting position	M1, output side A	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9	H	H	1	-	Z	+ N6 C	+ D11		
Terminal box position	1A	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9	H	H	1	-	Z	+ N6 C	+ D11	+ M5 5	+
Motor plug	HAN Q8 with 0.5 m cable	2	K	J	3	8	0	4	-	1	C	E	1	1	-	9	H	H	1	-	Z	+ N6 C	+ D11	+ M5 5	+ K50

Type designation of the gearboxes

The type designation is a meaningful name for SIMOGEAR geared motors.

It provides information about the fundamental design of the geared motor and about its main technical features.

Example of gearbox type designation:		BH	Z	39
Gearbox type				
	Bevel gearbox, light load	BH		
	Bevel gearbox, heavy load	KH		
Type				
Shaft				
	Solid shaft	-		
Mounting				
	Foot-mounted design		-	
	Flange-mounted design		F	
	Housing flange design		Z	
Connection				
	Feather key / without feather key		-	
Gearbox size				
	Bevel gearbox BH			29 ... 39
	Bevel gearbox KH			49 ... 79

Type designation of the motors

Example of motor type designation:		LE	90	ZLR	-	4	P	MFW	L	32/14	MN	IA
Definition of motor												
Motor type	Three-phase motor Aluminum housing	LA, LE										
Type	Integral mounting	-										
Motor frame size	Specified acc. to EN 50347		63 ... 132									
Overall length	Extended housing			Z								
	Overall length specified acc. to EN 50347			S, L, M								
	Packet length / power value			A ... Z								
Number of poles	2-pole					2						
	4-pole					4						
	6-pole					6						
Special features												
Efficiency class	Different to IE2 or IE3						-					
	IE2 (High Efficiency)						E					
	IE3 (Premium Efficiency)						P					
SINAMICS G110M	With SINAMICS G110M motor integrated frequency inverter							M				
Ventilation	Self ventilation							-				
	Forced ventilation							F				
	High inertia fan							I				
Canopy	With protective cover							W				
Handwheel	With handwheel							D				
Brake												
Brake type	DC brake								L			
Rated braking torque	L brakes									4 ... 150		
	Adjusted braking torque									/1.4 ... 125		
Brake options												
	Microswitch for monitoring brake release										M	
	Standard version										N	
	Enclosed brake										G	
	Manual brake release										H	
	Manual brake release with locking mechanism										HA	
Encoder												
	Incremental encoder											IN
	Resolver											IR
	Absolute encoder											IA
	Prepared for encoder mounting											IV

Introduction

Guidelines for selection and ordering

Notes on selection tables

Structure of the tables for geared motors

In the selection tables you will find the most frequently used versions and combinations of geared motors sorted according to the motor power.
Additional combinations can be selected with our DT Configurator.

The power ratings and torques specified in the catalog refer to mounting position M1 and comparable types of construction where the input stage does not run completely immersed in oil. Further, standard equipment and standard lubrication of the geared motors as well as normal ambient conditions are assumed.

The specified output speeds are guide values. You can calculate the rated input speed based on the rated motor speed and the transmission ratio. Please note that the actual output speed will depend on the motor load and the line supply conditions.

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code Number of poles
0.12	Type designation BH.29-LA63ME4									
	27	43	50.26	7 500	7 500	7 500	2.1	9	2KJ3803 - ■ BC11 - ■ ■ R1	

↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

- (1) Rated motor power at 50 Hz
- (2) Geared motor output speed
- (3) Geared motor output torque
- (4) Transmission ratio
- (5) Permissible radial force, optional force application angle
- (6) Permissible radial force, force application angle 90 °
- (7) Permissible radial force, force application angle 270 °
- (8) Service factor
- (9) Drive weight without any oil
- (10) Article No.
- (11) Order code for number of poles

1) Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft, [see page 2/9](#).

Structure of the tables for transmission ratios and torques

In the selection tables for transmission ratios and torques, the gearboxes are sorted according to gearbox type and ratio.

i -	n_2 rpm	T_{2N} Nm	F_{R2} N	F_{R290} N	F_{R2270} N	J_G 10^{-4} kgm ² -	R_{ex} -	Motor frame size						Article No.
								63	71	80	90	100	112	
Type designation BH.29														
50.26	29	90	7 340	7 500	7 500	0.04	4071/81	✓	✓					2KJ3803 - ■ ■ ■ ■ ■ - ■ ■ R1

↓	↓	↓		↓		↓	↓		↓
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

- (1) Transmission ratio
- (2) Geared motor output speed at a motor speed of 1 450 rpm
- (3) Maximum gearbox output torque with service factor of $f_B = 1$
- (4) Permissible radial force, optional force application angle
- (5) Permissible radial force, force application angle 90 °
- (6) Permissible radial force, force application angle 270 °
- (7) Moment of inertia of the gearbox reduced to the input shaft
- (8) Ratio, number of teeth
- (9) Geometrically possible geared motor combination
- (10) Article No.

Structure of the motor power tables

Left-hand side

Frame size	Motor	P_{rated}	n_{rated}	T_{rated}	I_{rated}	$\cos \varphi$	η		I_{St}/I_{rated}	Article No.				Order code
		kW	rpm	Nm	A	-	4/4 load	3/4 load		Data position				
4-pole, 1 500 rpm at 50 Hz														
80	LE80MD4E	0.55	1 440	3.65	1.37	0.74	78.1	78.6	5.3	D	C	2	2	-
	LE80MH4E	0.75	1 440	4.97	1.79	0.76	79.6	79.6	5.6	D	E	2	2	-

↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)	(9)	(10)	(10)	(11)	(12)	(13)

- (1) Motor frame size
- (2) Motor designation
- (3) Rated power
- (4) Rated speed
- (5) Rated torque
- (6) Rated current
- (7) Power factor
- (8) Efficiency
- (9) Relative starting current
- (10) Article No. of the motor frame size
- (11) Article No. of the motor type
- (12) Article No. of the motor series
- (13) Order code for number of poles

For different voltages, the starting, average acceleration and breakdown torque change acc. to a square law from their rated value.

Right-hand side

Frame size	Motor	T_{St}/T_{rated}	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{ptA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code
		-	-	-	dB (A)	dB (A)	1/h	10^{-4} kgm ²	kg	Data position				
4-pole, 1 500 rpm at 50 Hz														
80	LE80MD4E	2.2	3.1	2.4	53	64	10 000	17	9.3	D	C	2	2	-
	LE80MH4E	2.2	3.1	2.4	53	64	10 000	21	10	D	E	2	2	-

↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(11)	(12)	(13)	(14)

- (1) Motor frame size
- (2) Motor designation
- (3) Relative starting torque
- (4) Relative breakdown torque
- (5) Relative average acceleration torque
- (6) Measuring surface sound pressure level
- (7) Sound power level
- (8) No-load switching frequency
- (9) Moment of inertia
- (10) Weight (without end shield at DE)
- (11) Article No. of the motor frame size
- (12) Article No. of the motor type
- (13) Article No. of the motor series
- (14) Order code for number of poles

Introduction

Guidelines for selection and ordering

1

Notes on dimensional drawings

Overview

Standards

DIN/ISO	
DIN 743	Output shafts
ISO 281, ISO 76	Bearings
DIN 7190	Interference fits
DIN 6892	Parallel key connection
DIN 3991	Bevel gear toothing

Designs according to AGMA available on request.

Shaft heights

DIN 747 shaft heights for machines

Shaft height mm	Tolerance mm
≤ 250	-0.5

Note:

For foot-mounted gearboxes, the mounted motor can extend below the mounting surface of the gearbox.

Shaft extensions

DIN 748-1 cylindrical shaft extensions

Diameter tolerance:

Diameter mm	Tolerance mm
≤ 50	ISO k6
> 50	ISO m6

Centering holes according to DIN 332, form DR:

Diameter mm	Thread size
> 24 ... 30	M10
> 30 ... 38	M12
> 38 ... 50	M16
> 50 ... 85	M20

Undercut according to DIN 509:

Diameter mm	Undercut acc. to DIN 509	Suggested construction, minimum hollow on mating piece mm
> 16 ... 18	E1.0x0.2	0.9 x 45 °
> 18 ... 50	E1.2x0.2	1.1 x 45 °
> 50 ... 80	E1.6x0.3	1.4 x 45 °
> 80 ... 125	E2.5x0.4	2.2 x 45 °

Flanges

Centering edge tolerance:

Outer flange diameter mm	Tolerance mm
≤ 300	ISO j6
≥ 350	ISO h6

Vent valves

The gearboxes are shown in the dimensional drawings with screw plugs.

If venting is required, then depending on the type of construction, an activated vent valve is installed.

The contour dimension can change slightly as a result.

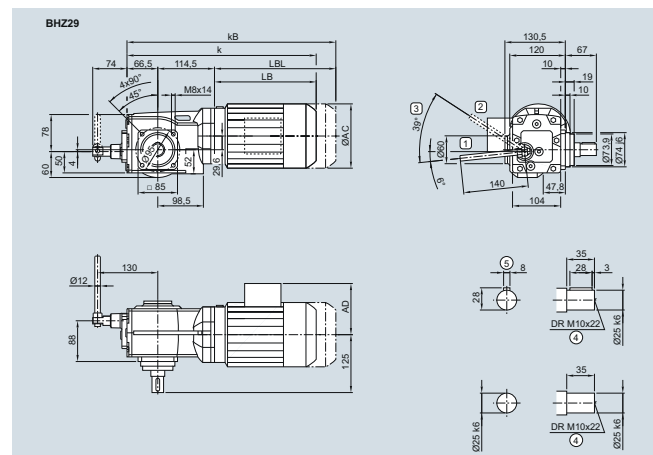









Fig. 1/5 Example, dimensional drawings

Overview

The following certificates are available for SIMOGEAR geared motors. You can select these individually, or combine them freely into a multi-certificate.

Specifications

Country/economic area	Marking Examples	Legal/normative requirements
Europe/EU 		Low Voltage Directive (LVD) 2006/95/EC
		Eco-design Directive 2009/125/EC EU Regulation (EC) No. 640/2009 to implement the eco-design directive and amending regulation (EU) No. 4/2014
USA 	MG1-12	NEMA MG1-12 National standard
		UL 1004 Standard of the Underwriters Laboratories Inc. (testing and certification body)
	CC032 A	EISA Energy Independence Security Act
Canada 		CSA-C22.2 No. 100 Standard of the Canadian Standards Association
		EER Energy Efficiency Regulations
China 		CCC China Compulsory Certification
		CEL – China Energy Label Based on the national standard GB 18613-2012 ECL Energy Conservation Law of PRC
Russian Federation 		EAC Eurasian Conformity
Belarus 		
Kazakhstan 		

Introduction

General technical specifications

1

Geared motors for use worldwide

Without CE marking for export

For geared motors to be exported outside the European Economic Area, the order option "without CE marking for export" is available. The CE marking is not displayed on the rating plate of these motors.

These geared motors may only be exported to countries outside the European Economic Area which do not require the CE marking.

Order code:

Without CE marking

N68

Motors for the North American market

Motors in frame sizes 63 to 132 are available in designs which meet the UL-R and CSA standards.

Order code:

Design in accordance with UL-R and CSA

N38

Note:

In the USA, a distinction is made between the rated voltage of the supply system and the rated voltage of the motor. See the table below for the assignment:

Country	Rated voltage of the supply system	Rated voltage of the motor
USA	208 V	200 V
	240 V	230 V
	480 V	460 V
Canada	600 V	575 V

UL-R – Underwriters Laboratories Inc.

The motors are listed for up to 600 V by Underwriters Laboratories Inc. ("Recognition Mark" = R/C). Motor voltages up to 600 V are certified according to UL. "UL Recognition Mark" is included on the rating plate of the motor.

In addition, the motor is designed to meet the NEMA MG1-12 electrical standard and includes the following data on the rating plate:

- Rated voltage(s)
- Nominal efficiency
- Design letter
- Code letter
- CONT
- NEMA MG1-12.

Externally or internally mounted components such as:

- Motor protection
- Heating element
- Forced ventilation
- Brake
- Encoder
- Plug connection

are UL-R/C, CSA, or C-US listed or used by manufacturers in accordance with regulations. UL-R/C cable glands must be used for the cable entry.

CSA – Canadian Standard Association

The motors are approved for up to 690 V in accordance with the "Canadian Standard Association" (CSA). Externally or internally mounted components which are used are listed by CSA or are used by manufacturers in accordance with regulations. The CSA mark and the rated voltage are stamped on the rating plate.

When energy-saving motors are ordered, they also have the "CSA-E mark" on the rating plate.

Motors for the Chinese market

CCC-certified motors, frame sizes 63 to 90, are available for export to China.

The "China Energy Label" required for import into China is available for motors in frame sizes from 80 to 132.

The motors are marked according to the requirements with CCC, CEL or both specifications.

Order code:

Design for the Chinese market

N67

CCC – China Compulsory Certification

"Small power motors" which are exported to China must be certified up to a rated power of:

2-pole: ≤ 2.2 kW

4-pole: ≤ 1.1 kW

6-pole: ≤ 0.75 kW

8-pole: ≤ 0.55 kW

Motors requiring certification are certified by CQC (China Quality Certification Center).

When ordered, the "CCC (Safety Mark)" logo is stamped on the rating plate and packaging.

Note:

Chinese customs checks the need for certification of imported products by means of the commodity code.

The following do not need to be certified:

- Motors imported to China which have already been installed in a machine
- Repair parts

CEL – China Energy Label

China introduced mandatory energy efficiency labeling for electric motors in June 2008.

From September 1, 2008, and until the transition phase expires, the affected electric motors may only be imported into China and sold in the country with a valid "China Energy Label".

The motor must be labeled with the "China Energy Label" sticker, which states the efficiency class.

In addition to the Energy Label (dimensions 80 x 54 mm), the efficiency is also stamped on the rating plate.

2-pole, 4-pole and 6-pole motors with a line frequency of 50 Hz and a rated voltage of up to 1 000 V must be appropriately marked. Efficiency classes 2 and 3 apply here to motors with rated powers from 0.75 to 375 kW.

Motors for the Eurasian market

SIMOGear geared motors are certified for the Eurasian Economic Area.

In the Russia, Kasachstan and Belarus customs union, new technical regulations and uniform conformity requirements (EAC) have been introduced. These replace the previous GOST-R certificates which thus lose their validity.

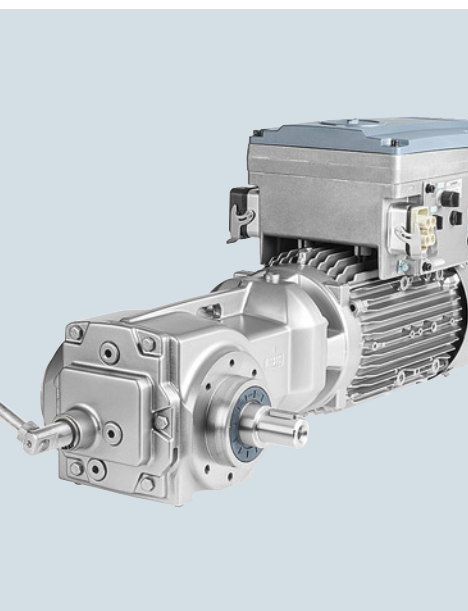
The certificate is mandatory for export and is required by the customs authorities.

The EAC certificate is valid for all geared motors. For gearboxes with adapters, the EAC certificate is not necessary because the EAC certificate only refers to the motor.

Order code:

Design in accordance with EAC

N30

**2/2 Determining the drive data**

- 2/2 Overview
- 2/2 Checklist
- 2/4 Design in accordance with VDI 3643

2/6 Configuring a gearbox

- 2/6 Service factor
- 2/6 • Determining the required service factor
- 2/6 • Determining the load classification
- 2/6 • Mass acceleration factor
- 2/7 Required torque
- 2/7 Input speed
- 2/8 Shaft load and bearing service life
- 2/8 • Available radial force
- 2/8 • Permissible radial force
- 2/9 • Radial force conversion for out of center force application point
- 2/9 • Definition of the force application point

2/10 Configuring a three-phase motor

- 2/10 Determining the duty type
- 2/11 Switching frequency
- 2/12 Additional moments of inertia
- 2/12 Line feeder cables
- 2/12 • Undervoltage
- 2/12 Motor protection
- 2/12 • Current-dependent protective devices
- 2/12 • Temperature-dependent protective devices
- 2/12 Coolant temperature and installation altitude
- 2/13 Degrees of protection
- 2/13 Cooling and ventilation
- 2/13 • Forced ventilation

2/14 Configuring a brake

- 2/14 Overview
- 2/14 Determining the braking torque
- 2/14 Braking torques as a function of the speed and permissible speed limits
- 2/14 Braking energy per braking operation
- 2/14 Service life of the brake lining
- 2/14 Brake service life
- 2/15 Brake control
- 2/15 • Definition of switching times (VDI 2241)
- 2/15 • Fast brake application
- 2/15 • Fast brake release
- 2/16 Brake switching time
- 2/16 Braking distance and positioning accuracy
- 2/16 Cyclic duration factor

2/17 Configuring a motor for inverter operation

- 2/17 Operation of geared motors on a frequency inverter
- 2/17 Motor characteristic
- 2/17 Utilization in accordance with temperature class F
- 2/18 Permissible voltage stress
- 2/18 Bearing currents
- 2/18 Mechanical stress, grease service life

Configuring guide

Determining the drive data

Overview

SIMOGEAR geared motors permit individual solutions to be created for a wide range of drive applications. In order to select the correct drive, specific data for the application must initially be known or determined.

For drives operating under special conditions, e.g. frequent reversing, short-time or intermittent duty, abnormal temperatures, reversal braking, extreme cantilever forces at the gearbox output shaft, etc., please consult your Siemens contact person.

You will find additional information on our website at www.siemens.com/gearedmotors

Checklist

General	Basic version					
	VDI guideline 3643:		<input type="checkbox"/> yes		<input type="checkbox"/> no	
	Power rating: _____					
	Number of starts/hour:		_____ s/h			
	Line voltage:		_____ V			
	Line frequency:		<input type="checkbox"/> 50 Hz		<input type="checkbox"/> 60 Hz	
			<input type="checkbox"/> 87 Hz		<input type="checkbox"/> Maximum frequency: _____ Hz	
	Brief description of the system:					

	Environmental conditions					
Installation altitude:		_____ m		<input type="checkbox"/> Outdoor operation		
				<input type="checkbox"/> Increased environmental stress		
Air humidity:		_____ %		<input type="checkbox"/> Normal environmental stress		
				<input type="checkbox"/> Aggressive environmental stress		
Temperature:		from _____ to _____ °C				
Trolley						
Type of trolley:		<input type="checkbox"/> Trolley type 1		<input type="checkbox"/> Trolley type 2:		
				<input type="checkbox"/> Trolley type 3		
				<input type="checkbox"/> Front running wheel, driven		
				<input type="checkbox"/> Rear running wheel, driven		
Dimensions:		H _____ mm (Vertical distance between running wheel axis and center of gravity)				
		L1 _____ mm (Distance between running wheels)				
		L2 _____ mm (Horizontal distance between running wheel and center of gravity)				
		L3 _____ mm (Distance between swivel joints)				
		S _____ mm (Center of gravity)				
Track						
Max. upward gradient:		_____ °		Height difference upward gradient: _____ mm		
Max. downward gradient:		_____ °		Height difference downward gradient: _____ mm		
Min. curve radius:		_____ mm				
Design data						
Weight of trolley:		_____ kg		Weight of load: _____ kg		
Wheel load (of driving wheel on rail):		_____ N				
Distance from shaft shoulder to force application point x		_____ mm				
Running wheel diameter:		_____ mm		Running wheel material: <input type="checkbox"/> Polyurethane		
				<input type="checkbox"/> Other _____		
Cyclic duration factor:		_____ %				
Deceleration:		_____ m/sec ²		Upward gradient _____ m/sec ²		
				Downward gradient _____ m/sec ²		
Acceleration:		_____ m/sec ²		Upward gradient _____ m/sec ²		
				Downward gradient _____ m/sec ²		
Travel velocity:		min. _____ m/sec		max. _____ m/sec		
				Upward/downward gradient _____ m/sec		

Checklist (continued)

Gearbox	Technical specifications	
	Transmission ratio:	_____
	Output torque:	_____ Nm
	Output speed:	_____ rpm
	Mounting and mounting position	
Mounting position:	<input type="checkbox"/> M1 <input type="checkbox"/> M2 <input type="checkbox"/> M3 <input type="checkbox"/> M4 <input type="checkbox"/> M5 <input type="checkbox"/> M6 Terminal box position: _____	
Mounting type:	<input type="checkbox"/> Flange <input type="checkbox"/> Foot	
Shafts		
Design:	<input type="checkbox"/> Solid shaft with feather key <input type="checkbox"/> Solid shaft without feather key Shaft dimensions: (d x l) _____ x _____ mm	
Other options:	<div style="border: 1px solid black; height: 40px; width: 100%;"></div>	

Motor	Electrical design	
	Motor protection:	<input type="checkbox"/> PTC thermistor <input type="checkbox"/> Winding thermostat <input type="checkbox"/> Temperature sensor KTY 84-130 <input type="checkbox"/> 1x resistance thermometer PT100
	Mechanical design	
	Degree of protection:	<input type="checkbox"/> IP55 <input type="checkbox"/> IP65
	Cooling & ventilation:	<input type="checkbox"/> Self ventilation <input type="checkbox"/> Forced ventilation <input type="checkbox"/> High inertia fan
	Motor plugs:	<input type="checkbox"/> HAN 10E <input type="checkbox"/> HAN Q8 <input type="checkbox"/> HAN Q8 with cable Cable length: _____ m <input type="checkbox"/> HAN Q12 <input type="checkbox"/> Others _____
	Mounted components	
	Brake:	<input type="checkbox"/> Brake Control voltage: _____ V Disconnection: _____ DC/AC <input type="checkbox"/> Manual release Perm. braking distance _____ mm
	Encoder:	<input type="checkbox"/> Incremental encoder <input type="checkbox"/> Absolute encoder <input type="checkbox"/> Resolver <input type="checkbox"/> Prepared for encoder mounting
	Frequency inverter:	_____
Other options:	<div style="border: 1px solid black; height: 40px; width: 100%;"></div>	

General options	Surface treatment	
	Surface protection:	<input type="checkbox"/> C1 <input type="checkbox"/> C2 <input type="checkbox"/> C3 <input type="checkbox"/> C4 <input type="checkbox"/> C5 <input type="checkbox"/> unpainted <input type="checkbox"/> C2 primed <input type="checkbox"/> C4 primed <input type="checkbox"/> RAL color: _____
	Other options:	<div style="border: 1px solid black; height: 40px; width: 100%;"></div>

Configuring guide

Determining the drive data

Design in accordance with VDI 3643

The VDI guideline 3643 is a set of minimum requirements defined by the VDI-Gesellschaft Fördertechnik Materialfluss Logistik (Society for Materials Handling, Materials Flow and Logistics Engineering) for the optimum, harmonized selection of drive systems for electric-monorail geared motors.

The order option as per VDI 3643 is provided as a selection guide.

The only available drives and options are those which conform to the permissible installation dimensions specified by VDI 3643.

Order code:

Design in accordance with VDI 3643

K42

The permitted selection options can be found in the following tables.

Electric-monorail geared motors in accordance with VDI 3643:

Geared motor	Motor frame size						
	LA63	LA71	LE80	LE90	LE100	LE112	LE132
Gearbox type							
BH.29	✓	✓	-	-	-	-	-
BH.39	✓	✓	-	-	-	-	-
KHF49	-	-	-	-	-	-	-
KHF69	-	-	-	-	-	-	-
KHF79	-	-	-	-	-	-	-
Rated motor power							
0.12 kW	4- or 6-pole	-	-	-	-	-	-
0.18 kW	2- or 4-pole	6-pole	-	-	-	-	-
0.25 kW	2-pole	4- or 6-pole	-	-	-	-	-
0.37 kW	-	2- or 4-pole	-	-	-	-	-
0.55 kW	-	2- or 4-pole	-	-	-	-	-
0.75 kW	-	-	-	-	-	-	-
1.1 kW	-	-	-	-	-	-	-
1.5 kW	-	-	-	-	-	-	-
2.2 kW	-	-	-	-	-	-	-
3 kW	-	-	-	-	-	-	-

Required selection in accordance with VDI guideline 3643:

Description of option	Motor frame size							Order code	Technical information → page
	LA63	LA71	LE80	LE90	LE100	LE112	LE132		
Terminal box type									
Terminal box gk030	✓	✓	-	-	-	-	-	-	page 6/14
Motor plug									
HAN Q8 motor plug with 0.5 m to 5 m cable	✓	✓	-	-	-	-	-	K50 ... K55	page 6/21

Available options in accordance with VDI guideline 3643:

Option	Motor frame size							Order code	Technical information → page
	LA63	LA71	LE80	LE90	LE100	LE112	LE132		
Mechanical design									
Cooling and ventilation									
Standard fan	✓	✓	-	-	-	-	-	-	page 6/9
Metal fan	✓	✓	-	-	-	-	-	M21	page 6/9
High inertia fan	-	✓	-	-	-	-	-	M22	page 6/9
Forced ventilation	-	-	-	-	-	-	-	M23	page 6/10
Terminal box type									
Standard terminal box	-	-	-	-	-	-	-	-	-
Cable entry NPT	-	-	-	-	-	-	-	M45	page 6/14
Motor plug									
HAN Q8 motor plug with 0.5 m to 5 m cable	✓	✓	-	-	-	-	-	K50 ... K55	page 6/21
HAN 10E motor plug	-	-	-	-	-	-	-	N00, N01, N04, N06	page 6/16
HAK 4/4 motor plug	-	-	-	-	-	-	-	N08 ... N11, N19	page 6/17
HAN Q8 motor plug EMC	-	-	-	-	-	-	-	N12	page 6/19
HAN Q12 motor plug EMC	-	-	-	-	-	-	-	N13	page 6/23

Design in accordance with VDI 3643 (continued)

Available options in accordance with VDI guideline 3643:

Option	Motor frame size							Order code	Technical information → page
	LA63	LA71	LE80	LE90	LE100	LE112	LE132		
Mounted components									
<i>Brakes</i>									
L4	✓	✓	-	-	-	-	-	B00 ... B03, B57	page 6/24
L8	-	✓	-	-	-	-	-	B04 ... B09	page 6/24
L16 ... L150	-	-	-	-	-	-	-	B10 ... B32, B66, B67	page 6/24
<i>Manual brake release</i>									
Manual brake release	✓	✓	-	-	-	-	-	C02	page 6/28
Manual brake release with locking mechanism	✓	✓	-	-	-	-	-	C03	page 6/28
<i>DC voltages</i>									
24 V DC ± 10 %	✓	✓	-	-	-	-	-	C66	page 6/25
103 V DC ± 10 %	✓	✓	-	-	-	-	-	C52	page 6/25
180 V DC ± 10 %	✓	✓	-	-	-	-	-	C53	page 6/25
105 V DC ± 10 %	✓	✓	-	-	-	-	-	C64	page 6/25
<i>AC voltages</i>									
<i>Function rectifier</i>	-	-	-	-	-	-	-	C59, C60	page 6/26
<i>Brake cable protection</i>	-	-	-	-	-	-	-	C80	page 6/26
<i>Encoder</i>									
<i>SINAMICS G110M distributed frequency inverter</i>	-	-	-	-	-	-	-	Q50 ... Q94	page 6/37 ... page 6/50
International standards									
CE	✓	✓	-	-	-	-	-	-	-
Design in accordance with EAC	✓	✓	-	-	-	-	-	N30	page 1/12
Design in accordance with UL/CSA (incl. NEMA)	✓	✓	-	-	-	-	-	N38	page 1/12
Design for the Chinese market ¹⁾	✓	✓	-	-	-	-	-	N67	page 1/12
Without CE marking	✓	✓	-	-	-	-	-	N68	page 1/12
General									
ATEX design	-	-	-	-	-	-	-	K70, K80 ... K82	-

¹⁾ Designs not possible for motor frame size 71 with 0.55 kW power rating.

Configuring guide

Configuring a gearbox

Service factor

Determining the required service factor

The operating conditions are crucial in determining the service factor and for selecting the geared motor. These are taken into account by the service factor f_{Btot} .

In standard operation, i.e. with a uniform load provided by the driven machine, small masses to be accelerated, and a low switching frequency, the service factor of $f_{Btot} = 1$ can be selected.

For different operating conditions, the service sector can be taken from the tables. When the motor power and the gearbox output speed are known, a gearbox type is selected with a service factor that meets the following condition:

$$f_{Btot} = f_{B1} \leq f_B$$

The gearbox size or rated gearbox torque and the resulting service factor are not standardized and depend on the manufacturer.

Determining the load classification

The service factor of the driven machine f_{Btot} is determined from the load classification, switching frequency, and operating period per day.

The operating conditions can vary greatly. To determine the service factor, empirical values can be derived from the configuration of other similar applications. The driven machines can be assigned to three load groups according to their load classification. These groups are assessed based on their mass acceleration factor m_{AF} .

Load groups of driven machines

Load classification	Mass acceleration factor	Driven machine (examples)
I Almost shock-free	≤ 0.3	Electric generators, belt conveyors, apron conveyors, screw conveyors, lightweight elevators, electric hoists, machine tool feed drives, turbo blowers, centrifugal compressors, mixers and agitators when mixing materials with uniform density
II Moderate shock loads	≤ 3	Machine tool main drives, heavy elevators, slewing gear, cranes, shaft ventilators, mixers and agitators when mixing materials with non-uniform densities, reciprocating pumps with multiple cylinders, metering pumps
III Heavy shock loads	≤ 10	Punching presses, shears, rubber kneaders, machinery used in rolling mills and the iron and steel industry, mechanical shovels, heavy centrifuges, heavyweight metering pumps, rotary drilling rigs, briquetting presses, pug mills

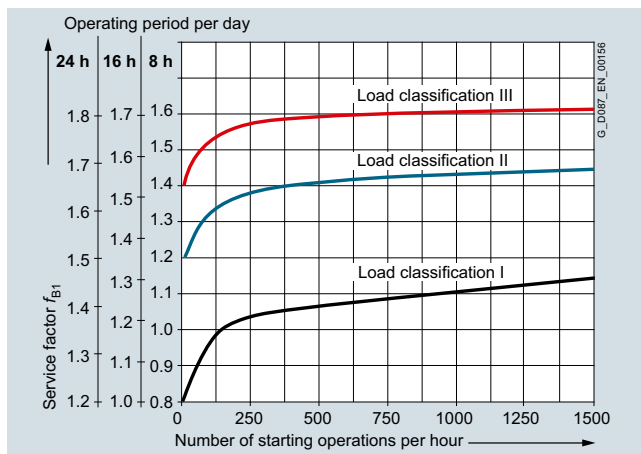


Fig. 2/1 Service factor f_{B1}

Note:

When selecting and dimensioning drives with the following special application conditions, please contact Siemens.

- Frequent reversing
- Short-time and intermittent operation
- Abnormal temperatures
- Reversal braking
- Extreme and/or circulating radial forces at the gearbox output shaft
- Fluctuating loads

Mass acceleration factor

The mass acceleration factor m_{AF} is calculated as follows:

$$m_{AF} = \frac{J_X}{(J_{mot} + J_B + J_Z)}$$

All external moments of inertia are moments of inertia of the driven machine and the gearbox, which are to be reduced to the motor speed.

The calculation is made using the following formula:

$$J_X = J_2 \cdot \left(\frac{n_2}{n_1}\right)^2 = \frac{J_2}{(i)^2}$$

In most cases the relatively insignificant moment of inertia of the gearbox can be ignored.

The mass acceleration factor m_{AF} is calculated as follows with reference to the gearbox and the adapter:

$$m_{AF} = \frac{J_X + J_G + J_{AD}}{(J_{mot} + J_B + J_Z)}$$

Code	Description	Unit
i	Transmission ratio	-
J_2	Moment of inertia of the load referred to the output speed of the gearbox	kgm ²
J_{AD}	Moment of inertia of the adapter referred to the input speed	kgm ²
J_B	Moment of inertia of the brake	kgm ²
J_G	Moment of inertia of the gearbox based on the input speed	kgm ²
J_{mot}	Moment of inertia of the motor	kgm ²
J_X	Moment of inertia of the load referred to the input speed	kgm ²
J_Z	Additional moment of inertia of a high inertia fan	kgm ²
m_{AF}	Mass acceleration factor	-
n_1	Input speed of the gearbox	rpm
n_2	Output speed of the gearbox	rpm

Required torque

Once the load situation (drive data) and the service factor have been clarified, then the required output torque can be determined.

$$T_2 = \frac{P_{\text{mot}} \cdot 9550}{n_1 / (i \cdot \eta)} = \frac{P_{\text{mot}} \cdot 9550}{n_2} \cdot \eta$$

Code	Description	Unit
η	Gearbox efficiency	%
i	Transmission ratio	-
n_1	Input speed of the gearbox	rpm
n_2	Output speed of the gearbox	rpm
P_{mot}	Motor power	kW
T_2	Required output torque of the driven machine	Nm

Input speed

For an identical power and output speed, in the selection tables 4-pole geared motors have priority over 6-pole motors.

As result of the very wide range of transmission ratios of SIMOGEAR gearboxes, it is hardly necessary to use motors with other pole numbers. In addition to good availability worldwide, 4-pole motors generally offer the optimum solution regarding price, length, noise level and service life.

Configuring guide

Configuring a gearbox

Shaft load and bearing service life

Available radial force

The total available radial force comprises the force due to weight on the running wheel and the tangential force exerted by the torque. The weight distribution depends on the relevant trolley type and on the number of drives and running wheels. Forces are also exerted as a result of weight transfer during startup, braking and ascending travel. These forces must be taken into account in the available radial force calculation.

Your Siemens contact person will be pleased to provide configuring advice. In order to dimension the drive, we will need the completed [checklist on page 2/2](#).

Variables for defining shaft load and bearing service life

Code	Description	Unit
H	Vertical distance between running axis and center of gravity	mm
L1	Distance between running wheels	mm
L2	Horizontal distance between running wheel and center of gravity	mm
L3	Distance between swivel joints	mm
S	Center of gravity	mm

Trolley type 1

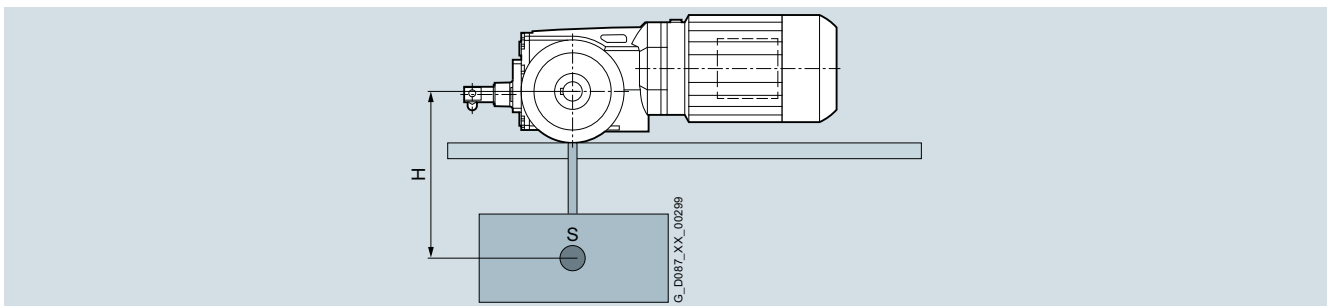


Fig. 2/2 Trolley type 1: 1 running wheel, one wheel is driven

Trolley type 2

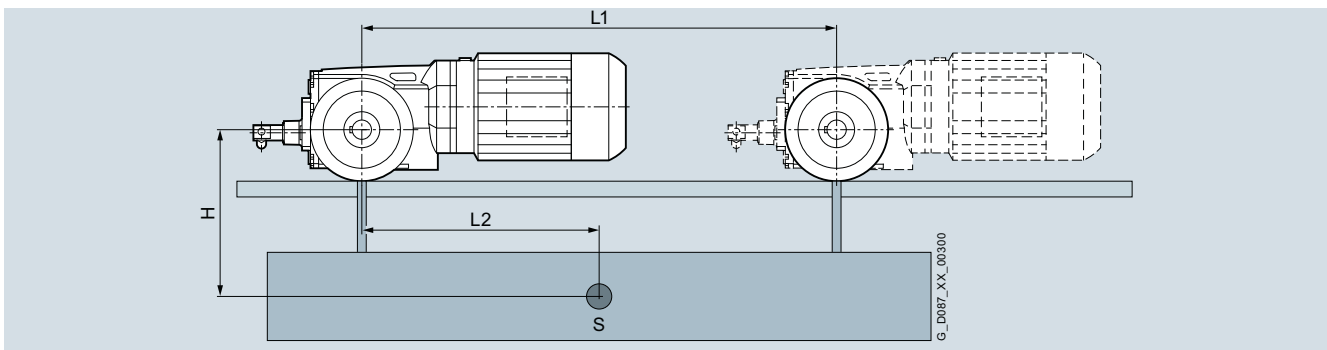


Fig. 2/3 Trolley type 2: 2 running wheels, one wheel at the front or rear is driven

Trolley type 3

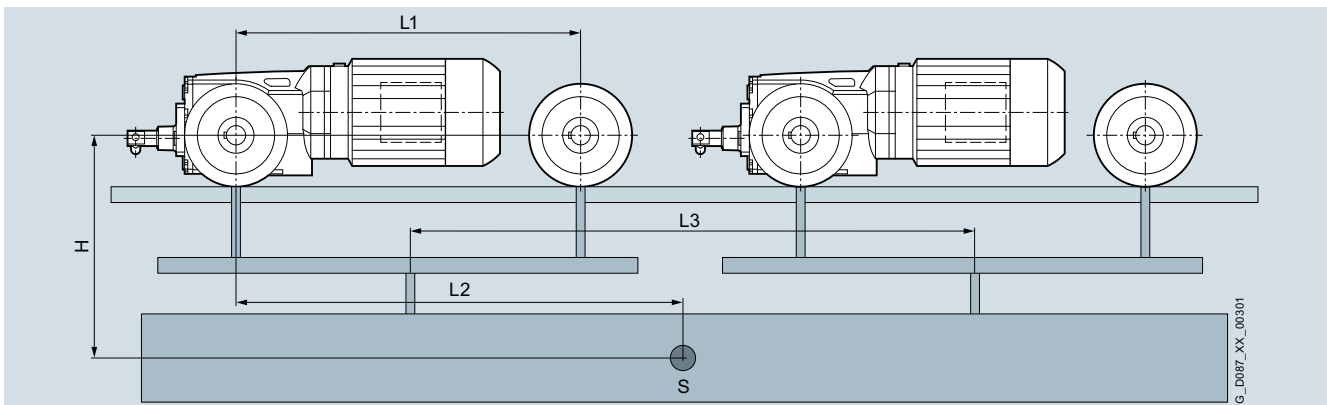


Fig. 2/4 Trolley type 3: 4 running wheels, 2 wheels are driven

Shaft load and bearing service life

Permissible radial force

The selection tables specify the permissible radial force F_{R2} . The table values refer to the force application point x , see table "Gearbox constants for calculating the radial force".

Note:

For BH.39 with 25 x 35 solid shaft, the permissible radial force F_x must always be calculated using the conversion below (even when $x = 18$ mm), because the table values apply to a 30 x 50 solid shaft.

Radial force conversion for force application at distance other than x

When the distance x to the shaft shoulder is other than the value stated in the table, use the following formulas to convert the permissible radial force.

The lowest value of F_{xperm1} (bearing service life), F_{xperm2} (strength) and F_{R2max} is the permissible radial force F_x . The calculation is applicable without axial force.

Permissible radial force according to the bearing service life

$$F_{xperm1} = F_{R2} \cdot \frac{y}{(z + x1)}$$

Permissible radial force according to the shaft strength

$$F_{xperm2} = \frac{a}{(b + x1)}$$

Permissible radial force for force application at distance other than x

$$F_x \leq F_{xperm1}; F_{xperm2}; F_{R2max}$$

Condition: Available radial force \leq permissible radial force

Variables for defining shaft load and bearing service life

Code	Description	Unit
α	Force application angle	°
a, b, d, l, y, z	Gearbox constants	Nmm / mm
d_0	Average diameter of the mounted transmission element	mm
F_G	Force due to weight	N
F_{R2}	Permissible radial force (from power table)	N
F_{R2max}	Maximum permissible radial force according to table "Gearbox constants for calculating the radial force"	N
F_{Ravail}	Available radial force	N
F_x	Permissible radial force from out of center force application point	N
F_{xperm1}	Permissible radial force, limited by the bearing service life, at a distance of x from the shaft shoulder	N
F_{xperm2}	Permissible radial force, limited by the shaft strength, at a distance of x from the shaft shoulder	N
RWC	Running wheel center	-
x	Distance from the shaft shoulder up to the force application point at running wheel center for F_{R2} according to table "Gearbox constants for calculating the radial force"	mm
$x1$	Distance from the shaft shoulder up to the force application point at running wheel center for F_x	mm

Definition of the force application point

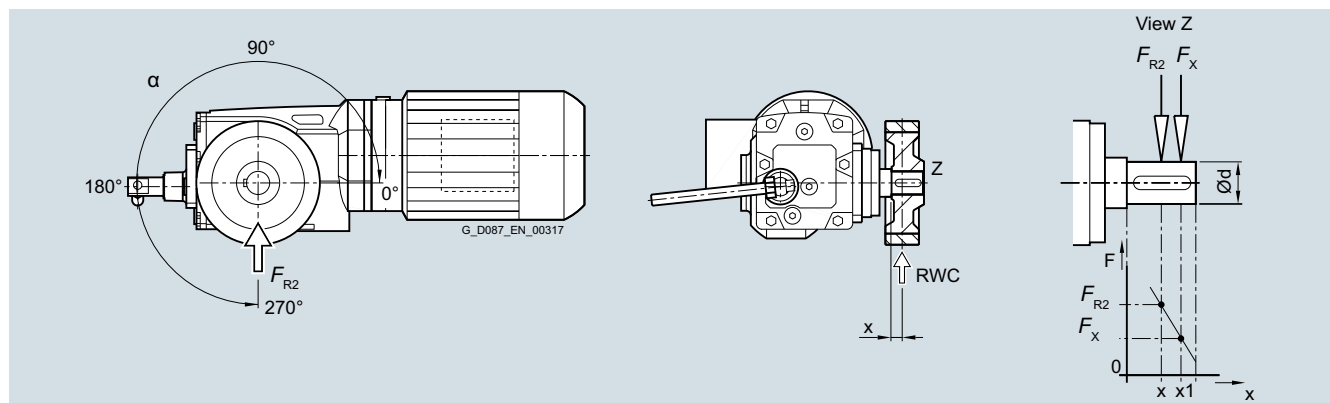


Fig. 2/5 Force application point

Gearbox constants for calculating the radial force

Gearbox size	Constants							F_{R2max} N	Force application x mm
	y mm	z mm	a Nmm	b mm	d mm	l mm	T_2 Nm		
Light-load applications									
BH.29	158	145	97 500	0	25	35	90	7 500	13
BH.39	170	162	216 000	0	25	35	200	12 000	18
BH.39	170	152	270 000	0	30	50	200	15 000	18
Heavy-load applications									
KH.49	199	171	333 000	0	30	60	420	18 500	18
KH.49	199	171	518 000	0	35	70	420	18 500	28
KH.69	239	211	700 000	0	45	90	600	25 000	28
KH.79	257	225	1 280 000	0	55	110	820	40 000	32

Configuring guide

Configuring a three-phase motor

Determining the duty type

The power ratings for continuous duty with constant load (duty type S1) are listed in the power tables. The motor power ratings can be converted to the lower duty cycle using the corresponding k_{DC} factors for S1, S2, and S3 duty types.

$$P_{DC} = P_{rated} \cdot k_{DC}$$

Code	Description	Unit
P_{DC}	Power for the new duty cycle	kW
P_{rated}	Rated motor power	kW
k_{DC}	Factor for increased power	-

For increased power, you should note that the breakdown torque ratio must not fall below 1.6. This same regulation applies when differentiating between the following groups of duty types.

Duty types according to EN 60034-1 (IEC 60034-1)

Duty type	Description	Information required	Factor for increased power	
			k_{DC}	
S1	Continuous duty Cyclic duration factor = 100 %	-	-	-
S2	Constant load for a brief time, e.g. S2 - 30 min	Load duration	60 min	1.10
			30 min	1.20
			10 min	1.40
S3	Intermittent periodic duty, where starting has no significant influence (cyclic operation), e.g. S3 - 40 %	Cyclic duration factor in % (referred to 10 min)	60 %	1.10
			40 %	1.15
			25 %	1.30
			15 %	1.40
S4 ... S10	Intermittent periodic duty with the influence of starting	Cyclic duration factor in % (referred to 10 min), starts per hour, load torque and moment of inertia The duty type and motor power can be determined if the number of starting operations per hour, starting time, load duration, type of braking, braking time, idle time, cycle time, standstill time, and required power are specified.	On request	-

Switching frequency

A higher switching frequency means that the motor winding will be subject to a thermal load.

The permissible switching frequency Z_{perm} has to be determined for different operating cases.

This value is influenced by the corresponding load torque, the additional moment of inertia, the power requirement, and the cyclic duration factor. These can be evaluated using the factors k_M , k_{FI} and k_P .

For 60 Hz operation, the calculated permissible switching frequency Z_{perm} must be reduced by 25 %. See the technical specifications for [brakes in chapter 6](#) for the permissible switching frequency for operation with function rectifiers.

The permissible no-load switching frequency Z_A for motors with brake L must be obtained from table "No-load switching frequency for brakes L" on page 6/35.

$$Z_{perm} = Z_A \cdot k_M \cdot k_{FI} \cdot k_P$$

The permissible no-load switching frequency Z_0 for motors without brakes must be obtained from the [Selection and ordering data page 4/6](#).

$$Z_{perm} = Z_0 \cdot k_M \cdot k_{FI} \cdot k_P$$

Code	Description	Unit
DC	Cyclic duration factor	%
J_{mot}	Moment of inertia of motor and brake	kgm ²
J_Z	Additional moment of inertia of the high inertia fan	kgm ²
J_X	Moment of inertia of the load, reduced to motor shaft	kgm ²
J_{add}	Additional moment of inertia, reduced to motor shaft	kgm ²
k_{FI}	Factor for taking into account the additional moment of inertia	-
k_M	Factor for taking into account the load torque while accelerating	-
k_P	Factor for taking into account the required power and duty cycle	-
P_S	Actual steady-state motor power	kW
P_{rated}	Rated motor power	kW
T_A	Acceleration torque of the motor	Nm
T_{rated}	Rated motor torque	Nm
T_x	Load torque, reduced to motor shaft	Nm
t_R	Duty cycle (decimal)	
Z_A	No-load switching frequency, motor with brake	1/h
Z_0	No-load switching frequency, motor without brake	1/h
Z_{perm}	Permissible switching frequency	1/h

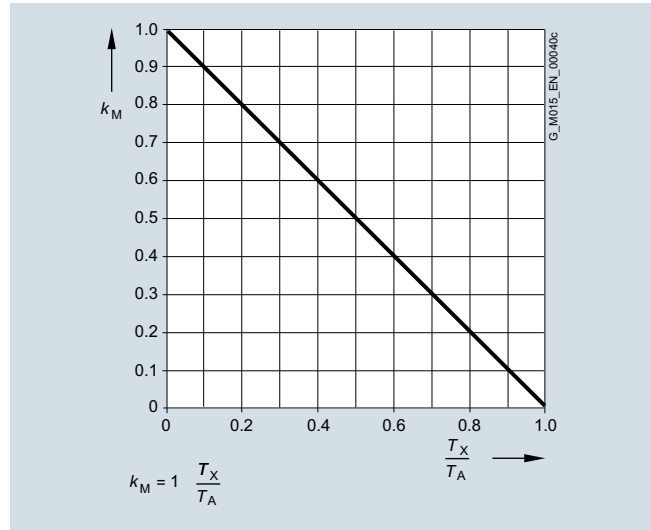


Fig. 2/6 Torque when accelerating

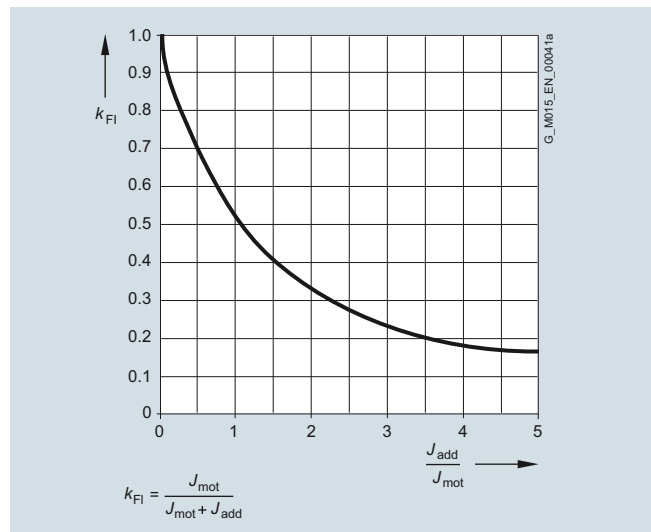


Fig. 2/7 Additional moment of inertia

$$J_{add} = J_X + J_Z$$

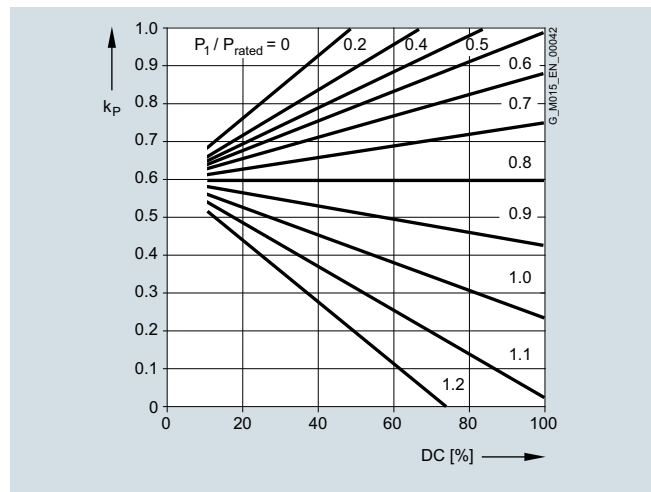


Fig. 2/8 Power requirement and duty cycle

$$k_P = t_R \cdot (1 - (P_S / P_{rated})^2) + 0.6 \cdot (1 - t_R) + 0.24 \cdot t_R$$

Configuring guide

Configuring a three-phase motor

Additional moments of inertia

The motor moment of inertia with standard fan is specified in the motor selection lists. The higher moment of inertia should be used for metal or high-inertia fans. This is also valid for mounted brakes, backstops and encoder systems.

Line feeder cables

Line feeder cables must be adequately dimensioned. The number of required parallel (if applicable) feeder cables is determined by the maximum connectable conductor cross-section, the type of cable, the cable installation, the ambient temperature and the permissible current. In Germany, DIN VDE 0298 must be applied when dimensioning cables.

Undervoltage

For an undervoltage condition as a result of weak line supplies, catalog values such as motor power, torque and speed are not reached. This is especially important when considering motor starting.

Motor protection

A distinction is made between current-dependent and temperature-dependent protective devices for motors.

Current-dependent protective devices

Fuses are only used to protect line cables in the event of a short-circuit. They are not suitable for protecting the motor against overload. The motors are usually protected by thermally delayed overload protective devices (circuit breakers for motor protection or overload relays).

This protection is current-dependent and is particularly effective in the case of a locked rotor. For normal operation with short starting operations, starting currents that are not excessive and for low numbers of starting operations, motor circuit breakers provide adequate protection. Motor circuit breakers are not suitable for heavy duty starting or high numbers of starting operations. Differences in the thermal time constants for the protective devices and the motor results in unnecessary early tripping when the circuit breaker is set to the rated current.

Temperature-dependent protective devices

Temperature-dependent protective devices are integrated in the motor winding and can be implemented as **temperature sensors** and **temperature switches**.

The number of temperature-dependent protective devices depends on the number of windings and their function.

The alarm is normally set to 10 K below the switch-off temperature. The rated response temperatures of the protective devices depend on the thermal class of the motors.

In order to achieve full thermal protection, it is necessary to combine a thermally delayed overcurrent release and a PTC thermistor.

Coolant temperature and installation altitude

The rated power specified in the [selection tables in chapter 4](#) is valid for a coolant temperature of +40 °C and an installation altitude of 1 000 m above sea level.

Please contact Siemens for higher coolant temperatures.

The table with correction factors provides a rough idea of the derating required if conditions are different.

This results in a permissible motor power of:

$$P_{\text{perm}} = P_{\text{rated}} \cdot k_{\text{HT}}$$

Code	Description	Unit
P_{perm}	Permissible motor power	kW
P_{rated}	Rated motor power	kW
k_{HT}	Factor for abnormal coolant temperature and installation altitude	-

Factor k_{HT} for different installation altitude and coolant temperature

Installation altitude IA	Coolant temperature CT					
	< +30 °C	+30 ... +40 °C	+45 °C	+50 °C	+55 °C	+60 °C
m						
1 000	1.07	1.00	0.96	0.92	0.87	0.82
1 500	1.04	0.97	0.93	0.89	0.84	0.79
2 000	1.00	0.94	0.90	0.86	0.82	0.77
2 500	0.96	0.90	0.86	0.83	0.78	0.74
3 000	0.92	0.86	0.82	0.79	0.75	0.70
3 500	0.88	0.82	0.79	0.75	0.71	0.67
4 000	0.82	0.77	0.74	0.71	0.67	0.63

Degrees of protection

The motors are supplied in IP55 to standard IEC 60034-5. They can be installed in dusty or humid environments. The motors are suitable for operation in tropical climates. Guide value below 60 % relative air humidity for a coolant temperature of +40 °C.

Other requirements on request.

First digit	Brief description	Second digit	Brief description
4	The motor is protected against solid objects larger than 1 mm.	4	The motor is protected against water splashed from all sides.
5	The motor is protected against dust.	5	The motor is protected against strong jets of water.
6	The machine is dust-tight.	6	The motor is protected against "heavy seas" or powerful jets of water.
		7	The motor is protected against immersion.
		8	The motor is protected against long periods of immersion under pressure.

The first digit of the degree of protection indicates the degree to which an enclosure provides protection against contact and the ingress of foreign bodies.

The second digit indicates the protection that an enclosure offers regarding the ingress of water.

Increased corrosion protection as well as additional protective measures for the winding (protection against moisture and acid, corrosion protection in the motor) can support the selected degree of protection.

The degree of protection only refers to the motor. When selecting higher degrees of protection, the equipping on the gearbox side should be taken into account (seals, vents).

Cooling and ventilation

When the geared motor is mounted and the air intake is restricted, you must ensure that a minimum clearance is maintained between the fan cover and the wall and that the cooling air is not immediately drawn in again.

Further, it must be guaranteed that the cooling air flow to the gearbox is not obstructed. As a consequence, the gearbox operating temperature can be further reduced.

Forced ventilation

The use of a separately driven fan is recommended to increase motor utilization at low speeds and to limit noise generation at speeds significantly higher than the synchronous speed. Both are mainly used in conjunction with inverter operation.

Typical areas of application for forced ventilation:

- High number of starting operations
- Inverter drives with a control range > 1:20
- Inverter drives with rated torque at low speeds
- Inverter drive with high motor speeds
- Noise reduction
- At high speeds

Configuring guide

Configuring a brake

2

Overview

The brakes can be used as working brakes or holding brakes. A holding brake is suitable for holding masses and loads at a fixed position. A working brake is also capable of decelerating masses and loads.

The brakes are designed as fail-safe spring-operated brakes. When the brake is mounted, it increases the length of the motor. The dimensions are shown in the dimensional drawings. The spring-operated disk brakes are suitable for a standard ambient temperature range of -20 to +40 °C.

Variables

Code	Description	Unit
f_{br}	Braking torque correction factor	-
J_{AD}	Moment of inertia of the adapter	kgm ²
J_G	Moment of inertia of the gearbox	kgm ²
J_{mot}	Moment of inertia of the motor	kgm ²
J_x	Moment of inertia of the load referred to the motor shaft	kgm ²
J_z	Additional moment of inertia of a high inertia fan	kgm ²
k	Factor for taking into account operating conditions	-
L_n	Service life of the brake lining until readjustment	h
L_{nmax}	Service life of the brake lining until replacement	h
n_{br}	Braking speed	rpm
η	Efficiency	%
Q_{perm}	Permissible operating energy	J
s_{br}	Braking distance	m
t_1	Application time of the brake	ms
t_{br}	Braking time	s
T_{br}	Rated braking torque	Nm
T_x	Load torque	Nm
v	Travel velocity	m/s
W	Friction energy per braking operation	J
W_{tot}	Friction energy until the brake lining is replaced	MJ
W_V	Friction energy until the brake is readjusted	MJ
Z	Switching frequency	1/h

Determining the braking torque

The braking torque must be selected in accordance with the particular drive application.

The following criteria are decisive when it comes to making the selection:

- Static safety
- Required braking time
- Permissible brake delay
- Possible braking distance
- Brake wear

The braking torque is determined using the safety factor k , which can be selected in the range from 1.0 to 2.5. As a general rule of thumb, the factor for horizontal motion is approx. 1.0 to 1.5 and for vertical motion approx. 2.0 to 2.5. However, the precise braking torque depends to a large extent on the particular operating conditions.

The rated braking torque is referred to a speed of $n = 100$ rpm and decreases with increasing motor speed. When calculating the braking torque, this is taken into account using the correction factor f_{br} . This means that the rated braking torque is applicable for most braking operations for inverter operation.

For line operation, braking is directly from the motor speed. In addition, for vertical conveyors, the increased speed when moving downwards must be taken into account.

$$T_{br} > T_x \cdot k \cdot f_{br}$$

Braking torques as a function of the speed and permissible speed limits

The braking torque available decreases with increasing motor speed.

The maximum permissible speeds from which emergency stops can be made are listed in the [table on page 6/32](#). These speeds should be considered as guide values and must be checked for the specific operating conditions.

The maximum permissible friction energy depends on the switching frequency and is shown for individual brakes in the [diagram "Permissible operating energy", page 6/32](#). Increased wear can be expected when the brakes are used for emergency stops.

Braking energy per braking operation

The braking energy W per braking operation comprises the energy of the moments of inertia to be braked and the energy which must be applied in order to brake against a load torque:

T_x is positive if the load torque is working against the braking torque (horizontal motion, upward vertical motion).

T_x is negative if it supports the brake (downward vertical motion).

The permissible operating energy Q_{perm} must be checked against the relevant switching frequency using the [diagram "Permissible operating energy", page 6/32](#). This is of particular importance for emergency-stop circuits.

$$W = \frac{T_{br}}{T_{br} \pm T_x \cdot \eta} \cdot \frac{(J_G + J_{AD} + J_{mot} + J_z + J_x \cdot \eta) \cdot n_{br}^2}{182.5}$$

$$W < Q_{perm}$$

Service life of the brake lining

The service life of the brake lining L_n until the air gap has to be readjusted depends on various factors. The main influencing factors include the masses to be braked, the motor speed, the switching frequency, and, therefore, the temperature at the friction surfaces.

This means it is not possible to specify a value for the friction energy until readjustment that is valid for all operating conditions. However, a wear calculation can be made according to the friction energy, so that the service life can be defined in normal operation.

Brake service life

The brake lining is subject to wear as a result of friction. As a consequence, the air gap increases and the brake application time lengthens. The air gap can be readjusted. The friction lining should be replaced after a certain number of readjustments.

Service life of the brake lining until readjustment

$$L_n = \frac{W_V}{W \cdot Z}$$

Service life of the brake lining until replacement

$$L_{nmax} = \frac{W_{tot}}{W \cdot Z}$$

Brake control

Definition of switching times (VDI 2241)

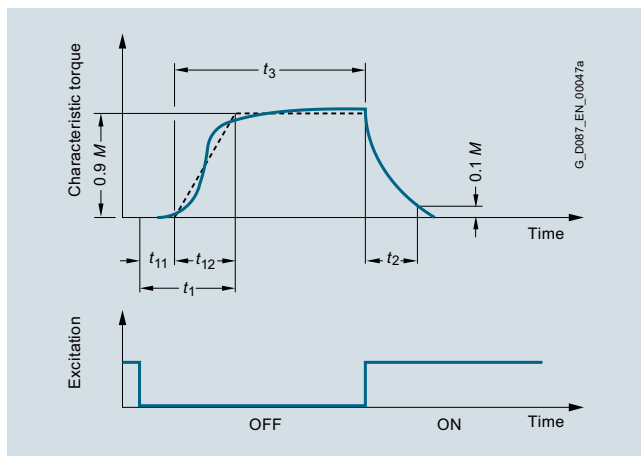


Fig. 2/9 Brake switching times

Switching times:

- t_1 Application time of the brake
- t_2 Disconnection time
- t_3 Slipping time
- t_{11} Response time
- t_{12} Rise time

Fast brake application

Disconnection on the AC side

If the brake is disconnected from the line supply, the brake is applied. With AC brake voltages, the brake application time is extended as a result of the inductance of the solenoid (disconnection on the AC side). This results in a considerable delay before the brake is mechanically applied. In order to achieve short brake application times, the circuit must also be disconnected on the DC side.

Rectifier for disconnection on the DC side

Electromagnetically released spring-operated disk brakes can be disconnected on the AC side and the DC side. Disconnection on the DC side means that the inductance and thus the magnetic field in the brake solenoid are reduced very quickly.

For disconnection on the DC side, a wire jumper can be removed from the rectifier and replaced by the contacts of an external switch. This enables significantly shorter application times to be achieved than those achieved for disconnection on the AC side.

Function rectifiers for fast brake application

If function rectifiers are used for fast brake application, then there is no need for an external switch and therefore less wiring is required.

Disconnection on the DC side using current sensing

One option of disconnecting on the DC side is to sense the motor current. If the motor current falls below the rectifier's sensor current when disconnected from the three-phase line supply, the brake solenoid is disconnected from the DC voltage electronically without any contacts.

Used in conjunction with disconnection on the DC side by means of current sensing, rectifiers are generally suitable for being connected in parallel with the motor connection, even in applications involving moving loads or large moments of inertia. Brakes controlled in this way are completely wired to the motor terminal board. Inverter operation is not permissible.

Disconnection on the DC side using voltage sensing

Another option of disconnecting on the DC side is by sensing the rectifier supply voltage.

An integrated switching transistor switches off the load if the input voltage falls below a specified switching threshold. Used in conjunction with disconnection on the DC side using voltage sensing, rectifiers are generally suitable for operation with separate AC-side brake control using an additional switching contact.

Connection in parallel with the motor connection is also possible, but it is not recommended, as the rectifier disconnection response will be impaired by the influence of the motor winding. In addition, many applications involve driving loads or large moments of inertia. This can cause the no-load voltage generated when the motor coasts down to considerably delay brake application if the switching threshold for voltage sensing is not fallen below.

If connection in parallel with the motor connection is nevertheless desired or required, disconnection on the DC side using current sensing is recommended.

Fast brake release

Function rectifiers for fast brake release

Rectifiers with overexcitation (high-speed excitation)

Rectifiers with overexcitation operate for approximately $300 \text{ ms} \pm 15 \%$ with bridge rectification, i.e. when being released, the brakes are supplied with twice the rated solenoid voltage.

After this time the rectifiers automatically switch from bridge to half-wave rectification and the brakes are operated with the rated solenoid voltage. This results in shorter release times and higher brake switching frequencies. The friction lining wear is also reduced, the permissible friction energy until the air gap is readjusted increases, and starting losses are reduced.

Rectifiers with overexcitation are generally suitable for being connected in parallel to the motor connection or for a separate circuit in the case of inverter operation (note connection information for disconnection on the DC side).

Configuring guide

Configuring a brake

Brake switching time

The total time it takes the motor to come to a standstill comprises the following times:

- Brake application time t_1
- Braking time t_{br}

The first is the time it takes the brake to reach 90 % of its braking torque. This time may be circuit- and control-dependent.

The braking time is determined as follows:

$$t_{br} = \frac{(J_G + J_{AD} + J_{mot} + J_z + J_x \cdot \eta) \cdot n_{br}}{9.55 \cdot (T_{br} \pm T_x \cdot \eta)}$$

If T_x supports the braking operation, T_x is positive; otherwise it is negative.

Braking distance and positioning accuracy

Braking distance s_{br} is the distance traveled by the driven machine during braking time t_{br} and application time t_1 .

With linear motion, a positioning accuracy of between $\pm 12\%$ and $\pm 15\%$ can be assumed. However, this can be heavily influenced by the condition of the brake.

The formula below applies to horizontal motion and upward vertical motion.

$$s_{br} = v \cdot \left(\frac{t_1}{1000} + 0.5 \cdot t_{br} \right)$$

Cyclic duration factor

The cyclic duration factor DC of the brake (referred to a cycle of max. 10 minutes) is the ratio between the ON period and the duration of the duty cycle. The duty cycle is the sum of the ON period and the no-voltage periods.

$$DC = \frac{t_s}{t_s + t_o} \cdot 100$$

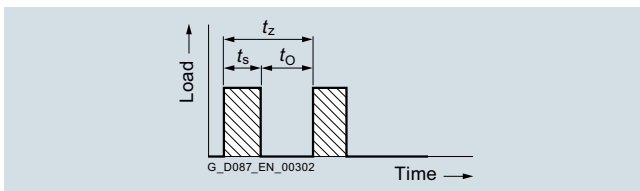


Fig. 2/10 Cyclic duration factor

Code	Description	Unit
DC	Cyclic duration factor	%
t_s	Close time (on-load factor)	s
t_o	Open time (off-load factor)	s
t_z	Cycle time (duty cycle time)	s

Operation of geared motors on a frequency inverter

It is possible in principle to operate geared motors on a frequency inverter.

Please note the following supplementary conditions:

- Maximum speed of the geared motor in the field-weakening range
- Maximum speed of the brake, see [page 6/32](#)
- Speed limits of the backstop

Motor characteristic

During the acceleration process, frequency inverters shift the speed-torque characteristic of the three-phase asynchronous motor over the traversing range to enable jerk-free acceleration. This enables the motor to be operated at different speeds (e.g. rapid traverse/creep speed), but also protects the mechanical components of the plant and gearbox.

Two main motor operating ranges are applicable for inverter operation:

Constant flux (constant torque)

For frequency inverters with an unregulated DC link (e.g. SINAMICS G110M), the output voltage can be as high as the line-side input voltage minus any voltage drops in the inverter (for example, for SINAMICS G110M:

$$U_{Output} = 0.87 \times U_{Input}$$

If the maximum output voltage has not yet been achieved, the inverter output voltage can be increased as the motor speed increases until **V/f = constant** applies. As a consequence, the magnetic flux, the motor current and therefore the transferred **continuous torque are constant** (provided that the motor is adequately cooled → in the case of self-cooling, the torque must be reduced in accordance with the motor characteristic at low speeds due to the reduced cooling). Alternatively, if a separately driven fan is used, the full motor torque can be utilized.

Field-weakening range

If the speed increases further when the maximum output voltage has been reached, $V/f \neq$ remains constant. The magnetic flux reduces with increasing motor speed, the motor current and therefore the transferred continuous torque reduces with respect to $1/n$, and the breakdown torque reduces according to $1/n^2$ (see motor characteristic). The motor can be operated in the field-weakening range at constant power as far as the limit of stability (see under "Mechanical stress, grease service life").

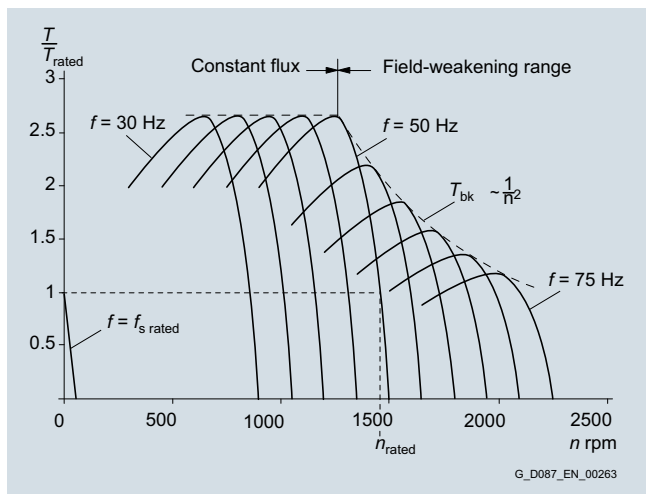


Fig. 2/11 Example for a 4-pole, three-phase asynchronous motor

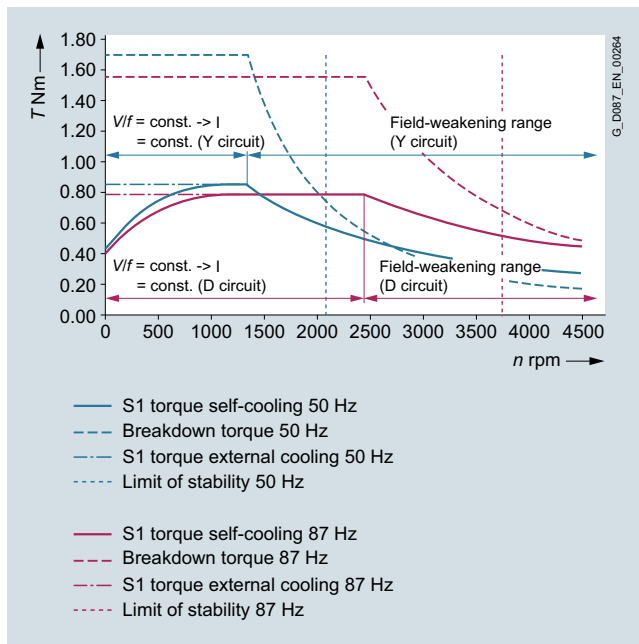


Fig. 2/12 Torque-speed characteristic for asynchronous motor (based on the example of LA63ME4)

Utilization in accordance with temperature class F

For rated power and line operation, the motor is utilized in accordance with temperature class B (130 °C maximum permissible constant temperature referred to a maximum cooling air temperature of 40 °C).

Siemens motors are designed as standard to temperature class F (155 °C maximum permissible constant temperature referred to a maximum cooling air temperature of 40 °C).

For inverter operation at reduced output voltage, the power reserve of the motor can be used to achieve the rated power.

In this case, the rated torque is applied to the motor and the frequency inverter outputs a frequency at which the motor achieves rated speed.

At this operating point the slip and current input are higher than under line operation, so that the constant motor temperature increases accordingly. Prerequisite for utilization of the motor in accordance with temperature class F is that the frequency inverter is capable of outputting a sufficiently high level of current:

$$I_{FUOutRated} \geq I_{Motor Rated Inc}$$

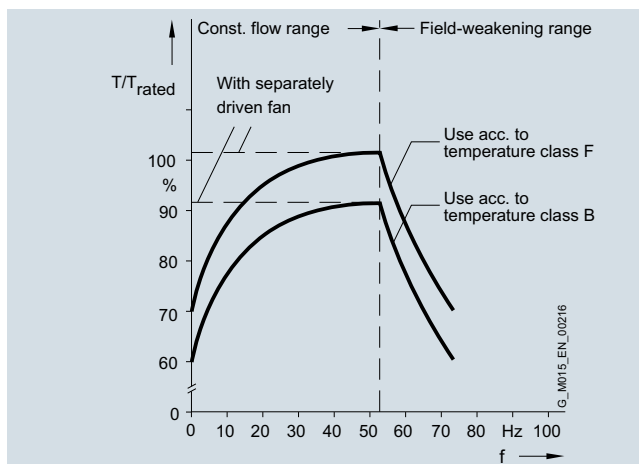


Fig. 2/13 Drive characteristic for various inverter frequencies

Configuring guide

Configuring a motor for inverter operation

2

Permissible voltage stress

More stress is placed on the insulation of the motor winding with inverter operation than with line operation. The voltage stress also depends on the type of inverter used. The inverter subjects the motor winding to stress specially as voltage pulses are quickly switched.

The maximum voltage is influenced by the rise time of the pulses, the cable length and the type of cable used between motor and inverter.

Output filters at the inverter can reduce the maximum motor voltage to uncritical values. When using output filters, the control type, pulse frequency, output frequency, and limit torque that can be realized need to be observed, among other factors.

With inverters without output filters, impermissible voltage peaks can occur even with a relatively short motor cable. Regenerative operation, in particular, can stress the motor insulation. This stress occurs predominantly during vertical motion and is dependent on the line voltage, inverter type, cable length, and cable type.

For further details, see [chapter "Motor options", page 6/8](#).

Mechanical stress, grease service life

High speeds that exceed the rated speed and the resulting increased vibration alter the mechanical smooth running operation and the bearings are subject to increased mechanical stress. This reduces the grease service life and the bearing service life.

More detailed information on request.

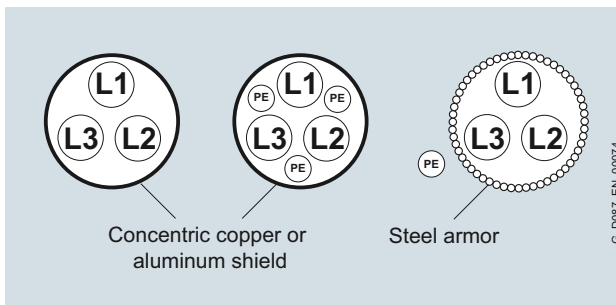
Bearing currents

Additional bearing currents can flow when motors are operated from inverters. They are mainly caused by the steep voltage rises which occur during switching. Without output filters, significant voltage variations can occur at the winding terminals. This phenomenon mainly occurs for larger machines.

EMC-compliant installation of the drive system is a basic prerequisite for preventing premature bearing damage as a result of bearing currents.

The most important measures for reducing bearing currents are:

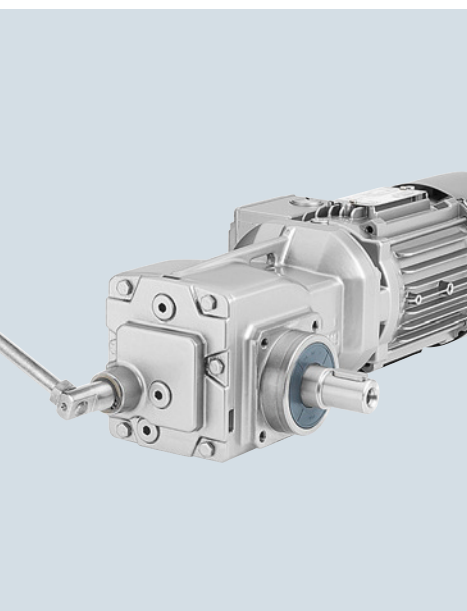
- Insulated motor bearing at the non-drive end (NDE).
- Using cables with a symmetrical cable cross-section:



- Preference given to a line supply with insulated neutral point (IT system).
- Using grounding cables with low impedance over a wide frequency range (DC up to approximately 70 MHz): e.g. braided copper straps, HF finely stranded conductors.
- Separate HF equipotential-bonding cable between motor housing and driven machine
- Separate HF equipotential-bonding cable between motor housing and inverter PE busbar
- 360° HF contact of the cable shield at the motor housing and the inverter PE busbar. This can be achieved using EMC screwed glands on the motor end and EMC shield clips at the inverter, for example.
- Using motor reactors at the inverter, common-mode filter at the inverter output.

Electric-monorail geared motors Light-load and heavy-load applications

3



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3/17	Selection and ordering data
	Dimensions
	<u>Light-load applications</u>
3/19	BHZ29 bevel gearbox
3/20	BHZ39 bevel gearbox
3/21	BH39 bevel gearbox
	<u>Heavy-load applications</u>
3/22	KHF49 bevel gearbox
3/23	KHF69 bevel gearbox
3/24	KHF79 bevel gearbox
3/25	Clutch lever, position B

Electric-monorail geared motors

Orientation

SIMOGEAR bevel geared motor BH for light-load applications

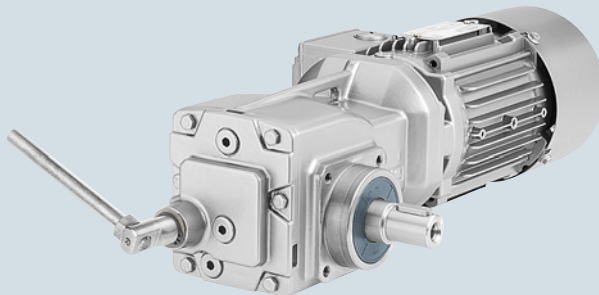


Fig. 3/1 Bevel geared motor BH

SIMOGEAR bevel geared motor KHF for heavy-load applications

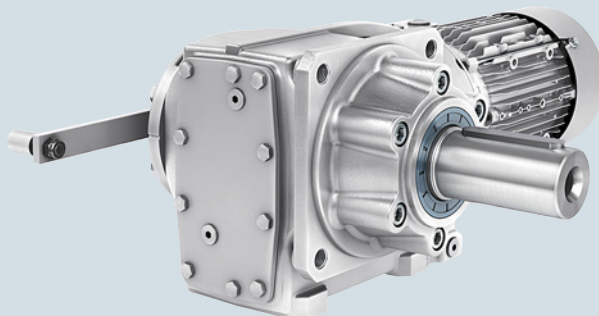


Fig. 3/2 Bevel geared motor KHF

SIMOGEAR bevel geared motors are available in the following versions for mounting in any position:

- Design with integrated housing flange BHZ
- Foot-mounted design BH
- Flange-mounted design KHF
- Solid shaft design with or without feather key

Selection and ordering data

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
0.12										
BH.29-LA63MG6										
	20	58	50.26	7 500	7 500	7 500	1.6	9	2KJ3803 - ■ BE11 - ■ R1	P01
	22	51	44.58	7 500	7 500	7 500	1.8	9	2KJ3803 - ■ BE11 - ■ Q1	P01
	26	44	38.68	7 500	7 500	7 500	2.0	9	2KJ3803 - ■ BE11 - ■ P1	P01
BH.29-LA63ME4										
	27	43	50.26	7 500	7 500	7 500	2.1	9	2KJ3803 - ■ BC11 - ■ R1	
	30	38	44.58	7 500	7 500	7 500	2.4	9	2KJ3803 - ■ BC11 - ■ Q1	
	35	33	38.68	7 240	7 330	7 350	2.7	9	2KJ3803 - ■ BC11 - ■ P1	
	38	30	35.16	7 030	7 110	7 130	3.0	9	2KJ3803 - ■ BC11 - ■ N1	
	45	26	30.16	6 700	6 760	6 780	3.5	9	2KJ3803 - ■ BC11 - ■ M1	
	49	23	27.41	6 500	6 560	6 580	3.9	9	2KJ3803 - ■ BC11 - ■ L1	
	56	20	24.04	6 240	6 290	6 300	4.4	9	2KJ3803 - ■ BC11 - ■ K1	
	63	18	21.45	6 020	6 060	6 070	4.9	9	2KJ3803 - ■ BC11 - ■ J1	
	71	16	19.12	5 800	5 840	5 850	5.5	9	2KJ3803 - ■ BC11 - ■ H1	
	76	15	17.65	5 650	5 690	5 700	6.0	9	2KJ3803 - ■ BC11 - ■ G1	
	87	13	15.45	5 410	5 450	5 460	6.7	9	2KJ3803 - ■ BC11 - ■ F1	
	100	12	13.55	5 180	5 210	5 220	7.3	9	2KJ3803 - ■ BC11 - ■ E1	
	110	10	12.29	5 030	5 050	5 060	7.8	9	2KJ3803 - ■ BC11 - ■ D1	
	117	9.8	11.57	4 930	4 950	4 960	8.0	9	2KJ3803 - ■ BC11 - ■ C1	
	132	8.7	10.20	4 730	4 750	4 760	8.8	9	2KJ3803 - ■ BC11 - ■ B1	
	153	7.5	8.85	4 520	4 540	4 540	9.6	9	2KJ3803 - ■ BC11 - ■ A1	
0.18										
BH.39-LA71MG6										
	14	122	60.21	15 000	15 000	15 000	1.6	15	2KJ3804 - ■ CD11 - ■ T1	P01
	16	106	52.26	15 000	15 000	15 000	1.9	15	2KJ3804 - ■ CD11 - ■ S1	P01
	18	94	46.47	15 000	15 000	15 000	2.1	15	2KJ3804 - ■ CD11 - ■ R1	P01
	21	82	40.80	15 000	15 000	15 000	2.4	15	2KJ3804 - ■ CD11 - ■ Q1	P01
BH.29-LA71MG6										
	17	102	50.26	7 500	7 500	7 500	0.89	10	2KJ3803 - ■ CD11 - ■ R1	P01
	19	90	44.58	7 500	7 500	7 500	1.0	10	2KJ3803 - ■ CD11 - ■ Q1	P01
	22	78	38.68	7 500	7 500	7 500	1.2	10	2KJ3803 - ■ CD11 - ■ P1	P01
	24	71	35.16	7 500	7 500	7 500	1.3	10	2KJ3803 - ■ CD11 - ■ N1	P01
BH.29-LA63MF4										
	27	64	50.26	7 500	7 500	7 500	1.4	9	2KJ3803 - ■ BD11 - ■ R1	
	30	57	44.58	7 440	7 500	7 500	1.6	9	2KJ3803 - ■ BD11 - ■ Q1	
	35	49	38.68	7 130	7 250	7 290	1.8	9	2KJ3803 - ■ BD11 - ■ P1	
	38	45	35.16	6 930	7 040	7 070	2.0	9	2KJ3803 - ■ BD11 - ■ N1	
	45	38	30.16	6 610	6 710	6 730	2.3	9	2KJ3803 - ■ BD11 - ■ M1	
	49	35	27.41	6 420	6 510	6 530	2.6	9	2KJ3803 - ■ BD11 - ■ L1	
	56	31	24.04	6 160	6 240	6 260	2.9	9	2KJ3803 - ■ BD11 - ■ K1	
	63	27	21.45	5 950	6 020	6 040	3.3	9	2KJ3803 - ■ BD11 - ■ J1	
	71	24	19.12	5 740	5 800	5 820	3.7	9	2KJ3803 - ■ BD11 - ■ H1	
	76	22	17.65	5 600	5 650	5 670	4.0	9	2KJ3803 - ■ BD11 - ■ G1	
	87	20	15.45	5 360	5 410	5 430	4.5	9	2KJ3803 - ■ BD11 - ■ F1	

Article No. supplement

Shaft design

1, 2 or 9

→ page 5/5

Frequency and voltage

2 or 9

→ page 6/2

Gearbox mounting type

A or H

→ page 5/5

¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Light-load applications

Geared motors up to 3 kW

Selection and ordering data (continued)

P_{rated}	n_2	T_2	i	$F_{R2}^{1)}$	$F_{R290}^{1)}$	$F_{R2270}^{1)}$	f_B	m	Article No.	Order code	
kW	rpm	Nm	-	N	N	N	-	kg	(Article No. supplement → below)	No. poles	
0.18	BH.29-LA63MF4										
	100	17	13.55	5 150	5 190	5 200	4.9	9	2KJ3803 - ■ BD11 - ■ ■ E1		
	110	16	12.29	4 990	5 030	5 040	5.2	9	2KJ3803 - ■ BD11 - ■ ■ D1		
	117	15	11.57	4 890	4 930	4 940	5.4	9	2KJ3803 - ■ BD11 - ■ ■ C1		
	132	13	10.20	4 700	4 730	4 740	5.9	9	2KJ3803 - ■ BD11 - ■ ■ B1		
	153	11	8.85	4 490	4 520	4 530	6.4	9	2KJ3803 - ■ BD11 - ■ ■ A1		
0.25	BH.39-LA71MH6										
	14	173	60.21	15 000	15 000	15 000	1.2	17	2KJ3804 - ■ CE11 - ■ ■ T1	P01	
	16	145	52.26	15 000	15 000	15 000	1.4	17	2KJ3804 - ■ CE11 - ■ ■ S1	P01	
	19	129	46.47	15 000	15 000	15 000	1.6	17	2KJ3804 - ■ CE11 - ■ ■ R1	P01	
	21	113	40.80	15 000	15 000	15 000	1.8	17	2KJ3804 - ■ CE11 - ■ ■ Q1	P01	
	23	103	37.09	15 000	15 000	15 000	1.9	17	2KJ3804 - ■ CE11 - ■ ■ P1	P01	
	BH.39-LA71MG4										
	22	106	60.21	15 000	15 000	15 000	1.9	15	2KJ3804 - ■ CD11 - ■ ■ T1		
	26	92	52.26	15 000	15 000	15 000	2.2	15	2KJ3804 - ■ CD11 - ■ ■ S1		
	29	82	46.47	15 000	15 000	15 000	2.4	15	2KJ3804 - ■ CD11 - ■ ■ R1		
	BH.29-LA71MH6										
	22	107	38.68	7 500	7 500	7 500	0.84	12	2KJ3803 - ■ CE11 - ■ ■ P1	P01	
	24	98	35.16	7 500	7 500	7 500	0.92	12	2KJ3803 - ■ CE11 - ■ ■ N1	P01	
	BH.29-LA71MG4										
	27	89	50.26	7 500	7 500	7 500	1.0	10	2KJ3803 - ■ CD11 - ■ ■ R1		
	30	79	44.58	7 280	7 480	7 500	1.1	10	2KJ3803 - ■ CD11 - ■ ■ Q1		
	35	68	38.68	7 000	7 170	7 210	1.3	10	2KJ3803 - ■ CD11 - ■ ■ P1		
	38	62	35.16	6 810	6 960	7 000	1.4	10	2KJ3803 - ■ CD11 - ■ ■ N1		
	45	53	30.16	6 510	6 640	6 680	1.7	10	2KJ3803 - ■ CD11 - ■ ■ M1		
	49	48	27.41	6 330	6 450	6 480	1.9	10	2KJ3803 - ■ CD11 - ■ ■ L1		
	56	42	24.04	6 080	6 190	6 220	2.1	10	2KJ3803 - ■ CD11 - ■ ■ K1		
	63	38	21.45	5 880	5 970	6 000	2.4	10	2KJ3803 - ■ CD11 - ■ ■ J1		
	71	34	19.12	5 670	5 760	5 780	2.7	10	2KJ3803 - ■ CD11 - ■ ■ H1		
76	31	17.65	5 540	5 610	5 640	2.9	10	2KJ3803 - ■ CD11 - ■ ■ G1			
87	27	15.45	5 320	5 380	5 400	3.2	10	2KJ3803 - ■ CD11 - ■ ■ F1			
100	24	13.55	5 100	5 160	5 180	3.5	10	2KJ3803 - ■ CD11 - ■ ■ E1			
110	22	12.29	4 950	5 000	5 020	3.7	10	2KJ3803 - ■ CD11 - ■ ■ D1			
117	20	11.57	4 860	4 910	4 920	3.9	10	2KJ3803 - ■ CD11 - ■ ■ C1			
132	18	10.20	4 670	4 710	4 720	4.2	10	2KJ3803 - ■ CD11 - ■ ■ B1			
153	16	8.85	4 460	4 500	4 510	4.6	10	2KJ3803 - ■ CD11 - ■ ■ A1			
0.37	BH.39-LA71MH4										
	23	155	60.21	15 000	15 000	15 000	1.3	17	2KJ3804 - ■ CE11 - ■ ■ T1		
	26	135	52.26	15 000	15 000	15 000	1.5	17	2KJ3804 - ■ CE11 - ■ ■ S1		
	29	120	46.47	15 000	15 000	15 000	1.7	17	2KJ3804 - ■ CE11 - ■ ■ R1		
	34	105	40.80	15 000	15 000	15 000	1.9	17	2KJ3804 - ■ CE11 - ■ ■ Q1		

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

→ page 5/5

→ page 6/2

→ page 5/5

¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles	
0.37	BH.39-LA71MH4										
	37	96	37.09	15 000	15 000	15 000	2.1	17	2KJ3804 - ■ CE11 - ■ ■ P1		
	43	82	31.73	15 000	15 000	15 000	2.4	17	2KJ3804 - ■ CE11 - ■ ■ N1		
	47	74	28.85	15 000	15 000	15 000	2.7	17	2KJ3804 - ■ CE11 - ■ ■ M1		
	BH.29-LA71MH4										
	35	100	38.68	6 740	6 980	7 040	0.90	12	2KJ3803 - ■ CE11 - ■ ■ P1		
	39	91	35.16	6 570	6 790	6 850	0.99	12	2KJ3803 - ■ CE11 - ■ ■ N1		
	45	78	30.16	6 300	6 490	6 540	1.2	12	2KJ3803 - ■ CE11 - ■ ■ M1		
	50	71	27.41	6 130	6 310	6 350	1.3	12	2KJ3803 - ■ CE11 - ■ ■ L1		
	57	62	24.04	5 910	6 070	6 110	1.5	12	2KJ3803 - ■ CE11 - ■ ■ K1		
	64	55	21.45	5 730	5 860	5 900	1.6	12	2KJ3803 - ■ CE11 - ■ ■ J1		
	72	49	19.12	5 540	5 660	5 690	1.8	12	2KJ3803 - ■ CE11 - ■ ■ H1		
	78	46	17.65	5 400	5 520	5 550	2.0	12	2KJ3803 - ■ CE11 - ■ ■ G1		
	89	40	15.45	5 200	5 300	5 320	2.2	12	2KJ3803 - ■ CE11 - ■ ■ F1		
	101	35	13.55	5 000	5 080	5 110	2.4	12	2KJ3803 - ■ CE11 - ■ ■ E1		
	111	32	12.29	4 850	4 930	4 950	2.6	12	2KJ3803 - ■ CE11 - ■ ■ D1		
	118	30	11.57	4 760	4 840	4 860	2.6	12	2KJ3803 - ■ CE11 - ■ ■ C1		
	134	26	10.20	4 590	4 650	4 670	2.9	12	2KJ3803 - ■ CE11 - ■ ■ B1		
	155	23	8.85	4 390	4 440	4 460	3.2	12	2KJ3803 - ■ CE11 - ■ ■ A1		
0.55	BH.39-LA71ZML4										
	23	231	60.21	15 000	15 000	15 000	0.90	17	2KJ3804 - ■ CH11 - ■ ■ T1		
	26	200	52.26	15 000	15 000	15 000	1.0	17	2KJ3804 - ■ CH11 - ■ ■ S1		
	29	178	46.47	15 000	15 000	15 000	1.1	17	2KJ3804 - ■ CH11 - ■ ■ R1		
	34	156	40.80	15 000	15 000	15 000	1.3	17	2KJ3804 - ■ CH11 - ■ ■ Q1		
	37	142	37.09	15 000	15 000	15 000	1.4	17	2KJ3804 - ■ CH11 - ■ ■ P1		
	43	122	31.73	15 000	15 000	15 000	1.6	17	2KJ3804 - ■ CH11 - ■ ■ N1		
	47	111	28.85	15 000	15 000	15 000	1.8	17	2KJ3804 - ■ CH11 - ■ ■ M1		
	54	98	25.50	15 000	15 000	15 000	2.0	17	2KJ3804 - ■ CH11 - ■ ■ L1		
	59	89	23.18	15 000	15 000	15 000	2.3	17	2KJ3804 - ■ CH11 - ■ ■ K1		
	67	78	20.31	14 800	15 000	15 000	2.6	17	2KJ3804 - ■ CH11 - ■ ■ J1		
	73	72	18.74	14 500	14 700	14 700	2.8	17	2KJ3804 - ■ CH11 - ■ ■ H1		
	83	64	16.60	14 000	14 200	14 200	3.1	17	2KJ3804 - ■ CH11 - ■ ■ G1		
		BH.39-LE80MB4									
		31	170	46.47	15 000	15 000	15 000	1.2	19	2KJ3804 - ■ DB21 - ■ ■ R1	
		35	149	40.80	15 000	15 000	15 000	1.3	19	2KJ3804 - ■ DB21 - ■ ■ Q1	
		39	135	37.09	15 000	15 000	15 000	1.5	19	2KJ3804 - ■ DB21 - ■ ■ P1	
		45	116	31.73	15 000	15 000	15 000	1.7	19	2KJ3804 - ■ DB21 - ■ ■ N1	
		50	105	28.85	15 000	15 000	15 000	1.9	19	2KJ3804 - ■ DB21 - ■ ■ M1	
		56	93	25.50	15 000	15 000	15 000	2.2	19	2KJ3804 - ■ DB21 - ■ ■ L1	
	62	85	23.18	15 000	15 000	15 000	2.4	19	2KJ3804 - ■ DB21 - ■ ■ K1		
	71	74	20.31	14 600	14 800	14 900	2.7	19	2KJ3804 - ■ DB21 - ■ ■ J1		

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

1) Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

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Electric-monorail geared motors

Light-load applications

Geared motors up to 3 kW

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
0.55	BH.39-LE80MB4									
		77	68	18.74	14 300	14 500	14 500	2.9	19	2KJ3804 - ■ DB21 - ■ ■ H1
		87	60	16.60	13 800	14 000	14 000	3.3	19	2KJ3804 - ■ DB21 - ■ ■ G1
	BH.29-LA71ZML4									
		50	105	27.41	5 900	6 150	6 210	0.86	12	2KJ3803 - ■ CH11 - ■ ■ L1
		57	92	24.04	5 700	5 930	5 980	0.98	12	2KJ3803 - ■ CH11 - ■ ■ K1
		64	82	21.45	5 540	5 740	5 790	1.1	12	2KJ3803 - ■ CH11 - ■ ■ J1
		72	73	19.12	5 370	5 550	5 590	1.2	12	2KJ3803 - ■ CH11 - ■ ■ H1
		78	68	17.65	5 250	5 420	5 460	1.3	12	2KJ3803 - ■ CH11 - ■ ■ G1
		89	59	15.45	5 060	5 210	5 250	1.5	12	2KJ3803 - ■ CH11 - ■ ■ F1
		101	52	13.55	4 880	5 010	5 040	1.6	12	2KJ3803 - ■ CH11 - ■ ■ E1
		111	47	12.29	4 750	4 860	4 890	1.7	12	2KJ3803 - ■ CH11 - ■ ■ D1
		118	44	11.57	4 660	4 770	4 800	1.8	12	2KJ3803 - ■ CH11 - ■ ■ C1
		134	39	10.20	4 500	4 590	4 620	1.9	12	2KJ3803 - ■ CH11 - ■ ■ B1
		155	34	8.85	4 310	4 390	4 420	2.1	12	2KJ3803 - ■ CH11 - ■ ■ A1
	BH.29-LE80MB4									
		48	110	30.16	5 960	6 230	6 290	0.82	14	2KJ3803 - ■ DB21 - ■ ■ M1
		53	100	27.41	5 820	6 070	6 120	0.90	14	2KJ3803 - ■ DB21 - ■ ■ L1
		60	88	24.04	5 630	5 840	5 890	1.0	14	2KJ3803 - ■ DB21 - ■ ■ K1
	67	78	21.45	5 460	5 660	5 700	1.2	14	2KJ3803 - ■ DB21 - ■ ■ J1	
	75	70	19.12	5 290	5 470	5 510	1.3	14	2KJ3803 - ■ DB21 - ■ ■ H1	
	82	64	17.65	5 180	5 340	5 380	1.4	14	2KJ3803 - ■ DB21 - ■ ■ G1	
	93	56	15.45	4 990	5 130	5 170	1.6	14	2KJ3803 - ■ DB21 - ■ ■ F1	
	106	49	13.55	4 810	4 930	4 970	1.7	14	2KJ3803 - ■ DB21 - ■ ■ E1	
	117	45	12.29	4 680	4 790	4 820	1.8	14	2KJ3803 - ■ DB21 - ■ ■ D1	
	124	42	11.57	4 600	4 700	4 730	1.9	14	2KJ3803 - ■ DB21 - ■ ■ C1	
	141	37	10.20	4 430	4 520	4 550	2.0	14	2KJ3803 - ■ DB21 - ■ ■ B1	
	163	32	8.85	4 250	4 330	4 350	2.2	14	2KJ3803 - ■ DB21 - ■ ■ A1	
0.75	BH.39-LE80MH4E									
		31	230	46.47	14 800	15 000	15 000	0.87	21	2KJ3804 - ■ DE22 - ■ ■ R1
		35	200	40.80	15 000	15 000	15 000	0.99	21	2KJ3804 - ■ DE22 - ■ ■ Q1
		39	184	37.09	15 000	15 000	15 000	1.1	21	2KJ3804 - ■ DE22 - ■ ■ P1
		45	158	31.73	15 000	15 000	15 000	1.3	21	2KJ3804 - ■ DE22 - ■ ■ N1
		50	143	28.85	15 000	15 000	15 000	1.4	21	2KJ3804 - ■ DE22 - ■ ■ M1
		56	127	25.50	15 000	15 000	15 000	1.6	21	2KJ3804 - ■ DE22 - ■ ■ L1
		62	115	23.18	15 000	15 000	15 000	1.7	21	2KJ3804 - ■ DE22 - ■ ■ K1
		71	101	20.31	14 500	14 700	14 800	2.0	21	2KJ3804 - ■ DE22 - ■ ■ J1
		77	93	18.74	14 100	14 400	14 400	2.1	21	2KJ3804 - ■ DE22 - ■ ■ H1
		87	83	16.60	13 700	13 900	13 900	2.4	21	2KJ3804 - ■ DE22 - ■ ■ G1
		104	69	13.81	13 000	13 200	13 200	2.9	21	2KJ3804 - ■ DE22 - ■ ■ F1
		111	65	13.00	12 800	13 000	13 000	3.1	21	2KJ3804 - ■ DE22 - ■ ■ E1
	124	58	11.65	12 400	12 600	12 600	3.5	21	2KJ3804 - ■ DE22 - ■ ■ D1	

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

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Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles		
0.75	BH.29-LE80MH4E											
	67	107	21.45	5 260	5 520	5 580	0.84	16	2KJ3803 - ■ DE22 - ■ ■ J1			
	75	95	19.12	5 120	5 350	5 400	0.95	16	2KJ3803 - ■ DE22 - ■ ■ H1			
	82	88	17.65	5 020	5 230	5 280	1.0	16	2KJ3803 - ■ DE22 - ■ ■ G1			
	93	77	15.45	4 850	5 040	5 080	1.1	16	2KJ3803 - ■ DE22 - ■ ■ F1			
	106	67	13.55	4 690	4 850	4 890	1.2	16	2KJ3803 - ■ DE22 - ■ ■ E1			
	117	61	12.29	4 560	4 710	4 750	1.3	16	2KJ3803 - ■ DE22 - ■ ■ D1			
	124	58	11.57	4 490	4 630	4 660	1.4	16	2KJ3803 - ■ DE22 - ■ ■ C1			
	141	51	10.20	4 330	4 460	4 490	1.5	16	2KJ3803 - ■ DE22 - ■ ■ B1			
	163	44	8.85	4 160	4 270	4 300	1.6	16	2KJ3803 - ■ DE22 - ■ ■ A1			
1.1	BH.39-LE90SG4E											
	45	230	31.73	14 800	15 000	15 000	0.86	23	2KJ3804 - ■ EK22 - ■ ■ N1			
	49	210	28.85	14 900	15 000	15 000	0.94	23	2KJ3804 - ■ EK22 - ■ ■ M1			
	56	188	25.50	15 000	15 000	15 000	1.1	23	2KJ3804 - ■ EK22 - ■ ■ L1			
	61	171	23.18	14 600	15 000	15 000	1.2	23	2KJ3804 - ■ EK22 - ■ ■ K1			
	70	150	20.31	14 200	14 500	14 600	1.3	23	2KJ3804 - ■ EK22 - ■ ■ J1			
	76	138	18.74	13 900	14 200	14 300	1.4	23	2KJ3804 - ■ EK22 - ■ ■ H1			
	86	122	16.60	13 500	13 700	13 800	1.6	23	2KJ3804 - ■ EK22 - ■ ■ G1			
	103	102	13.81	12 800	13 100	13 100	2.0	23	2KJ3804 - ■ EK22 - ■ ■ F1			
	110	96	13.00	12 600	12 800	12 900	2.1	23	2KJ3804 - ■ EK22 - ■ ■ E1			
	122	86	11.65	12 300	12 500	12 500	2.3	23	2KJ3804 - ■ EK22 - ■ ■ D1			
	144	73	9.92	11 700	11 900	12 000	2.7	23	2KJ3804 - ■ EK22 - ■ ■ C1			
	168	63	8.50	11 300	11 400	11 400	3.2	23	2KJ3804 - ■ EK22 - ■ ■ B1			
	195	54	7.32	10 800	10 900	11 000	3.7	23	2KJ3804 - ■ EK22 - ■ ■ A1			
	BH.29-LE90SG4E											
	105	100	13.55	4 470	4 720	4 770	0.84	18	2KJ3803 - ■ EK22 - ■ ■ E1			
	116	91	12.29	4 370	4 590	4 640	0.89	18	2KJ3803 - ■ EK22 - ■ ■ D1			
	123	85	11.57	4 310	4 520	4 570	0.93	18	2KJ3803 - ■ EK22 - ■ ■ C1			
	140	75	10.20	4 180	4 360	4 410	1.0	18	2KJ3803 - ■ EK22 - ■ ■ B1			
	161	65	8.85	4 030	4 190	4 230	1.1	18	2KJ3803 - ■ EK22 - ■ ■ A1			
1.5	BH.39-LE90LH4E											
	62	230	23.18	14 200	14 700	14 800	0.86	26	2KJ3804 - ■ EM22 - ■ ■ K1			
	71	200	20.31	13 800	14 200	14 400	0.99	26	2KJ3804 - ■ EM22 - ■ ■ J1			
	77	187	18.74	13 500	13 900	14 000	1.1	26	2KJ3804 - ■ EM22 - ■ ■ H1			
	86	166	16.60	13 100	13 500	13 600	1.2	26	2KJ3804 - ■ EM22 - ■ ■ G1			
	104	138	13.81	12 600	12 900	13 000	1.5	26	2KJ3804 - ■ EM22 - ■ ■ F1			
	110	130	13.00	12 400	12 700	12 700	1.5	26	2KJ3804 - ■ EM22 - ■ ■ E1			
	123	116	11.65	12 000	12 300	12 400	1.7	26	2KJ3804 - ■ EM22 - ■ ■ D1			
	145	99	9.92	11 500	11 800	11 800	2.0	26	2KJ3804 - ■ EM22 - ■ ■ C1			
	169	85	8.50	11 100	11 300	11 300	2.4	26	2KJ3804 - ■ EM22 - ■ ■ B1			
	196	73	7.32	10 600	10 800	10 900	2.7	26	2KJ3804 - ■ EM22 - ■ ■ A1			

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

1) Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

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Electric-monorail geared motors

Light-load applications

Geared motors up to 3 kW

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
1.5	BH.29-LE90LH4E									
	162	88	8.85	3 860	4 080	4 120	0.81	21	2KJ3803 - ■ EM22 - ■ ■ A1	
2.2	BH.39-LE100LE4E									
	88	240	16.60	12 600	13 100	13 200	0.83	32	2KJ3804 - ■ FL22 - ■ ■ G1	
	105	199	13.81	12 100	12 500	12 600	1.0	32	2KJ3804 - ■ FL22 - ■ ■ F1	
	112	188	13.00	11 900	12 300	12 400	1.1	32	2KJ3804 - ■ FL22 - ■ ■ E1	
	125	168	11.65	11 600	12 000	12 100	1.2	32	2KJ3804 - ■ FL22 - ■ ■ D1	
	147	143	9.92	11 200	11 500	11 600	1.4	32	2KJ3804 - ■ FL22 - ■ ■ C1	
	171	123	8.50	10 800	11 100	11 100	1.6	32	2KJ3804 - ■ FL22 - ■ ■ B1	
	199	106	7.32	10 400	10 600	10 700	1.9	32	2KJ3804 - ■ FL22 - ■ ■ A1	
3	BH.39-LE100LK4E									
	125	225	11.65	11 200	11 700	11 800	0.87	36	2KJ3804 - ■ FM22 - ■ ■ D1	
	147	195	9.92	10 800	11 300	11 400	1.0	36	2KJ3804 - ■ FM22 - ■ ■ C1	
	171	167	8.50	10 500	10 900	10 900	1.2	36	2KJ3804 - ■ FM22 - ■ ■ B1	
	199	144	7.32	10 100	10 400	10 500	1.4	36	2KJ3804 - ■ FM22 - ■ ■ A1	

Article No. supplement

Shaft design

1, 2 or 9

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Frequency and voltage

2 or 9

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Gearbox mounting type

A or H

→ page 5/5

¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Heavy-load applications

Geared motors up to 7.5 kW

Selection and ordering data

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles	
0.25	KH.49-LA71MG4										
	11	215	121.6	18 500	18 500	18 500	2	22	2KJ3806 - ■ CD11 - ■ ■ W1		
	12	196	110.55	18 500	18 500	18 500	2.1	22	2KJ3806 - ■ CD11 - ■ ■ V1		
0.37	KH.69-LA71MH4										
	11	315	123.29	25 000	25 000	25 000	1.9	46	2KJ3807 - ■ CE11 - ■ ■ W1		
	12	285	110.55	25 000	25 000	25 000	2.1	46	2KJ3807 - ■ CE11 - ■ ■ V1		
	KH.49-LA71MH4										
	11	310	121.6	18 500	18 500	18 500	1.3	23	2KJ3806 - ■ CE11 - ■ ■ W1		
	12	285	110.55	18 500	18 500	18 500	1.5	23	2KJ3806 - ■ CE11 - ■ ■ V1		
	14	250	97.71	18 500	18 500	18 500	1.7	23	2KJ3806 - ■ CE11 - ■ ■ U1		
	15	225	88.83	18 500	18 500	18 500	1.8	23	2KJ3806 - ■ CE11 - ■ ■ T1		
	18	200	77.81	18 500	18 500	18 500	2.1	23	2KJ3806 - ■ CE11 - ■ ■ S1		
	19	185	71.82	18 500	18 500	18 500	2.3	23	2KJ3806 - ■ CE11 - ■ ■ R1		
	0.55	KH.79-LA71ZML4									
		10	525	137.35	40 000	40 000	40 000	1.6	53	2KJ3808 - ■ CH11 - ■ ■ W1	
11		475	123.8	40 000	40 000	40 000	1.7	53	2KJ3808 - ■ CH11 - ■ ■ V1		
12		435	114.28	40 000	40 000	40 000	1.9	53	2KJ3808 - ■ CH11 - ■ ■ U1		
13		400	104.32	40 000	40 000	40 000	2.1	53	2KJ3808 - ■ CH11 - ■ ■ T1		
KH.79-LE80MB4											
10		500	137.35	40 000	40 000	40 000	1.6	55	2KJ3808 - ■ DB21 - ■ ■ W1		
12		450	123.8	40 000	40 000	40 000	1.8	55	2KJ3808 - ■ DB21 - ■ ■ V1		
13		415	114.28	40 000	40 000	40 000	2	55	2KJ3808 - ■ DB21 - ■ ■ U1		
14		380	104.32	40 000	40 000	40 000	2.2	55	2KJ3808 - ■ DB21 - ■ ■ T1		
KH.69-LA71ZML4											
11		470	123.29	25 000	25 000	25 000	1.3	46	2KJ3807 - ■ CH11 - ■ ■ W1		
12		420	110.55	25 000	25 000	25 000	1.4	46	2KJ3807 - ■ CH11 - ■ ■ V1		
14		380	99.64	25 000	25 000	25 000	1.6	46	2KJ3807 - ■ CH11 - ■ ■ U1		
15		350	91.98	25 000	25 000	25 000	1.7	46	2KJ3807 - ■ CH11 - ■ ■ T1		
16		320	83.96	25 000	25 000	25 000	1.9	46	2KJ3807 - ■ CH11 - ■ ■ S1		
20		265	69.67	25 000	25 000	25 000	2.2	46	2KJ3807 - ■ CH11 - ■ ■ R1		
21		250	65.57	25 000	25 000	25 000	2.4	46	2KJ3807 - ■ CH11 - ■ ■ Q1		
KH.69-LE80MB4											
10		500	138.18	25 000	25 000	25 000	1.2	48	2KJ3807 - ■ DB21 - ■ ■ X1		
12		450	123.29	25 000	25 000	25 000	1.3	48	2KJ3807 - ■ DB21 - ■ ■ W1		
13	400	110.55	25 000	25 000	25 000	1.5	48	2KJ3807 - ■ DB21 - ■ ■ V1			
14	360	99.64	25 000	25 000	25 000	1.7	48	2KJ3807 - ■ DB21 - ■ ■ U1			
16	335	91.98	25 000	25 000	25 000	1.8	48	2KJ3807 - ■ DB21 - ■ ■ T1			
17	305	83.96	25 000	25 000	25 000	2	48	2KJ3807 - ■ DB21 - ■ ■ S1			
21	250	69.67	25 000	25 000	25 000	2.4	48	2KJ3807 - ■ DB21 - ■ ■ R1			
KH.49-LA71ZML4											
11	465	121.6	18 500	18 500	18 500	0.9	23	2KJ3806 - ■ CH11 - ■ ■ W1			
12	420	110.55	18 500	18 500	18 500	0.99	23	2KJ3806 - ■ CH11 - ■ ■ V1			
14	375	97.71	18 500	18 500	18 500	1.1	23	2KJ3806 - ■ CH11 - ■ ■ U1			
15	340	88.83	18 500	18 500	18 500	1.2	23	2KJ3806 - ■ CH11 - ■ ■ T1			

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Heavy-load applications

Geared motors up to 7.5 kW

Selection and ordering data (continued)

P_{rated}	n_2	T_2	i	$F_{R2}^{1)}$	$F_{R290}^{1)}$	$F_{R2270}^{1)}$	f_B	m	Article No.	Order code	
kW	rpm	Nm	-	N	N	N	-	kg	(Article No. supplement → below)	No. poles	
0.55	KH.49-LA71ZML4										
	18	295	77.81	18 500	18 500	18 500	1.4	23	2KJ3806 - ■ CH11 - ■ ■ S1		
	19	275	71.82	18 500	18 500	18 500	1.5	23	2KJ3806 - ■ CH11 - ■ ■ R1		
	22	240	63.59	18 500	18 500	18 500	1.7	23	2KJ3806 - ■ CH11 - ■ ■ Q1		
	26	200	52.93	18 500	18 500	18 500	2.1	23	2KJ3806 - ■ CH11 - ■ ■ P1		
	27	191	49.82	18 500	18 500	18 500	2.2	23	2KJ3806 - ■ CH11 - ■ ■ N1		
	31	171	44.63	18 500	18 500	18 500	2.5	23	2KJ3806 - ■ CH11 - ■ ■ M1		
0.55	KH.49-LE80MB4										
	10	515	142.13	17 900	18 300	18 500	0.81	26	2KJ3806 - ■ DB21 - ■ ■ X1		
	12	440	121.6	18 500	18 500	18 500	0.95	26	2KJ3806 - ■ DB21 - ■ ■ W1		
	13	400	110.55	18 500	18 500	18 500	1	26	2KJ3806 - ■ DB21 - ■ ■ V1		
	15	355	97.71	18 500	18 500	18 500	1.2	26	2KJ3806 - ■ DB21 - ■ ■ U1		
	16	320	88.83	18 500	18 500	18 500	1.3	26	2KJ3806 - ■ DB21 - ■ ■ T1		
	19	280	77.81	18 500	18 500	18 500	1.5	26	2KJ3806 - ■ DB21 - ■ ■ S1		
	20	260	71.82	18 500	18 500	18 500	1.6	26	2KJ3806 - ■ DB21 - ■ ■ R1		
	23	230	63.59	18 500	18 500	18 500	1.8	26	2KJ3806 - ■ DB21 - ■ ■ Q1		
	27	193	52.93	18 500	18 500	18 500	2.2	26	2KJ3806 - ■ DB21 - ■ ■ P1		
	29	182	49.82	18 500	18 500	18 500	2.3	26	2KJ3806 - ■ DB21 - ■ ■ N1		
	0.75	KH.79-LE80MH4E									
10		680	137.35	39 400	40 000	40 000	1.2	57	2KJ3808 - ■ DE22 - ■ ■ W1		
12		615	123.8	40 000	40 000	40 000	1.3	57	2KJ3808 - ■ DE22 - ■ ■ V1		
13		565	114.28	40 000	40 000	40 000	1.4	57	2KJ3808 - ■ DE22 - ■ ■ U1		
14		515	104.32	40 000	40 000	40 000	1.6	57	2KJ3808 - ■ DE22 - ■ ■ T1		
17		430	86.56	40 000	40 000	40 000	1.9	57	2KJ3808 - ■ DE22 - ■ ■ S1		
18		405	81.47	40 000	40 000	40 000	2	57	2KJ3808 - ■ DE22 - ■ ■ R1		
19		380	76.94	40 000	40 000	40 000	2.1	57	2KJ3808 - ■ DE22 - ■ ■ Q1		
0.75	KH.69-LE80MH4E										
	10	685	138.18	25 000	25 000	25 000	0.87	50	2KJ3807 - ■ DE22 - ■ ■ X1		
	12	610	123.29	25 000	25 000	25 000	0.98	50	2KJ3807 - ■ DE22 - ■ ■ W1		
	13	550	110.55	25 000	25 000	25 000	1.1	50	2KJ3807 - ■ DE22 - ■ ■ V1		
	14	495	99.64	25 000	25 000	25 000	1.2	50	2KJ3807 - ■ DE22 - ■ ■ U1		
	16	455	91.98	25 000	25 000	25 000	1.3	50	2KJ3807 - ■ DE22 - ■ ■ T1		
	17	415	83.96	25 000	25 000	25 000	1.4	50	2KJ3807 - ■ DE22 - ■ ■ S1		
	21	345	69.67	25 000	25 000	25 000	1.7	50	2KJ3807 - ■ DE22 - ■ ■ R1		
	22	325	65.57	25 000	25 000	25 000	1.8	50	2KJ3807 - ■ DE22 - ■ ■ Q1		
	23	305	61.93	25 000	25 000	25 000	1.9	50	2KJ3807 - ■ DE22 - ■ ■ P1		
0.75	KH.49-LE80MH4E										
	15	485	97.71	18 300	18 500	18 500	0.86	28	2KJ3806 - ■ DE22 - ■ ■ U1		
	16	440	88.83	18 500	18 500	18 500	0.95	28	2KJ3806 - ■ DE22 - ■ ■ T1		
	19	385	77.81	18 500	18 500	18 500	1.1	28	2KJ3806 - ■ DE22 - ■ ■ S1		
	20	355	71.82	18 500	18 500	18 500	1.2	28	2KJ3806 - ■ DE22 - ■ ■ R1		
	23	315	63.59	18 500	18 500	18 500	1.3	28	2KJ3806 - ■ DE22 - ■ ■ Q1		
	27	260	52.93	18 500	18 500	18 500	1.6	28	2KJ3806 - ■ DE22 - ■ ■ P1		
	29	245	49.82	18 500	18 500	18 500	1.7	28	2KJ3806 - ■ DE22 - ■ ■ N1		

Article No. supplement

Shaft design

1, 2 or 9

Frequency and voltage

2 or 9

Gearbox mounting type

A or H

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles	
0.75	KH.49-LE80MH4E										
	32	220	44.63	18 500	18 500	18 500	1.9	28	2KJ3806 - ■ DE22 - ■ ■ M1		
	38	189	38	18 500	18 500	18 500	2.2	28	2KJ3806 - ■ DE22 - ■ ■ L1		
	44	162	32.57	18 500	18 500	18 500	2.6	28	2KJ3806 - ■ DE22 - ■ ■ K1		
1.1	KH.79-LE90SG4E										
	10	1010	137.35	31 600	38 000	40 000	0.81	58	2KJ3808 - ■ EK22 - ■ ■ W1		
	12	840	114.28	35 600	40 000	40 000	0.97	58	2KJ3808 - ■ EK22 - ■ ■ V1		
	12	910	123.8	34 000	40 000	40 000	0.9	58	2KJ3808 - ■ EK22 - ■ ■ U1		
	14	765	104.32	37 400	40 000	40 000	1.1	58	2KJ3808 - ■ EK22 - ■ ■ T1		
	16	635	86.56	40 000	40 000	40 000	1.3	58	2KJ3808 - ■ EK22 - ■ ■ S1		
	17	600	81.47	40 000	40 000	40 000	1.4	58	2KJ3808 - ■ EK22 - ■ ■ R1		
	19	565	76.94	40 000	40 000	40 000	1.4	58	2KJ3808 - ■ EK22 - ■ ■ Q1		
	22	480	65.47	40 000	40 000	40 000	1.7	58	2KJ3808 - ■ EK22 - ■ ■ P1		
	25	410	56.08	40 000	40 000	40 000	2	58	2KJ3808 - ■ EK22 - ■ ■ N1		
	29	360	49.31	40 000	40 000	40 000	2.3	58	2KJ3808 - ■ EK22 - ■ ■ M1		
	34	305	41.6	40 000	40 000	40 000	2.6	58	2KJ3808 - ■ EK22 - ■ ■ L1		
	KH.69-LE90SG4E										
	14	735	99.64	24 400	25 000	25 000	0.82	51	2KJ3807 - ■ EK22 - ■ ■ U1		
	15	675	91.98	25 000	25 000	25 000	0.88	51	2KJ3807 - ■ EK22 - ■ ■ T1		
	17	615	83.96	25 000	25 000	25 000	0.97	51	2KJ3807 - ■ EK22 - ■ ■ S1		
	20	510	69.67	25 000	25 000	25 000	1.2	51	2KJ3807 - ■ EK22 - ■ ■ R1		
22	480	65.57	25 000	25 000	25 000	1.2	51	2KJ3807 - ■ EK22 - ■ ■ Q1			
23	455	61.93	25 000	25 000	25 000	1.3	51	2KJ3807 - ■ EK22 - ■ ■ P1			
27	385	52.69	25 000	25 000	25 000	1.5	51	2KJ3807 - ■ EK22 - ■ ■ N1			
32	330	45.14	25 000	25 000	25 000	1.8	51	2KJ3807 - ■ EK22 - ■ ■ M1			
36	290	39.69	25 000	25 000	25 000	2.1	51	2KJ3807 - ■ EK22 - ■ ■ L1			
43	245	33.48	25 000	25 000	25 000	2.3	51	2KJ3807 - ■ EK22 - ■ ■ K1			
49	215	29.18	25 000	25 000	25 000	2.6	51	2KJ3807 - ■ EK22 - ■ ■ J1			
KH.49-LE90SG4E											
22	465	63.59	18 500	18 500	18 500	0.9	28	2KJ3806 - ■ EK22 - ■ ■ Q1			
27	390	52.93	18 500	18 500	18 500	1.1	28	2KJ3806 - ■ EK22 - ■ ■ P1			
29	365	49.82	18 500	18 500	18 500	1.1	28	2KJ3806 - ■ EK22 - ■ ■ N1			
32	325	44.63	18 500	18 500	18 500	1.3	28	2KJ3806 - ■ EK22 - ■ ■ M1			
38	280	38	18 500	18 500	18 500	1.5	28	2KJ3806 - ■ EK22 - ■ ■ L1			
44	240	32.57	18 500	18 500	18 500	1.7	28	2KJ3806 - ■ EK22 - ■ ■ K1			
51	205	28.05	18 500	18 500	18 500	2	28	2KJ3806 - ■ EK22 - ■ ■ J1			
54	194	26.3	18 500	18 500	18 500	2.2	28	2KJ3806 - ■ EK22 - ■ ■ H1			
61	172	23.28	18 500	18 500	18 500	2.4	28	2KJ3806 - ■ EK22 - ■ ■ G1			
74	143	19.38	18 500	18 500	18 500	2.9	28	2KJ3806 - ■ EK22 - ■ ■ F1			
78	134	18.24	18 500	18 500	18 500	3.1	28	2KJ3806 - ■ EK22 - ■ ■ E1			
1.5	KH.79-LE90LH4E										
	17	860	86.56	35 200	40 000	40 000	0.95	61	2KJ3808 - ■ EM22 - ■ ■ S1		
	18	810	81.47	36 400	40 000	40 000	1	61	2KJ3808 - ■ EM22 - ■ ■ R1		
	19	765	76.94	37 400	40 000	40 000	1.1	61	2KJ3808 - ■ EM22 - ■ ■ Q1		
	22	650	65.47	40 000	40 000	40 000	1.3	61	2KJ3808 - ■ EM22 - ■ ■ P1		

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Heavy-load applications

Geared motors up to 7.5 kW

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
1.5										
KH.79-LE90LH4E										
26	560	56.08	40 000	40 000	40 000	40 000	1.5	61	2KJ3808 - ■ EM22 - ■ ■ N1	
29	490	49.31	40 000	40 000	40 000	40 000	1.7	61	2KJ3808 - ■ EM22 - ■ ■ M1	
34	415	41.6	40 000	40 000	40 000	40 000	1.9	61	2KJ3808 - ■ EM22 - ■ ■ L1	
40	360	36.26	40 000	40 000	40 000	40 000	2.1	61	2KJ3808 - ■ EM22 - ■ ■ K1	
44	325	32.78	39 400	40 000	39 600	39 600	2.5	61	2KJ3808 - ■ EM22 - ■ ■ J1	
53	270	27.2	37 400	38 100	37 500	37 500	2.9	61	2KJ3808 - ■ EM22 - ■ ■ H1	
KH.69-LE90LH4E										
21	695	69.67	24 900	25 000	25 000	25 000	0.86	54	2KJ3807 - ■ EM22 - ■ ■ R1	
22	655	65.57	25 000	25 000	25 000	25 000	0.92	54	2KJ3807 - ■ EM22 - ■ ■ Q1	
23	615	61.93	25 000	25 000	25 000	25 000	0.97	54	2KJ3807 - ■ EM22 - ■ ■ P1	
27	525	52.69	25 000	25 000	25 000	25 000	1.1	54	2KJ3807 - ■ EM22 - ■ ■ N1	
32	450	45.14	25 000	25 000	25 000	25 000	1.3	54	2KJ3807 - ■ EM22 - ■ ■ M1	
36	395	39.69	25 000	25 000	25 000	25 000	1.5	54	2KJ3807 - ■ EM22 - ■ ■ L1	
43	330	33.48	25 000	25 000	25 000	25 000	1.7	54	2KJ3807 - ■ EM22 - ■ ■ K1	
49	290	29.18	25 000	25 000	25 000	25 000	1.9	54	2KJ3807 - ■ EM22 - ■ ■ J1	
55	260	26.05	25 000	25 000	25 000	25 000	2.3	54	2KJ3807 - ■ EM22 - ■ ■ H1	
59	245	24.52	25 000	25 000	25 000	25 000	2.4	54	2KJ3807 - ■ EM22 - ■ ■ G1	
62	230	23.15	25 000	25 000	25 000	25 000	2.5	54	2KJ3807 - ■ EM22 - ■ ■ F1	
73	197	19.7	25 000	25 000	25 000	25 000	2.8	54	2KJ3807 - ■ EM22 - ■ ■ E1	
85	169	16.88	25 000	25 000	25 000	25 000	3.1	54	2KJ3807 - ■ EM22 - ■ ■ D1	
97	148	14.84	24 800	25 000	24 900	24 900	3.5	54	2KJ3807 - ■ EM22 - ■ ■ C1	
KH.49-LE90LH4E										
29	495	49.82	18 300	18 500	18 500	18 500	0.84	31	2KJ3806 - ■ EM22 - ■ ■ N1	
32	445	44.63	18 500	18 500	18 500	18 500	0.94	31	2KJ3806 - ■ EM22 - ■ ■ M1	
38	375	38	18 500	18 500	18 500	18 500	1.1	31	2KJ3806 - ■ EM22 - ■ ■ L1	
44	325	32.57	18 500	18 500	18 500	18 500	1.3	31	2KJ3806 - ■ EM22 - ■ ■ K1	
51	280	28.05	18 500	18 500	18 500	18 500	1.5	31	2KJ3806 - ■ EM22 - ■ ■ J1	
55	260	26.3	18 500	18 500	18 500	18 500	1.6	31	2KJ3806 - ■ EM22 - ■ ■ H1	
62	230	23.28	18 500	18 500	18 500	18 500	1.8	31	2KJ3806 - ■ EM22 - ■ ■ G1	
74	193	19.38	18 500	18 500	18 500	18 500	2.2	31	2KJ3806 - ■ EM22 - ■ ■ F1	
79	182	18.24	18 500	18 500	18 500	18 500	2.3	31	2KJ3806 - ■ EM22 - ■ ■ E1	
88	163	16.34	18 500	18 500	18 500	18 500	2.6	31	2KJ3806 - ■ EM22 - ■ ■ D1	
103	139	13.91	17 900	18 300	18 000	18 000	3	31	2KJ3806 - ■ EM22 - ■ ■ C1	
120	119	11.93	17 200	17 500	17 200	17 200	3.5	31	2KJ3806 - ■ EM22 - ■ ■ B1	
2.2										
KH.79-LE100LE4E										
22	945	65.47	33 200	39 300	40 000	40 000	0.87	69	2KJ3808 - ■ FL22 - ■ ■ P1	
26	810	56.08	36 400	40 000	40 000	40 000	1	69	2KJ3808 - ■ FL22 - ■ ■ N1	
30	710	49.31	38 700	40 000	40 000	40 000	1.2	69	2KJ3808 - ■ FL22 - ■ ■ M1	
35	600	41.6	40 000	40 000	40 000	40 000	1.3	69	2KJ3808 - ■ FL22 - ■ ■ L1	
40	520	36.26	39 700	40 000	39 900	39 900	1.5	69	2KJ3808 - ■ FL22 - ■ ■ K1	
44	470	32.78	38 700	39 900	38 900	38 900	1.7	69	2KJ3808 - ■ FL22 - ■ ■ J1	
53	390	27.2	36 800	37 800	37 000	37 000	2	69	2KJ3808 - ■ FL22 - ■ ■ H1	
57	370	25.6	36 200	37 100	36 300	36 300	2.1	69	2KJ3808 - ■ FL22 - ■ ■ G1	
60	345	24.17	35 600	36 500	35 800	35 800	2.2	69	2KJ3808 - ■ FL22 - ■ ■ F1	

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Shaft design

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Gearbox mounting type

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
2.2										
KH.79-LE100LE4E										
71	295	20.57	34 100	34 900	34 200	2.5	69	2KJ3808 - ■ FL22 - ■ ■ E1		
83	250	17.62	32 700	33 300	32 800	2.8	69	2KJ3808 - ■ FL22 - ■ ■ D1		
94	220	15.49	31 500	32 100	31 600	3.1	69	2KJ3808 - ■ FL22 - ■ ■ C1		
111	189	13.07	30 000	30 500	30 100	3.5	69	2KJ3808 - ■ FL22 - ■ ■ B1		
KH.69-LE100LE4E										
32	650	45.14	25 000	25 000	25 000	0.92	62	2KJ3807 - ■ FL22 - ■ ■ M1		
37	570	39.69	25 000	25 000	25 000	1	62	2KJ3807 - ■ FL22 - ■ ■ L1		
43	480	33.48	25 000	25 000	25 000	1.2	62	2KJ3807 - ■ FL22 - ■ ■ K1		
50	420	29.18	25 000	25 000	25 000	1.3	62	2KJ3807 - ■ FL22 - ■ ■ J1		
56	375	26.05	25 000	25 000	25 000	1.6	62	2KJ3807 - ■ FL22 - ■ ■ H1		
59	350	24.52	25 000	25 000	25 000	1.7	62	2KJ3807 - ■ FL22 - ■ ■ G1		
63	330	23.15	25 000	25 000	25 000	1.8	62	2KJ3807 - ■ FL22 - ■ ■ F1		
74	280	19.7	25 000	25 000	25 000	2	62	2KJ3807 - ■ FL22 - ■ ■ E1		
86	240	16.88	25 000	25 000	25 000	2.2	62	2KJ3807 - ■ FL22 - ■ ■ D1		
98	210	14.84	24 400	25 000	24 500	2.4	62	2KJ3807 - ■ FL22 - ■ ■ C1		
116	181	12.52	23 300	23 800	23 400	2.7	62	2KJ3807 - ■ FL22 - ■ ■ B1		
133	158	10.91	22 400	22 900	22 500	3	62	2KJ3807 - ■ FL22 - ■ ■ A1		
KH.49-LE100LE4E										
45	470	32.57	18 500	18 500	18 500	0.89	40	2KJ3806 - ■ FL22 - ■ ■ K1		
52	405	28.05	18 500	18 500	18 500	1	40	2KJ3806 - ■ FL22 - ■ ■ J1		
55	380	26.3	18 500	18 500	18 500	1.1	40	2KJ3806 - ■ FL22 - ■ ■ H1		
62	335	23.28	18 500	18 500	18 500	1.2	40	2KJ3806 - ■ FL22 - ■ ■ G1		
75	280	19.38	18 500	18 500	18 500	1.5	40	2KJ3806 - ■ FL22 - ■ ■ F1		
80	260	18.24	18 500	18 500	18 500	1.6	40	2KJ3806 - ■ FL22 - ■ ■ E1		
89	235	16.34	18 200	18 500	18 300	1.8	40	2KJ3806 - ■ FL22 - ■ ■ D1		
105	200	13.91	17 500	18 100	17 600	2.1	40	2KJ3806 - ■ FL22 - ■ ■ C1		
122	172	11.93	16 800	17 300	16 900	2.4	40	2KJ3806 - ■ FL22 - ■ ■ B1		
142	148	10.27	16 200	16 600	16 200	2.8	40	2KJ3806 - ■ FL22 - ■ ■ A1		
3										
KH.79-LE100LK4E										
30	970	49.31	32 600	38 800	40 000	0.84	73	2KJ3808 - ■ FM22 - ■ ■ M1		
35	815	41.6	36 200	40 000	40 000	0.98	73	2KJ3808 - ■ FM22 - ■ ■ L1		
40	710	36.26	38 700	40 000	39 300	1.1	73	2KJ3808 - ■ FM22 - ■ ■ K1		
44	645	32.78	38 000	39 600	38 200	1.3	73	2KJ3808 - ■ FM22 - ■ ■ J1		
53	535	27.2	36 200	37 600	36 400	1.5	73	2KJ3808 - ■ FM22 - ■ ■ H1		
57	500	25.6	35 600	36 900	35 900	1.6	73	2KJ3808 - ■ FM22 - ■ ■ G1		
60	475	24.17	35 100	36 300	35 300	1.6	73	2KJ3808 - ■ FM22 - ■ ■ F1		
71	405	20.57	33 600	34 700	33 800	1.8	73	2KJ3808 - ■ FM22 - ■ ■ E1		
83	345	17.62	32 300	33 200	32 400	2.1	73	2KJ3808 - ■ FM22 - ■ ■ D1		
94	305	15.49	31 200	32 000	31 300	2.3	73	2KJ3808 - ■ FM22 - ■ ■ C1		
111	255	13.07	29 700	30 400	29 900	2.6	73	2KJ3808 - ■ FM22 - ■ ■ B1		
128	220	11.39	28 600	29 200	28 700	2.9	73	2KJ3808 - ■ FM22 - ■ ■ A1		
KH.69-LE100LK4E										
43	655	33.48	25 000	25 000	25 000	0.88	66	2KJ3807 - ■ FM22 - ■ ■ K1		
50	575	29.18	25 000	25 000	25 000	0.97	66	2KJ3807 - ■ FM22 - ■ ■ J1		

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Heavy-load applications

Geared motors up to 7.5 kW

Selection and ordering data (continued)

P_{rated} kW	n_2 rpm	T_2 Nm	i -	$F_{R2}^{1)}$ N	$F_{R290}^{1)}$ N	$F_{R2270}^{1)}$ N	f_B -	m kg	Article No. (Article No. supplement → below)	Order code No. poles
3										
KH.69-LE100LK4E										
	56	510	26.05	25 000	25 000	25 000	1.2	66	2KJ3807 - ■ FM22 - ■ ■ H1	
	59	480	24.52	25 000	25 000	25 000	1.2	66	2KJ3807 - ■ FM22 - ■ ■ G1	
	63	455	23.15	25 000	25 000	25 000	1.3	66	2KJ3807 - ■ FM22 - ■ ■ F1	
	74	385	19.7	25 000	25 000	25 000	1.4	66	2KJ3807 - ■ FM22 - ■ ■ E1	
	86	330	16.88	24 900	25 000	25 000	1.6	66	2KJ3807 - ■ FM22 - ■ ■ D1	
	98	290	14.84	24 100	24 900	24 200	1.8	66	2KJ3807 - ■ FM22 - ■ ■ C1	
	116	245	12.52	23 000	23 700	23 100	2	66	2KJ3807 - ■ FM22 - ■ ■ B1	
	133	215	10.91	22 200	22 800	22 300	2.2	66	2KJ3807 - ■ FM22 - ■ ■ A1	
KH.49-LE100LK4E										
	55	515	26.3	17 900	18 300	18 500	0.81	44	2KJ3806 - ■ FM22 - ■ ■ H1	
	62	455	23.28	18 500	18 500	18 500	0.92	44	2KJ3806 - ■ FM22 - ■ ■ G1	
	75	380	19.38	18 500	18 500	18 500	1.1	44	2KJ3806 - ■ FM22 - ■ ■ F1	
	80	355	18.24	18 300	18 500	18 400	1.2	44	2KJ3806 - ■ FM22 - ■ ■ E1	
	89	320	16.34	17 800	18 500	17 900	1.3	44	2KJ3806 - ■ FM22 - ■ ■ D1	
	105	270	13.91	17 100	18 000	17 200	1.5	44	2KJ3806 - ■ FM22 - ■ ■ C1	
	122	235	11.93	16 500	17 200	16 600	1.8	44	2KJ3806 - ■ FM22 - ■ ■ B1	
	142	200	10.27	15 900	16 500	16 000	2.1	44	2KJ3806 - ■ FM22 - ■ ■ A1	
4										
KH.79-LE112ME4E										
	40	945	36.26	33 200	39 300	38 400	0.81	74	2KJ3808 - ■ GH22 - ■ ■ K1	
	45	855	32.78	35 300	39 300	37 400	0.96	74	2KJ3808 - ■ GH22 - ■ ■ J1	
	54	710	27.2	35 400	37 300	35 800	1.1	74	2KJ3808 - ■ GH22 - ■ ■ H1	
	57	670	25.6	34 900	36 700	35 200	1.2	74	2KJ3808 - ■ GH22 - ■ ■ G1	
	60	630	24.17	34 400	36 100	34 700	1.2	74	2KJ3808 - ■ GH22 - ■ ■ F1	
	71	535	20.57	33 100	34 500	33 300	1.4	74	2KJ3808 - ■ GH22 - ■ ■ E1	
	83	460	17.62	31 800	33 000	32 000	1.6	74	2KJ3808 - ■ GH22 - ■ ■ D1	
	94	405	15.49	30 700	31 800	30 900	1.7	74	2KJ3808 - ■ GH22 - ■ ■ C1	
	112	340	13.07	29 400	30 300	29 500	1.9	74	2KJ3808 - ■ GH22 - ■ ■ B1	
	128	295	11.39	28 300	29 100	28 400	2.2	74	2KJ3808 - ■ GH22 - ■ ■ A1	
KH.69-LE112ME4E										
	56	680	26.05	25 000	25 000	25 000	0.88	67	2KJ3807 - ■ GH22 - ■ ■ H1	
	60	640	24.52	25 000	25 000	25 000	0.93	67	2KJ3807 - ■ GH22 - ■ ■ G1	
	63	605	23.15	25 000	25 000	25 000	0.97	67	2KJ3807 - ■ GH22 - ■ ■ F1	
	74	515	19.7	25 000	25 000	25 000	1.1	67	2KJ3807 - ■ GH22 - ■ ■ E1	
	86	440	16.88	24 400	25 000	24 600	1.2	67	2KJ3807 - ■ GH22 - ■ ■ D1	
	98	385	14.84	23 600	24 700	23 800	1.3	67	2KJ3807 - ■ GH22 - ■ ■ C1	
	117	325	12.52	22 600	23 600	22 800	1.5	67	2KJ3807 - ■ GH22 - ■ ■ B1	
	134	285	10.91	21 800	22 600	22 000	1.6	67	2KJ3807 - ■ GH22 - ■ ■ A1	
KH.49-LE112ME4E										
	75	505	19.38	17 800	18 400	18 000	0.83	45	2KJ3806 - ■ GH22 - ■ ■ F1	
	80	475	18.24	17 600	18 500	17 800	0.88	45	2KJ3806 - ■ GH22 - ■ ■ E1	
	89	425	16.34	17 200	18 500	17 400	0.98	45	2KJ3806 - ■ GH22 - ■ ■ D1	
	105	360	13.91	16 600	17 700	16 800	1.2	45	2KJ3806 - ■ GH22 - ■ ■ C1	
	122	310	11.93	16 100	17 000	16 200	1.3	45	2KJ3806 - ■ GH22 - ■ ■ B1	
	142	265	10.27	15 500	16 300	15 600	1.5	45	2KJ3806 - ■ GH22 - ■ ■ A1	

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¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Heavy-load applications

Geared motors up to 7.5 kW

Selection and ordering data (continued)

P_{rated}	n_2	T_2	i	$F_{R2}^{1)}$	$F_{R290}^{1)}$	$F_{R2270}^{1)}$	f_B	m	Article No.	Order code
kW	rpm	Nm	-	N	N	N	-	kg	(Article No. supplement → below)	No. poles
5.5	KH.79-LE132SF4E									
	54	975	27.2	32 500	36 600	34 700	0.82	87	2KJ3808 - ■ HG22 - ■ ■ H1	
	57	915	25.6	33 900	36 200	34 300	0.86	87	2KJ3808 - ■ HG22 - ■ ■ G1	
	61	865	24.17	33 400	35 700	33 800	0.89	87	2KJ3808 - ■ HG22 - ■ ■ F1	
	71	735	20.57	32 200	34 100	32 500	1	87	2KJ3808 - ■ HG22 - ■ ■ E1	
	83	630	17.62	31 000	32 700	31 300	1.1	87	2KJ3808 - ■ HG22 - ■ ■ D1	
	95	555	15.49	30 100	31 500	30 300	1.3	87	2KJ3808 - ■ HG22 - ■ ■ C1	
	112	465	13.07	28 800	30 000	29 000	1.4	87	2KJ3808 - ■ HG22 - ■ ■ B1	
	129	405	11.39	27 800	28 900	28 000	1.6	87	2KJ3808 - ■ HG22 - ■ ■ A1	
	KH.69-LE132SF4E									
	87	605	16.88	23 600	25 000	23 900	0.88	80	2KJ3807 - ■ HG22 - ■ ■ D1	
	99	530	14.84	23 000	24 400	23 200	0.97	80	2KJ3807 - ■ HG22 - ■ ■ C1	
	117	445	12.52	22 100	23 300	22 300	1.1	80	2KJ3807 - ■ HG22 - ■ ■ B1	
	134	390	10.91	21 300	22 400	21 500	1.2	80	2KJ3807 - ■ HG22 - ■ ■ A1	
	KH.49-LE132SF4E									
	105	495	13.91	15 900	17 400	16 100	0.84	58	2KJ3806 - ■ HG22 - ■ ■ C1	
	123	425	11.93	15 400	16 700	15 600	0.98	58	2KJ3806 - ■ HG22 - ■ ■ B1	
	143	365	10.27	15 000	16 100	15 100	1.1	58	2KJ3806 - ■ HG22 - ■ ■ A1	
	7.5	KH.79-LE132ZMS4P								
83		855	17.62	30 100	32 100	30 500	0.83	109	2KJ3808 - ■ HL23 - ■ ■ D1	
95		755	15.49	29 200	31 200	29 600	0.92	109	2KJ3808 - ■ HL23 - ■ ■ C1	
112		635	13.07	28 100	29 800	28 400	1	109	2KJ3808 - ■ HL23 - ■ ■ B1	
129		555	11.39	27 200	28 600	27 400	1.2	109	2KJ3808 - ■ HL23 - ■ ■ A1	
KH.69-LE132ZMS4P										
117		610	12.52	21 300	23 000	21 600	0.8	102	2KJ3807 - ■ HL23 - ■ ■ B1	
135		530	10.91	20 700	22 200	21 000	0.88	102	2KJ3807 - ■ HL23 - ■ ■ A1	
KH.49-LE132ZMS4P										
143		500	10.27	14 300	15 700	14 400	0.83	80	2KJ3806 - ■ HL23 - ■ ■ A1	

Article No. supplement

Shaft design	1, 2 or 9	→ page 5/5
Frequency and voltage	2 or 9	→ page 6/2
Gearbox mounting type	A or H	→ page 5/5

¹⁾ Values apply to BH.39 for 30 x 50 solid shaft. For conversion for 25 x 35 solid shaft see page 2/9.

Electric-monorail geared motors

Light-load applications

Transmission ratios and torques

Selection and ordering data

<i>i</i>	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>F</i> _{R2} N	<i>F</i> _{R290} N	<i>F</i> _{R2270} N	<i>J</i> _G 10 ⁻⁴ kgm ²	<i>R</i> _{ex}	Motor frame size						Article No.
								63	71	80	90	100	112	
BH.29														
50.26	29	90	7 340	7 500	7 500	0.04	4071/81	✓	✓					2KJ3803 - ■■■■■ - ■■ R1
44.58	33	90	7 030	7 250	7 300	0.05	4012/90	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ Q1
38.68	37	90	6 670	6 890	6 950	0.06	3481/90	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ P1
35.16	41	90	6 440	6 660	6 720	0.07	3481/99	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ N1
30.16	48	90	6 090	6 310	6 360	0.09	2714/90	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ M1
27.41	53	90	5 880	6 100	6 150	0.11	2714/99	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ L1
24.04	60	90	5 600	5 820	5 870	0.12	2596/108	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ K1
21.45	68	90	5 370	5 590	5 640	0.15	2124/99	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ J1
19.12	76	90	5 140	5 360	5 410	0.18	2065/108	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ H1
17.65	82	90	4 990	5 210	5 260	0.22	2065/117	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ G1
15.45	94	88	4 760	4 980	5 020	0.24	1947/126	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ F1
13.55	107	84	4 560	4 760	4 810	0.25	1829/135	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ E1
12.29	118	81	4 410	4 610	4 660	0.32	1770/144	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ D1
11.57	125	79	4 330	4 520	4 570	0.37	1770/153	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ C1
10.20	142	76	4 150	4 330	4 380	0.42	1652/162	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ B1
8.85	164	72	3 960	4 140	4 180	0.55	1593/180	✓	✓	✓	✓			2KJ3803 - ■■■■■ - ■■ A1
BH.39														
60.21	24	200	15 000	15 000	15 000	0.05	4335/72		✓	✓				2KJ3804 - ■■■■■ - ■■ T1
52.26	28	200	15 000	15 000	15 000	0.06	4233/81	✓	✓					2KJ3804 - ■■■■■ - ■■ S1
46.47	31	200	15 000	15 000	15 000	0.07	4182/90	✓	✓	✓	✓			2KJ3804 - ■■■■■ - ■■ R1
40.80	36	200	15 000	15 000	15 000	0.08	3672/90	✓	✓	✓	✓			2KJ3804 - ■■■■■ - ■■ Q1
37.09	39	200	15 000	15 000	15 000	0.10	3672/99	✓	✓	✓	✓			2KJ3804 - ■■■■■ - ■■ P1
31.73	46	200	15 000	15 000	15 000	0.12	2856/90	✓	✓	✓	✓			2KJ3804 - ■■■■■ - ■■ N1
28.85	50	200	15 000	15 000	15 000	0.14	2856/99	✓	✓	✓	✓			2KJ3804 - ■■■■■ - ■■ M1
25.50	57	200	15 000	15 000	15 000	0.17	2754/108	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ L1
23.18	63	200	15 000	15 000	15 000	0.23	2295/99	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ K1
20.31	71	200	15 000	15 000	15 000	0.26	2193/108	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ J1
18.74	77	200	14 800	14 800	14 800	0.31	2193/117	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ H1
16.60	87	200	14 200	14 200	14 200	0.36	2091/126	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ G1
13.81	105	200	13 500	13 500	13 500	0.49	1989/144	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ F1
13.00	112	200	13 200	13 200	13 200	0.57	1989/153	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ E1
11.65	124	200	12 800	12 800	12 800	0.62	1887/162	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ D1
9.92	146	200	12 200	12 200	12 200	0.80	1785/180	✓	✓	✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ C1
8.50	171	200	11 600	11 600	11 600	1.05	1683/198			✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ B1
7.32	198	200	11 100	11 100	11 100	1.34	1581/216			✓	✓	✓	✓	2KJ3804 - ■■■■■ - ■■ A1

Electric-monorail geared motors

Heavy-load applications

Transmission ratios and torques

Selection and ordering data

<i>i</i>	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>F</i> _{R2} N	<i>F</i> _{R290} N	<i>F</i> _{R2270} N	<i>J</i> _G 10 ⁻⁴ kgm ²	<i>R</i> _{ex}	Motor frame size							Article No.
								63	71	80	90	100	112	132	
KH.49															
200.25	7.2	420	18 500	18 500	18 500	0.06	12616/63	✓	✓						2KJ3806 - ■■■■■ - ■■ C2
178.06	8.1	420	18 500	18 500	18 500	0.07	6232/35	✓	✓	✓	✓				2KJ3806 - ■■■■■ - ■■ B2
156.34	9.3	420	18 500	18 500	18 500	0.08	5472/35	✓	✓	✓	✓				2KJ3806 - ■■■■■ - ■■ A2
142.13	10	420	18 500	18 500	18 500	0.10	10944/77	✓	✓	✓	✓				2KJ3806 - ■■■■■ - ■■ X1
121.60	12	420	18 500	18 500	18 500	0.12	608/5	✓	✓	✓	✓				2KJ3806 - ■■■■■ - ■■ W1
110.55	13	420	18 500	18 500	18 500	0.14	1216/11	✓	✓	✓	✓				2KJ3806 - ■■■■■ - ■■ V1
97.71	15	420	18 500	18 500	18 500	0.17	684/7	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ U1
88.83	16	420	18 500	18 500	18 500	0.22	6840/77	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ T1
77.81	19	420	18 500	18 500	18 500	0.25	1634/21	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ S1
71.82	20	420	18 500	18 500	18 500	0.30	6536/91	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ R1
63.59	23	420	18 500	18 500	18 500	0.37	3116/49	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ Q1
52.93	27	420	18 500	18 500	18 500	0.50	741/14	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ P1
49.82	29	420	18 500	18 500	18 500	0.58	5928/119	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ N1
44.63	32	420	18 500	18 500	18 500	0.64	2812/63	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ M1
38.00	38	420	18 500	18 500	18 500	0.84	38/1	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ L1
32.57	45	420	18 500	18 500	18 500	1.11	228/7			✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ K1
28.05	52	420	18 500	18 500	18 500	1.43	589/21			✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ J1
26.30	55	420	18 500	18 500	18 500	0.52	55040/2093	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ H1
23.28	62	420	18 500	18 500	18 500	0.64	26240/1127	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ G1
19.38	75	420	18 300	18 500	18 500	0.89	3120/161	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ F1
18.24	79	420	17 900	18 500	18 100	1.03	49920/2737	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ E1
16.34	89	420	17 300	18 500	17 500	1.2	23680/1449	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ D1
13.91	104	420	16 400	17 600	16 500	1.61	320/23	✓	✓	✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ C1
11.93	122	420	15 500	16 800	15 700	2.2	1920/161			✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ B1
10.27	141	415	14 800	16 000	14 900	2.8	4960/483			✓	✓	✓	✓		2KJ3806 - ■■■■■ - ■■ A1
KH.69															
196.59	7.4	600	25 000	25 000	25 000	0.17	14744/75	✓	✓	✓	✓				2KJ3807 - ■■■■■ - ■■ C2
178.72	8.1	600	25 000	25 000	25 000	0.20	29488/165	✓	✓	✓	✓				2KJ3807 - ■■■■■ - ■■ B2
152.00	9.5	600	25 000	25 000	25 000	0.25	152/1	✓	✓	✓	✓				2KJ3807 - ■■■■■ - ■■ A2
138.18	10	600	25 000	25 000	25 000	0.30	1520/11	✓	✓	✓	✓				2KJ3807 - ■■■■■ - ■■ X1
123.29	12	600	25 000	25 000	25 000	0.35	5548/45	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ W1
110.55	13	600	25 000	25 000	25 000	0.42	1216/11	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ V1
99.64	15	600	25 000	25 000	25 000	0.49	4484/45	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ U1
91.98	16	600	25 000	25 000	25 000	0.58	17936/195	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ T1
83.96	17	600	25 000	25 000	25 000	0.69	8816/105	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ S1
69.67	21	600	25 000	25 000	25 000	0.87	209/3	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ R1
65.57	22	600	25 000	25 000	25 000	1.01	3344/51	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ Q1
61.93	23	600	25 000	25 000	25 000	1.15	1672/27	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ P1
52.69	28	600	25 000	25 000	25 000	1.4	3952/75	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ N1
45.14	32	600	25 000	25 000	25 000	1.7	7448/165			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ M1
39.69	37	600	25 000	25 000	25 000	2.1	1786/45			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ L1
33.48	43	580	25 000	25 000	25 000	2.6	11552/345			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ K1
29.18	50	555	25 000	25 000	25 000	3.5	3648/125			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ J1
26.05	56	600	25 000	25 000	25 000	1.26	3751/144	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ H1
24.52	59	595	25 000	25 000	25 000	1.44	3751/153	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ G1
23.15	63	585	25 000	25 000	25 000	1.63	3751/162	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ F1
19.70	74	555	25 000	25 000	25 000	2.1	4433/225	✓	✓	✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ E1
16.88	86	530	24 000	25 000	24 300	2.6	1519/90			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ D1
14.84	98	515	23 100	24 600	23 400	3.3	16027/1080			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ C1
12.52	116	490	22 000	23 300	22 200	4.3	12958/1035			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ B1
10.91	133	470	21 100	22 400	21 300	5.7	1364/125			✓	✓	✓	✓		2KJ3807 - ■■■■■ - ■■ A1

Electric-monorail geared motors

Heavy-load applications

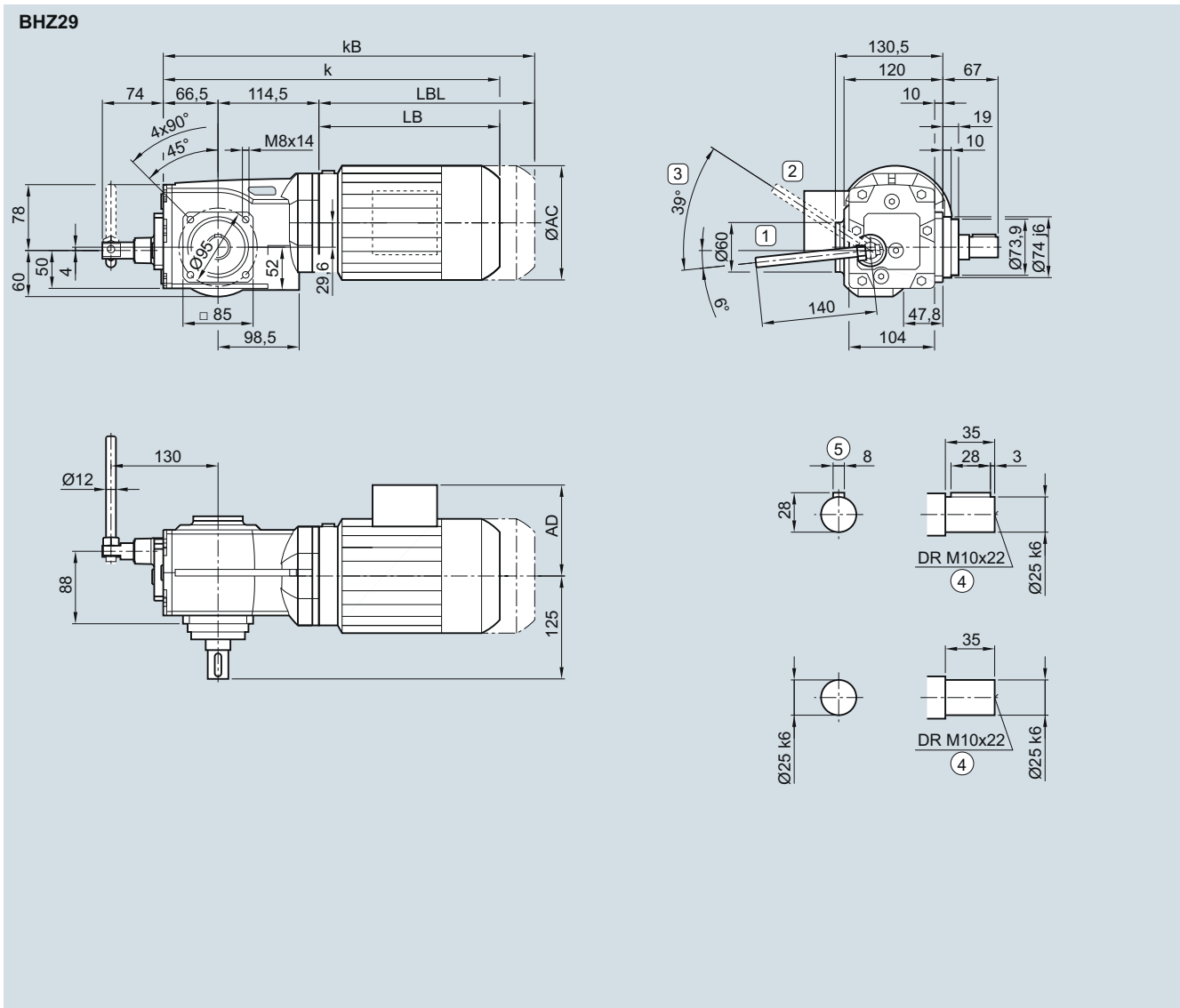
Transmission ratios and torques

Selection and ordering data (continued)

<i>i</i>	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>F</i> _{R2} N	<i>F</i> _{R290} N	<i>F</i> _{R2270} N	<i>J</i> _G 10 ⁻⁴ kgm ²	<i>R</i> _{ex}	Motor frame size							Article No.
								63	71	80	90	100	112	132	
KH.79															
244.25	5.9	820	36 100	40 000	40 000	0.17	175861/720	✓	✓	✓	✓				2KJ3808 - ■■■■■■ - ■■ E2
222.05	6.5	820	36 100	40 000	40 000	0.21	175861/792	✓	✓	✓	✓				2KJ3808 - ■■■■■■ - ■■ D2
188.85	7.7	820	36 100	40 000	40 000	0.25	9065/48	✓	✓	✓	✓				2KJ3808 - ■■■■■■ - ■■ C2
171.69	8.4	820	36 100	40 000	40 000	0.31	45325/264	✓	✓	✓	✓				2KJ3808 - ■■■■■■ - ■■ B2
153.18	9.5	820	36 100	40 000	40 000	0.35	132349/864	✓	✓	✓	✓	✓	✓		2KJ3808 - ■■■■■■ - ■■ A2
137.35	11	820	36 100	40 000	40 000	0.42	9065/66	✓	✓	✓	✓	✓	✓		2KJ3808 - ■■■■■■ - ■■ W1
123.80	12	820	36 100	40 000	40 000	0.50	106967/864	✓	✓	✓	✓	✓	✓		2KJ3808 - ■■■■■■ - ■■ V1
114.28	13	820	36 100	40 000	40 000	0.59	106967/936	✓	✓	✓	✓	✓	✓		2KJ3808 - ■■■■■■ - ■■ U1
104.32	14	820	36 100	40 000	40 000	0.70	7511/72	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ T1
86.56	17	820	36 100	40 000	40 000	0.89	99715/1152	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ S1
81.47	18	820	36 100	40 000	40 000	1.02	99715/1224	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ R1
76.94	19	820	36 100	40 000	40 000	1.16	99715/1296	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ Q1
65.47	22	820	36 100	40 000	40 000	1.42	23569/360	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ P1
56.08	26	820	36 100	40 000	40 000	1.74	88837/1584			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ N1
49.31	29	820	36 100	40 000	40 000	2.1	85211/1728			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ M1
41.60	35	800	36 600	40 000	40 000	2.7	34447/828			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ L1
36.26	40	770	37 300	40 000	39 100	3.6	1813/50			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ K1
32.78	44	820	36 100	39 400	37 700	0.95	6293/192	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ J1
27.20	53	800	35 200	37 200	35 500	1.25	83545/3072	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ H1
25.60	57	785	34 500	36 600	34 900	1.43	83545/3264	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ G1
24.17	60	770	34 000	35 900	34 300	1.62	83545/3456	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ F1
20.57	70	740	32 300	34 200	32 600	2.1	19747/960	✓	✓	✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ E1
17.62	82	715	30 800	32 700	31 100	2.6	74431/4224			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ D1
15.49	94	695	29 600	31 400	29 900	3.2	71393/4608			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ C1
13.07	111	665	28 200	29 900	28 500	4.2	28861/2208			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ B1
11.39	127	645	27 300	28 800	27 500	5.6	4557/400			✓	✓	✓	✓	✓	2KJ3808 - ■■■■■■ - ■■ A1

BHZ29 gearbox in a housing flange design

BHZ030



Clutch							
①	Engaged						
②	Disengaged						
③	Operating travel in accordance with VDI 3643						
Motor	LA63	LA71	LA71Z	LE80	LE80Z	LE90	LE90Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2
AD ²⁾	101.0	111.0	111.0	-	-	-	-
k	375.5	407.5	426.5	471.0	506.0	533.0	573.0
kB	420.0	462.5	481.5	531.0	566.5	603.0	643.0
LB	194.0	226.0	245.0	290.0	325.0	351.5	391.5
LBL	238.5	281.0	300.0	350.0	385.0	421.5	461.5

¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

④ DIN 332

⑤ Feather key/keyway DIN 6885-1

²⁾ AD with plug cable for design in accordance with VDI 3643, for further information see page 2/4.

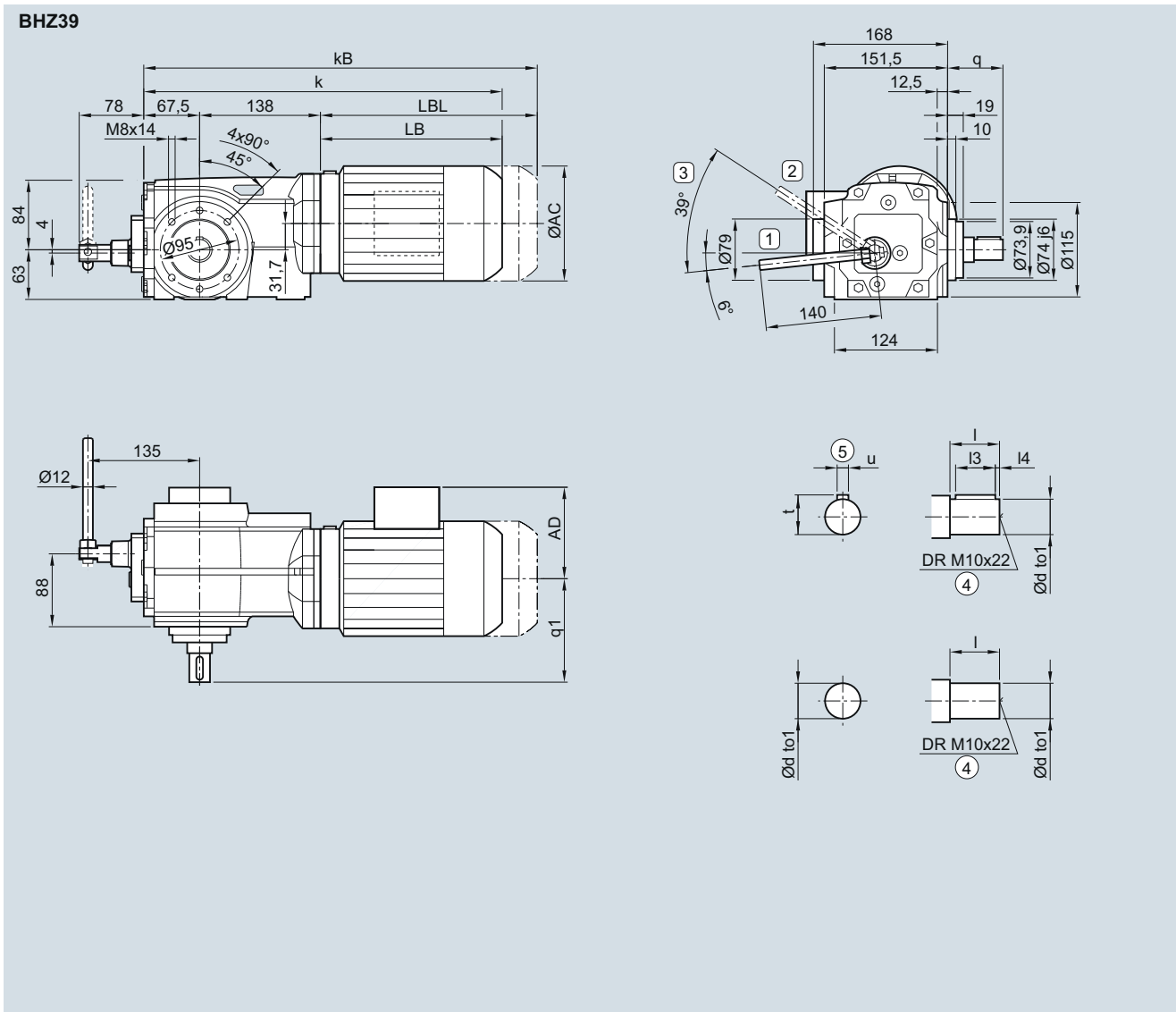
Electric-monorail geared motors

Light-load applications

Dimensions

BHZ39 gearbox in a housing flange design

BHZ030



Clutch

①	Engaged
②	Disengaged
③	Operating travel in accordance with VDI 3643

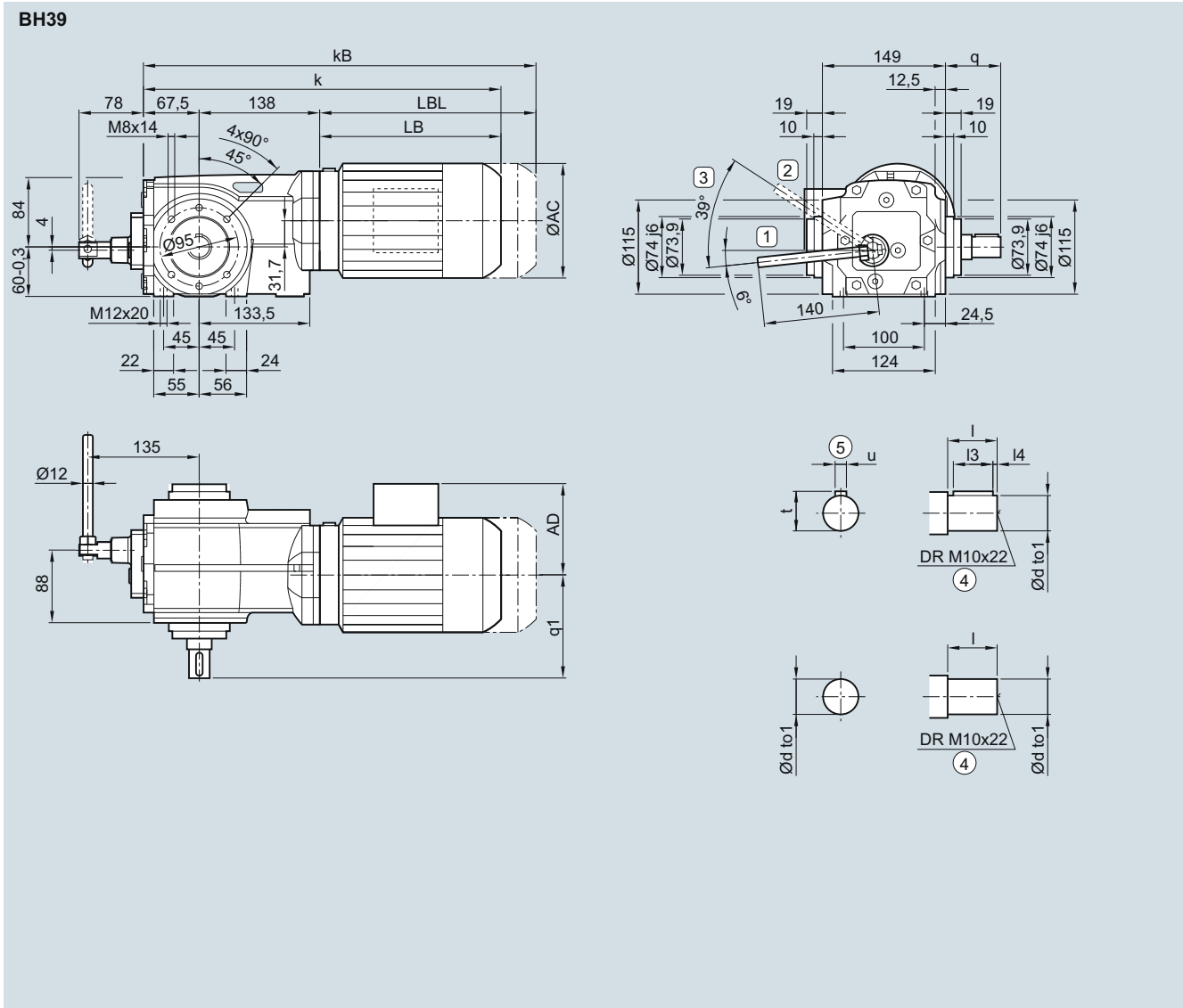
Shaft	d	to1	l	l3	l4	t	u	q	q1
	25	k6	35	28	3	28	8	67	125
	30	k6	50	40	5	33	8	72	130
Motor	LA63	LA71	LA71Z	LE80	LE80Z	LE90	LE90Z	LE100	LE100Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8	198.0	198.0
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2	170.5	170.5
AD ²⁾	101.0	111.0	111.0	-	-	-	-	-	-
k	400.0	432.0	451.0	496.0	531.0	557.5	597.5	614.0	649.0
kB	444.5	487.0	506.0	556.0	591.0	627.5	667.5	692.5	727.5
LB	194.0	226.0	245.0	290.0	325.0	351.5	391.5	408.0	443.0
LBL	238.5	281.0	300.0	350.0	385.0	421.5	461.5	486.5	521.5

¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

④ DIN 332

⑤ Feather key/keyway DIN 6885-1

²⁾ AD with plug cable for design in accordance with VDI 3643, for further information see page 2/4.

BH39 gearbox in a foot-mounted design
BH030


Clutch	
①	Engaged
②	Disengaged
③	Operating travel in accordance with VDI 3643

Shaft	d	to1	l	l3	l4	t	u	q	q1
	25	k6	35	28	3	28	8	67	125
	30	k6	50	40	5	33	8	72	130
Motor	LA63	LA71	LA71Z	LE80	LE80Z	LE90	LE90Z	LE100	LE100Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8	198.0	198.0
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2	170.5	170.5
AD ²⁾	101.0	111.0	111.0	-	-	-	-	-	-
k	400.0	432.0	451.0	496.0	531.0	557.5	597.5	614.0	649.0
k _B	444.5	487.0	506.0	556.0	591.0	627.5	667.5	692.5	727.5
LB	194.0	226.0	245.0	290.0	325.0	351.5	391.5	408.0	443.0
LBL	238.5	281.0	300.0	350.0	385.0	421.5	461.5	486.5	521.5

¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

^④ DIN 332

^⑤ Feather key/keyway DIN 6885-1

²⁾ AD with plug cable for design in accordance with VDI 3643, for further information see page 2/4.

Electric-monorail geared motors

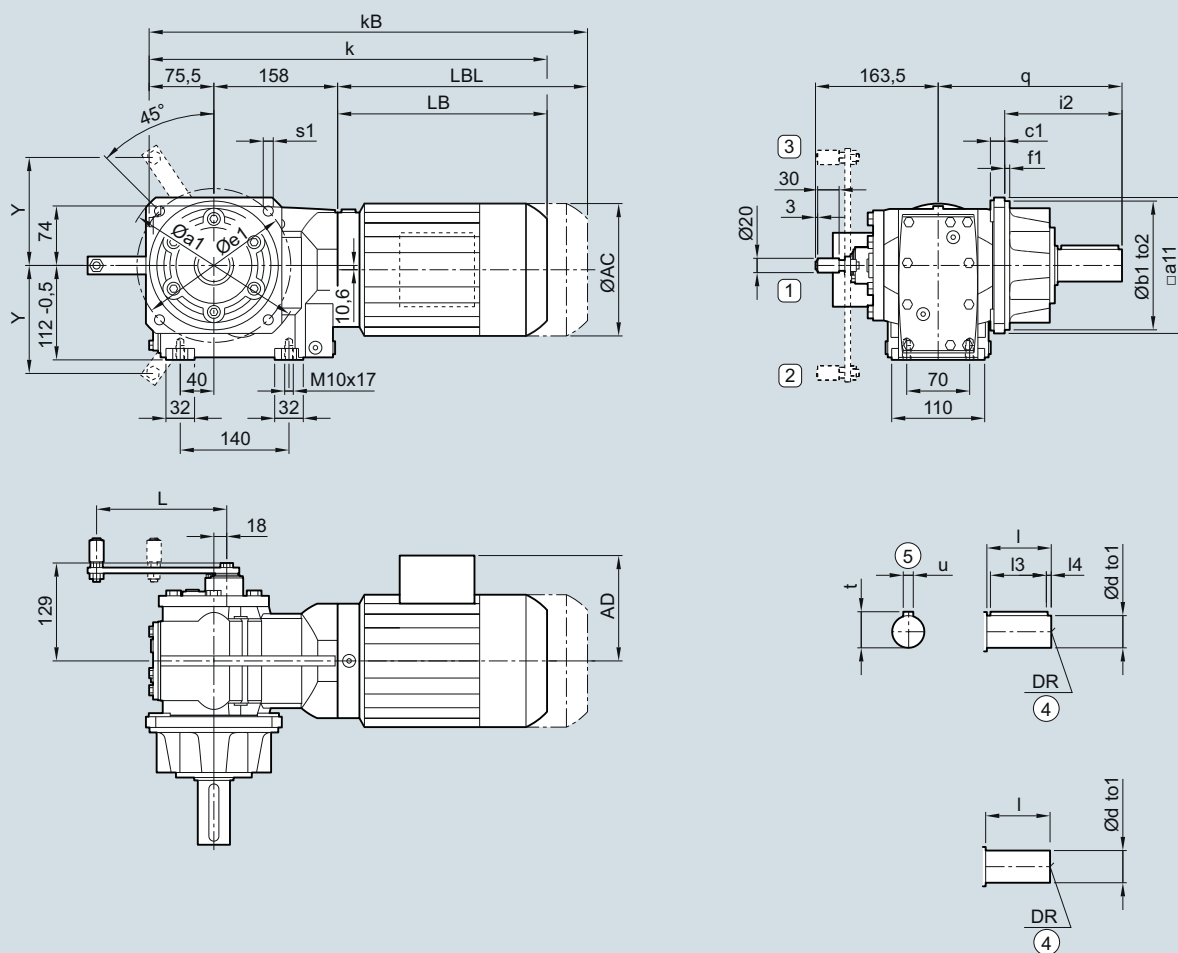
Heavy-load applications

Dimensions

KHF49 gearbox in a flange-mounted design

KHF030

KHF49



Clutch		Clutch lever	L	Y
①	Engaged	Position A, short	140	117
② ③	Disengaged	Position A, long	182	151

Flange	a1	b1	to2	c1	f1	a11	e1	s1	Shaft	d	to1	l	l3	l4	t	u	q	i2	DR
200	130	j6	13	6	160	165	M10		30	k6	60	50	3.5	33	8	191	100	M10x22	
									35	k6	70	56	7	38	10	201	110	M12x28	
250	180	j6	15	6	190	215	M12		30	k6	60	50	3.5	33	8	191	105	M10x22	
									35	k6	70	56	7	38	10	201	115	M12x28	

Motor	LA	71	71Z	LE	80Z	90	90Z	100	100Z	112	112Z	132	132Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8	198.0	198.0	222.0	222.0	264.0	264.0
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2	170.5	170.5	181.5	181.5	207.0	207.0
k	418.0	450.0	469.0	514.0	549.0	575.5	615.5	632.0	667.0	642.0	676.5	695.0	745.0
kB	462.5	505.0	524.0	574.0	609.0	645.5	685.5	710.5	745.5	715.0	749.5	799.5	849.5
LB	184.5	216.5	235.5	280.5	315.5	342.0	382.0	398.5	433.5	408.5	443.0	461.5	511.5
LBL	229.0	271.5	290.5	340.5	375.5	412.0	452.0	477.0	512.0	481.5	516.0	566.0	616.0

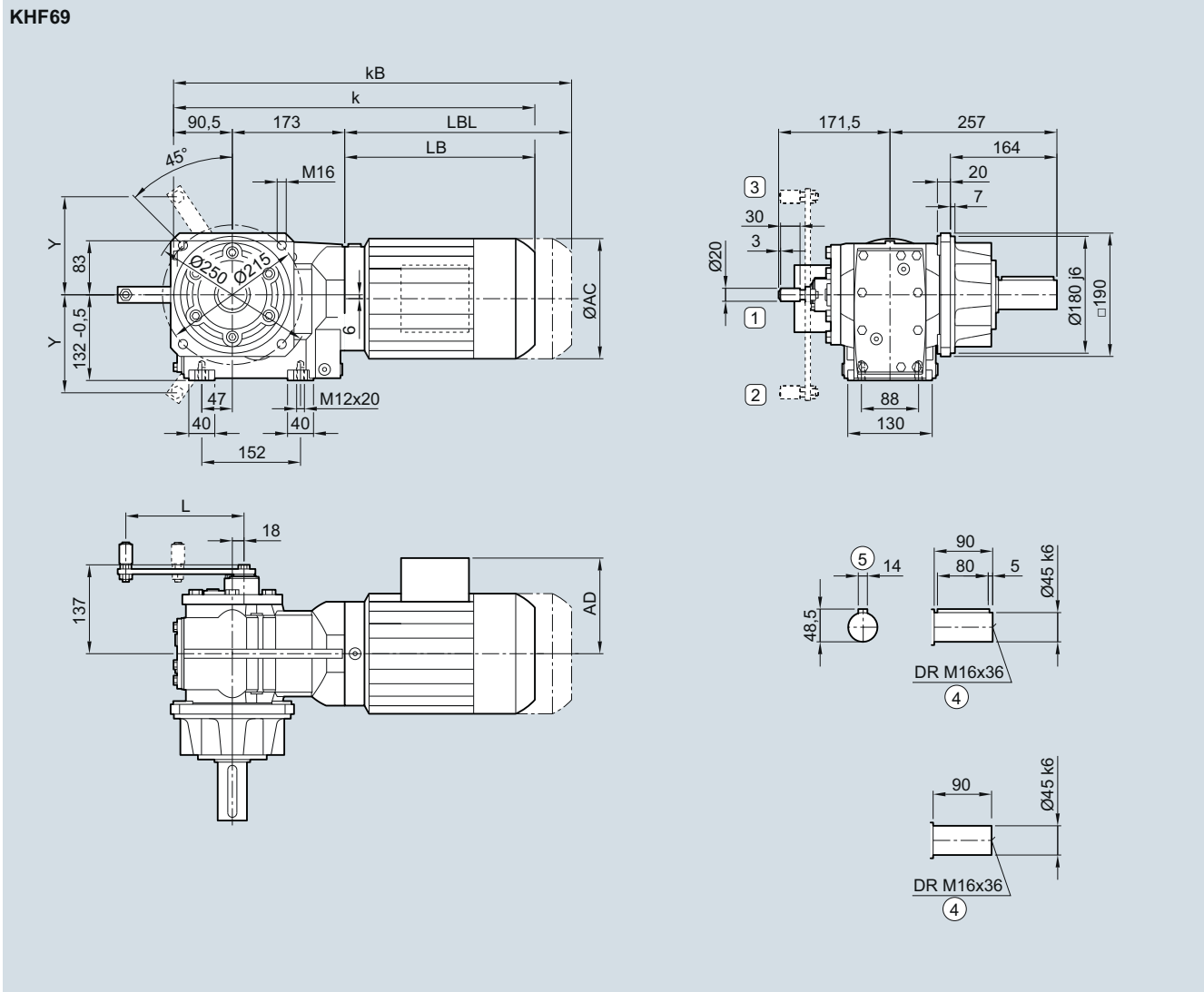
¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

④ DIN 332

⑤ Feather key/keyway DIN 6885-1

KHF69 gearbox in a flange-mounted design

KHF030



3

Clutch	
①	Engaged
② ③	Disengaged

Clutch lever	L	Y
Position A, short	140	117
Position A, long	182	151

Motor	LA			LE									
	63	71	71Z	80	80Z	90	90Z	100	100Z	112	112Z	132	132Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8	198.0	198.0	222.0	222.0	264.0	264.0
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2	170.5	170.5	181.5	181.5	207.0	207.0
k	448.0	480.0	499.0	544.0	579.0	605.5	645.5	662.0	697.0	672.0	706.5	725.0	775.0
kB	492.5	535.0	554.0	604.0	639.0	675.5	715.5	740.5	775.5	745.0	779.5	829.5	879.5
LB	184.5	216.5	235.5	280.5	315.5	342.0	382.0	398.5	433.5	408.5	443.0	461.5	511.5
LBL	229.0	271.5	290.5	340.5	375.5	412.0	452.0	477.0	512.0	481.5	516.0	566.0	616.0

¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

④ DIN 332

⑤ Feather key/keyway DIN 6885-1

Electric-monorail geared motors

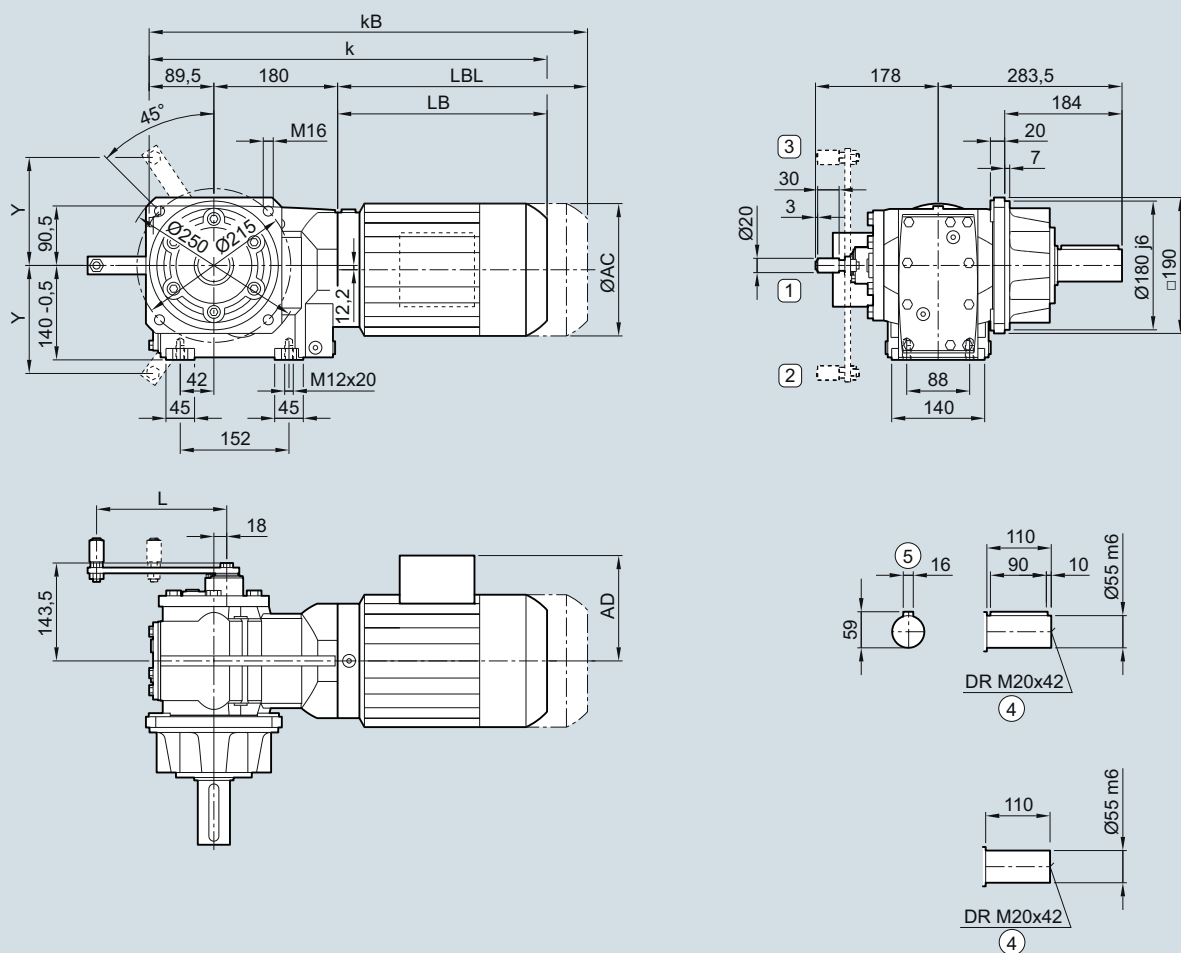
Heavy-load applications

Dimensions

KHF79 gearbox in a flange-mounted design

KHF030

KHF79



Clutch		Clutch lever		L	Y
①	Engaged	Position A, short	140	117	
② ③	Disengaged	Position A, long	182	151	

Motor	LA			LE									
	63	71	71Z	80	80Z	90	90Z	100	100Z	112	112Z	132	132Z
AC	117.8	138.8	138.8	156.3	156.3	173.8	173.8	198.0	198.0	222.0	222.0	264.0	264.0
AD ¹⁾	124.0	134.0	134.0	149.2	149.2	154.2	154.2	170.5	170.5	181.5	181.5	207.0	207.0
k	454.0	486.0	505.0	550.0	585.0	611.5	651.5	668.0	703.0	678.5	712.5	731.0	781.0
kB	498.5	541.0	560.0	610.0	645.0	681.5	721.5	746.5	781.5	751.0	785.5	835.5	885.5
LB	184.5	216.5	235.5	280.5	315.5	342.0	382.0	398.5	433.5	408.5	443.0	461.5	511.5
LBL	229.0	271.5	290.5	340.5	375.5	412.0	452.0	477.0	512.0	481.5	516.0	566.0	616.0

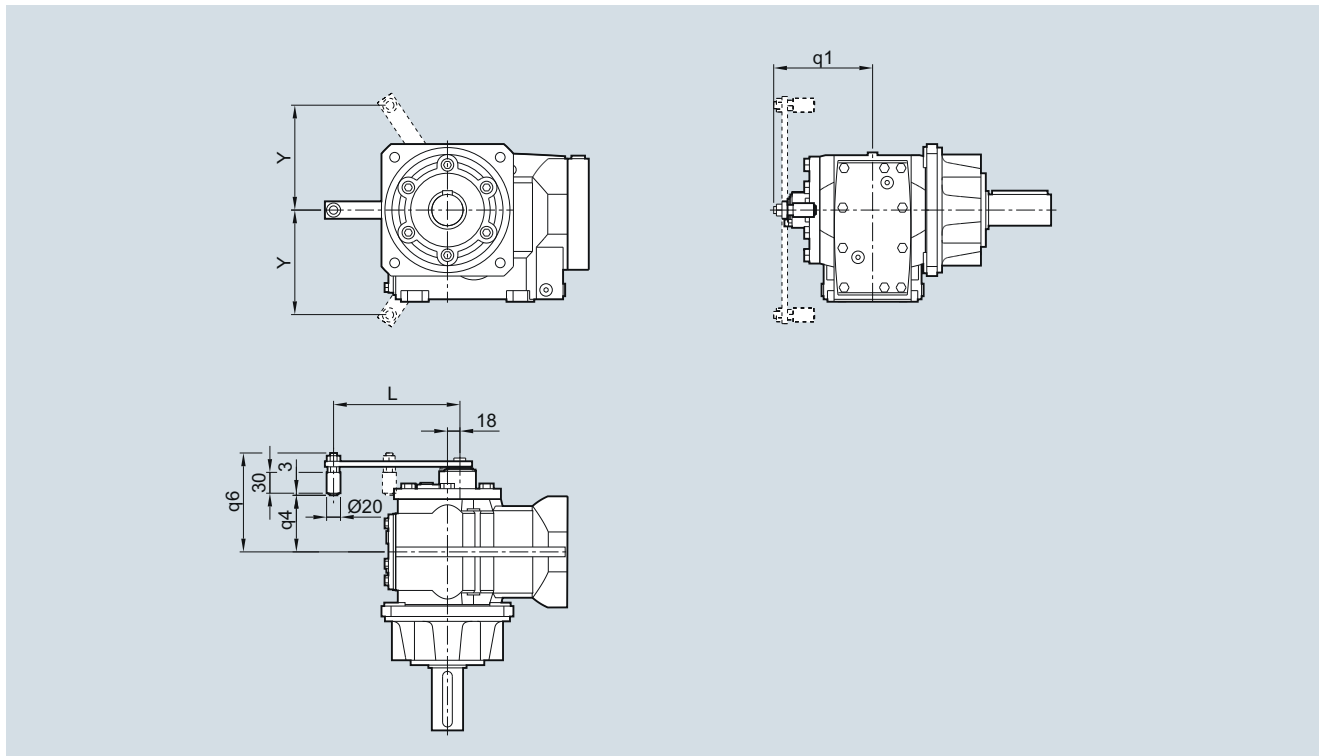
¹⁾ AD depends on the motor options, for other dimensions see page 6/14.

④ DIN 332

⑤ Feather key/keyway DIN 6885-1

Clutch lever, position B

Further information about the clutch lever can be found in chapter "Gearbox options" on page 5/6.



Gearbox type	q1	q4	q6
KHF49	129.0	73.5	134.5
KHF69	137.0	81.5	142.5
KHF79	143.5	88.0	149.0

Clutch lever	L	Y
Position B, short	140	117
Position B, long	182	151

Electric-monorail geared motors

Notes

Motors



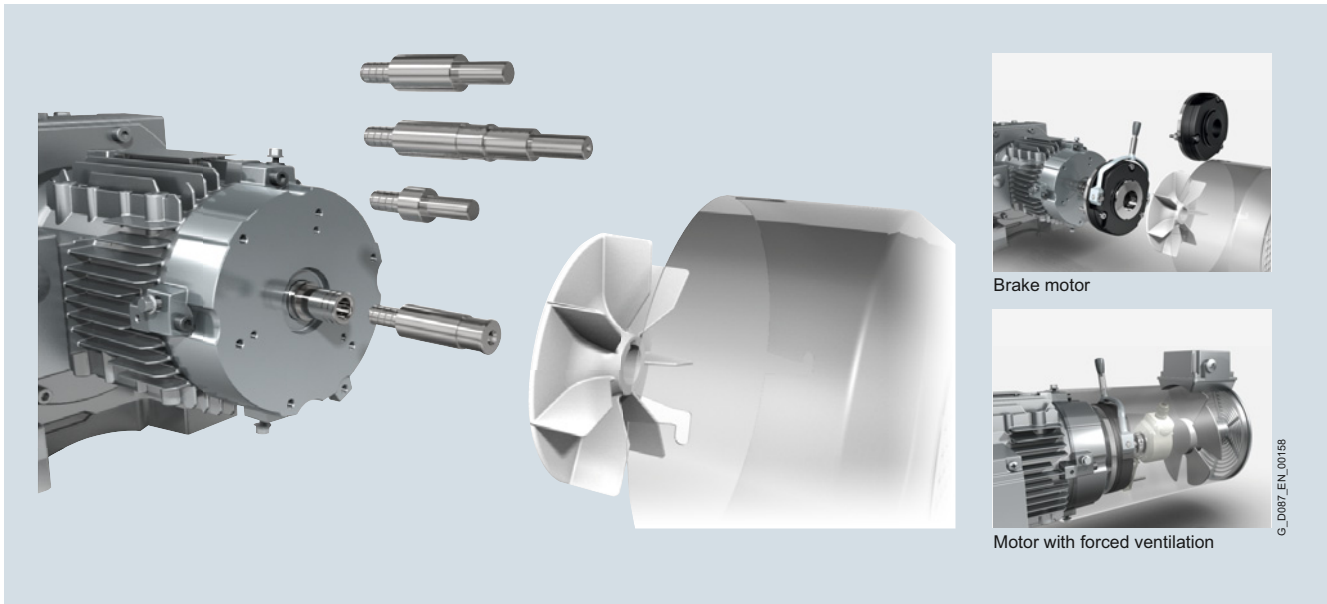
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Motors

Orientation

MODULOG modular principle

Overview



4

The MODULOG modular principle has a range of benefits for machine and plant designers.

The name MODULOG stands for a clear and transparent **modular** motor system with an optimum **logistical** structure. It enables users to assemble powerful, durable, and extremely easy-to-service motors from just a few standard components to create a customized motor system for most applications.

At the heart of the system is a basic motor dimensioned for international line supply conditions with an individually configurable MODULOG modular system at the non-drive end (NDE) of the motor.

Functional expansions, such as brakes, backstops, rotary encoders, separately driven fan, canopy, etc., can be combined almost arbitrarily as "additional functional components".

Overview

The motors comply with all applicable international (IEC), European (EN, CENELEC), and national (DIN/VDE) standards:

Motor type	Three-phase induction motors with squirrel-cage rotor
Connection types	You can establish the connection type that can be used from the product number suffixes in the selection and ordering data for the required motor.
Number of poles	2, 4, 6, 8
Rated speed (synchronous speed)	750 ... 3 600 rpm
Rated power (50 Hz)	0.09 ... 9.2 kW (4-pole)
Rated torque	0.85 ... 49.9 Nm (4-pole)
Stator winding insulation	Temperature class 155 (F) Utilization according to temperature class 130 (B) Optionally, temperature class 180 (H)
Degree of protection acc. to IEC 60034-5 (EN 60034-5)	IP55 Optional IP65, IP56
Cooling acc. to IEC 60034-6 (EN 60034-6)	Self-cooled (IC 411) Optionally, force ventilated (IC 416)
Coolant temperature	-20 ... +40 °C
Installation altitude	Up to 1 000 m above sea level
Rated voltage	200 ... 690 V You can establish the voltage that can be used from the selection and ordering data for the required motor.
Rated frequency	50 Hz, 60 Hz, 87 Hz
Vibration severity acc. to IEC 60034-14 (EN 60034-14)	Vibration severity A
Balancing type	Half-key balancing
Sound pressure level, sound power level acc. to IEC 60034-9 (EN 60034-9)	You can establish the corresponding sound pressure level and sound power level from the selection and ordering data for the required motor.
Weight	You can establish the corresponding weight from the selection and ordering data for the required motor.
Rating plates	See "Rating plate" in chapter "General options"
Connection and terminal boxes	See "Connection, circuit and terminal boxes" in chapter "Motor options"

Motors

Orientation

Technical specifications

Standards

The geared motors comply with all of the applicable IEC/EN standards.

IEC	EN	DIN/VDE	Title
IEC 60027-4	EN 60027-4	EN 60027-4	Formula symbols for electrical engineering, Part 4: Rotating electrical machines
IEC 60034-1	EN 60034-1	EN 60034-1 (VDE 0530-1)	Rotating electrical machines: - Rating and performance
IEC 60034-2-1	EN 60034-2-1	EN 60034-2-1 (VDE 0530-2-1)	- Standard technique to determine the losses and efficiency based on testing (with the exception of machines for track and road vehicles) (IEC 60034-2-1:2007); German Edition EN 60034-2-1:2007
IEC 60034-5	EN 60034-5	EN 60034-5 (VDE 0530-5)	- Degrees of protection provided by integral design of rotating electrical machines (IP code) - Classification
IEC 60034-6	EN 60034-6	EN 60034-6 (VDE 0530-6)	- Classification of cooling methods (IC code)
IEC 60034-7	EN 60034-7	EN 60034-7 (VDE 0530-7)	- Classification of types of construction, mounting types and terminal box position (IM code)
IEC 60034-8	EN 60034-8	EN 60034-8 (VDE 0530-8)	- Terminal markings and direction of rotation
IEC 60034-9	EN 60034-9	EN 60034-9 (VDE 0530-9)	- Noise limits
IEC 60034-11	EN 60034-11	EN 60034-11 (VDE 0530-11)	- Built-in thermal protection
IEC 60034-12	EN 60034-12	EN 60034-12 (VDE 0530-12)	- Starting behavior of three-phase squirrel-cage induction motors, with the exception of pole-changing motors
IEC 60034-14	EN 60034-14	EN 60034-14 (VDE 0530-14)	- Mechanical vibration of certain machines with shaft heights 56 mm and higher
IEC 60034-30-1	EN 60034-30-1	EN 60034-30-1 (VDE 0530-30)	- International efficiency classes for rotating electrical machines (IE code)
-	-	DIN VDE 0530-17 (VDE 0530-17)	- Inverter-fed squirrel-cage induction motors - Application guide
IEC 60038	EN 60038	EN 60038 (VDE 0175-1)	IEC standard voltages
-	EN 50347	EN 50347	Three-phase induction motors for general applications with standardized dimensions and power ratings – frame sizes 56 up to 315 and flange sizes 65 up to 740
IEC 60085	EN 60085	EN 60085 (VDE 0301-1)	Electrical insulation, thermal evaluation + designation
IEC 60445	EN 60445	EN 60445 (VDE 0197)	Identification of equipment terminals, conductor terminations and conductors
IEC 60529	EN 60529	EN 60529 (VDE 0470-1)	Degrees of protection provided by the enclosure (IP code)
IEC 62444	EN 62444	EN 62444 (VDE 0619)	Cable glands for electrical installation
-	-	DIN 42925	Terminal box cable entries for three-phase squirrel-cage induction motors at rated voltages from 400 V to 690 V

Tolerances

According to EN 60034, the following tolerances are permitted:
Motors which comply with EN 60034-1 must have a voltage tolerance of $\pm 5\%$ /frequency tolerance of $\pm 2\%$ (Zone A).
If utilized, the admissible limit temperature of the temperature class may be exceeded by 10 K.

Description	Tolerance
Efficiency	$P_{\text{rated}} \leq 150 \text{ kW}$: - 0.15 (1 - η) $P_{\text{rated}} > 150 \text{ kW}$: - 0.1 (1 - η)
Power factor	$\frac{1 - \cos \varphi}{6}$ (minimum 0.02/maximum 0.07)

Description	Tolerance
Slip at full load and operating temperature	$\pm 20\%$ of the setpoint slip for $P_{\text{rated}} \geq 1 \text{ kW}$ $\pm 30\%$ of the setpoint slip for $P_{\text{rated}} < 1 \text{ kW}$
Starting torque	-15 % and +25 %
Breakdown torque	-10 % without upper limit
Starting current	+20 % without lower limit
Moment of inertia	$\pm 10\%$

Efficiency and power factor

The efficiency η and power factor $\cos \varphi$ for each rated power are listed in the selection tables in the individual sections of this catalog.

Partial-load power factor $\cos \varphi$

4/4 of full load	1/4	1/2	3/4	5/4
0.92	0.70	0.86	0.90	0.92
0.91	0.65	0.85	0.89	0.91
0.90	0.63	0.83	0.88	0.90
0.89	0.61	0.80	0.86	0.89
0.88	0.57	0.78	0.85	0.88
0.87	0.53	0.76	0.84	0.87
0.86	0.51	0.75	0.83	0.86
0.85	0.49	0.73	0.81	0.86
0.84	0.47	0.71	0.80	0.85
0.83	0.45	0.69	0.79	0.84
0.82	0.43	0.67	0.77	0.83
0.81	0.41	0.66	0.76	0.82
0.80	0.40	0.65	0.75	0.81
0.79	0.38	0.63	0.74	0.80
0.78	0.36	0.61	0.72	0.80
0.77	0.34	0.59	0.71	0.79
0.76	0.32	0.58	0.70	0.78
0.75	0.30	0.56	0.69	0.78
0.74	0.29	0.55	0.68	0.77
0.73	0.28	0.54	0.67	0.77
0.72	0.27	0.52	0.63	0.76
0.71	0.26	0.50	0.62	0.76

For motors with Standard Efficiency (IE1), High Efficiency (IE2) and Premium Efficiency (IE3), the 3/4 load efficiency is also listed in the selection tables. The part-load values stated in the tables below are averages; precise values can be provided on request.

Partial-load efficiency η in %

4/4 of full load	1/4	1/2	3/4	5/4
97	93	96.0	97.0	96.5
96	92	95.0	96.0	95.5
95	90	93.5	95.0	94.5
94	89	92.5	94.0	93.5
93	88	91.5	93.0	92.5
92	87	91.0	92.0	91.5
91	86	90.0	91.0	90.0
90	85	89.0	90.0	89.0
89	84	88.0	89.0	88.0
88	80	87.0	88.0	87.0
87	79	86.0	87.0	86.0
86	78	85.0	86.0	85.0
85	76	84.0	85.0	83.5
84	74	83.0	84.0	82.5
83	72	82.0	83.0	81.5
82	70	81.0	82.0	80.5
81	68	80.0	81.0	79.5
80	66	79.0	80.0	78.5
79	64	77.0	79.5	77.5
78	62	75.5	78.5	76.5
77	60	74.0	77.5	75.0
76	58	73.0	76.0	74.0
75	56	72.0	75.0	73.0
74	55	71.0	74.0	72.0
73	54	70.0	73.0	71.0
72	53	68.0	72.0	70.0
71	52	67.0	71.0	69.0
70	51	66.0	70.0	68.0
69	50	65.0	69.0	67.0
68	49	64.0	67.5	66.0
67	48	62.0	66.5	65.0
66	47	61.0	65.0	64.0
65	46	60.0	64.0	63.0
64	45	59.0	63.0	62.0
63	44	57.0	62.0	61.0
62	43	56.0	60.5	60.5
61	42	55.0	59.5	59.5
60	41	54.0	58.5	58.5

EMC measures

SIMOGEAR geared motors are designed as components for installation in systems and machines. The manufacturer of the system or machine is responsible for complying with EMC Directive 2004/108/EC.

LA and LE motors, when correctly used in continuous operation connected to the line supply, fulfill basic EMC standards EN 50081 and EN 50082.

Motors

Standard Efficiency IE1

IE1

Selection and ordering data

Frame size	Motor	P_{rated}	n_{rated}	T_{rated}	I_{rated}	$\cos \varphi$		η	Efficiency class	I_{St}/I_{rated}	Article No.				Order code		
		kW	rpm	Nm	A	50 Hz: 400 V 60 Hz: 460 V	4/4 load	3/4 load			acc. to IEC 60034-30	Data position				Power No. poles	
												9th	10th	11th	12th		
4-pole, 1 500 rpm at 50 Hz																	
63	LA63MD4	0.09	1 400	0.61	0.42	0.61	51.30	45.80	-	2.90	B	B	1	1	-	-	
	LA63ME4	0.12	1 350	0.85	0.42	0.75	53.60	52.10	-	2.80	B	C	1	1	-	-	
	LA63MF4	0.18	1 350	1.27	0.58	0.76	58.30	56.80	-	3.00	B	D	1	1	-	-	
71	LA71MG4	0.25	1 350	1.77	0.77	0.78	61.90	60.40	-	3.00	C	D	1	1	-	-	
	LA71MH4	0.37	1 370	2.58	1.06	0.78	65.80	64.80	-	3.30	C	E	1	1	-	-	
	LA71ZML4	0.55	1 370	3.83	1.54	0.73	70.00	69.00	-	3.70	C	H	1	1	-	-	
80	LE80MB4	0.55	1 440	3.65	1.64	0.69	70.00	68.40	-	4.60	D	B	2	1	-	-	
	LE80MF4 ¹⁾	0.75	1 430	5.01	2.00	0.75	72.10	72.00	IE1	4.70	D	D	2	1	-	-	
90	LE90SE4 ¹⁾	1.10	1 425	7.37	2.80	0.76	75.00	75.40	IE1	5.00	E	L	2	1	-	-	
	LE90LD4 ¹⁾	1.50	1 420	10.1	3.70	0.76	77.20	77.40	IE1	4.90	E	N	2	1	-	-	
100	LE100LB4 ¹⁾	2.20	1 425	14.7	4.90	0.81	79.70	80.50	IE1	5.10	F	L	2	1	-	-	
	LE100LH4 ¹⁾	3.00	1 425	20.1	6.30	0.85	81.50	83.00	IE1	5.40	F	N	2	1	-	-	
112	LE112ME4 ¹⁾	4.00	1 435	26.6	8.20	0.85	83.10	84.50	IE1	5.30	G	H	2	1	-	-	
132	LE132SF4 ¹⁾	5.50	1 450	36.2	11.20	0.82	84.70	85.70	IE1	5.70	H	F	2	1	-	-	
	LE132ME4 ¹⁾	7.50	1 450	49.4	15.20	0.82	86.00	86.90	IE1	6.60	H	J	2	1	-	-	
	LE132ZMSA4 ¹⁾	9.20	1 450	60.6	18.00	0.84	87.60	O. R.	IE1	7.40	H	V	2	1	-	-	
4-pole, 1 800 rpm at 60 Hz, 50 Hz power																	
63	LA63MD4	0.09	1 695	0.51	0.41	0.60	46.00	41.00	-	3.30	B	B	1	1	-	-	
	LA63ME4	0.12	1 670	0.69	0.42	0.68	54.10	51.80	-	3.20	B	C	1	1	-	-	
	LA63MF4	0.18	1 690	1.02	0.56	0.70	58.80	56.40	-	3.30	B	D	1	1	-	-	
71	LA71MG4	0.25	1 675	1.43	0.74	0.65	65.50	63.00	-	3.60	C	D	1	1	-	-	
	LA71MH4	0.37	1 695	2.08	0.97	0.66	73.00	71.80	-	4.20	C	E	1	1	-	-	
	LA71ZML4	0.55	1 680	3.13	1.41	0.68	72.20	71.00	-	4.20	C	H	1	1	-	-	
80	LE80MB4	0.55	1 745	3.01	1.41	0.69	74.00	73.00	-	5.70	D	B	2	1	-	-	
	LE80MF4 ¹⁾	0.75	1 735	4.13	1.70	0.75	77.00	76.60	IE1	5.60	D	D	2	1	-	-	
90	LE90SE4 ¹⁾	1.10	1 730	6.07	2.35	0.77	79.00	79.20	IE1	5.90	E	L	2	1	-	-	
	LE90LD4 ¹⁾	1.50	1 730	8.28	3.15	0.77	81.50	81.70	IE1	6.40	E	N	2	1	-	-	
100	LE100LB4 ¹⁾	2.20	1 720	12.2	4.30	0.82	83.00	83.00	-	5.80	F	L	2	1	-	-	
	LE100LH4 ¹⁾	3.00	1 725	16.6	5.50	0.86	85.00	85.00	-	6.00	F	N	2	1	-	-	
112	LE112ME4 ¹⁾	4.00	1 730	22.1	7.30	0.85	85.00	85.00	-	5.80	G	H	2	1	-	-	
132	LE132SF4 ¹⁾	5.50	1 745	30.1	9.90	0.84	87.00	87.00	-	6.70	H	F	2	1	-	-	
	LE132ME4 ¹⁾	7.50	1 750	40.9	13.40	0.84	87.50	87.50	-	7.00	H	J	2	1	-	-	
	LE132ZMSA4 ¹⁾	9.20	1 760	49.9	15.4	0.85	88.50	O. R.	IE1	9.10	H	V	2	1	-	-	

O. R. On request

¹⁾ Only as brake motor or motor for intermittent duty S3 - 75 %

Selection and ordering data (continued)

Frame size	Motor	T_{S2}/T_{rated}	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{pA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code	
										Data position	Power	No. poles			
		-	-	-	dB (A)	dB (A)	1/h	10^{-4} kgm ²	kg	9th	10th	11th	12th		
4-pole, 1 500 rpm at 50 Hz															
63	LA63MD4	2.60	2.70	2.30	42	53	20 000	2.9	3.20	B B	1 1	-	-	-	-
	LA63ME4	1.90	2.00	1.70	42	53	20 000	2.9	3.20	B C	1 1	-	-	-	-
	LA63MF4	1.90	1.90	1.60	42	53	15 000	3.7	3.60	B D	1 1	-	-	-	-
71	LA71MG4	1.90	1.90	1.50	44	55	10 000	5.2	4.30	C D	1 1	-	-	-	-
	LA71MH4	1.90	2.10	1.60	44	55	10 000	7.7	5.80	C E	1 1	-	-	-	-
	LA71ZML4	2.30	2.30	2.10	46	57	9 000	11.0	8.10	C H	1 1	-	-	-	-
80	LE80MB4	2.20	2.80	2.40	53	64	9 000	O. R.	O. R.	D B	2 1	-	-	-	-
	LE80MF4 ¹⁾	2.10	2.50	2.30	53	64	9 000	O. R.	O. R.	D D	2 1	-	-	-	-
90	LE90SE4 ¹⁾	2.20	2.60	2.40	56	67	7 500	O. R.	O. R.	E L	2 1	-	-	-	-
	LE90LD4 ¹⁾	2.40	2.60	2.60	58	69	7 500	O. R.	O. R.	E N	2 1	-	-	-	-
100	LE100LB4 ¹⁾	2.20	2.30	2.40	60	72	6 000	59.0	21.00	F L	2 1	-	-	-	-
	LE100LH4 ¹⁾	2.40	2.60	2.60	60	72	6 000	78.0	25.00	F N	2 1	-	-	-	-
112	LE112ME4 ¹⁾	2.20	2.60	2.40	58	70	5 000	100.0	31.00	G H	2 1	-	-	-	-
132	LE132SF4 ¹⁾	2.30	2.70	2.50	64	76	3 000	190.0	44.00	H F	2 1	-	-	-	-
	LE132ME4 ¹⁾	2.60	3.10	2.80	64	76	3 000	240.0	51.00	H J	2 1	-	-	-	-
	LE132ZMSA4 ¹⁾	2.20	3.20	O. R.	65	77	1 600	330.0	O. R.	H V	2 1	-	-	-	-
4-pole, 1 800 rpm at 60 Hz, 50 Hz power															
63	LA63MD4	3.20	3.30	2.90	46	57	15 000	2.9	3.20	B B	1 1	-	-	-	-
	LA63ME4	2.30	2.40	2.10	46	57	15 000	2.9	3.20	B C	1 1	-	-	-	-
	LA63MF4	2.30	2.30	2.00	46	57	12 000	3.7	3.60	B D	1 1	-	-	-	-
71	LA71MG4	2.20	2.30	1.80	48	59	8 000	5.2	4.30	C D	1 1	-	-	-	-
	LA71MH4	2.30	2.50	2.00	48	59	8 000	7.7	5.80	C E	1 1	-	-	-	-
	LA71ZML4	2.50	2.50	2.30	48	59	7 000	O. R.	O. R.	C H	1 1	-	-	-	-
80	LE80MB4	2.40	3.30	2.60	55	66	7 000	O. R.	O. R.	D B	2 1	-	-	-	-
	LE80MF4 ¹⁾	2.30	2.80	2.50	55	66	7 000	O. R.	O. R.	D D	2 1	-	-	-	-
90	LE90SE4 ¹⁾	2.50	3.00	2.80	54	65	6 000	O. R.	O. R.	E L	2 1	-	-	-	-
	LE90LD4 ¹⁾	2.60	3.00	2.90	55	66	6 000	O. R.	O. R.	E N	2 1	-	-	-	-
100	LE100LB4 ¹⁾	2.20	2.40	2.40	62	74	5 000	59.0	21.00	F L	2 1	-	-	-	-
	LE100LH4 ¹⁾	2.20	2.30	2.40	62	74	5 000	78.0	25.00	F N	2 1	-	-	-	-
112	LE112ME4 ¹⁾	2.10	2.70	O. R.	62	74	5 000	100.0	31.00	G H	2 1	-	-	-	-
132	LE132SF4 ¹⁾	2.20	2.80	O. R.	68	80	3 000	190.0	44.00	H F	2 1	-	-	-	-
	LE132ME4 ¹⁾	2.40	3.00	O. R.	68	80	3 000	240.0	51.00	H J	2 1	-	-	-	-
	LE132ZMSA4 ¹⁾	2.40	3.70	O. R.	69	81	1 600	330.0	O. R.	H V	2 1	-	-	-	-

O. R. On request

¹⁾ Only as brake motor or motor for intermittent duty S3 - 75 %

Motors

Standard Efficiency IE1

IE1

Selection and ordering data (continued)

Frame size	Motor	P_{rated} kW	n_{rated} rpm	T_{rated} Nm	I_{rated} A	$\cos \varphi$		η		Efficiency class acc. to IEC 60034-30	I_{st}/I_{rated}	Article No.				Order code		
						60 Hz: 460 V 87 Hz: 400 V	4/4 load	3/4 load	Data position				Power	No. poles				
													9th	10th	11th	12th		
4-pole, 1 800 rpm at 60 Hz, 60 Hz power																		
63	LA63MD4	0.11	1 675	0.63	0.42	0.64	51.80	46.20	-	3.20	B B	1 1	-	-	-	-		
	LA63ME4	0.14	1 650	0.81	0.43	0.74	56.00	54.50	-	3.10	B C	1 1	-	-	-	-		
	LA63MF4	0.21	1 650	1.22	0.59	0.77	58.30	56.80	-	3.10	B D	1 1	-	-	-	-		
71	LA71MG4	0.29	1 650	1.68	0.76	0.77	61.90	60.40	-	3.30	C D	1 1	-	-	-	-		
	LA71MH4	0.43	1 670	2.46	1.08	0.76	65.80	64.80	-	3.80	C E	1 1	-	-	-	-		
	LA71ZML4	0.66	1 665	3.79	1.54	0.74	72.80	71.80	-	3.80	C H	1 1	-	-	-	-		
80	LE80MB4	0.63	1 740	3.46	1.55	0.69	74.00	72.90	IE1	5.40	D B	2 1	-	-	-	-		
	LE80MF4 ¹⁾	0.86	1 730	4.75	1.87	0.75	77.00	76.90	IE1	5.30	D D	2 1	-	-	-	-		
90	LE90SE4 ¹⁾	1.27	1 725	7.03	2.60	0.77	79.00	79.30	IE1	5.60	E L	2 1	-	-	-	-		
	LE90LD4 ¹⁾	1.75	1 720	9.72	3.50	0.77	81.50	82.00	IE1	6.00	E N	2 1	-	-	-	-		
100	LE100LB4 ¹⁾	2.55	1 720	14.2	4.70	0.82	83.00	83.00	IE1	5.80	F L	2 1	-	-	-	-		
	LE100LH4 ¹⁾	3.45	1 725	19.1	5.90	0.86	85.00	85.00	IE1	6.00	F N	2 1	-	-	-	-		
112	LE112ME4 ¹⁾	4.55	1 730	25.1	7.90	0.85	85.00	85.00	IE1	5.80	G H	2 1	-	-	-	-		
132	LE132SF4 ¹⁾	6.30	1 745	34.5	10.80	0.84	87.00	87.00	IE1	6.70	H F	2 1	-	-	-	-		
	LE132ME4 ¹⁾	8.60	1 750	46.9	14.70	0.84	87.50	87.50	IE1	7.00	H J	2 1	-	-	-	-		
	LE132ZMSA4 ¹⁾	10.50	1 750	57.3	17.70	0.85	88.50	O. R.	IE1	8.00	H V	2 1	-	-	-	-		
4-pole, 2 610 rpm at 87 Hz power																		
63	LA63MD4	0.15	2 530	0.57	0.64	0.54	63.00	-	-	-	B B	1 1	P91	-	-	-		
	LA63ME4 ¹⁾	0.20	2 460	0.78	0.70	0.73	56.50	-	-	-	B C	1 1	P91	-	-	-		
	LA63MF4 ¹⁾	0.30	2 460	1.16	0.97	0.76	59.00	-	-	-	B D	1 1	P91	-	-	-		
71	LA71MG4 ¹⁾	0.45	2 460	1.75	1.40	0.78	59.50	-	-	-	C D	1 1	P91	-	-	-		
	LA71MH4 ¹⁾	0.65	2 480	2.50	1.80	0.79	66.00	-	-	-	C E	1 1	P91	-	-	-		
	LA71ZML4	0.95	2 480	3.66	2.68	0.73	70.00	-	-	-	C H	1 1	P91	-	-	-		
80	LE80MB4	0.95	2 570	3.53	2.80	0.66	74.20	-	-	-	D B	2 1	P91	-	-	-		
	LE80MF4	1.30	2 550	4.87	3.50	0.71	75.50	-	-	-	D D	2 1	P92	-	-	-		
90	LE90SE4	1.90	2 540	7.14	4.70	0.71	82.20	-	-	-	E L	2 1	P92	-	-	-		
	LE90LD4	2.60	2535	9.79	6.40	0.71	82.60	-	-	-	E N	2 1	P92	-	-	-		
100	LE100LB4	3.80	2 540	14.3	8.30	0.77	81.70	-	-	-	F L	2 1	P92	-	-	-		
	LE100LH4	5.00	2 540	18.8	10.80	0.80	83.80	-	-	-	F N	2 1	P92	-	-	-		
112	LE112ME4	6.50	2 550	24.3	13.60	0.81	85.30	-	-	-	G H	2 1	P92	-	-	-		
132	LE132SF4	9.00	2 560	33.6	19.20	0.79	85.70	-	-	-	H F	2 1	P92	-	-	-		
	LE132ME4	13.00	2 560	48.5	26.50	0.79	86.20	-	-	-	H J	2 1	P92	-	-	-		
	LE132ZMSA4	16.00	O. R.	O. R.	O. R.	O. R.	O. R.	-	-	-	H V	2 1	P92	-	-	-		

O. R. On request

¹⁾ Only as brake motor or motor for intermittent duty S3 - 75 %

Selection and ordering data (continued)

Frame size	Motor	T_{St}/T_{rated}	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{pFA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code		
										Data position	Power	No. poles				
											9th	10th	11th	12th		
4-pole, 1 800 rpm at 60 Hz, 60 Hz power																
63	LA63MD4	2.50	2.70	2.30	46	57	15 000	2.9	3.20	B B	1 1	-	-			
	LA63ME4	2.00	2.10	1.80	46	57	15 000	2.9	3.20	B C	1 1	-	-			
	LA63MF4	2.00	2.00	1.70	46	57	12 000	3.7	3.60	B D	1 1	-	-			
71	LA71MG4	1.90	2.00	1.60	48	59	8 000	5.2	4.30	C D	1 1	-	-			
	LA71MH4	2.00	2.20	1.70	48	59	8 000	7.7	5.80	C E	1 1	-	-			
	LA71ZML4	2.40	2.40	2.20	50	61	7 000	11.0	8.10	C H	1 1	-	-			
80	LE80MB4	2.30	3.10	2.50	55	66	7 000	O. R.	O. R.	D B	2 1	-	-			
	LE80MF4 ¹⁾	2.20	2.70	2.40	55	66	7 000	O. R.	O. R.	D D	2 1	-	-			
90	LE90SE4 ¹⁾	2.40	2.80	2.60	54	65	6 000	O. R.	O. R.	E L	2 1	-	-			
	LE90LD4 ¹⁾	2.50	2.80	2.80	55	66	6 000	O. R.	O. R.	E N	2 1	-	-			
100	LE100LB4 ¹⁾	2.20	2.40	2.40	62	74	5 000	59.0	21.00	F L	2 1	-	-			
	LE100LH4 ¹⁾	2.20	2.30	2.40	62	74	5 000	78.0	25.00	F N	2 1	-	-			
112	LE112ME4 ¹⁾	2.10	2.70	2.30	62	74	5 000	100.0	31.00	G H	2 1	-	-			
132	LE132SF4 ¹⁾	2.20	2.80	2.40	68	80	3 000	190.0	44.00	H F	2 1	-	-			
	LE132ME4 ¹⁾	2.40	3.00	2.60	68	80	3 000	240.0	51.00	H J	2 1	-	-			
	LE132ZMSA4 ¹⁾	2.10	3.20	O. R.	69	81	1 600	330.0	O. R.	H V	2 1	-	-			
4-pole, 2 610 rpm at 87 Hz power																
63	LA63MD4	-	2.90	-	O. R.	O. R.	-	2.9	3.20	B B	1 1	P91	-			
	LA63ME4 ¹⁾	-	2.10	-	O. R.	O. R.	-	2.9	3.20	B C	1 1	P91	-			
	LA63MF4 ¹⁾	-	2.00	-	O. R.	O. R.	-	3.7	3.60	B D	1 1	P91	-			
71	LA71MG4 ¹⁾	-	1.90	-	O. R.	O. R.	-	5.2	4.30	C D	1 1	P91	-			
	LA71MH4 ¹⁾	-	2.10	-	O. R.	O. R.	-	7.7	5.80	C E	1 1	P91	-			
	LA71ZML4	-	2.30	-	O. R.	O. R.	-	11.0	8.10	C H	1 1	P91	-			
80	LE80MB4	-	2.80	-	O. R.	O. R.	-	O. R.	O. R.	D B	2 1	P91	-			
	LE80MF4	-	2.50	-	O. R.	O. R.	-	O. R.	O. R.	D D	2 1	P92	-			
90	LE90SE4	-	2.60	-	O. R.	O. R.	-	O. R.	O. R.	E L	2 1	P92	-			
	LE90LD4	-	2.60	-	O. R.	O. R.	-	O. R.	O. R.	E N	2 1	P92	-			
100	LE100LB4	-	2.50	-	O. R.	O. R.	-	59.0	21.00	F L	2 1	P92	-			
	LE100LH4	-	2.70	-	O. R.	O. R.	-	78.0	25.00	F N	2 1	P92	-			
112	LE112ME4	-	2.8	-	O. R.	O. R.	-	100.0	31.00	G H	2 1	P92	-			
132	LE132SF4	-	2.9	-	O. R.	O. R.	-	190.0	44.00	H F	2 1	P92	-			
	LE132ME4	-	3.2	-	O. R.	O. R.	-	240.0	51.00	H J	2 1	P92	-			
	LE132ZMSA4	-	O. R.	-	O. R.	O. R.	-	330.0	O. R.	H V	2 1	P92	-			

O. R. On request

¹⁾ Only as brake motor or motor for intermittent duty S3 - 75 %

Motors

High Efficiency IE2

IE2

Selection and ordering data

Frame size	Motor	P_{rated}	n_{rated}	T_{rated}	I_{rated}	$\cos \varphi$		η	Efficiency class	I_{st}/I_{rated}	Article No.				Order code		
		kW	rpm	Nm	A	4/4 load	3/4 load	acc. to IEC 60034-30			Data position				Power	No. poles	
				50/87 Hz: 400 V 60 Hz: 460 V				4/4 load	3/4 load			9th	10th	11th	12th		
								%	%								
4-pole, 1 500 rpm at 50 Hz																	
80	LE80MD4E	0.55	1 440	3.65	1.39	0.74	77.10	76.80	-	5.30	D	C	2	2	-	-	
	LE80MH4E	0.75	1 440	4.97	1.79	0.76	79.60	79.90	IE2	5.60	D	E	2	2	-	-	
90	LE90SG4E	1.10	1 425	7.37	2.50	0.78	81.40	81.80	IE2	5.60	E	K	2	2	-	-	
	LE90LH4E	1.50	1 435	9.98	3.30	0.79	82.80	83.50	IE2	6.40	E	M	2	2	-	-	
100	LE100LE4E	2.20	1 455	14.4	4.65	0.81	84.30	85.10	IE2	6.90	F	L	2	2	-	-	
	LE100LK4E	3.00	1 455	19.7	6.20	0.82	85.50	86.40	IE2	6.90	F	M	2	2	-	-	
112	LE112ME4E	4.00	1 460	26.2	8.20	0.81	86.60	87.30	IE2	7.10	G	H	2	2	-	-	
132	LE132SF4E	5.50	1 465	35.9	11.30	0.80	87.70	89.00	IE2	6.90	H	G	2	2	-	-	
	LE132MF4E	7.50	1 465	48.9	14.70	0.83	88.70	90.30	IE2	6.90	H	J	2	2	-	-	
	LE132ZMM4E	9.20	1 455	60.4	17.90	0.83	89.30	O. R.	IE2	7.10	H	V	2	2	-	-	
4-pole, 1 800 rpm at 60 Hz, 50 Hz power																	
80	LE80MD4E	0.55	1 750	3.00	1.29	0.71	75.50	74.60	-	6.40	D	C	2	2	-	-	
	LE80MH4E	0.75	1 750	4.09	1.68	0.72	78.00	77.40	IE2	6.80	D	E	2	2	-	-	
90	LE90SG4E	1.10	1 740	6.04	2.20	0.74	84.00	83.70	IE2	7.00	E	K	2	2	-	-	
	LE90LH4E	1.50	1 745	8.21	3.00	0.75	84.00	84.00	IE2	7.50	E	M	2	2	-	-	
100	LE100LE4E	2.20	1 760	11.9	4.05	0.78	87.50	88.30	IE2	8.10	F	L	2	2	-	-	
	LE100LK4E	3.00	1 765	16.2	5.40	0.79	87.50	86.00	IE2	8.30	F	M	2	2	-	-	
112	LE112ME4E	3.70	1 770	20	6.90	0.77	87.50	87.00	IE2	8.70	G	H	2	2	-	-	
132	LE132SF4E	5.50	1 770	29.7	9.90	0.78	89.50	89.60	IE2	8.00	H	G	2	2	-	-	
	LE132MF4E	7.50	1 770	40.5	12.80	0.82	89.50	90.30	IE2	8.00	H	J	2	2	-	-	
	LE132ZMM4E	9.20	1 760	49.9	15.50	0.82	89.50	O. R.	IE2	8.10	H	V	2	2	-	-	
4-pole, 1 800 rpm at 60 Hz, 60 Hz power																	
80	LE80MD4E	0.63	1 735	3.47	1.42	0.74	75.50	75.80	-	5.70	D	C	2	2	-	-	
	LE80MH4E	0.86	1 740	4.72	1.82	0.76	78.00	78.50	IE2	6.20	D	E	2	2	-	-	
90	LE90SG4E	1.27	1 725	7.03	2.45	0.78	84.00	84.70	IE2	6.10	E	K	2	2	-	-	
	LE90LH4E	1.75	1 730	9.66	3.30	0.79	84.00	85.00	IE2	6.70	E	M	2	2	-	-	
100	LE100LE4E	2.55	1 755	13.9	4.45	0.82	87.50	87.90	IE2	7.30	F	L	2	2	-	-	
	LE100LK4E	3.45	1 755	18.8	6.00	0.82	87.50	88.20	IE2	7.50	F	M	2	2	-	-	
112	LE112ME4E	4.55	1 760	24.7	8.00	0.82	87.50	88.00	IE2	7.50	G	H	2	2	-	-	
132	LE132SF4E	6.30	1 765	34.1	10.90	0.81	89.50	89.80	IE2	7.30	H	G	2	2	-	-	
	LE132MF4E	8.60	1 765	46.5	14.50	0.83	89.50	90.50	IE2	7.10	H	J	2	2	-	-	
	LE132ZMM4E	10.50	1 760	57	17.70	0.83	91.00	O. R.	IE2	7.20	H	V	2	2	-	-	
4-pole, 2 610 rpm at 87 Hz, 400 V, duty type S9																	
80	LE80MD4E	0.95	2 555	3.55	2.45	0.68	82.10	-	-	-	D	C	2	2	P91	-	
	LE80MH4E	1.30	2 555	4.86	3.20	0.71	83.00	-	-	-	D	E	2	2	P91	-	
90	LE90SG4E	1.90	2 540	7.14	4.50	0.72	84.30	-	-	-	E	K	2	2	P91	-	
	LE90LH4E	2.50	2 550	9.36	5.80	0.73	85.70	-	-	-	E	M	2	2	P91	-	
100	LE100LE4E	3.60	2 570	13.4	7.50	0.79	87.80	-	-	-	F	L	2	2	P91	-	
	LE100LK4E	5.00	2 565	18.6	10.30	0.80	88.00	-	-	-	F	M	2	2	P91	-	
112	LE112ME4E	6.50	2 570	24.2	14.00	0.76	88.20	-	-	-	G	H	2	2	P91	-	
132	LE132SF4E	9.00	2 575	33.4	18.80	0.78	88.60	-	-	-	H	G	2	2	P91	-	
	LE132MF4E	12.50	2 575	46.4	24.50	0.82	89.80	-	-	-	H	J	2	2	P91	-	
	LE132ZMM4E	16.00	2 570	59.5	30.50	0.82	90.00	-	-	-	H	V	2	2	P91	-	

O. R. On request

Selection and ordering data (continued)

Frame size	Motor	T_{S1}/T_{rated}	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{ptA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code	
										Data position	Power	No. poles		9th	10th
		-	-	-	dB (A)	dB (A)	1/h	10^{-4} kgm ² kg							
4-pole, 1 500 rpm at 50 Hz															
80	LE80MD4E	2.20	3.10	2.40	53	64	9 000	17	9.30	D C	2 2	-	-	-	-
	LE80MH4E	2.20	3.10	2.40	53	64	9 000	21	10.00	D E	2 2	-	-	-	-
90	LE90SG4E	2.30	2.90	2.50	56	68	10 000	28	12.00	E K	2 2	-	-	-	-
	LE90LH4E	2.60	3.40	2.80	56	68	10 000	36	15.00	E M	2 2	-	-	-	-
100	LE100LE4E	2.10	3.30	2.30	60	72	6 000	86	20.00	F L	2 2	-	-	-	-
	LE100LK4E	2.00	3.10	2.20	60	72	6 000	110	24.00	F M	2 2	-	-	-	-
112	LE112ME4E	2.50	3.20	2.70	58	70	5 000	140	24.00	G H	2 2	-	-	-	-
	LE132SF4E	2.30	2.90	2.50	64	76	3 000	270	35.00	H G	2 2	-	-	-	-
132	LE132MF4E	2.30	2.90	2.50	64	76	3 000	340	42.00	H J	2 2	-	-	-	-
	LE132ZMM4E	2.30	3.10	O. R.	64	76	1 600	410	O. R.	H V	2 2	-	-	-	-
4-pole, 1 800 rpm at 60 Hz, 50 Hz power															
80	LE80MD4E	2.70	3.80	3.00	55	66	7 000	17	9.30	D C	2 2	-	-	-	-
	LE80MH4E	2.50	3.80	2.80	55	66	7 000	21	10.00	D E	2 2	-	-	-	-
90	LE90SG4E	2.70	3.60	3.00	58	70	8 000	28	12.00	E K	2 2	-	-	-	-
	LE90LH4E	2.90	4.00	3.20	58	70	8 000	36	15.00	E M	2 2	-	-	-	-
100	LE100LE4E	2.50	3.90	2.80	62	74	5 000	86	20.00	F L	2 2	-	-	-	-
	LE100LK4E	2.40	3.70	2.60	62	74	5 000	110	24.00	F M	2 2	-	-	-	-
112	LE112ME4E	3.00	4.00	O. R.	62	74	5 000	140	24.00	G H	2 2	-	-	-	-
132	LE132SF4E	2.60	3.30	O. R.	68	80	3 000	270	35.00	H G	2 2	-	-	-	-
	LE132MF4E	2.70	3.40	O. R.	68	80	3 000	340	42.00	H J	2 2	-	-	-	-
	LE132ZMM4E	2.50	3.60	O. R.	64	76	1 600	410	O. R.	H V	2 2	-	-	-	-
4-pole, 1 800 rpm at 60 Hz, 60 Hz power															
80	LE80MD4E	2.40	3.30	2.60	55	66	7 000	17	9.30	D C	2 2	-	-	-	-
	LE80MH4E	2.20	3.30	2.40	55	66	7 000	21	10.00	D E	2 2	-	-	-	-
90	LE90SG4E	2.30	3.00	2.50	58	70	8 000	28	12.00	E K	2 2	-	-	-	-
	LE90LH4E	2.50	3.40	2.80	58	70	8 000	36	15.00	E M	2 2	-	-	-	-
100	LE100LE4E	2.10	3.30	2.30	62	74	5 000	86	20.00	F L	2 2	-	-	-	-
	LE100LK4E	2.00	3.10	2.20	62	74	5 000	110	24.00	F M	2 2	-	-	-	-
112	LE112ME4E	2.40	3.20	2.60	62	74	5 000	140	24.00	G H	2 2	-	-	-	-
132	LE132SF4E	2.30	2.90	2.50	68	80	3 000	270	35.00	H G	2 2	-	-	-	-
	LE132MF4E	2.30	2.90	2.50	68	80	3 000	340	42.00	H J	2 2	-	-	-	-
	LE132ZMM4E	2.10	3.00	O. R.	64	76	1 600	410	O. R.	H V	2 2	-	-	-	-
4-pole, 2 610 rpm at 87 Hz, 400 V, duty type S9															
80	LE80MD4E	-	3.10	-	O. R.	O. R.	-	17	9.30	D C	2 2	P91	-	-	-
	LE80MH4E	-	3.10	-	O. R.	O. R.	-	21	10.00	D E	2 2	P91	-	-	-
90	LE90SG4E	-	2.90	-	O. R.	O. R.	-	28	12.00	E K	2 2	P91	-	-	-
	LE90LH4E	-	3.60	-	O. R.	O. R.	-	36	15.00	E M	2 2	P91	-	-	-
100	LE100LE4E	-	3.50	-	O. R.	O. R.	-	86	20.00	F L	2 2	P91	-	-	-
	LE100LK4E	-	3.20	-	O. R.	O. R.	-	110	24.00	F M	2 2	P91	-	-	-
112	LE112ME4E	-	3.4	-	O. R.	O. R.	-	140	24.00	G H	2 2	P91	-	-	-
132	LE132SF4E	-	3.1	-	O. R.	O. R.	-	270	35.00	H G	2 2	P91	-	-	-
	LE132MF4E	-	3.0	-	O. R.	O. R.	-	340	42.00	H J	2 2	P91	-	-	-
	LE132ZMM4E	-	3.1	-	O. R.	O. R.	-	410	O. R.	H V	2 2	P91	-	-	-

O. R. On request

Motors

Premium Efficiency IE3

IE3

Selection and ordering data

Frame size	Motor	P_{rated}	n_{rated}	T_{rated}	I_{rated}	$\cos \varphi$	η		I_{St}/I_{rated}	Article No.	Order code					
		kW	rpm	Nm	A		50/87 Hz: 400 V 60 Hz: 460 V	4/4 load			3/4 load	Data position	Power	No. poles		
												9th	10th	11th	12th	
4-pole, 1 500 rpm at 50 Hz																
80	LE80ZMQ4P	0.75	1 450	4.94	1.75	0.75	82.50	82.30	IE3	7.10	D F 2 3	-	-			
90	LE90SM4P	1.10	1 440	7.29	2.40	0.78	84.10	84.70	IE3	6.90	E K 2 3	-	-			
	LE90ZLR4P	1.50	1 445	9.91	3.15	0.80	85.30	85.90	IE3	7.20	E M 2 3	-	-			
100	LE100ZLSA4P	2.20	1 465	14.3	4.40	0.83	86.70	87.30	IE3	7.60	F N 2 3	-	-			
	LE100ZLSB4P	3.00	1 460	19.6	5.90	0.83	87.70	88.40	IE3	7.30	F P 2 3	-	-			
112	LE112ZMKB4P	4.00	1 460	26.2	7.90	0.82	88.60	88.60	IE3	7.10	G J 2 3	-	-			
132	LE132ZST4P	5.50	1 470	35.7	10.50	0.84	89.60	89.60	IE3	7.20	H J 2 3	-	-			
	LE132ZMS4P	7.50	1 470	48.7	14.30	0.84	90.40	90.40	IE3	7.40	H L 2 3	-	-			
4-pole, 1 800 rpm at 60 Hz, 50 Hz power																
80	LE80ZMQ4P	0.75	1 760	4.07	1.59	0.71	83.50	82.60	IE3	8.30	D F 2 3	-	-			
90	LE90SM4P	1.10	1 750	6	2.15	0.75	86.50	86.40	IE3	8.20	E K 2 3	-	-			
	LE90ZLR4P	1.50	1 755	8.16	2.85	0.77	86.50	86.40	IE3	8.40	E M 2 3	-	-			
100	LE100ZLSA4P	2.20	1 770	11.9	3.90	0.81	87.50	87.40	IE2	8.70	F N 2 3	-	-			
	LE100ZLSB4P	3.00	1 765	16.2	5.20	0.81	89.50	89.60	IE3	8.60	F P 2 3	-	-			
112	LE112ZMKB4P	3.70	1 770	20	6.50	0.80	89.50	89.50	IE3	8.20	G J 2 3	-	-			
132	LE132ZST4P	5.50	1 775	29.6	9.10	0.83	89.50	89.50	IE2	8.20	H J 2 3	-	-			
	LE132ZMS4P	7.50	1 775	40.3	12.40	0.83	89.50	89.50	IE2	8.50	H L 2 3	-	-			
4-pole, 1 800 rpm at 60 Hz, 60 Hz power																
80	LE80ZMQ4P	0.86	1 755	4.68	1.72	0.75	83.50	83.20	IE3	7.70	D F 2 3	-	-			
90	LE90SM4P	1.27	1 740	6.97	2.35	0.79	86.50	86.90	IE3	7.40	E K 2 3	-	-			
	LE90ZLR4P	1.75	1 740	9.6	3.15	0.80	86.50	87.00	IE3	7.50	E M 2 3	-	-			
100	LE100ZLSA4P	2.55	1 760	13.8	4.35	0.84	87.50	87.90	IE2	7.70	F N 2 3	-	-			
	LE100ZLSB4P	3.45	1 760	18.7	5.80	0.84	89.50	90.10	IE3	7.60	F P 2 3	-	-			
112	LE112ZMKB4P	4.55	1 770	24.5	7.70	0.83	89.50	89.50	IE3	8.20	G J 2 3	-	-			
132	LE132ZST4P	6.30	1 770	34	10.30	0.84	89.50	89.50	IE2	7.30	H J 2 3	-	-			
	LE132ZMS4P	8.60	1 770	46.4	13.80	0.85	89.50	89.50	IE2	7.50	H L 2 3	-	-			
4-pole, 2 610 rpm at 87 Hz power																
80	LE80ZMQ4P	1.30	2 565	4.84	3.05	0.71	86.20	-	-	-	D F 2 3	P91	-			
90	LE90SM4P	1.90	2 550	7.12	4.15	0.75	87.30	-	-	-	E K 2 3	P91	-			
	LE90ZLR4P	2.60	2 555	9.72	5.30	0.76	88.00	-	-	-	E M 2 3	P91	-			
100	LE100ZLSA4P	3.60	2 575	13.4	7.10	0.81	89.10	-	-	-	F N 2 3	P91	-			
	LE100ZLSB4P	5.00	2 570	18.6	9.80	0.82	89.60	-	-	-	F P 2 3	P91	-			
112	LE112ZMKB4P	6.50	2 575	24.1	13.00	0.81	90.20	-	-	-	G J 2 3	P91	-			
132	LE132ZST4P	9.00	2 585	33.2	17.40	0.83	90.60	-	-	-	H J 2 3	P91	-			
	LE132ZMS4P	12.50	2 580	46.3	23.50	0.83	91.20	-	-	-	H L 2 3	P91	-			

O. R. On request

Selection and ordering data (continued)

Frame size	Motor	T_{St}/T_{rated}	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{pA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code		
										Data position				Power	No. poles	
											9th	10th	11th	12th		
											-		-			
4-pole, 1 500 rpm at 50 Hz																
80	LE80ZMQ4P	2.70	3.90	3.00	53	64	15 000	29	10.00	D	F	2	3	-	-	
90	LE90SM4P	2.90	3.60	3.20	56	68	9 000	36	12.00	E	K	2	3	-	-	
	LE90ZLR4P	2.70	3.60	3.00	56	68	7 500	49	15.00	E	M	2	3	-	-	
100	LE100ZLSA4P	2.10	3.60	2.30	60	72	6 000	140	29.00	F	N	2	3	-	-	
	LE100ZLSB4P	2.30	3.70	2.50	60	72	6 000	140	29.00	F	P	2	3	-	-	
112	LE112ZMKB4P	2.40	3.70	2.60	58	70	5 100	170	29.00	G	J	2	3	-	-	
132	LE132ZST4P	2.10	3.40	3.00	64	76	4 500	460	57.00	H	J	2	3	-	-	
	LE132ZMS4P	2.40	3.50	2.80	64	76	4 500	460	57.00	H	L	2	3	-	-	
4-pole, 1 800 rpm at 60 Hz, 50 Hz power																
80	LE80ZMQ4P	3.10	4.70	3.40	55	66	12 000	29	10.00	D	F	2	3	-	-	
90	LE90SM4P	3.40	4.40	3.70	58	70	7 000	36	12.00	E	K	2	3	-	-	
	LE90ZLR4P	3.00	4.30	3.30	58	70	6 000	49	15.00	E	M	2	3	-	-	
100	LE100ZLSA4P	2.50	4.30	2.80	62	74	4 800	140	29.00	F	N	2	3	-	-	
	LE100ZLSB4P	2.60	4.30	2.90	62	74	4 800	140	29.00	F	P	2	3	-	-	
112	LE112ZMKB4P	2.90	4.30	O. R.	62	74	O. R.	170	29.00	G	J	2	3	-	-	
132	LE132ZST4P	2.60	3.90	O. R.	68	80	O. R.	460	57.00	H	J	2	3	-	-	
	LE132ZMS4P	2.40	4.00	O. R.	68	80	O. R.	460	57.00	H	L	2	3	-	-	
4-pole, 1 800 rpm at 60 Hz, 60 Hz power																
80	LE80ZMQ4P	2.70	4.10	3.00	55	66	12 000	29	10.00	D	F	2	3	-	-	
90	LE90SM4P	2.90	3.80	3.20	58	70	7 000	36	12.00	E	K	2	3	-	-	
	LE90ZLR4P	2.60	3.70	2.90	58	70	6 000	49	15.00	E	M	2	3	-	-	
100	LE100ZLSA4P	2.20	3.70	2.40	62	74	4 800	140	29.00	F	N	2	3	-	-	
	LE100ZLSB4P	2.20	3.80	2.40	62	74	4 800	140	29.00	F	P	2	3	-	-	
112	LE112ZMKB4P	2.90	4.30	2.70	62	74	O. R.	170	29.00	G	J	2	3	-	-	
132	LE132ZST4P	2.30	3.40	2.70	68	80	O. R.	460	57.00	H	J	2	3	-	-	
	LE132ZMS4P	2.10	3.50	2.50	68	80	O. R.	460	57.00	H	L	2	3	-	-	
4-pole, 2 610 rpm at 87 Hz power																
80	LE80ZMQ4P	-	3.9	-	O. R.	O. R.	-	29	10.00	D	F	2	3	P91	-	
90	LE90SM4P	-	3.6	-	O. R.	O. R.	-	36	12.00	E	K	2	3	P91	-	
	LE90ZLR4P	-	2.8	-	O. R.	O. R.	-	49	15.00	E	M	2	3	P91	-	
100	LE100ZLSA4P	-	3.8	-	O. R.	O. R.	-	140	29.00	F	N	2	3	P91	-	
	LE100ZLSB4P	-	3.9	-	O. R.	O. R.	-	140	29.00	F	P	2	3	P91	-	
112	LE112ZMKB4P	-	3.9	-	O. R.	O. R.	-	170	29.00	G	J	2	3	P91	-	
132	LE132ZST4P	-	3.6	-	O. R.	O. R.	-	460	57.00	H	J	2	3	P91	-	
	LE132ZMS4P	-	3.7	-	O. R.	O. R.	-	460	57.00	H	L	2	3	P91	-	

O. R. On request

Motors

NEMA Premium Efficient motors MG1, Table 12-12



Selection and ordering data

Frame size	Motor	P_{rated}		n_{rated}	T_{rated}	EISA	I_{rated}	$\cos \varphi$	η		I_{St}/I_{rated}	T_{St}/T_{rated}
		kW	hp						rpm	Nm		
4-pole, 1 800 rpm at 60 Hz, 50 Hz power												
63	LA63MD4	0.09	0.12	1 695	0.51	-	0.41	0.60	46.00	41.00	3.30	3.20
	LA63ME4	0.12	0.16	1 670	0.69	-	0.42	0.68	54.10	51.80	3.20	2.30
	LA63MF4	0.18	0.25	1 690	1.02	-	0.56	0.70	58.80	56.40	3.30	2.30
71	LA71MG4	0.25	0.33	1 675	1.43	-	0.74	0.65	65.50	63.00	3.60	2.20
	LA71MH4	0.37	0.50	1 695	2.08	-	0.97	0.66	73.00	71.80	4.20	2.30
80	LE80MD4E	0.55	0.75	1 750	3	-	1.29	0.71	75.50	74.60	6.40	2.70
	LE80ZMQ4P	0.75	1.00	1 760	4.07	✓	1.59	0.71	83.50	82.60	8.30	3.10
90	LE90SM4P	1.10	1.50	1 750	6	✓	2.15	0.75	86.50	86.40	8.20	3.40
	LE90ZLR4P	1.50	2.00	1 755	8.16	✓	2.85	0.77	86.50	86.40	8.40	3.00
100	LE100ZLSA4P	2.20	3.00	1 770	11.9	✓	3.80	0.81	89.50	89.20	9.60	3.50
	LE100ZLSB4P	3.00	4.00	1 760	16.3	✓	5.10	0.82	89.50	89.50	9.50	3.10
112	LE112ZMKB4P	3.70	5.00	1 770	20.0	✓	6.50	0.80	89.50	89.50	8.20	2.90
132	LE132ZST4P	5.50	7.50	1 780	29.5	✓	9.10	0.83	91.70	91.70	9.50	2.90
	LE132ZMS4P	7.50	10.00	1 770	40.5	✓	12.40	0.83	91.70	91.70	9.60	2.70
4-pole, 1 800 rpm at 60 Hz, 60 Hz power												
63	LA63MD4	0.11	0.15	1 695	0.62	-	0.41	0.60	46.00	41.00	3.30	3.20
	LA63ME4	0.14	0.19	1 650	0.81	-	0.43	0.74	56.00	54.50	3.10	2.00
	LA63MF4	0.21	0.28	1 650	1.22	-	0.59	0.77	58.30	56.80	3.10	2.00
71	LA71MG4	0.29	0.39	1 650	1.68	-	0.76	0.77	61.90	60.40	3.30	1.90
	LA71MH4	0.43	0.58	1 669	2.46	-	1.08	0.76	65.80	64.80	3.80	2.00
80	LE80MD4E	0.63	0.85	1 735	3.47	-	1.42	0.74	75.50	75.80	5.70	2.40
	LE80ZMQ4P	0.86	1.15	1 755	4.68	-	1.72	0.75	83.50	83.20	7.70	2.70
90	LE90SM4P	1.27	1.70	1 740	6.97	-	2.35	0.79	86.50	86.90	7.40	2.90
	LE90ZLR4P	1.75	2.35	1 740	9.6	-	3.15	0.80	86.50	87.00	7.50	2.60
100	LE100ZLSA4P	2.55	3.40	1 765	13.8	-	4.25	0.84	89.50	89.50	8.50	3.00
	LE100ZLSB4P	3.45	4.60	1 755	18.8	-	5.80	0.84	89.50	89.50	8.40	2.70
112	LE112ZMKB4P	4.55	6.10	1 760	24.7	-	7.70	0.83	89.50	89.50	7.30	2.50
132	LE132ZST4P	6.30	8.40	1 775	33.9	-	10.30	0.84	91.70	91.70	8.40	2.50
	LE132ZMS4P	8.60	11.50	1 765	46.5	-	13.80	0.85	91.70	91.70	8.40	2.30

O. R. On request


Selection and ordering data (continued)

Frame size	Motor	T_{Bk}/T_{rated}	T_A/T_{rated}	L_{pFA}	L_{WA}	Z_0	J_{mot}	m_{mot}	Article No.				Order code	
		-	-	dB (A)	dB (A)	1/h	10^{-4} kgm ²	kg	Data position 9th 10th 11th 12th	No. poles	Specification UL-R/CSA			
4-pole, 1 800 rpm at 60 Hz, 50 Hz power														
63	LA63MD4	3.30	O. R.	46	57	15 000	2.9	3.20	B	B	1	1	-	N38
	LA63ME4	2.40	O. R.	46	57	15 000	2.9	3.20	B	C	1	1	-	N38
	LA63MF4	2.30	O. R.	46	57	15 000	3.7	3.60	B	D	1	1	-	N38
71	LA71MG4	2.30	O. R.	48	59	15 000	5.2	4.30	C	D	1	1	-	N38
	LA71MH4	2.50	O. R.	48	59	15 000	7.7	5.80	C	E	1	1	-	N38
80	LE80MD4E	3.80	3.00	55	66	10 000	17	9.30	D	C	2	2	-	N38
	LE80ZMQ4P	4.70	3.40	55	66	12 000	29	10.00	D	F	2	3	-	N38
90	LE90SM4P	4.40	3.70	58	70	7 000	36	12.00	E	K	2	3	-	N38
	LE90ZLR4P	4.30	3.30	58	70	6 000	49	15.00	E	M	2	3	-	N38
100	LE100ZLSA4P	5.10	3.90	62	74	4 800	140	29.00	F	N	2	3	-	N38
	LE100ZLSB4P	4.60	3.40	62	74	4 800	140	29.00	F	P	2	3	-	N38
112	LE112ZMKB4P	4.30	O. R.	62	74	O. R.	170	29.00	G	J	2	3	-	N38
132	LE132ZST4P	4.40	O. R.	68	80	O. R.	460	57.00	H	J	2	3	-	N38
	LE132ZMS4P	4.20	O. R.	68	80	O. R.	460	57.00	H	L	2	3	-	N38
4-pole, 1 800 rpm at 60 Hz, 60 Hz power														
63	LA63MD4	3.30	O. R.	46	57	15 000	2.9	3.20	B	B	1	1	-	N38
	LA63ME4	2.10	O. R.	46	57	15 000	2.9	3.20	B	C	1	1	-	N38
	LA63MF4	2.00	O. R.	46	57	15 000	3.7	3.60	B	D	1	1	-	N38
71	LA71MG4	2.00	O. R.	48	59	15 000	5.2	4.30	C	D	1	1	-	N38
	LA71MH4	2.20	O. R.	48	59	15 000	7.7	5.80	C	E	1	1	-	N38
80	LE80MD4E	3.30	2.60	55	66	10 000	17	9.30	D	C	2	2	-	N38
	LE80ZMQ4P	4.10	3.00	55	66	12 000	29	10.00	D	F	2	3	-	N38
90	LE90SM4P	3.80	3.20	58	70	7 000	36	12.00	E	K	2	3	-	N38
	LE90ZLR4P	3.70	2.90	58	70	6 000	49	15.00	E	M	2	3	-	N38
100	LE100ZLSA4P	4.40	3.30	62	74	4 800	140	29.00	F	N	2	3	-	N38
	LE100ZLSB4P	3.90	3.00	62	74	4 800	140	29.00	F	P	2	3	-	N38
112	LE112ZMKB4P	3.80	3.10	62	74	O. R.	170	29.00	G	J	2	3	-	N38
132	LE132ZST4P	3.90	3.10	68	80	O. R.	460	57.00	H	J	2	3	-	N38
	LE132ZMS4P	3.60	2.90	68	80	O. R.	460	57.00	H	L	2	3	-	N38

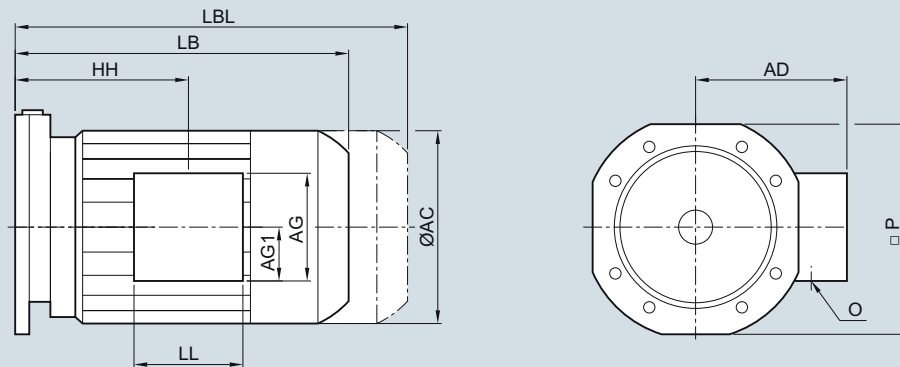
O. R. On request

Motors

Dimensions

Motor frame size LA63 to LE90Z

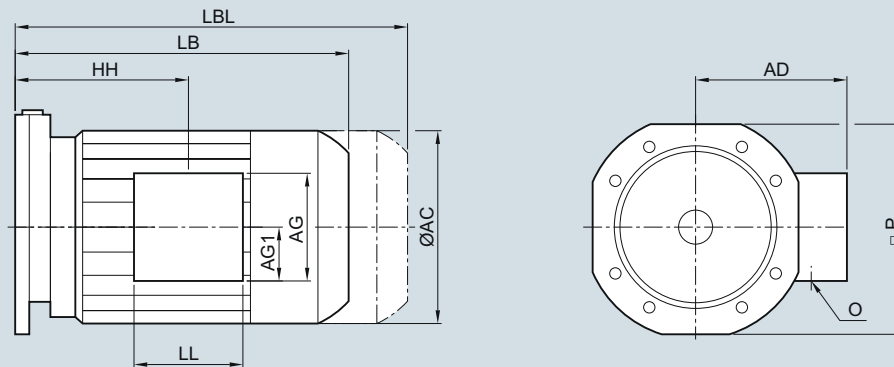
Overview



Motor	Gearbox type		Dimensions					Terminal box						
	BH	KH	P	HH	LB	LBL	AC	Type ¹⁾	AD	LL	AG	AG1	O metric	O NPT
LA63	29	-	120	95.0	194.0	238.5	117.8	gk127	124.0	90	90	45.0	M20x1.5/ M25x1.5	2 x 1/2"
	39	-						gk030						
	-	49	160	85.5	184.5	229.0	-	TB1E10	132.0	123	119.5	58.0	-	-
	-	69												
	-	79												
LA71	29	-	120	135.0	226.0	281.0	138.8	gk127	134.0	90	90	45.0	M20x1.5/ M25x1.5	2 x 1/2"
	39	-						gk030						
	-	49	160	125.5	216.5	271.5	-	TB1E10	142.0	123	119.5	58.0	-	-
	-	69												
	-	79												
LA71Z	29	-	120	135.0	245.0	300.0	138.8	gk127	134.0	90	90	45.0	M20x1.5/ M25x1.5	2 x 1/2"
	39	-						gk030						
	-	49	160	125.5	235.5	290.5	-	TB1E10	142.0	123	119.5	58.0	-	-
	-	69												
	-	79												
LE80	29	-	120	170.0	290.0	350.0	156.3	TB1E10	149.2	123	119.5	58.0	M20x1.5/ M25x1.5	2 x 1/2"
	39	-						TB1E00						
	-	49	160	160.5	280.5	340.5	-	-	-	-	-	-	-	-
	-	69												
	-	79												
LE80Z	29	-	120	205.0	325.0	385.0	156.3	TB1E10	149.2	123	119.5	58.0	M20x1.5/ M25x1.5	2 x 1/2"
	39	-						TB1E00						
	-	49	160	195.5	315.5	375.5	-	-	-	-	-	-	-	-
	-	69												
	-	79												
LE90	29	-	120	207.5	351.5	421.5	173.8	TB1E10	154.2	123	119.5	58	M20x1.5/ M25x1.5	3/4"+1/2"
	39	-						TB1E00						
	-	49	160	198.0	342.0	412.0	-	-	-	-	-	-	-	-
	-	69												
	-	79												
LE90Z	29	-	120	247.5	391.5	461.5	173.8	TB1E10	154.2	123	119.5	58	M20x1.5/ M25x1.5	3/4"+1/2"
	39	-						TB1E00						
	-	49	160	238.0	382.0	452.0	-	-	-	-	-	-	-	-
	-	69												
	-	79												

¹⁾ Terminal box type is dependent on the motor options, see page 6/14.

Overview



Motor	Gearbox type		Dimensions					Terminal box							
	BH	KH	P	HH	LB	LBL	AC	Type ¹⁾	AD	LL	AG	AG1	O metric	O NPT	
LE100	29	-	120	242.5	408.0	486.5	198.0	TB1F10	170.5	135	135	67.5	2xM32x1.5	3/4"+1/2"	
	39	-						TB1F00	166.0	112	135	71.5			-
	-	49	160	233.0	398.5	477.0	198.0	-	-	-	-	-	-	-	
	-	69						-	-	-	-	-	-		
	-	79						-	-	-	-	-	-		
LE100Z	29	-	120	277.5	443.0	521.5	198.0	TB1F10	170.5	135	135	67.5	2xM32x1.5	3/4"+1/2"	
	39	-						TB1F00	166.0	112	135	71.5			-
	-	49	160	268.0	433.5	512.0	198.0	-	-	-	-	-	-	-	
	-	69						-	-	-	-	-	-		
	-	79						-	-	-	-	-	-		
LE112	29	-	120	244.0	418.0	491.0	222.0	TB1F10	181.5	135	135	67.5	2xM32x1.5	3/4"+1/2"	
	39	-						TB1F00	177.0	112	135	71.5			-
	-	49	160	234.5	408.5	481.5	222.0	-	-	-	-	-	-	-	
	-	69						-	-	-	-	-	-		
	-	79						-	-	-	-	-	-		
LE112Z	29	-	120	269.0	443.0	516.0	222.0	TB1F10	181.5	135	135	67.5	2xM32x1.5	3/4"+1/2"	
	39	-						TB1F00	177.0	112	135	71.5			-
	-	49	160	259.5	433.5	506.5	222.0	-	-	-	-	-	-	-	
	-	69						-	-	-	-	-	-		
	-	79						-	-	-	-	-	-		
LE132	-	49	160	266.0	461.5	566.0	264.0	TB1H10	207.0	162	162	81.0	2xM32x1.5	3/4"+1/2"	
	-	69						TB1H00	202.0	130	155	84.5			-
	-	79						-	-	-	-	-			-
LE132Z	-	49	160	316.0	511.5	616.0	264.0	TB1H10	207.0	162	162	81.0	2xM32x1.5	3/4"+1/2"	
	-	69						TB1H00	202.0	130	155	84.5			-
	-	79						-	-	-	-	-			-

¹⁾ Terminal box type is dependent on the motor options, see page 6/14.

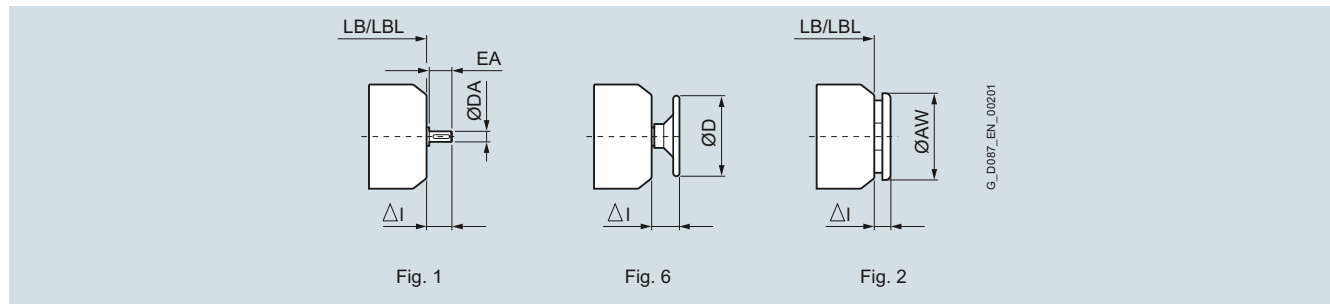
Motors

Dimensions

Additional lengths

Second shaft extension, handwheel and canopy

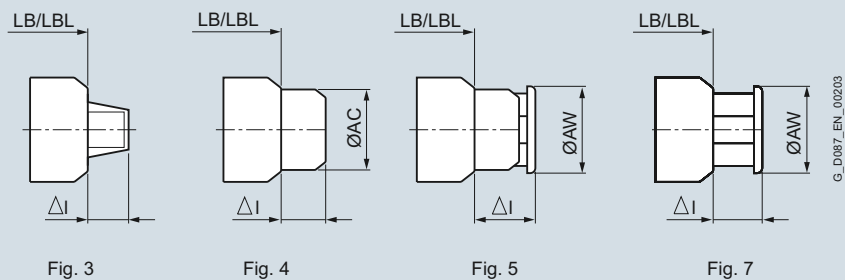
Further information about the second shaft extension, the handwheel and the canopy can be found in [chapter "Motor options"](#) from page 6/51.



Relevant figure	1			6		2	
	Second shaft extension			Handwheel at the second shaft extension		Canopy	
Motor	DA	EA	ΔI	D	ΔI	AW	ΔI
LA63	-	-	-	-	-	122.8	11.9
LA71	14	30	34	100	50	137.8	25.9
LA71Z							
LE80	14	30	34	100	50	137.8	25.9
LE80Z							
LE90	19	40	45	160	65	175.8	16
LE90Z							
LE100	19	40	45	160	65	195	40
LE100Z							
LE112	24	50	56	200	77	195	40
LE112Z							
LE132	28	60	68	200	89	260	60
LE132Z							

Encoder

Further information about the encoder can be found in [chapter "Motor options"](#) from page 6/36.



Relevant figure	3		4			5			7						
	Encoder with protective plate		Encoder under cover			Encoder under cover with canopy			Encoder with canopy						
Motor	ΔI	1XP	AC	ΔI	1XP	LL, HOG9, HOG10	AW	ΔI	1XP	LL, HOG9, HOG10	AW	ΔI	1XP	LL, HOG9	HOG10
LA63	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LA71	70	139	92.5	-	138	118.5	-	-	-	-	-	-	-	-	-
LA71Z															
LE80	70	156.5	92.5	-	138	118.5	-	155	67.5	-	-	-	-	-	-
LE80Z															
LE90	70	174	92.5	-	176	107	-	155	67.5	-	-	-	-	-	-
LE90Z															
LE100	-	174	93.5	-	176	108	-	195	83	-	-	-	-	-	-
LE100Z															
LE112	-	195	95.0	-	194	111	-	195	83	83	-	-	-	-	-
LE122Z															
LE132	-	195	95.0	-	194	111	-	260	87	87	130	-	-	-	-
LE132Z															

Motors

Dimensions

Additional lengths

Prepared for encoder mounting

Further information about "prepared for encoder mounting" can be found in [chapter "Motor options" on page 6/46](#).

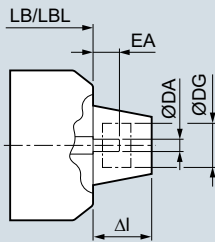


Fig. 1

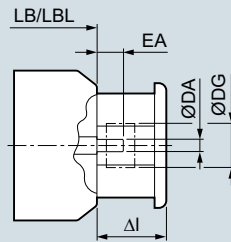


Fig. 2

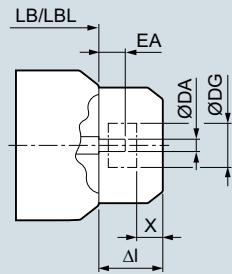


Fig. 3

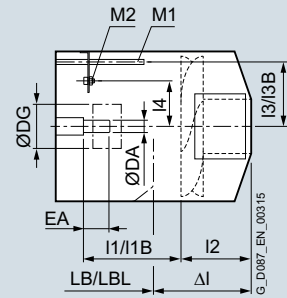


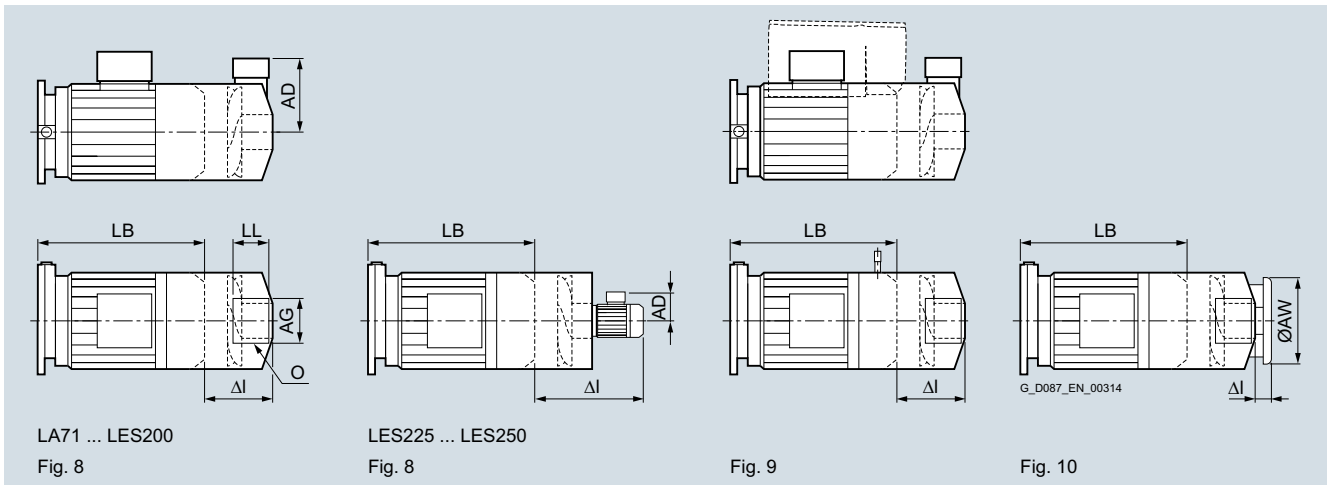
Fig. 4

Relevant figure	Encoder prepared + separately driven fan + with / without brake																		
	Motor	DA	EA	DG	1 Encoder prepared with protective plate	2 Encoder prepared under canopy	3 Encoder prepared under cover	4											
					Δl	Δl	Δl	X	Δl	I1	I2	I3	Brake	I1B	I3B	I4	M1	M2	
LA63	12	25	Max. 60	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LA71		30																	
LA71Z																			
LE80		30 (25) ¹⁾			67.5				213.0	121.2	95	56.0	L4, L8	95.5	67.0		M6x130		
LE80Z													L16	95.5	56.0				
LE90									213.0	109.4	105	66.0	L8, L16	93.5	75.0				
LE90Z													L32	93.5	66.0				
LE100		25			83	93.5			218.5	115.3	105	66.0	L16, L32	97.0	85.0		M8x160		
LE100Z													L60	97.0	72.5				
LE112						95.0			206.0	115.5	105	72.5	L32, L60	93.5	95.0				
LE112Z																			
LE132					87				258.5	132.0	127	98.0	L80	97.5	116.0				
LE132Z													L150	97.5	98.0				
													L80	97.5	116.0				
													L150	97.5	98.0				

¹⁾ Value in parenthesis applies to motor with separately driven fan and brake

Separately driven fan, encoder and canopy

Further information about the separately driven fan can be found in chapter "Motor options" on page 6/10.



Relevant figure Motor	8 Separately driven fan					9 Brake + separately driven fan	9 Encoder + separately driven fan		9 Brake + encoder + separately driven fan			9 SINAMICS G110M	10 Canopy for separately driven fan	
	ΔI	AD	LL	AG	O	ΔI	ΔI 1XP	LL, HOG9, HOG10	ΔI 1XP	LL, HOG9	HOG10	ΔI	ΔI	AW
LA63	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LA71	110.5	122.5	95	105	M16x1.5	134.5	229.5	-	229.5	-	-	229.5	37	150
LA71Z														
LE80	89	130	95	105	M16x1.5	118	213	-	213	-	-	213	40	170
LE80Z														
LE90	85	140.5	95	105	M16x1.5	120	213	-	213	-	-	213	30	188
LE90Z														
LE100	81.5	149	95	105	M16x1.5	121.5	218.5	-	218.5	-	-	218.5	28	210
LE100Z														
LE112	81	161	95	105	M16x1.5	113	206	-	206	-	-	206	33	249
LE112Z														
LE132	114.5	185	95	105	M16x1.5	164.5	258.5	258.5	258.5	258.5	302.5	-	25	300
LE132Z														

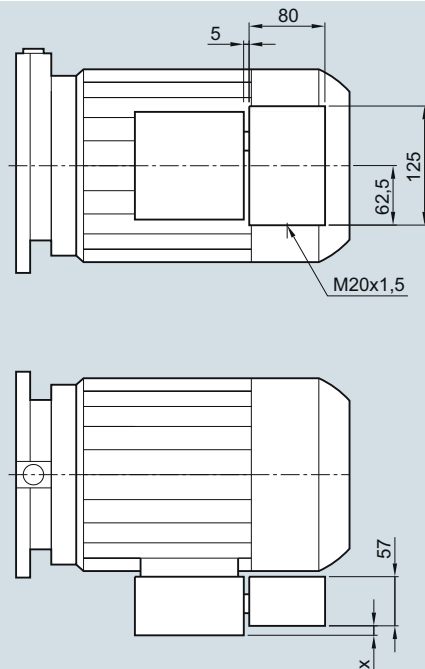
Motors

Dimensions

Application terminal box

Overview

Further information about the application terminal box can be found in [chapter "Motor options" on page 6/50](#).



Motor	x	Terminal box type ¹⁾
LA63	2.5 (3.5)	gk127 (TB1E10)
LA71	2.5 (3.5)	
LE80	3.5	TB1E10
LE90	3.5	
LE100	7.0	TB1F10
LE112	7.0	
LE132	11.5	TB1H10

() Dimension or terminal box type in parenthesis for terminal box with 9 terminals (YY/Y connection)

¹⁾ Different sizes of terminal box are used depending on the connections required.
For more information, see [chapter "Motor options", page 6/14](#).

Overview

Further information about the HAN 10E motor plug can be found in chapter "Motor options" on page 6/16.

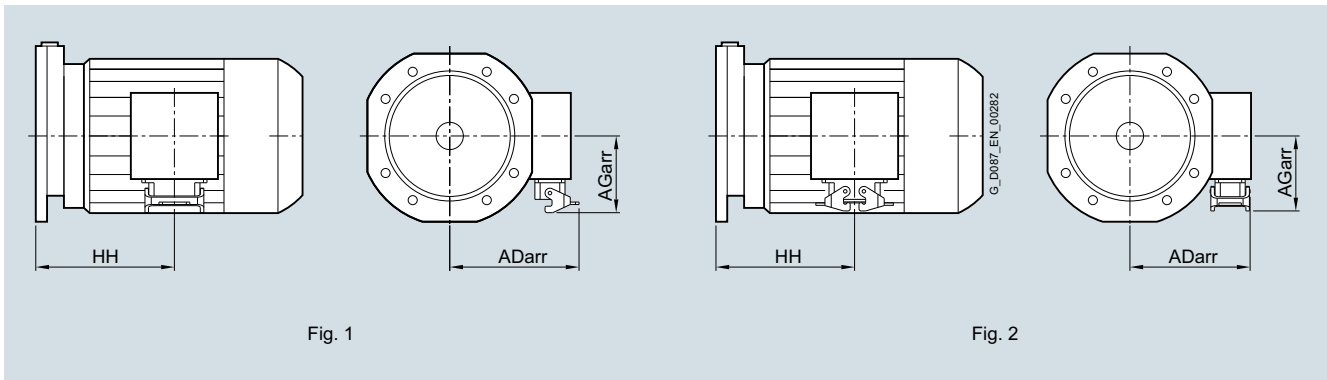


Fig. 1

Fig. 2

Relevant figure			Fig. 1			Fig. 2		
Motor	Gearbox type		HAN 10E motor plug with one bracket			HAN 10E motor plug with two brackets		
	B	K	HH	ADarr	AGarr	HH	ADarr	AGarr
LA63	29, 39	-	95.0	132	92.0	95.0	127.0	89.5
	-	49 ... 79	85.5			85.5		
LA71 LA71Z	29, 39	-	135.0	142.0	92.0	135.0	127.0	89.5
	-	49 ... 79	125.5			125.5		
LE80	29, 39	-	170.0	155.0	106.0	170.0	139.5	103.5
	-	49 ... 79	160.5			160.5		
LE80Z	29, 39	39	205.0	155.0	106.0	205.0	139.5	103.5
	49	49 ... 79	195.5			195.5		
LE90	29, 39	-	207.5	160.0	106.0	207.5	144.5	103.5
	-	49 ... 79	198.0			198.0		
LE90Z	29, 39	-	247.5	160.0	106.0	247.5	144.5	103.5
	-	49 ... 79	238.0			238.0		
LE100	29, 39	-	242.5	179.5	115.5	242.5	164.0	113.0
	-	49 ... 79	233.0			233.0		
LE100Z	29, 39	-	277.5	179.5	115.5	277.5	164.0	113.0
	-	49 ... 79	268.0			268.0		
LE112	29, 39	-	244.0	190.5	115.5	244.0	175.0	113.0
	-	49 ... 79	234.5			234.5		
LE112Z	29, 39	-	269.0	190.5	115.5	269.0	1175.0	113.0
	-	49 ... 79	234.5			234.5		
LE132	-	49 ... 79	266.0	209.5	138.0	266.0	223.0	135.5
LE132Z	-	49 ... 79	316.0	209.5	138.0	316.0	223.0	135.5

Motors

Dimensions

HAN K4/4 motor plug

Overview

Further information about the HAN K4/4 motor plug can be found in [chapter "Motor options" on page 6/17](#).

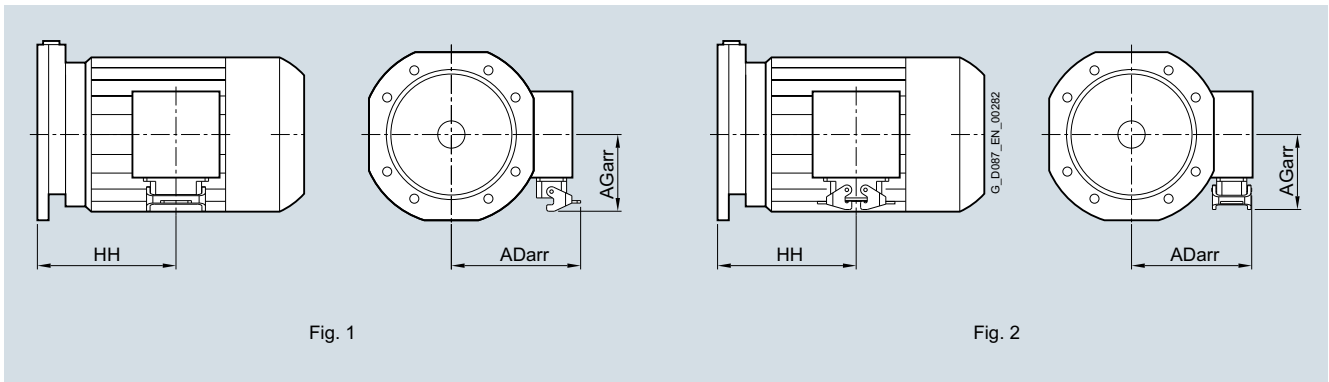


Fig. 1

Fig. 2

Relevant figure Motor	Gearbox type		Fig. 1 HAN K4/4 motor plug with one bracket			Fig. 2 HAN K4/4 motor plug with two brackets		
	B	K	HH	ADarr	AGarr	HH	ADarr	AGarr
LE112	29, 39	-	244.0	190.5	115.5	244.0	175.0	113.0
	-	49 ... 79	234.5			234.5		
LE112Z	29, 39	-	269.0	190.5	115.5	269.0	1175.0	113.0
	-	49 ... 79	234.5			234.5		
LE132	-	49 ... 79	266.0	209.5	138.0	266.0	223.0	135.5
LE132Z	-	49 ... 79	316.0	209.5	138.0	316.0	223.0	135.5

Overview

Further information about the HAN Q8 and HAN Q12 motor plugs can be found in [chapter "Motor options" on page 6/19](#).

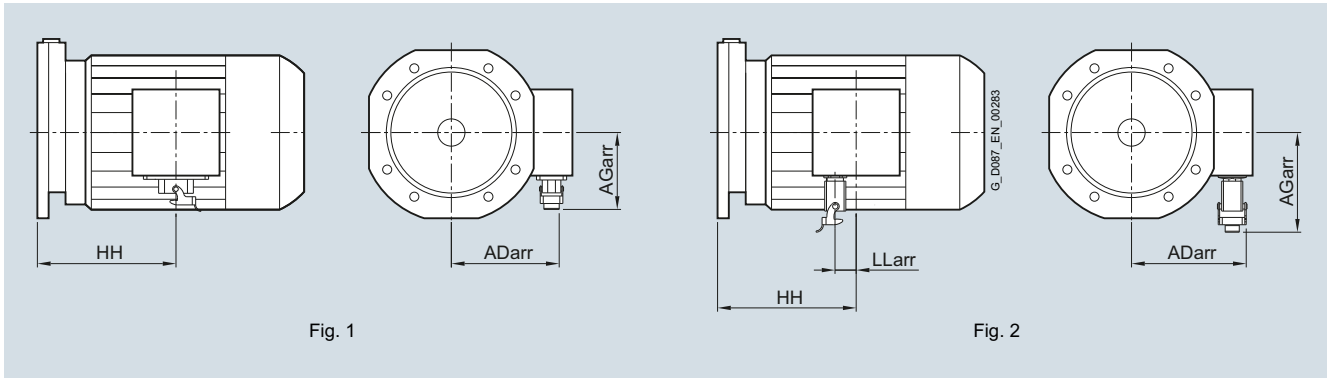


Fig. 1

Fig. 2

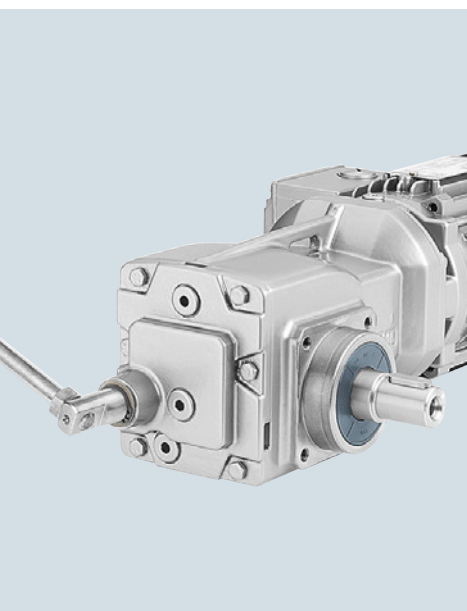
Relevant figure Motor	Gearbox type		Fig. 1 HAN Q8 motor plug			Fig. 2 HAN Q12 motor plug			
	B	K	HH	ADarr	AGarr	HH	ADarr	AGarr	LLarr
LA63	29, 39	-	95.0	110.0	87.5	95.0	104.0	109.0	18
	-	49 ... 79	85.5			85.5			
LA71 LA71Z	29, 39	-	135.0	120.0	87.5	135.0	114.0	109.0	
	-	49 ... 79	125.5			125.5			
LE80	29, 39	-	170.0	134.0	107.0	170.0	128.0	122.0	
	-	49 ... 79	160.5			160.5			
LE80Z	29, 39	-	205.0	134.0	107.0	205.0	233.0	122.0	
	-	49 ... 79	195.5			195.5			
LE90	29, 39	-	207.5	139.0	107.0	207.5	133.0	122.0	
	-	49 ... 79	198.0			198.0			
LE90Z	29, 39	-	247.5	139.0	107.0	247.5	152.5	122.0	
	-	49 ... 79	238.0			238.0			
LE100	29, 39	-	242.5	158.5	116.5	-	-	-	
	-	49 ... 79	233.0						
LE100Z	29, 39	-	277.5	158.5	116.5				
	-	49 ... 79	268.0						
LE112	29, 39	-	244.0	169.5	116.5				
	-	49 ... 79	234.5						
LE112Z	29, 39	-	269.0	169.5	116.5				
	-	49 ... 79	234.5						
LE132	-	49 ... 79	266.0	188.5	130.0				
LE132Z	-	49 ... 79	316.0	188.5	130.0				

Motors

Notes

4

Gearbox options



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5/2	Overview
	<u>Light-load applications</u>
5/3	Foot-mounted and housing flange designs
	<u>Heavy-load applications</u>
5/4	Flange-mounted design
5/5	Mounting
	<u>Mounting types</u>
5/5	Overview
	<u>Shaft designs</u>
5/5	Selection and ordering data
5/6	Clutch
5/6	Overview
5/7	Lubrication and sealing
	<u>Overview</u>
5/7	• Lubrication
5/7	• Sealing
5/7	• Oil quantities
5/7	Roller bearing greases for gearboxes and motors
5/7	Selection
5/8	Venting and oil level control
	<u>Venting</u>
5/8	Overview
5/8	Pressure breather valve
	<u>Oil level control</u>
5/8	Oil sight glass

Gearbox options

Mounting position

Overview

The mounting position must be specified when you place your order to ensure that the gearbox is supplied with the correct quantity of oil.

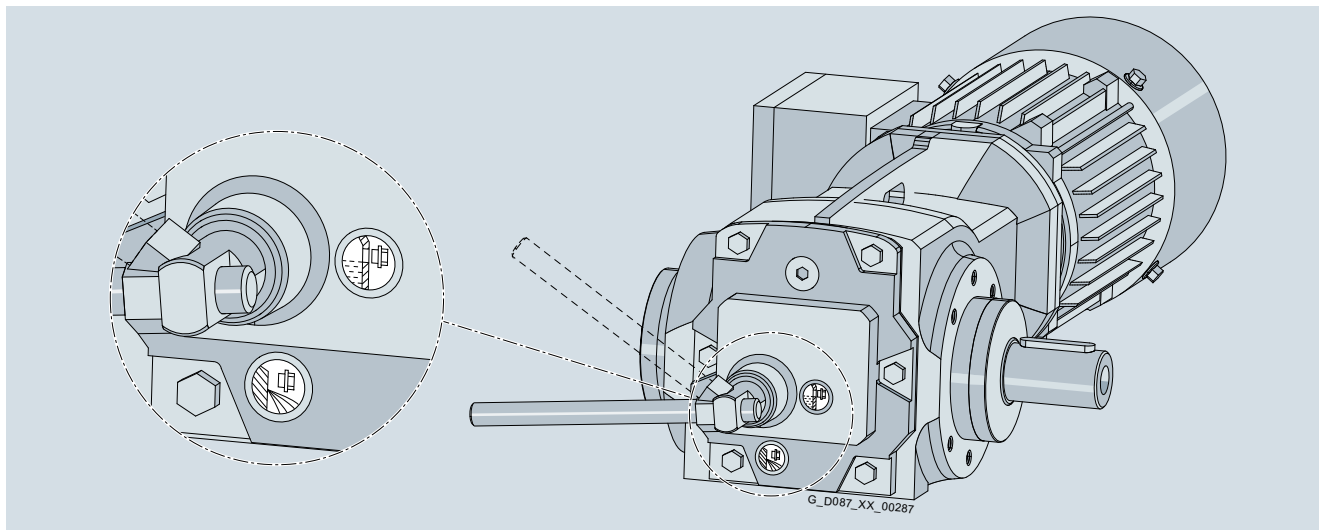


Fig. 5/1 Dimensional drawing from DT Configurator with details

An explanation of the symbols used to represent mounting positions on the following pages

Symbol

Oil valves



Venting



Oil drain



Oil level checking screw

Supplements

* On opposite side

① Clutch engaged

② Clutch disengaged

③ Clutch disengaged

① ... ④ Terminal box position

A ... D Position of the cable entry

Note:

The **DT Configurator** can be used to configure SIMOGEAR geared motors.

The DT Configurator is available in conjunction with the electronic catalog CA 01 on DVD. In addition, the DT Configurator can be used on the Internet without requiring any installation.

The DT Configurator can be found in the Siemens Mall at the following address:

www.siemens.com/dt-configurator

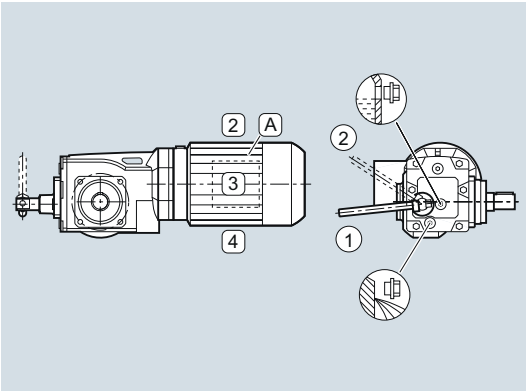
For the selected mounting position, the 3D images show the exact position of the oil valves.

Foot-mounted and housing flange designs

Electric-monorail geared motor BH., sizes 29 and 39

Oil valves

M1

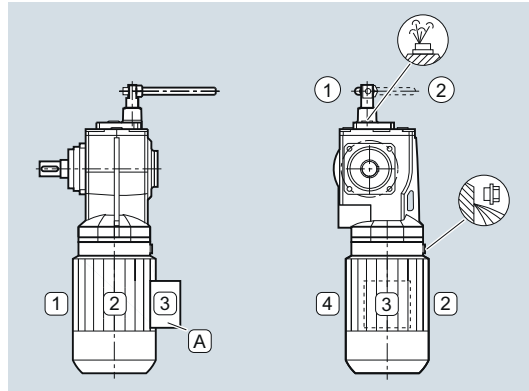


Order code:

M1

D11

M2

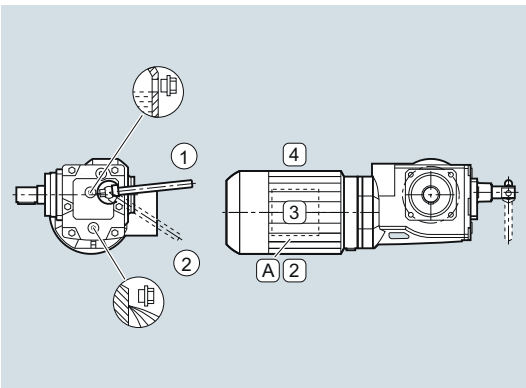


Order code:

M2

D12

M3

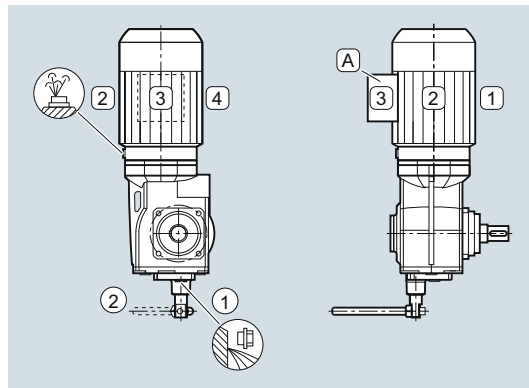


Order code:

M3

D13

M4

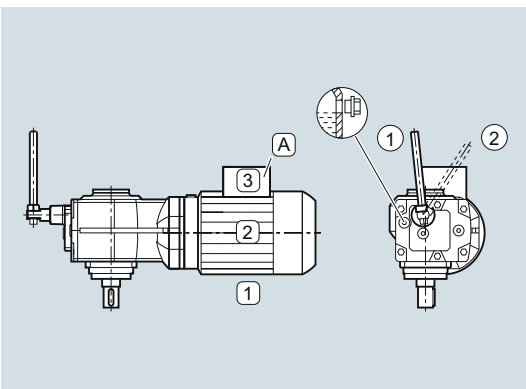


Order code:

M4

D14

M5

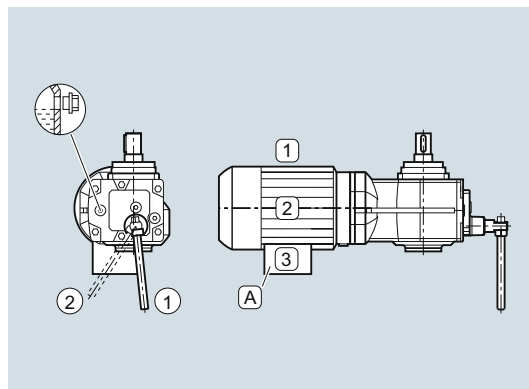


Order code:

M5

D15

M6



Order code:

M6

D16

Gearbox options

Mounting position

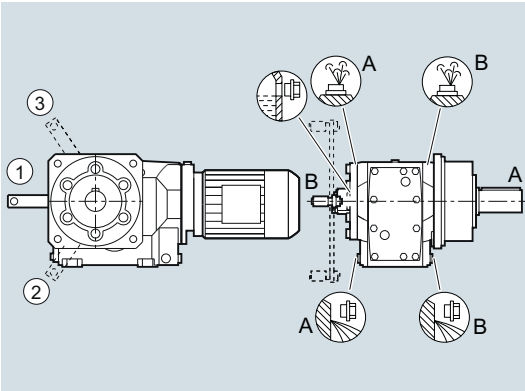
Heavy-load applications

Flange-mounted design

Electric-monorail geared motor KH., sizes 49 to 79

Oil valves

M1



Order code:

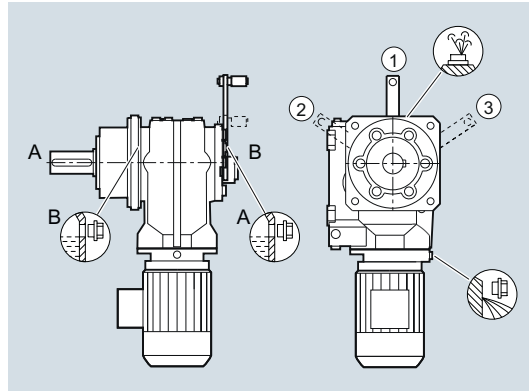
M1 output side A

M1 output side B

D11

D21

M2



Order code:

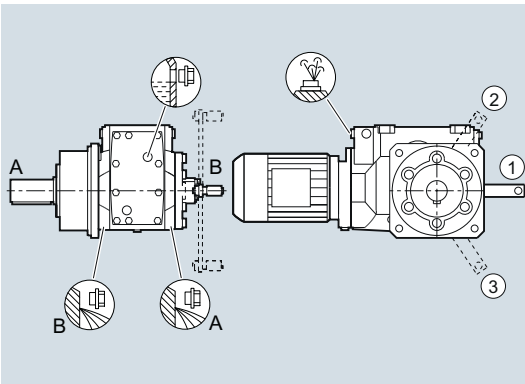
M2 output side A

M2 output side B

D12

D22

M3



Order code:

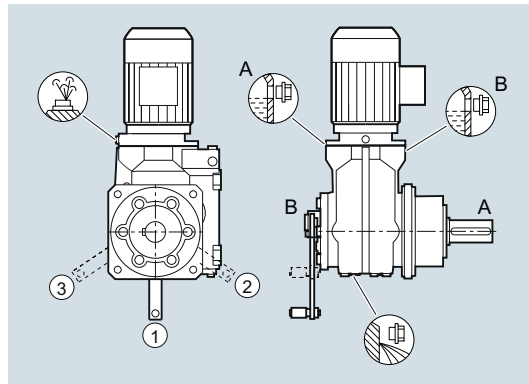
M3 output side A

M3 output side B

D13

D23

M4



Order code:

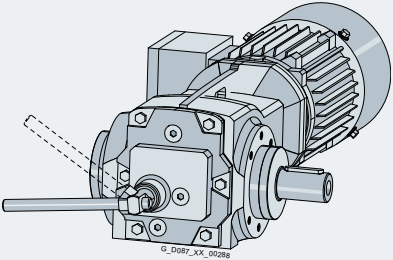
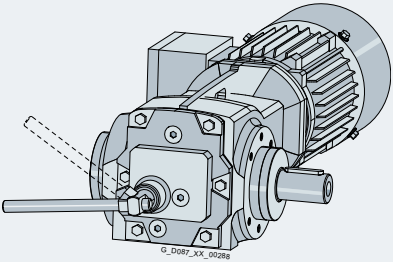
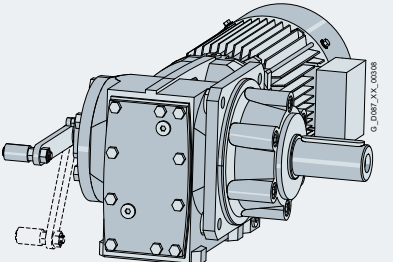
M4 output side A

M4 output side B

D14

D24

Mounting types

Mounting type	Type designation	Possible for		Example	Article No.
	2nd data position	BH	KH		14th data position
Foot-mounted design (optional)	-	✓	-		A
Housing flange (C type) (standard)	Z	✓	-		H
Flange-mounted design (standard)	F	-	✓		F

Flange-mounted design

Flange-mounted design	Dimensions			Order code
	mm			
Bevel gearboxes KH				
Gearbox size	49	69	79	
	200			H05
	250	250	250	H06

Shaft design

Shaft design	Dimensions			Article No.	Article No. supplement
	mm			8th data position	
Bevel gearboxes BH					
Gearbox size	29		39		
Solid shaft	V25 x 35		V25 x 35	1	
			V30 x 50	2	
Solid shaft without feather key	VG25 x 35		VG25 x 35	9	H1G
			VG30 x 50	9	H1H
Bevel gearboxes KH					
Gearbox size	49	69	79		
Solid shaft	V30 x 60	V45 x 90	V55 x 110	1	
	V35 x 70			2	
Solid shaft without feather key	VG30 x 60	VG45 x 90	VG55 x 110	9	H1G
	VG35 x 70			9	H1H

Gearbox options

Clutch

Overview

The SIMOGEAR electric-monorail gearboxes have a mechanical clutch which safely engages and disengages power transmission by interrupting the force flow between the input and output.

Clutch for light-load applications

The position and operating travel of the clutch lever are designed in accordance with VDI guideline 3643 on sizes BH.29 and BH.39.

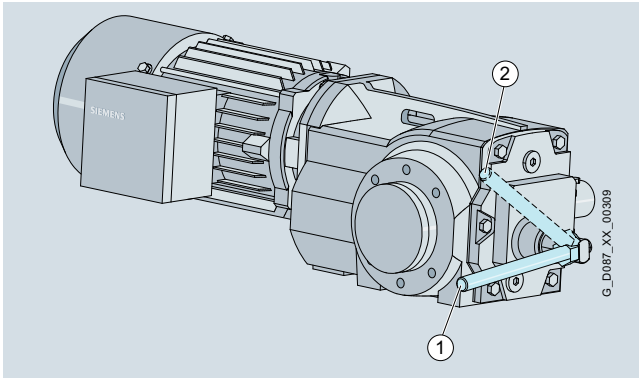


Fig. 5/2 Clutch on BH.29 and BH.39

- ① Clutch engaged
- ② Clutch disengaged

Clutch for heavy-load applications

Position 1 is the standard clutch position on sizes KHF49 to KHF79.

The end stop bolt (position 4) limits the operating travel from position 1 to 2, or from position 1 to 3. The operating travel can be altered by changing the thread position. The position of the operating travel is specified with the order.

Furthermore, a short version of the clutch is also available. The relevant dimensions can be seen in the dimensional drawings provided in the gearbox chapter.

Order code:

Clutch operating travel 1-3	H21
Clutch operating travel 1-2	H22
Long clutch lever	-
Short clutch lever	H23
Clutch lever facing outwards (position A)	-
Clutch lever facing inwards (position B)	H25

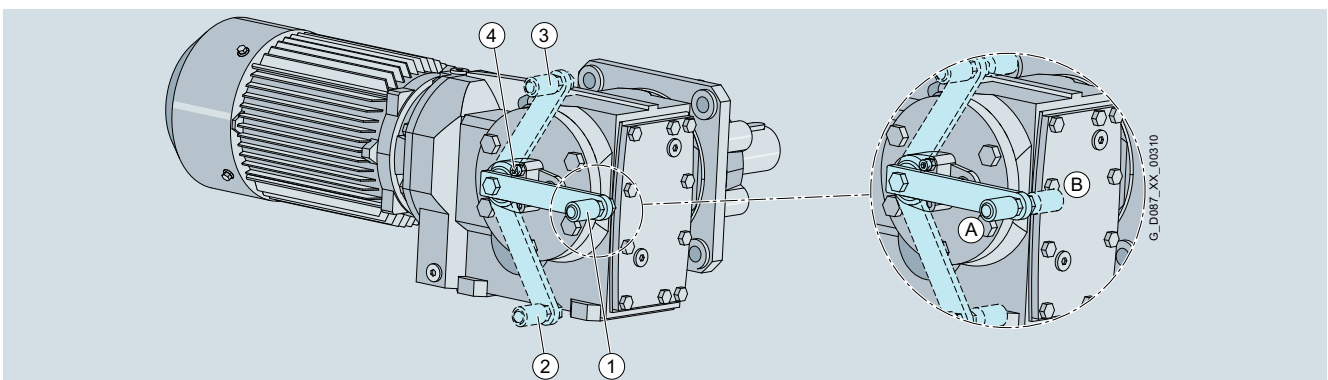


Fig. 5/3 Clutches for KHF49 to KHF79

- ① Clutch engaged
- ② Clutch disengaged
- ③ Clutch disengaged
- ④ End stop bolt
- A Clutch lever facing outwards (position A)
- B Clutch lever facing inwards (position B)

Overview

Lubrication

The gearboxes are filled in the factory with a high-quality lubricant. Lubricants permitted for the various gearbox types and applications are listed in the lubricant table.

Other oils from various lubricant manufacturers that have been approved by Siemens AG can be found on the Internet in the Service and Support pages in the List of approved and recommended gear lubricants T 7300:

<http://support.automation.siemens.com/WW/view/en/44231658>

Note:

For ambient conditions with a high air humidity and salt-laden atmosphere, we recommend that only mineral or PAO oils are used.

Oil quantities

The lubricant quantity depends on the gearbox type, size and mounting position. The corresponding oil quantities are specified in the operating instructions and on the rating plate of the geared motor.

Sealing

The standard models of gearbox are supplied with high-quality radial shaft sealing rings with dust protection lips. This sealing design is reliable for a wide range of applications.

Special application areas and environmental conditions require special radial shaft sealing rings and materials, which are coordinated with the particular gearbox oil and environment. This coordinated sealing system results in a high reliability and availability of the plant.

Roller bearing greases for gearboxes and motors

The roller bearings of gearboxes and motors are lubricated in the factory with a roller bearing grease that is coordinated with the selected application area. The quantity of grease between the rolling elements and the space in front of the bearing depends on the operating conditions and the gearbox mounting position. For operation in the selected application areas, it is not necessary to lubricate the roller bearings.

We recommend that the grease filling of the roller bearings is also changed when the oil or shaft sealing rings are replaced.

Other greases supplied by different lubricant manufacturers that have been approved by Siemens AG are specified in the List of approved and recommended gear lubricants T 7300.

Selection

Gearboxes can be used for different applications. The following lubricants and seals can be selected to ensure that a gearbox is optimally designed for a specific application.

Note:

Note the ambient conditions specified in chapter "General options" on page 7/2.

Selection of lubricant			
Application	Permissible ambient temperature of oil °C	Oil type Designation acc. to DIN 51502	Order code
Bevel gearboxes BH			
Standard	-25 ... +40	CLP ISO PG VG220	K07
	-35 ... +40	CLP ISO PAO VG220	K12
	-40 ... +10	CLP ISO PAO VG68	K13
	-25 ... +80	CLP ISO PG VG460	K08
Foodstuff area	-25 ... +40	CLP ISO H1 VG460	K11
	-30 ... +10	CLP ISO H1 VG100	K14
Bevel gearboxes KH			
Standard	-15 ... +40	CLP ISO VG220	K06
	-35 ... +40	CLP ISO PAO VG220	K12
	-40 ... +10	CLP ISO PAO VG68	K13
	-25 ... +80	CLP ISO PG VG460	K08
	-25 ... +50	CLP ISO PG VG220	K07
Foodstuff area	-25 ... +40	CLP ISO H1 VG460	K11
	-30 ... +10	CLP ISO H1 VG100	K14
Biodegradable oil	-20 ... +40	CLP ISO E VG220	K10

CLP = mineral oil

CLP PG = polyglycol oil

E = ester oil, organic oil (bio oil / risk of water pollution, class WGK1)

PAO = poly-alpha-olefin oil

CLP H1 = physiologically safe oil (USDA-H1 approval)

Gearbox options

Venting and oil level control

Overview

Gearbox sizes 29 and 39 are supplied ready for operation, lubricated for life and can be operated in mounting positions M1, M3, M5 and M6 without requiring a pressure breather valve. For mounting positions M2 and M4, they are equipped with a pressure breather valve.

Possible venting and oil level control options

Design	Possible for			Order code
Bevel gearboxes BH				
Size	29	39		
Lubricated for life	✓			
Pressure breather valve	✓ ¹⁾	✓		G45
Oil sight glass	✓	✓		G34
Magnetic oil drain screw	-	-		G53
Bevel gearboxes KH				
Size	49	69	79	
Pressure breather valve	✓	✓	✓	G45
Oil sight glass	✓	✓	✓	G34
Magnetic oil drain screw	✓	✓	✓	G53

¹⁾ Only with mounting positions M2 and M4

Pressure breather valve

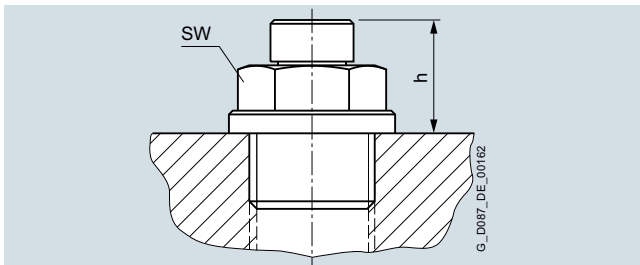


Fig. 5/4 Pressure breather valve

Technical specifications

Gearbox type	Size	Width across flats	Thread	Dimension h
		SW		
Bevel gearboxes B	29, 39	13	G 1/4 A	15
Bevel gearboxes K	49 ... 89	13	G 1/4 A	15

Order code:

Pressure breather valve

G45

Oil level checking screw

On gearboxes in mounting positions M1, M3, M5 and M6, the oil level is checked using the oil level checking screw.

An oil sight glass with a reflector is available to facilitate visual monitoring.

Order code:

Oil sight glass

G34

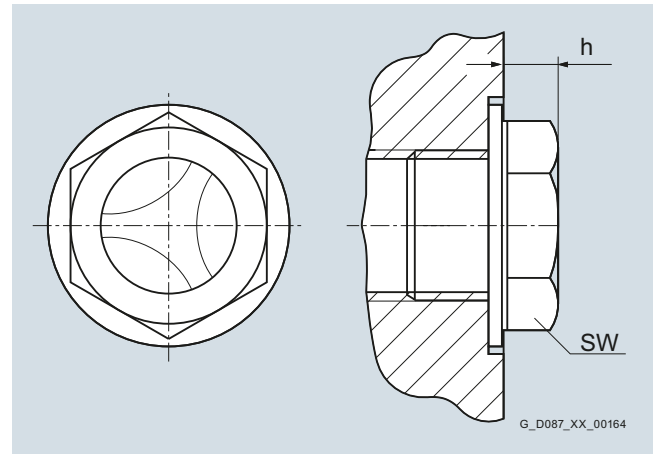
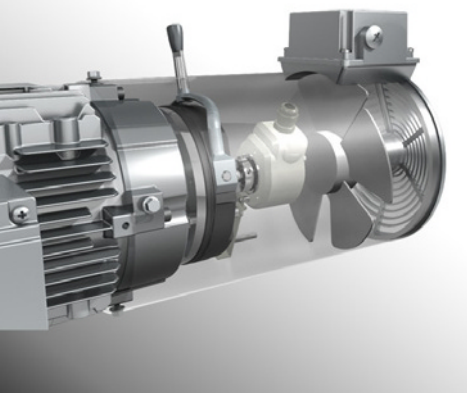


Fig. 5/5 Oil sight glass

Technical specifications

Gearbox type	Size	Width across flats	Thread	Dimension h
		SW		
Bevel gearboxes BH	29, 39	16	G 1/4 A	10
Bevel gearboxes KH	49 ... 79	16	G 1/4 A	10

Motor options

**6/2 Electrical design**Voltages and frequencies

- 6/2 Duty types
- 6/2 Standard voltages

Motor protection

- 6/4 Temperature sensor
- 6/4 Temperature switch
- 6/5 KTY 84-130 temperature sensor
- 6/5 1x PT100 resistance thermometer
- 6/6 Selection and ordering data
- 6/6 Anti-condensation heating

Windings and insulation

- 6/7 Inverter operation
- 6/7 Impulse Voltage Insulation Class (IVIC)
- 6/7 Examples of how to design a drive system
- 6/8 DURIGNIT IR 2000 insulation
- 6/8 Temperature class
- 6/8 Increased air humidity/temperature with 30 to 60 g water per m³ of air

6/9 Mechanical designDegrees of protection

- 6/9 Overview

Cooling and ventilation

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- 6/10 Forced ventilation

Motor connection and terminal boxes

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Motor plug

- 6/16 HAN 10E motor plug
- 6/17 HAN K4/4 motor plug
- 6/19 HAN Q8 motor plug
- 6/21 HAN Q8 motor plug with cable
- 6/23 HAN Q12 motor plug

6/24 Mounted componentsBrake

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- 6/24 Selecting the brake
- 6/25 Connecting the brake
- 6/25 Supply voltages
- 6/26 Function rectifier
- 6/28 Brake options
- 6/32 Technical specifications

Encoder

- Incremental encoders
 - 6/37 • Incremental encoder 1XP8012
 - 6/38 • Incremental encoder 1XP8032
 - 6/39 • Incremental encoder 1XP8022
- Resolvers
 - 6/40 • Resolvers 1XP8013 and 1XP8023
- Absolute encoders
 - 6/41 • Absolute encoders 1XP8014 and 1XP8024
 - 6/42 Absolute encoder 1XP8024-21
 - 6/43 Rugged encoders
- Mechanical protection
 - 6/45 Motors prepared for encoder mounting
 - 6/46 MOTION-CONNECT signal cables
- Encoder accessories
 - 6/48 • Connector
 - 6/48 • Cable with end sleeves
 - 6/49 • Cable with coupling socket
 - 6/50 • EnDAT gateways for absolute encoders
 - 6/50 • Application terminal box
 - 6/50 • Modular system in combination with encoder systems
- Second shaft extension and handwheel
 - 6/51 • Modular system in combination with second shaft extension
- SINAMICS G110M motor integrated frequency inverter
 - 6/52 Overview
 - 6/53 Selection and ordering data

6/54 Designs for special environmental conditions

- 6/54 Condensation drain hole
- 6/54 Internal motor corrosion protection

Motor options

Electrical design

Voltages and frequencies

Duty types

Line operation

The three-phase AC motors are designed for duty type S1 according to IEC 60034 (continuous duty).

Order codes for line operation:

Duty type S1

-

Duty type S3 - 75 %

P90

Inverter operation

For inverter operation (**P91, P92**), the motors with the applicable voltages are also stamped with duty type Inv. Duty.

Depending on the selected voltage, the technical specifications for the operating points at 50 Hz, 60 Hz and 87 Hz are stated on the rating plate.

With IE2 motors rated for 0.75 kW and above that fall within the scope of the Eco-design Directive (EC) No. 640/2009, the notice "IE2 Inv. Duty only" is also attached to the motor.

IE2

 EU REGULATION 640/2009
 USE WITH VARIABLE
 SPEED DRIVE ONLY!

Order codes for inverter operation:

Duty type S1//Inv. Duty

P91

Duty type Inv. Duty (VSD10)

P92

Standard voltages

Three-phase AC motors are available for rated voltages ranging from 200 up to 690 V.

Motor frame sizes 63 up to 112 are generally supplied for the voltage range 230/400 V at 50 Hz.

The standard version is 400/690 V at 50 Hz for motor frame size 132.

Standard motor voltages

At the customer's request, we can stamp a tolerance of $\pm 10\%$ on the rating plate for a number of our standard voltages.

Order code:

Voltage tolerance $\pm 10\%$

P80

Fre- quency	Voltages	Power	Possible specifications						Motor frame size		Article No.	Article No. supplement	Voltage tolerance $\pm 10\%$	Inverter operation	
			CE	UL-R/ CSA	China	EAC	Ex- port ¹⁾	63 ... 112	132	13th data position				P80	P91

Voltages for 50/60 Hz

Voltages for 50/60 Hz, 50 Hz power

50 Hz	230 V Δ /400 V Y	P ₅₀	✓	✓	✓ ²⁾	✓	✓	✓	-	4		✓	✓	-
60 Hz	460 V Y	P ₅₀	✓	✓	✓	✓	✓	-	✓	9	N3A	✓	✓	-
50 Hz	230 V Δ /400 V Y	P ₅₀	✓	✓	✓	✓	✓	-	✓	4		✓	-	-
60 Hz	460 V Y	P ₅₀	✓	✓	✓	✓	✓	-	✓	9	N3B	✓	-	-
50 Hz	400 V Δ /690 V Y	P ₅₀	✓	✓	✓ ³⁾	✓	✓	✓	-	9	N3C	✓	✓	-
60 Hz	460 V Δ	P ₅₀	✓	✓	✓	✓	✓	✓ ²⁾	✓	9		✓	✓	-

Voltages for 50/60 Hz, 60 Hz power

50 Hz	230 V Δ /400 V Y	P ₅₀	✓	✓	✓	✓	✓	✓	-	2		✓	✓	-
60 Hz	460 V Y	P ₆₀	✓	✓	✓	✓	✓	-	✓	9	N2A	✓	✓	-
50 Hz	230 V Δ /400 V Y	P ₅₀	✓	✓	✓	✓	✓	-	✓	2		✓	-	-
60 Hz	460 V Δ	P ₆₀	✓	✓	✓	✓	✓	-	✓	9	N2B	✓	-	-
50 Hz	400 V Δ /690 V Y	P ₅₀	✓	✓	✓ ³⁾	✓	✓	✓	-	9		✓	-	-
60 Hz	460 V Δ	P ₆₀	✓	✓	✓	✓	✓	✓	✓	9	N2C	✓	✓	✓
50 Hz	220 V Δ /380 V Y	P ₅₀	✓	✓	✓	✓	✓	✓	✓	9		✓	✓	✓
60 Hz	440 V Y	P ₆₀	✓	✓	✓	✓	✓	✓	✓	9	N2G	-	-	✓

■ With additional price

¹⁾ With motor power 0.75 kW or higher.

²⁾ Can be selected for motor frame size 80 or higher.

³⁾ Can be selected for motor frame size 100 or higher.

Standard voltages (continued)

Standard motor voltages

Fre- quency	Voltages	Power	Possible specifications					Motor frame size		Article No. 13th data position	Article No. supplement	Voltage tolerance ± 10 %			Inverter operation	
			CE	UL-R/ CSA	China	EAC	Ex- port ¹⁾	63 ... 112	132			P80	P91	P92		
Voltages for 50 Hz																
50 Hz	400 V Y	P ₅₀	✓		✓ ³⁾	✓		✓	✓	9	N6B	✓		✓	-	
50 Hz	400 V Δ	P ₅₀	✓		✓ ³⁾	✓		✓	✓	9	N6C	✓		✓	-	
50/87 Hz	230 V Δ/400 V Δ	P ₅₀ /P ₈₇	✓		✓ ³⁾	✓		✓	✓	9	N6A	✓		✓	-	
50 Hz	500 V Y	P ₅₀	✓			✓	✓	✓	✓	9	N1C	-		✓	-	
50 Hz	500 V Δ	P ₅₀	✓			✓	✓	✓ ³⁾	✓	9	N1D	-		✓	-	
50 Hz	220 V Δ/380 V Y	P ₅₀	✓		✓ ³⁾	✓	✓	■	■	9	N1R	✓		✓	-	
50 Hz	380 V Δ/660 V Y	P ₅₀	✓		✓ ³⁾	✓	✓	■	■	9	N1S	✓		-	✓	
50 Hz +3/-5 %	240 V Δ/415 V Y	P ₅₀	✓			✓	✓	■	■	9	N1T	✓		✓	-	
50 Hz +3/-5 %	415 V Δ	P ₅₀	✓			✓	✓	■	■	9	N1U	✓		✓	-	
50 Hz	200 V Δ	P ₅₀	✓			✓	✓	■	■	9	N1K	-		✓	-	
Voltages for 60 Hz																
<i>Voltages for 60 Hz, 50 Hz power</i>																
60 Hz	220 V Δ/380 V Y	P ₅₀	✓			✓		■	■	9	N4C	-		✓	-	
60 Hz	380 V Δ/660 V Y	P ₅₀	✓			✓		■	■	9	N4D	-		-	-	
60 Hz	440 V Y	P ₅₀	✓			✓		■	■	9	N4E	-		✓	-	
60 Hz	440 V Δ	P ₅₀	✓			✓		■	■	9	N4F	-		✓	-	
60 Hz	460 V Y	P ₅₀	✓	✓		✓		■	■	9	N4H	✓		✓	-	
60 Hz	460 V Δ	P ₅₀	✓	✓		✓		■	■	9	N4J	✓		✓	-	
60 Hz	575 V Y	P ₅₀	✓	✓		✓		■	■	9	N4L	✓		✓	-	
60 Hz	575 V Δ	P ₅₀	✓	✓		✓		-	■	9	N4M	✓		✓	-	
60 Hz	230 V YY/460 V Y	P ₅₀	✓	✓		✓		■	■	9	N4N	✓		✓	-	
60 Hz	230 V Δ/400 V Y	P ₅₀	✓			✓		■	■	9	N4A	-		✓	-	
60 Hz	400 V Δ/690 V Y	P ₅₀	✓			✓		■	■	9	N4B	-		-	-	
60 Hz	200 V Δ	P ₅₀	✓			✓		■	■	9	N4P	-		✓	-	
60 Hz	208 V Δ	P ₅₀	✓			✓		■	■	9	N4Q	-		✓	-	
<i>Voltages for 60 Hz, 60 Hz power</i>																
60 Hz	220 V Δ/380 V Y	P ₆₀	✓			✓		■	■	9	N5C	-		✓	-	
60 Hz	380 V Δ/660 V Y	P ₆₀	✓			✓		■	■	9	N5D	-		-	-	
60 Hz	440 V Y	P ₆₀	✓			✓		■	■	9	N5E	-		✓	-	
60 Hz	440 V Δ	P ₆₀	✓			✓		■	■	9	N5F	-		✓	-	
60 Hz	460 V Y	P ₆₀	✓	✓		✓		✓	✓	9	N5H	✓		✓	-	
60 Hz	460 V Δ	P ₆₀	✓	✓		✓		✓	✓	9	N5J	✓		✓	-	
60 Hz	575 V Y	P ₆₀	✓	✓		✓		■	■	9	N5L	✓		✓	-	
60 Hz	575 V Δ	P ₆₀	✓	✓		✓		■ ³⁾	■	9	N5M	✓		✓	-	
60 Hz	230 V YY/460 V Y	P ₆₀	✓	✓		✓		■	■	9	N5N	✓		✓	-	
Voltages for brake motors with function rectifier																
50 Hz	400 V Y	P ₅₀	✓			✓		✓	✓	9	N6B	✓		✓	-	
50 Hz	400 V Δ	P ₅₀	✓			✓		✓	✓	9	N6C	✓		✓	-	
60 Hz	440 V Δ	P ₅₀	✓			✓		✓	✓	9	N4G	On request		-	-	
60 Hz	440 V Δ	P ₆₀	✓			✓		✓	✓	9	N5G	On request		-	-	
60 Hz	460 V Δ	P ₅₀	✓			✓		✓	✓	9	N4K	On request		-	-	
60 Hz	460 V Δ	P ₆₀	✓			✓		✓	✓	9	N5K	On request		-	-	

■ With additional price

1) With motor power 0.75 kW or higher.

2) Can be selected for motor frame size 80 or higher.

3) Can be selected for motor frame size 100 or higher.

Motor options

Electrical design

Motor protection

Temperature sensor

The temperature sensor is a **positive temperature coefficient (PTC)** thermistor which offers comprehensive protection against thermal motor overload. The temperature of the winding can be accurately monitored thanks to its low thermal capacity and the excellent heat contact with the winding. The PTC thermistor exhibits a sudden change in resistance when a rated response temperature is reached.

A tripping unit is used to evaluate the change in resistance and to open auxiliary circuits via auxiliary contacts.

The switching hysteresis of the PTC thermistor is low, which facilitates fast restarting of the drive. Motors with this type of protection are recommended for heavy duty starting, intermittent duty, extreme changes in load, high ambient temperatures, or fluctuating supply systems.

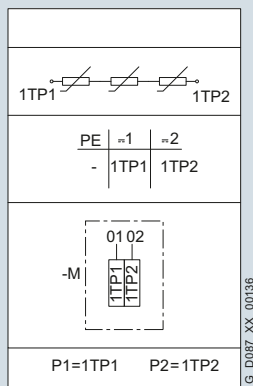


Fig. 6/1 Connection circuit diagram

In order to prevent serious damage by impulse voltage peaks to the sensor and the downstream evaluation electronic circuitry which can occur in inverter operation as a result of the close contact between PTC thermistor and winding, the connecting cables and the PTC thermistor have reinforced insulation designed to provide "protective separation".

Order code:

PTC thermistor for disconnection	M10
PTC thermistor for warning and disconnection	M11

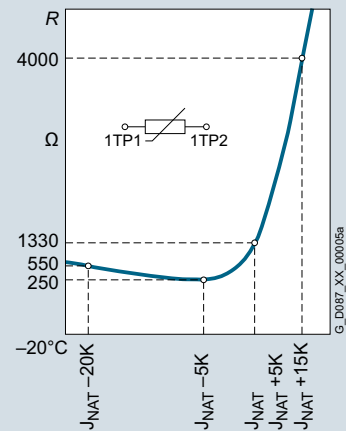


Fig. 6/2 Temperature sensor characteristic

Temperature switch

The temperature switch is a **winding thermostat (NC contact)** and is suitable as a protection device for slowly increasing motor temperatures. When the rated response temperature is reached, it can open an auxiliary circuit. When the motor temperature decreases, the winding thermostat closes again as soon as the temperature falls significantly below the rated response temperature.

When the motor current rises quickly (e.g. with a locked rotor), these switches are not suitable due to their large thermal time constants.

The temperature switch provides safety isolation in accordance with EN 61800-5-1 up to max. 500 V.

Order code:

Winding thermostat for disconnection	M12
Winding thermostat for warning and disconnection	M13

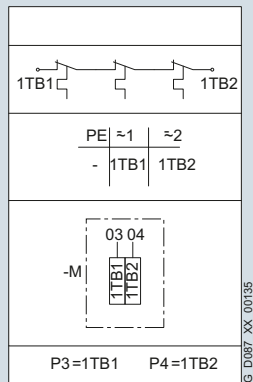


Fig. 6/3 Connection circuit diagram

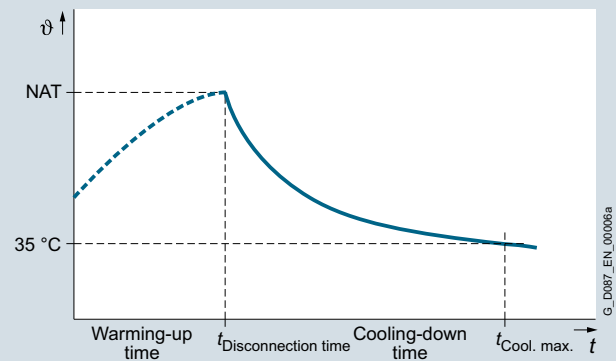


Fig. 6/4 Temperature switch characteristic

KTY 84-130 temperature sensor

This sensor is a PTC thermistor that changes its resistance depending on the temperature in accordance with a defined curve. The KTY 84-130 temperature sensor can be used for monitoring the motor temperature in inverter operation.

Some inverters determine the motor temperature using the resistance of the temperature sensor. They can be set to a required temperature for warning and disconnection.

In order to prevent serious damage by impulse voltage peaks to the sensor and the downstream evaluation electronic circuitry which can occur in inverter operation as a result of the close contact between temperature sensor and winding, the connecting cables and the temperature sensor have reinforced insulation designed to provide "protective separation".

Order code:

KTY 84-130 temperature sensor

M16

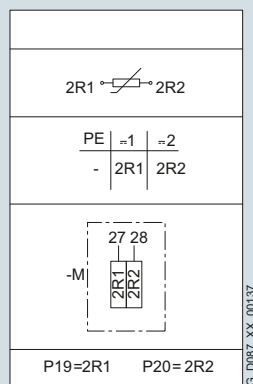


Fig. 6/5 Connection circuit diagram

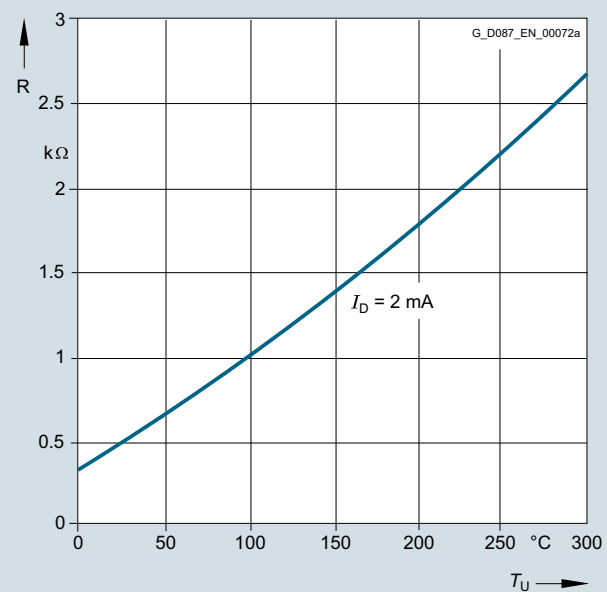


Fig. 6/6 Temperature sensor characteristic

1x PT100 resistance thermometer

This sensor is a PTC thermistor and at 0 °C has a resistance of 100 Ω. Its resistance changes almost linearly in the range between 0 and 100 °C. Changes in temperature are transferred to an evaluation device in the form of resistance changes.

The evaluation device is not included in the scope of supply.

In order to prevent serious damage by impulse voltage peaks to the sensor and the downstream evaluation electronic circuitry which can occur in inverter operation as a result of the close contact between resistance thermometer and winding, the connecting cables and the resistance thermometer have reinforced insulation designed to provide "protective separation".

Order code:

1x PT100 resistance thermometer

M19

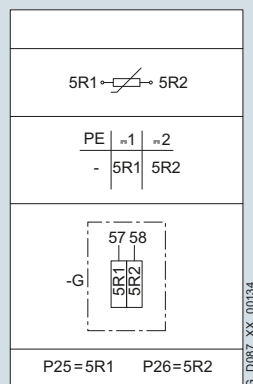


Fig. 6/7 Connection circuit diagram

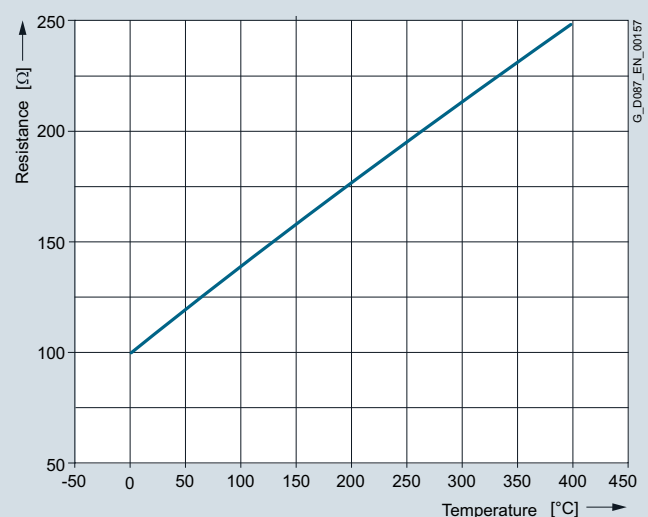


Fig. 6/8 Resistance thermometer characteristic

Motor options

Electrical design

Motor protection

Selection and ordering data

Motor protection	Motor frame size							Order code
	63	71	80	90	100	112	132	
PTC thermistor, disconnection	✓	✓	✓	✓	✓	✓	✓	M10
PTC thermistor, warning and disconnection	✓	✓	✓	✓	✓	✓	✓	M11
Winding thermostat, disconnection	✓	✓	✓	✓	✓	✓	✓	M12
Winding thermostat, warning and disconnection ¹⁾	✓	✓	✓	✓	✓	✓	✓	M13
KTY 84-130 temperature sensor	✓	✓	✓	✓	✓	✓	✓	M16
1x PT100 resistance thermometer	✓	✓	✓	✓	✓	✓	✓	M19

¹⁾ Not possible for inverter operation

Protective devices

Number of windings	Example	Function	Number of temperature-dependent protective devices	Number of terminals
1	Motors with one pole number	Disconnection	3 or 1 (motor frame sizes 80 and 90)	2
		Warning and disconnection	6	3 (motor frame size 71 to 132)

Anti-condensation heating

Motors whose windings are at risk of condensation due to the climatic conditions, e.g. inactive motors in humid atmospheres or motors that are subjected to widely fluctuating temperatures, can be equipped with anti-condensation heaters. Anti-condensation heating must not be switched on during operation.

Instead of an anti-condensation heater, another possibility is to connect a voltage that is approximately 4 to 10 % of the rated motor voltage to stator terminals U1 and V1; 20 to 30 % of rated motor current is sufficient to heat the motor.

Order code:

115 V anti-condensation heating

M40

230 V anti-condensation heating

M41

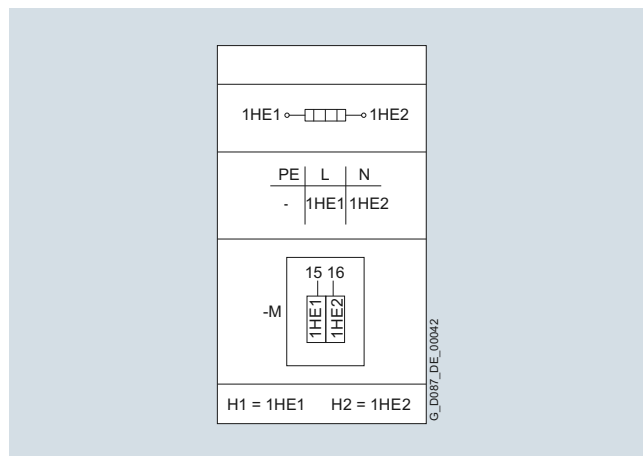


Fig. 6/9 Connection circuit diagram for the anti-condensation heating

Technical specifications

Motor frame size	Heating power
	W
63 ... 80	12.5
90 ... 112	25
132	50

Inverter operation

All motors used in SIMOGEAR geared motors are equipped with innovative insulation systems, consisting of high-quality enamel wires and insulating sheet materials in conjunction with highly temperature-resistant impregnations.

The motors can be operated with SINAMICS G and SINAMICS S converters and inverters (controlled and uncontrolled infeed) provided that the permissible voltage peaks listed in the relevant table are not exceeded.

Continuous operation while utilizing the admissible voltage tolerances must be avoided and is not recommended according to IEC 60034-1 2011 Chapter 7.3.

Preferred supply system configurations are TT systems and TN systems with neutral-point grounding. In the case of a fault when connected to an IT supply system (ground fault), the insulation is excessively stressed. In this case, the process should be terminated as quickly as possible ($t < 2$ h), and the fault resolved. We do not recommend operation on TN supply systems with transition-point grounding.

Impulse Voltage Insulation Class (IVIC) – category C (strong)

The insulation system of the motors meets the requirements of EN 60034-18-41:2014 according to the stress category C (strong).

The insulation systems of the motors are optimized for operation on SINAMICS inverters. The admissible voltage peaks specified in the table must not be exceeded.

Thanks to the high-quality insulation systems, the requirements of IVIC C are significantly exceeded; see the comparison in the table. This also means that significantly more stringent requirements can be met by the system operator.

Note:

When motors are operated on SINAMICS inverters additional losses occur which, depending on the admissible winding over-temperature, can make it necessary to reduce the torque. The admissible torque values can be obtained from the SIZER engineering tool. The lowest frequency specified there is 5 Hz. For stationary inverter operation at lower frequencies, particularly in the case of frame sizes < 100 , it is necessary to inquire at the Quotation Center.

For inverter operation with the outputs specified in the catalog, the motors are utilized according to temperature class 155 (F), i.e. in this case neither a service factor > 1 nor an increased coolant temperature is possible.

The table below shows a comparison between the maximum admissible peak-peak voltage at the motor terminal as stipulated by EN 60034-18-41 and the peak-peak voltage tolerance of SIMOTICS insulation systems.

	Line voltage U_{rated}			
	400 V		480 V	
Standard	IVIC C	Siemens	IVIC C	Siemens
$\hat{U}_{phase-ground}$	1 680	2 200	2 016	2 200
$\hat{U}_{phase-phase}$	2 360	3 000	2 832	3 000

The following applies for the voltage rise time: $T_a > 0.3 \pm 0.2 \mu s$

The voltages specified are peak-peak values ($V_{pk/pk}$).

Example of how to design a drive system for a line voltage of 400 V in compliance with the specifications for the motor and inverter

When SIMOGEAR geared motors are operated on SINAMICS inverters, reflections may cause voltage peaks in excess of the upper tolerance limits. These effects may also be influenced by the design and length of the cables used.

A = standard power cable (NYCWY)

B = power cable with symmetrical shield (e.g. Prototflex)

In the example below, various motor configurations are assessed on the basis of the following general conditions:

- Configuration with a single motor:
Each motor has its own Motor Module with a separate infeed for each module
- Configuration with multiple motors:
Each motor has its own Motor Module; these modules are interconnected via a common DC link which is supplied by an Active Line Module combined with an Active Interface Module (AIM).
- TN system $U_k = 5 \%$
- $U_{DC Link} = 1.5 \times U_{Line}$ with a modulation depth $ALM_{max} < 0.97$ and $U_{DC,max}$
- Motor Modules in booksize format
- Active Line Module (ALM) with matching Active Interface Module (AIM)
- No parallel connection of Active Line Modules
- Pulse frequencies set to factory defaults

On this basis, the maximum recommended cable lengths [m] are:

Rated power kW	Rated voltage $U_{Line} = 400 V \pm 10 \%$ (DC link voltage $U_{DC Link} = 640 V_{DC}$)			
	Multi-motor operation		Single-motor operation	
	Cable type A	Cable type B	Cable type A	Cable type B
0.09 ... 4	50 ¹⁾	50 ¹⁾	50 ¹⁾	50 ¹⁾
5.5 ... 7.5	55	70 ¹⁾	70 ¹⁾	70 ¹⁾
11 ... 18.5	50	75	100 ¹⁾	100 ¹⁾
22 ... 45	100 ¹⁾	100 ¹⁾		
55 ... 90	85			

¹⁾ Cable length limitation by SINAMICS Motor Module

Provided that the cables do not exceed the recommended lengths and on the basis of the specified general conditions, it can be assumed that the system will operate in compliance with the product specifications.

Other lengths of cable may be used, but the potential voltage peaks and front times must be checked separately according to the table for compliance with the product specifications.

Motor options

Electrical design

Windings and insulation

DURIGNIT IR 2000 insulation

The DURIGNIT IR 2000 insulating system consists of high-quality enamel wires and insulating sheet materials in conjunction with temperature-resistant resin impregnation.

This ensures that these motors will have a high mechanical and electrical strength, high service value, and a long service life. The insulating system protects the winding to a large degree against aggressive gases, vapors, dust, oil, and increased air humidity. It can withstand the usual vibration stressing.

Temperature class

All motors are designed for temperature class 155 (F). They are utilized to temperature class 130 (B).

The 4-pole motors can be optionally implemented for temperature class 180 (H). The winding is utilized to temperature class 155 (F).

Order code:

Temperature class 180 (H)

M08

Increased air humidity/temperature with 30 to 60 g water per m³ of air

The motors in the standard range are designed for up to 30 g water per m³. A design for increased air humidity in the range between 30 and 60 g water per m³ air as a function of the temperature is possible, as shown in the following table.

Order code:

Increased air humidity/temperature with 30 to 60 g water per m³ of air

N54

Relative humidity	Temperature						
	+20 °C	+30 °C	+40 °C	+50 °C	+60 °C	+70 °C	+80 °C
10 %	2	3	5	8	13	20	29
15 %	3	5	8	12	19	30	44
20 %	3	6	10	17	26	39	58
25 %	4	8	13	21	32	49	
30 %	5	9	15	25	39	59	
35 %	6	11	18	29	45		
40 %	7	12	20	33	52		
45 %	8	14	23	38	58		
50 %	9	15	26	41			
55 %	10	17	28	46			
60 %	10	19	31	50			
65 %	11	20	33	54			
70 %	12	21	36	58			
75 %	13	23	38				
80 %	14	24	41				
85 %	15	26	43				
90 %	16	27	46				
95 %	16	29	49				
100 %	17	30	51				

Overview

Note:

The degree of protection only applies to the electrical equipment (motor, brake, encoder). Depending on the application area, the applicable measures must be applied to the gearbox.

Available degrees of protection

Degree of protection	Motor options that can be mounted	Order code
IP55	No restrictions	K01
IP65	Possible in conjunction with a brake, backstop, separately driven fan, incremental encoder, absolute encoder, resolver, and motor plug.	K03

Cooling and ventilation

Overview

The motors have radial-flow fans, which cool regardless of the direction of rotation of the motor (cooling method IC 411, IEC 60034-6). The air flows from the non-drive end (NDE) to the drive end (DE).

Self ventilation

The motor fan can either be a standard fan, metal fan, or high inertia fan.

Fan design

Motor frame size	Fan	Material		Order code
		Fan	Fan cover	
63 ... 90	Standard fan	Plastic	Sheet metal	-
	Metal fan	Aluminum		M21
	High inertia fan	Steel core with plastic fan blades		M22
100 ... 132	Standard fan	Plastic	Sheet metal	-
	Metal fan	Aluminum		M21
	High inertia fan	Cast iron		M22

Standard fan

As standard, the motors are equipped with a plastic fan. This can be used for the entire standard ambient temperature range.

Metal fan

As an alternative to the standard plastic fans, aluminum fans are available for the motors.

Metal fans are used for specific environmental conditions, e.g.:

- If there are solid or dirt particles, such as wood chips, textile fibers in the cooling air
- Special motor designs for increased ambient temperatures exceeding +60 °C

Order code:

Metal fan	M21
-----------	------------

High inertia fan

When required, 4-pole motors in frame sizes 71 to 132 can be equipped with a high inertia fan.

High inertia fans as an additional inertia are finely balanced according to ISO 1940. Typical applications are drives for traveling gear, conveying equipment, or in general for supporting soft starting and/or soft braking in line operation.

Order code:

High inertia fan	M22
------------------	------------

A high inertia fan increases the moment of inertia of the motor according to the table below.

Motor frame size	J_2 10 ⁻⁴ kgm ²	m_{fan} kg
71	17.1	1.38
80	27.9	1.75
90	54.0	2.55
100	116.0	3.30
112	230.0	5.30
132	562.0	9.10

Motor options

Mechanical design

Cooling and ventilation

Forced ventilation

Forced ventilation (separately driven fan) can be combined with almost all brakes and encoders as required.

Order code:

Separately driven fan

M23

Technical specifications

Motor frame size	Frequency Hz	Rated voltage range			Rated current A	Power consumption W	Volume flow m ³ /h	Weight kg
		Phase	V	Connection				
71	50	1 AC	230 ... 277	⊥(Δ)	0.10	27.0	78	1.45
		3 AC	220 ... 303/346 ... 525	Δ/Y	0.11/0.06	31.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.12	33.0	98	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.10/0.06	29.0		
80	50	1 AC	230 ... 277	⊥(Δ)	0.11	29.0	127	1.50
		3 AC	200 ... 303/346 ... 525	Δ/Y	0.11/0.06	31.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.14	37.0	148	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.10/0.06	34.0		
90	50	1 AC	230 ... 277	⊥(Δ)	0.25	65.0	200	1.90
		3 AC	200 ... 303/346 ... 525	Δ/Y	0.38/0.22	91.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.29	65.0	240	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.33/0.19	77.0		
100	50	1 AC	230 ... 277	⊥(Δ)	0.28	66.0	260	2.05
		3 AC	200 ... 303/346 ... 525	Δ/Y	0.37/0.22	91.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.30	75.0	310	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.31/0.18	87.0		
112	50	1 AC	230 ... 277	⊥(Δ)	0.28	71.0	337	2.15
		3 AC	200 ... 303/346 ... 525	Δ/Y	0.35/0.20	97.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.37	94.0	411	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.31/0.18	103.0		
132	50	1 AC	230 ... 277	⊥(Δ)	0.52	125.0	560	3.00
		3 AC	200 ... 303/346 ... 525	Δ/Y	0.64/0.37	160.0		
	60	1 AC	230 ... 277	⊥(Δ)	0.61	163.0	650	
		3 AC	220 ... 332/380 ... 575	Δ/Y	0.35/0.20	180.0		

Modular system in combination with self ventilation and forced ventilation for motor frame sizes 63 to 132

Cooling method	Motor plug	Encoder			Brake					2nd shaft extension		
		Incremental encoder	Absolute encoder	Resolver ³⁾	Encoder under cover ²⁾	Encoder accessories	Without manual release	With manual release	Microswitch Air flow monitoring ¹⁾		Wear monitoring	
Self ventilation												
Standard fan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	On request	✓
Metal fan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
High inertia fan ²⁾	✓	✓	-	✓	-	✓	✓	✓	✓	✓		✓
Canopy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		-
Forced ventilation ²⁾												
Canopy	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	On request	-

¹⁾ Can be selected for brake type L32 or higher

²⁾ Can be selected for motor frame size 71 or higher

³⁾ Cannot be combined with brake motor

Connection, circuit and terminal boxes

Location and position of the terminal box

The terminal box of the motor can be mounted in four different locations or positions. The position of the terminal box is always when viewing the drive end (DE) of the motor.

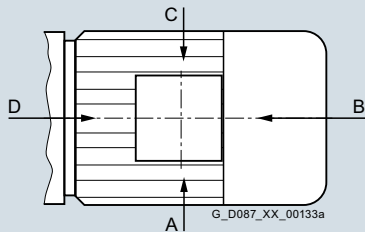
The standard position of the terminal box (for mounting position M1) is on the right-hand side, with the cable entry from below (1A).

The terminal box is always located at the non-drive end (NDE) of the motor.

Selection data, cable entry

Terminal box position	Position of the cable entry	Order code
Motor	LA63 ... 71, LE80 ... 100	
1	A	M55
	B	M56
	C	M57
	D	M58
2	A	M59
	B	M60
	C	M61
	D	M62
3	A	M63
	B	M64
	C	M65
	D	M66
4	A	M67
	B	M68
	C	M69
	D	M70

Position of the cable entry



Terminal box position (for mounting position M1)
When viewing DE

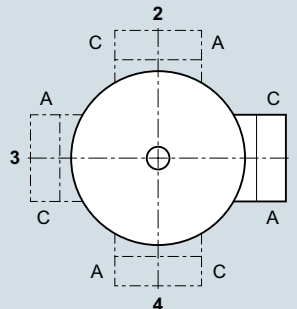


Fig. 6/10 Terminal box position and cable entry

Motor connection

The number of winding ends depends on the winding design. Three-phase AC motors are connected to the three phase conductors L1, L2, and L3 of a three-phase line supply. The motor rated voltage in the operating connection must match the phase conductor voltages of the line supply.

When the three phases operate in sequence and are connected to the terminals of the motor in alphabetical order U1, V1 and W1, the motor rotates clockwise when viewing the DE motor shaft.

The direction of rotation of the motor can be reversed if two connecting cables are interchanged. Labeled terminals are provided to connect the protective conductor.

The connections for a brake, anti-condensation heating or thermal motor protection are also located in the terminal box.

Note:

Different sizes of terminal box are used depending on the connections required.

Additional notes see "Terminal box type" page 6/14.

Motor options

Mechanical design

Motor connection and terminal boxes

Connection, circuit and terminal boxes (continued)

Motor connection Δ/Y

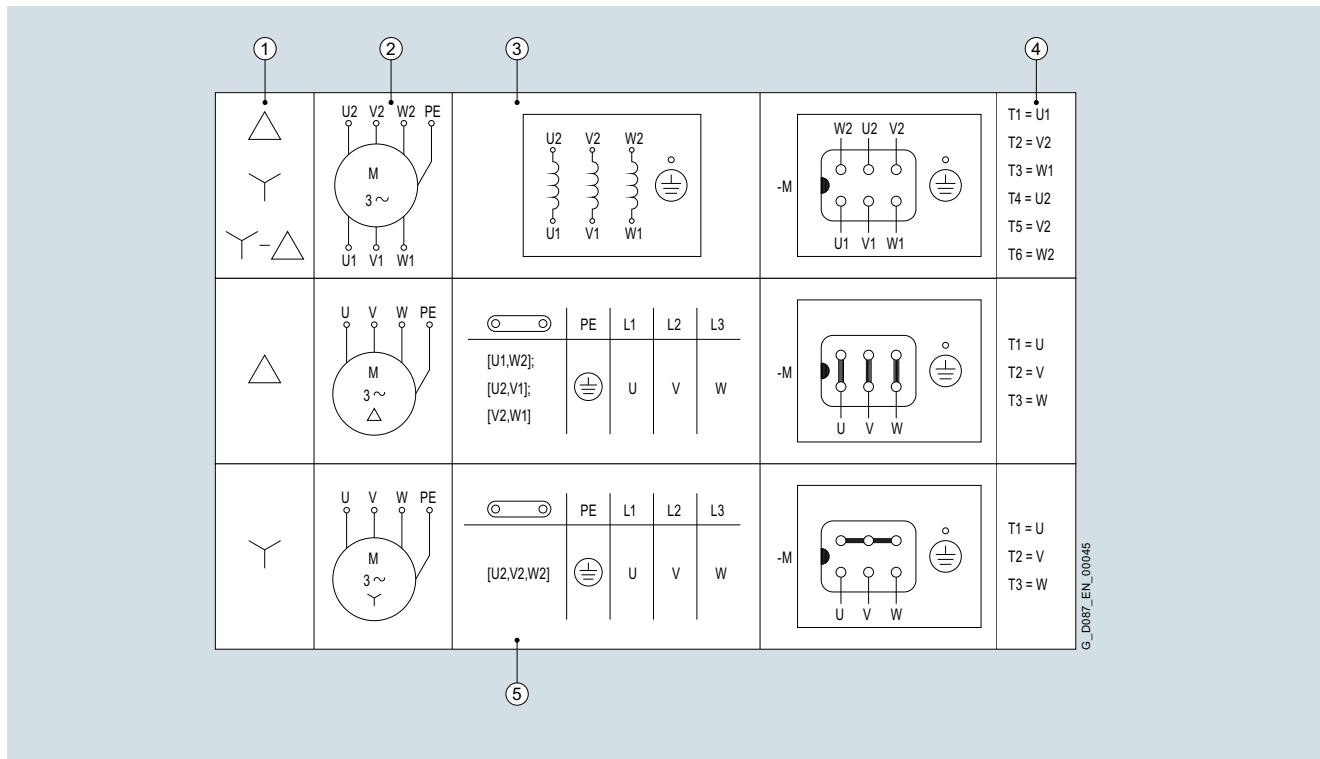


Fig. 6/11 Connection circuit diagram, motor connection Δ/Y

- ① Motor connection
- ② Circuit diagram symbols
- ③ Winding arrangement in the motor
- ④ Comparison:
Terminal designation acc. to NEMA MG1/acc. to IEC 60034-8
- ⑤ Location of the jumpers on the terminal board and juxtaposition of the line connection with the motor connection

6

Motor connection Y

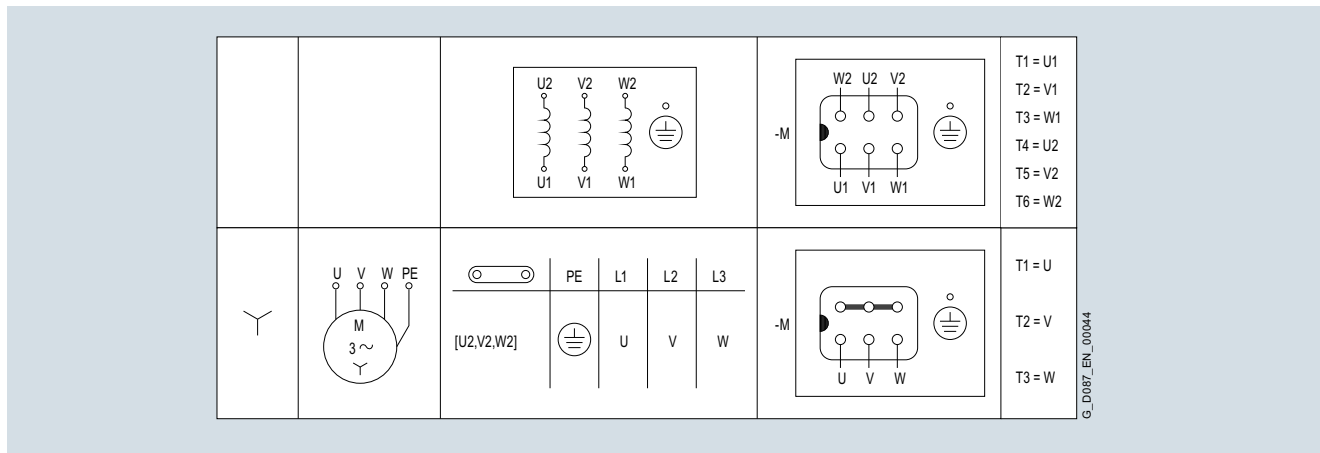


Fig. 6/12 Connection circuit diagram, motor connection Y

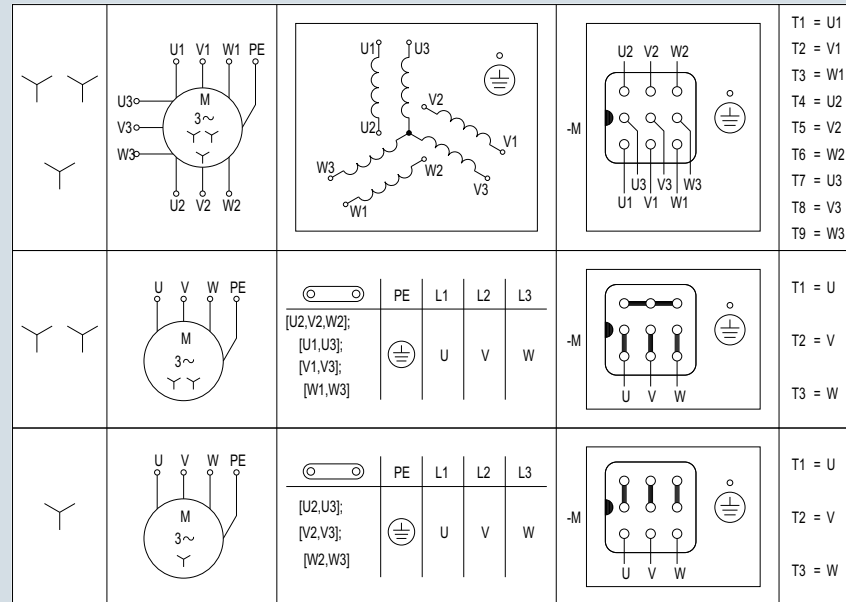
Connection, circuit and terminal boxes (continued)
Motor connection YY/Y


Fig. 6/13 Connection circuit diagram, motor connection YY/Y

Terminal connection

The terminal board accommodates the terminals that are connected to the leads to the motor windings.

The terminals are designed so that up to frame size 100, the external (line) connections can be established without requiring cable lugs.

Terminal box assignment

Motor frame size	Terminals Number	Contact screw thread	Max. connectable conductor mm ²	Number of cable entries	Terminal box material	Line feeder cable connection	Auxiliary terminals	
							Max. number	Max. connectable conductor mm ²
63	6 (9 for YY/Y motor connection)	M4	1.5 (2.5 with cable lug)	2 cable entries with screw plugs	Aluminum alloy	With or without cable lug	8	2.5
71								
80								
90			4				10	
100								
112								
132	6							

Motor options

Mechanical design

Motor connection and terminal boxes

Connection, circuit and terminal boxes (continued)

Terminal box type

The terminal box contains all the electrical connections that are installed in the motor. Different sizes of terminal box are used depending on the connections required.

The dimensions of terminal boxes can be found in [chapter "Motors" from page 4/16](#).



Fig. 6/14 Terminal box type gk030, TB1E00, TB1F00

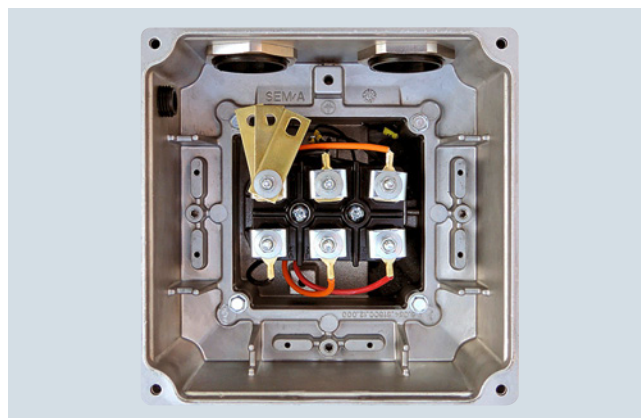


Fig. 6/15 Terminal box type gk127, TB1E10, TB1F10

Cable entry metric

Motor frame size	Motor options				Cable entry metric	Terminal box type		
	Brake	Winding protection	Heating	Application terminal box				
63 ... 71	Without	PTC thermistor for disconnection	Without	Without	1 x M25 x 1.5 + 1 x M20 x 1.5	gk030 ¹⁾		
		Winding thermostat for disconnection						
KTY 84-130 temperature sensor								
1x PT100 resistance thermometer								
80 ... 90	Without	Without	No restriction	Without	2 x M32 x 1.5	TB1E00		
		With					No restriction	
100 ... 112	Without	PTC thermistor for disconnection	No restriction	Without			2 x M32 x 1.5	TB1F00
		Winding thermostat for disconnection						
KTY 84-130 temperature sensor								
1x PT100 resistance thermometer								
132	Without	Without	No restriction	Without	2 x M32 x 1.5	TB1F10		
		With					No restriction	
132	Without	PTC thermistor for disconnection	No restriction	Without			2 x M32 x 1.5	TB1H00
		Winding thermostat for disconnection						
KTY 84-130 temperature sensor								
1x PT100 resistance thermometer								
132	Without	Without	No restriction	Without	2 x M32 x 1.5	TB1H10		
		With					No restriction	

¹⁾ For terminal boxes with 9 terminals (circuit YY/Y) terminal box type TB1E10

²⁾ For brake motors which meet the UL-R and CSA or NEMA electrical standard terminal box type TB1E10

³⁾ Terminal box gk030 possible only in design according to VDI 3643, for further information see [chapter Configuring guide "Design in accordance with VDI 3643" on page 2/4](#).

Cable entry NPT

The cable entry with national pipe thread (NPT) can be ordered as an option.

Motor frame size	Cable entry NPT	Terminal box type
63 ... 71	2 x 1/2"	gk127 ^{1) 2)}
80 ... 90		TB1E10
100 ... 112	3/4" + 1/2"	TB1F10
132		TB1H10

¹⁾ For terminal boxes with 9 terminals (circuit YY/Y) terminal box type TB1E10

²⁾ For brake motors which meet the UL-R and CSA or NEMA electrical standard terminal box type TB1E10

Order code:

Cable entry NPT

M45

Connection, circuit and terminal boxes (continued)

Terminal box cast

Motors can be supplied with the bottom half of the terminal box cast onto the motor housing in order to prevent water ingress into the housing.

In this case, no further changes can be made to the position of the terminal box.

Order code:

Terminal box cast	M53
-------------------	------------

External grounding

IEC 60034 specifies additional external grounding for motors with ratings of 100 kW and higher. This is optionally available for motors in frame sizes between 63 and 132.

Order code:

External grounding	N53
--------------------	------------

Maximum conductor connection for external grounding

Motor frame size	Thread size
63 ... 90	M4
100 ... 112	M5
132	M6

Modular system in combination with motor connection and terminal box for motor sizes 63 to 132

Modular system	Encoder system	Brake system		Microswitch		Self ventilation Forced ventilation	Second shaft extension	
		Without manual release	With manual release	Air flow monitoring ¹⁾	Wear monitoring			
			Without locking mechanism	With locking mechanism				
Terminal box	✓	✓	✓	✓	✓	On request	✓	✓
Motor plug	✓	✓	✓	✓	-	On request	✓	✓

¹⁾ Can be selected for brake type L32 or higher

Motor options

Mechanical design

Motor plug

Overview

The motor plug is supplied ready for use, and replaces the terminal box with terminal board.

Motor plugs are also available in an EMC design. A counterplug can also be provided.

In the basic design, the motor plug connection is in position B, see page 6/11. The dimensions depend on the motor frame size.

Particularly in cases where a brake with a manual release lever is used in the direction of the non-drive end (NDE), a check must be made to ensure that the motor plug does not collide with the manual release lever in the direction of the drive end (DE).

The main advantages of a motor plug over a terminal box with terminals are as follows:

- Peripheral equipment can be quickly installed
- Reduction of installation and repair times for end users
- No wiring errors as a result of the plug system
- Replacement of a geared motor without having to make any intervention in the electronics

The winding connections and, optionally, the power supply for the brake and the signal cables for the temperature sensors are connected in the plug housing.

HAN 10E motor plug

The motor plug is compatible with the products from the ECOFAST field device system. It is available for motor frame sizes 63 to 132 and can be used for line voltages at the motor plug ≤ 500 V and rated currents ≤ 16 A.

The motor plug can be used in the standard temperature range from -20 up to $+40$ °C. A special design is required for higher temperatures.

The motor connection (star or delta connection) is selected by the customer in the form of the counterplug used.

Technical specifications

Number of contacts	10 + ⊕
Max. voltage	500 V
Max. current load per PIN	16 A
Specifications	CE, cUL-Rus
Degree of protection	IP65

Order code:

HAN 10E motor plug (2 brackets)	N00
HAN 10E motor plug (2 brackets) EMC	N01
HAN 10E motor plug (1 bracket)	N04
HAN 10E motor plug (1 bracket) EMC	N06
HAN 10E counterplug	N18

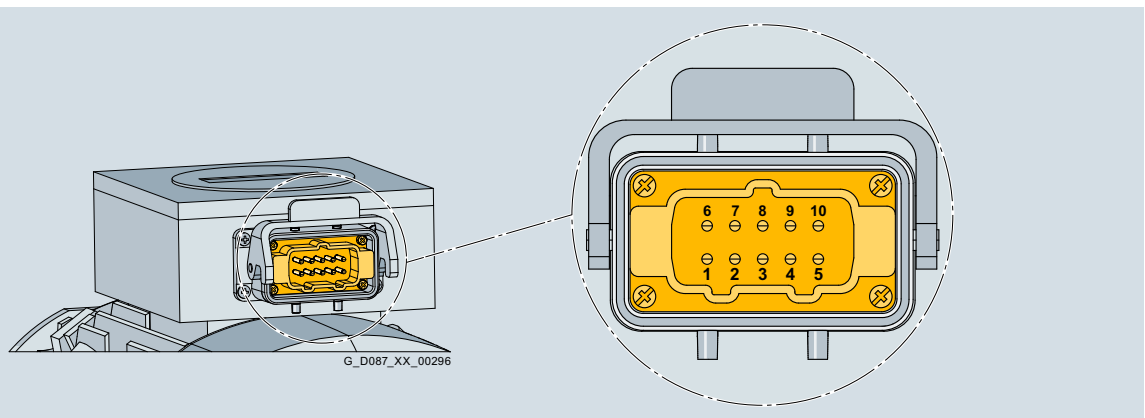
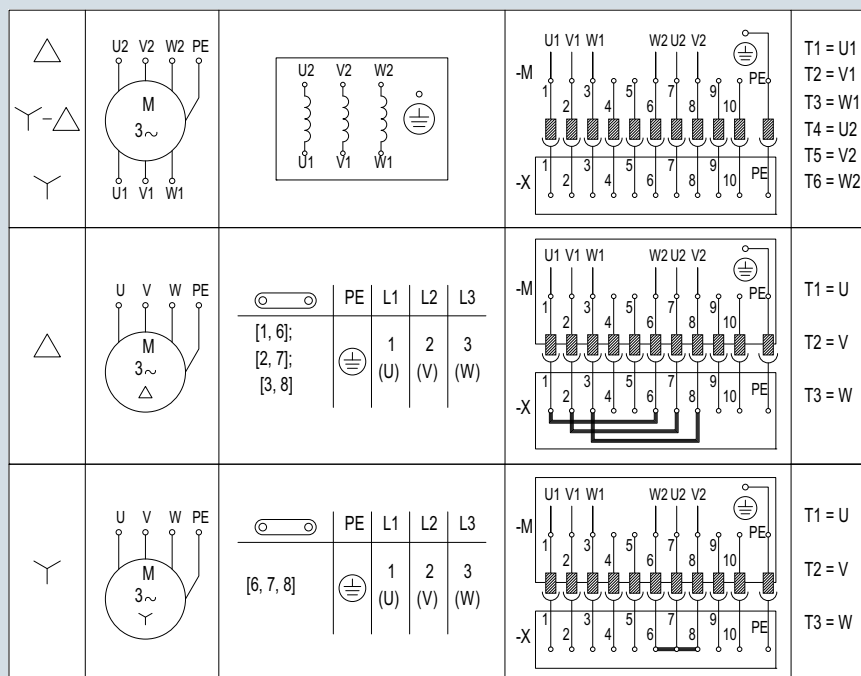


Fig. 6/16 HAN 10 E motor plug with pin assignments

Connection assignment

PIN	1	2	3	4	5	6	7	8	9	10	PE
Connection	U1	V1	W1	Brake	Brake	W2	U2	V2	Temperature-dependent winding protection		Protective conductor

HAN 10E motor plug


G_D087_XX_00143b

Fig. 6/17 Connection circuit diagram for motor winding

HAN K4/4 motor plug

The motor plug is available for motor frame size 132, and can be used for line voltages ≤ 690 V at the power connection and ≤ 250 V at the control connection – as well as rated currents ≤ 63 A at the power connection and ≤ 16 A at the control connection. The jumpers are connected to the terminal board at the factory depending on the selected circuit or voltage.

Technical specifications

Number of contacts	4 + 4 + ⊕
Max. voltage power range	690 V (pollution degree 3)
Max. current load power range per PIN	63 A
Max. voltage control range	250 V (pollution degree 3)
Max. current load control range per PIN	16 A
Specifications	CE, cUL-Rus
Degree of protection (interlocked)	IP65

Order code:

HAN K4/4 motor plug (1 bracket)	N08
HAN K4/4 motor plug (1 bracket) EMC	N09
HAN K4/4 motor plug (2 brackets)	N10
HAN K4/4 motor plug (2 brackets) EMC	N11
HAN K4/4 counterplug	N19

Motor options

Mechanical design

Motor plug

HAN K4/4 motor plug (continued)

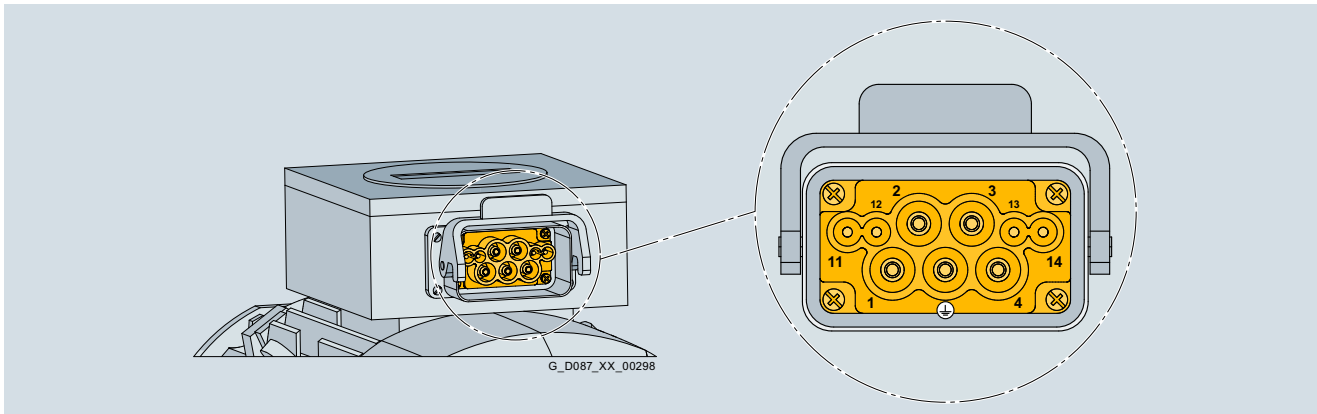


Fig. 6/18 HAN K4/4 motor plug with pin assignments

Connection assignment

PIN	1	2	3	4	11	12	13	14	PE
Connection	U	V	W	-	Brake	Brake	Temperature-dependent winding protection	Protective conductor	

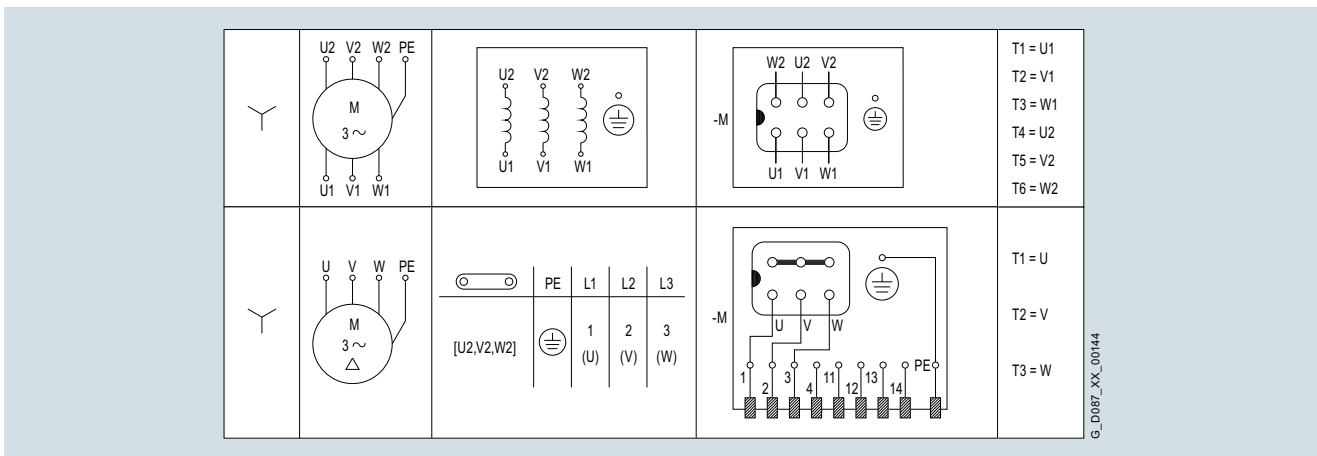


Fig. 6/19 Connection circuit diagram for motor winding Y connection

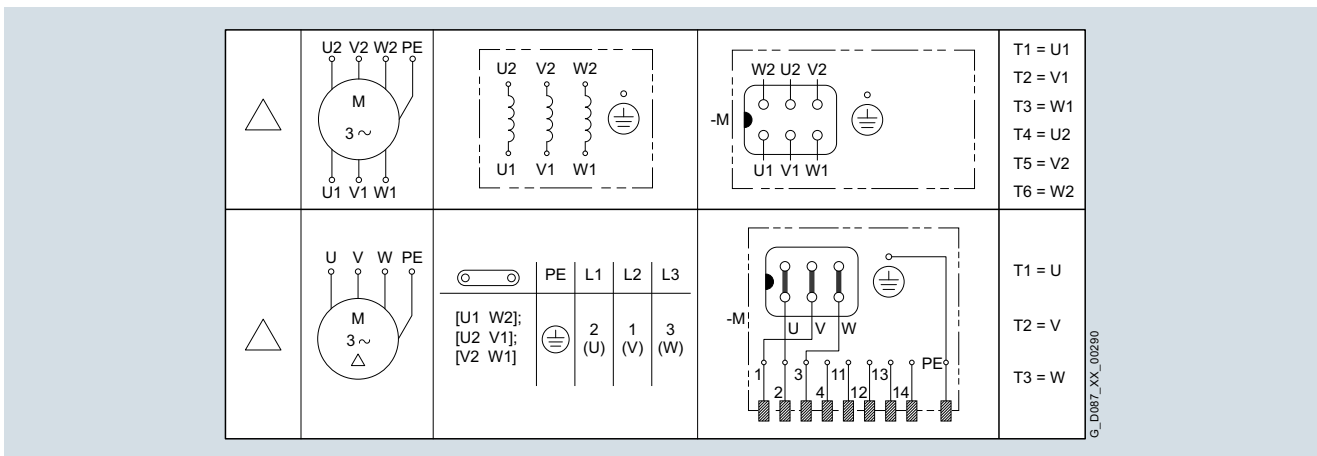


Fig. 6/20 Connection circuit diagram for motor winding Δ connection

HAN Q8 motor plug

The motor plug is available for motor frame sizes 63 to 132 and can be used for line voltages ≤ 500 V as well as rated currents ≤ 16 A. The jumpers are connected to the terminal board at the factory depending on the selected circuit or voltage.

Order code:

HAN Q8 motor plug (1 bracket) EMC

N12
Technical specifications

Number of contacts	8 + ⊕
Max. voltage	500 V (pollution degree 3)
Max. current load per PIN	16 A
Specifications	CE, cUL-Rus
Degree of protection (interlocked)	IP65

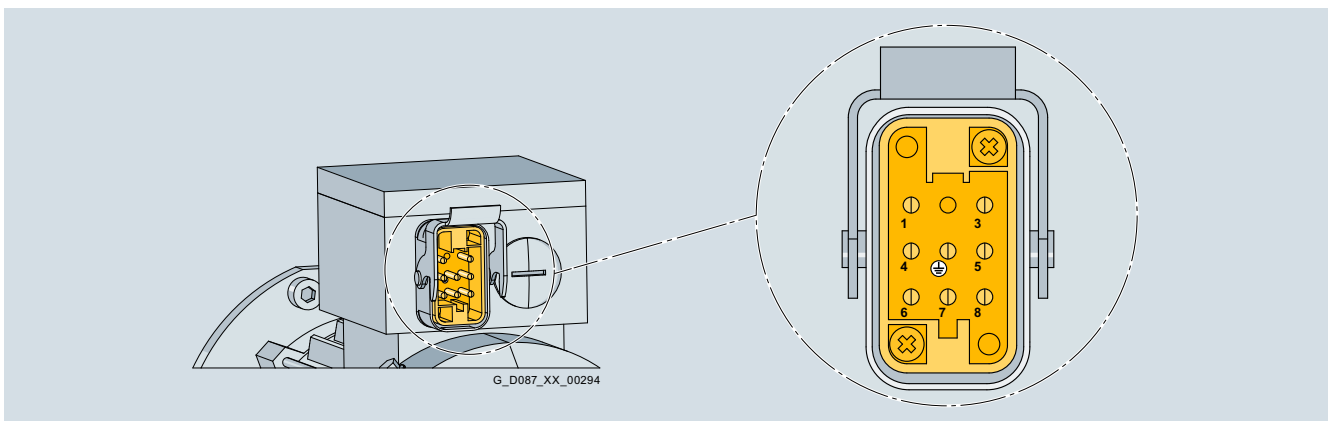


Fig. 6/21 HAN Q8 motor plug with pin assignments for motor frame sizes 63 and 71

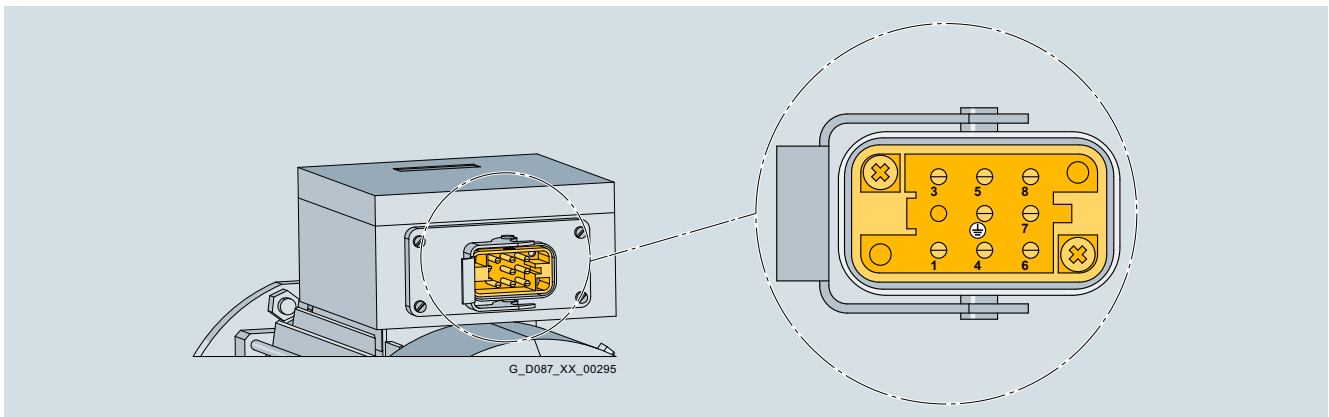


Fig. 6/22 HAN Q8 motor plug with pin assignments for motor frame sizes 80 to 132

Connection assignment

PIN	1	2	3	4	5	6	7	8	PE
Connection	U	-	W	Brake	Temperature-dependent motor protection	Brake	V	Temperature-dependent motor protection	Protective conductor

Motor options

Mechanical design

Motor plug

HAN Q8 motor plug (continued)

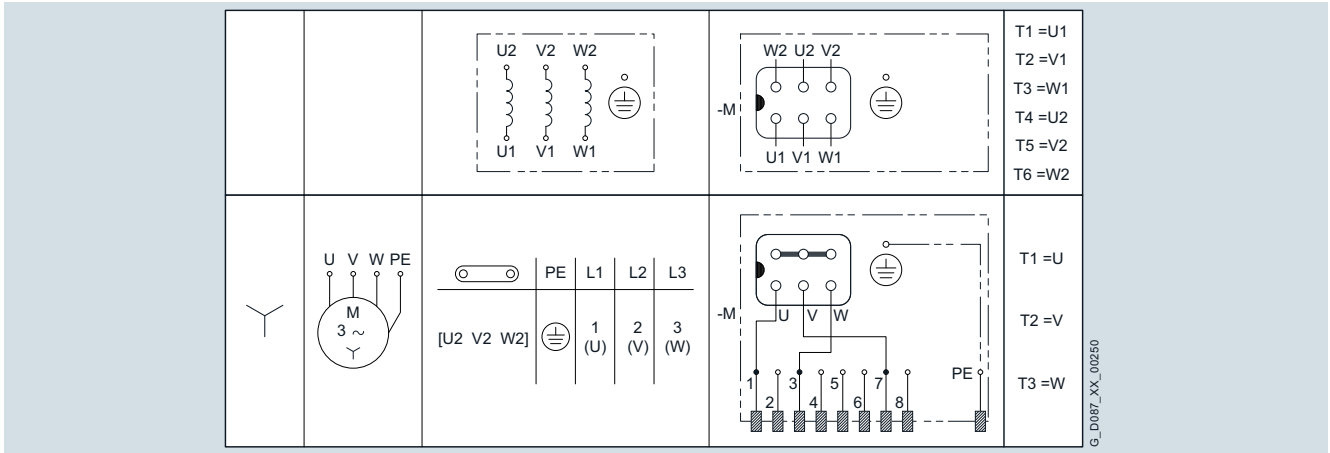


Fig. 6/23 Connection circuit diagram for motor winding Y connection

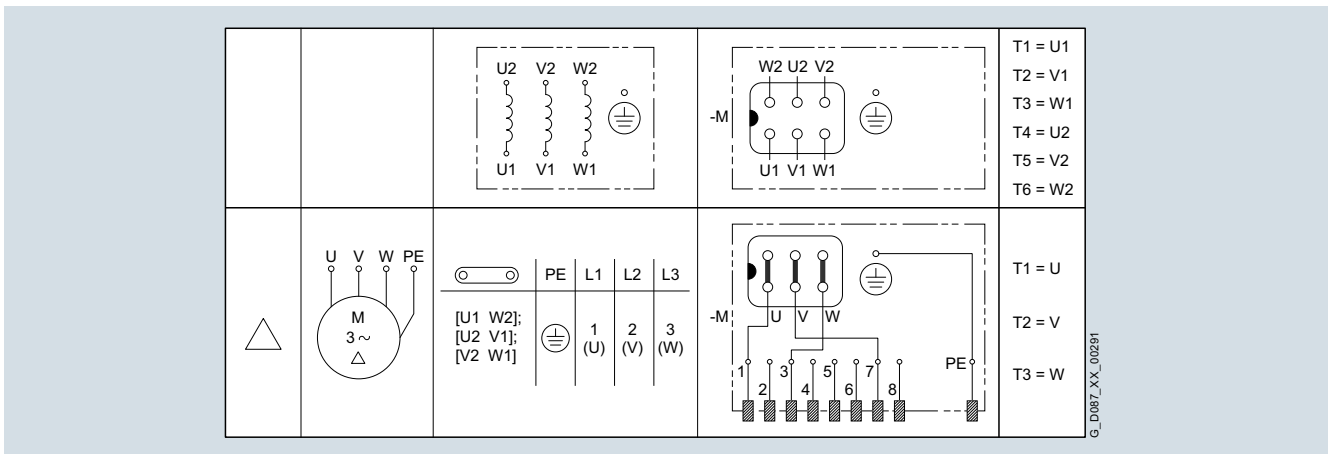


Fig. 6/24 Connection circuit diagram for motor winding Δ connection

HAN Q8 motor plug with cable

The motor plug with cable is available for motor frame sizes 63 to 100 and can be used for line voltages ≤ 500 V as well as rated currents ≤ 16 A.

One of the intended uses of the motor plug with cable is to provide an optimum connection to SINAMICS G120D.

The jumpers are connected to the terminal board at the factory depending on the selected circuit or voltage.

Technical specifications

Motor plug	
Number of contacts	8 + \oplus
Max. voltage	500 V / UL 600 V + 10 % (pollution degree 3)
Max. current load per PIN	16 A
Specifications	CE, cUL-Rus
Degree of protection (interlocked)	IP65
Cable suitable for cable carriers	
Approvals	
• VDE	yes
• cULus or UL/CSA	yes
• UL-CSA File No.	E172204/LL104758
Rated voltage	
• Power cores U_0/U	600 / 1 000 V
• Signal cores U_0/U	300 V
Operating temperature on the surface	
• Permanently installed	-50 °C ... +90 °C
• Moving	-30 °C ... +80 °C
Smallest bending radius	
• Permanently installed	5 x outer diameter
• Moving	12 x outer diameter
Bending operations	Typ. 2×10^6 cycles
Oil resistance	DIN VDE 0282 Part 10 + HD22.10
Outer jacket	Polyurethane (PUR)
Design	$4 \times 1.5 \text{ mm}^2 + 2 \times (2 \times 0.75 \text{ mm}^2)$ (shielded)
Outer diameter	11.7 ... 12.7 mm

Note:

With the HAN Q8 motor plug version with 0.5 m cable (**K50**), the plug insert in the plug is rotated by 180°, see Fig. 6/26.

Order code:

HAN Q8 motor plug with 0.5 m cable (plug insert rotated by 180°)

K50

HAN Q8 motor plug with 1 m cable

K51

HAN Q8 motor plug with 2 m cable

K52

HAN Q8 motor plug with 3 m cable

K53

HAN Q8 motor plug with 4 m cable

K54

HAN Q8 motor plug with 5 m cable

K55

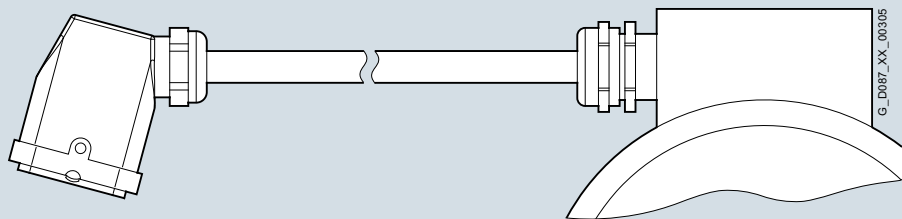


Fig. 6/25 HAN Q8 motor plug with cable

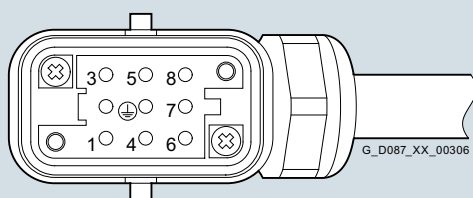


Fig. 6/26 Pin assignments for motor plug with 0.5 m cable, plug insert rotated by 180°

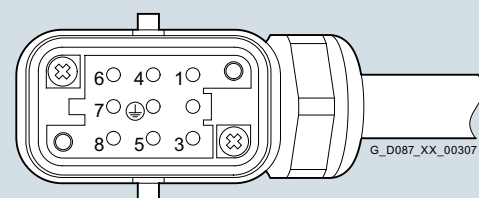


Fig. 6/27 Pin assignments for motor plug with 1 m to 5 m cable, plug insert rotated by 0°

Motor options

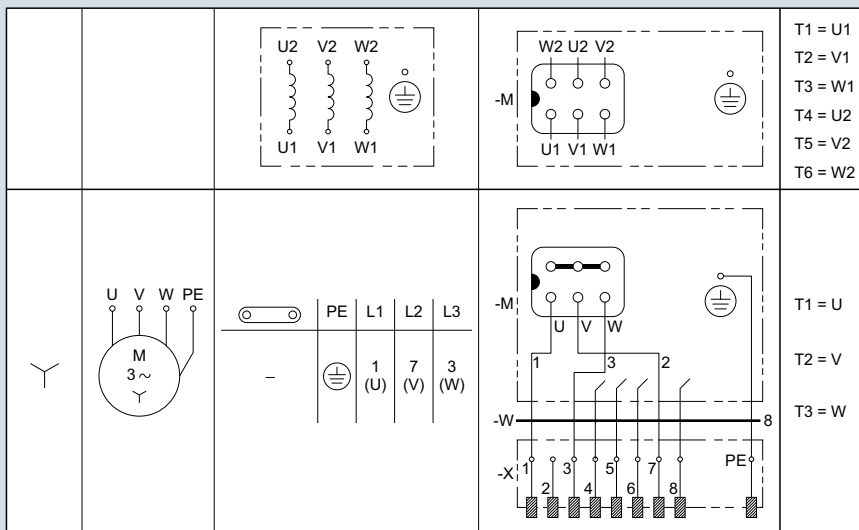
Mechanical design

Motor plug

HAN Q8 motor plug with cable

Connection assignment

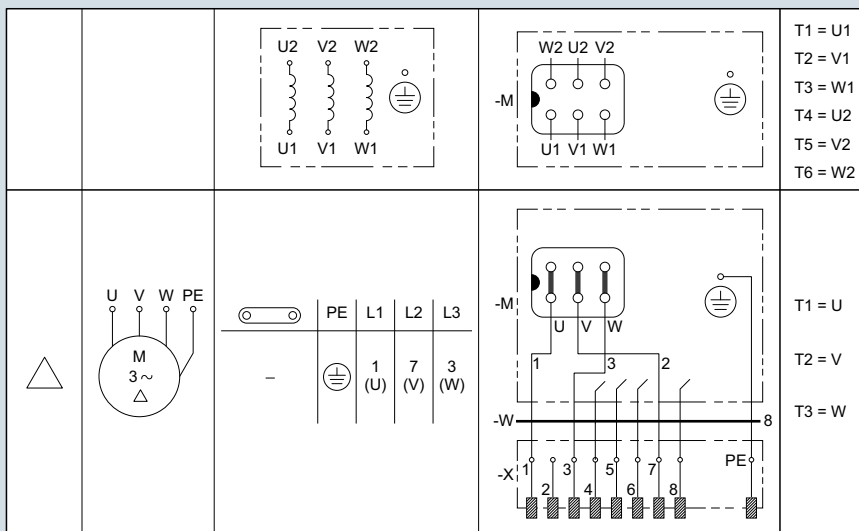
PIN	1	2	3	4	5	6	7	8	PE
Connection	U	-	W	Brake	Temperature-dependent motor protection	Brake	V	Temperature-dependent motor protection	Protective conductor



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Fig. 6/28 Connection circuit diagram for motor winding Y connection

6



G_D087_XX_00292

Fig. 6/29 Connection circuit diagram for motor winding Δ connection

HAN Q12 motor plug

The motor plug is available for motor frame sizes 63 to 90 and can be used for line voltages ≤ 400 V as well as rated currents ≤ 10 A. The motor connection (star or delta connection) is selected by the customer.

Order code:

HAN Q12 motor plug (1 bracket) EMC

N13

Technical specifications

Number of contacts	12 + ⊕
Max. voltage	400 V (pollution degree 3)
Max. current load per PIN	10 A
Specifications	CE
Degree of protection (interlocked)	IP65

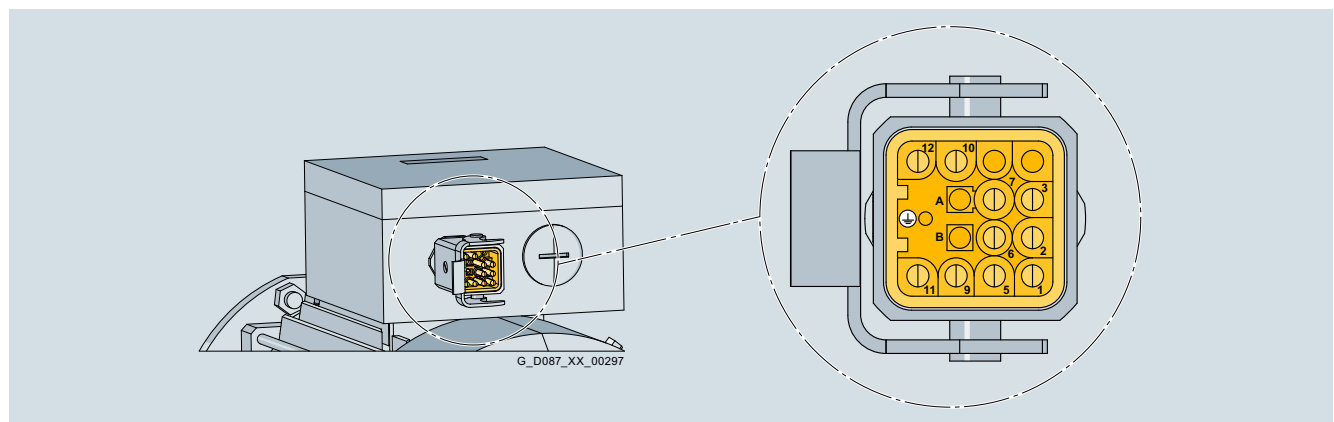


Fig. 6/30 HAN Q12 motor plug with pin assignments

Connection assignment

PIN	1	2	3	4	5	6	7	8	9	10	11	12	PE
Connection	U1	V1	W1	-	W2	U2	V2	-	Brake	Temperature-dependent winding protection	Brake	Temperature-dependent winding protection	Protective conductor

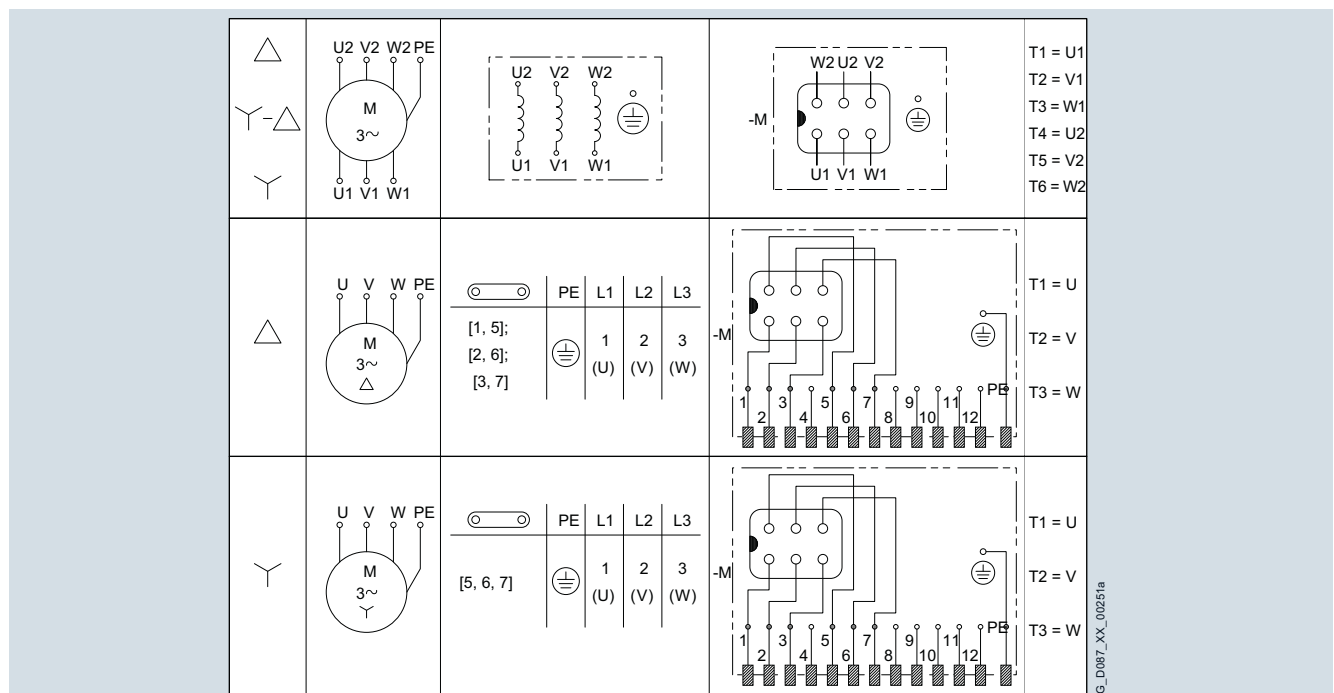


Fig. 6/31 Connection circuit diagram for motor winding

Motor options

Mounted components

Brake

Overview

SIMOGEAR geared motors can be supplied with spring-operated disk brakes in order to reduce the motor run-on time or to hold loads, for example.

Our MODULOG modular system allows several brake sizes to be used with one motor frame size. This chapter specifies the assignment to the motor frame sizes and possible brake options.

Design and principle of operation

Single-disk, spring-operated brakes have two friction surfaces. When the brake is in a zero current state, a braking torque is generated using several springs.

The brake is released electromagnetically. When the motor brakes, the rotor which can be axially shifted on the hub or the shaft is pressed via the armature disk against the friction surface by means of the springs. In the braked state, there is a gap between the armature disk and the solenoid assembly.

To release the brake, the solenoid is energized with DC voltage. The resulting magnetic force attracts the armature disk onto the solenoid assembly against the spring force.

The spring force is then no longer applied to the rotor, which can now rotate freely.

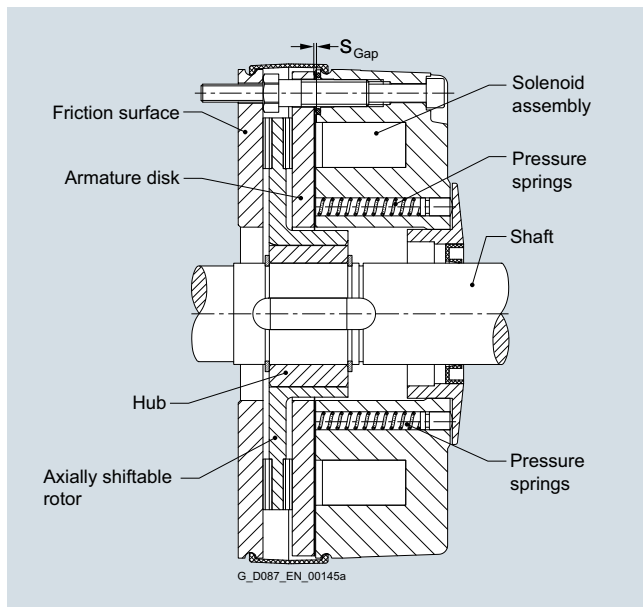


Fig. 6/32 Brake L

Selecting the brake

Our MODULOG modular system allows several brake sizes to be used with one motor frame size.

Brake assignment

Brake type	Braking torque Nm	Motor frame size							Order code
		63	71	80	90	100	112	132	
L4/1.4	1.4	○	○	○					B01
L4/2	2	○	○	○					B02
L4/3	3	○	○	○					B03
L4	4	□	□	○					B00
L4/5	5	○	○	○					B57
L8/3	3		○	○	○				B05
L8/4	4		○	○	○				B06
L8/5	5		○	○	○				B07
L8/6.3	6.3		○	○	○				B08
L8	8		○	□	○				B04
L8/10	10		○	○	○				B09
L16/8	8			○	○	○			B14
L16/10	10			○	○	○			B11
L16/13	13			○	○	○			B12
L16	16			●	□	○			B10
L16/20	20				○	○			B13
L32/14	14				○	○	○		B66
L32/18	18				○	○	○		B16
L32/23	23				○	○	○		B17
L32	32				○	□	□		B15
L32/40	40					○	○		B18
L60/25	25					○	○		B67
L60/38	38					○	○		B20
L60/50	50					○	○		B21
L60	60						○		B19
L80/25	25							○	B24
L80/35	35							○	B25
L80/50	50							○	B26
L80/63	63							○	B27
L80	80							□	B22
L80/100	100							○	B23
L150/60	60							○	B31
L150/80	80							○	B32
L150/100	100							○	B29
L150/125	125							○	B30
L150	150							○	B28

□ Standard assignment

○ Working brake and holding brake

● Can only be used as holding brake

Connecting the brake

Labeled terminals are provided in the main terminal box of the motor to connect the brake.

Connection circuit diagram with AC or DC control

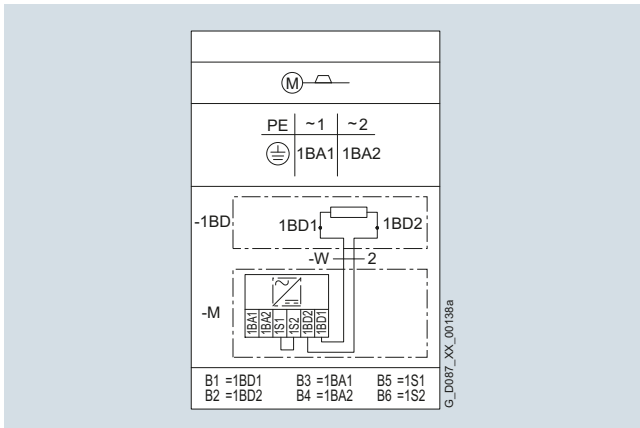


Fig. 6/33 Connection circuit diagram with AC control voltage

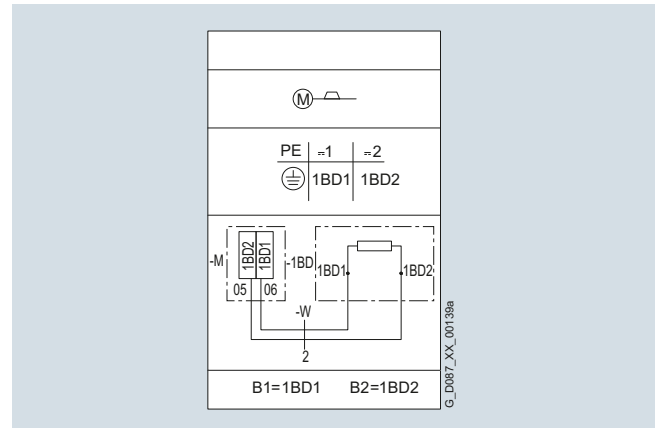


Fig. 6/34 Connection circuit diagram with DC control voltage

Function diagram of a brake switched on the AC or DC and AC sides

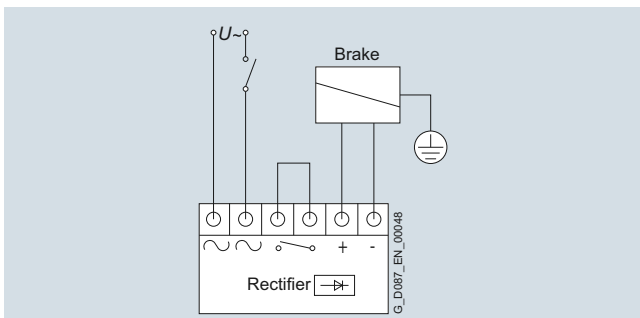


Fig. 6/35 Function diagram of a brake switched on the AC side

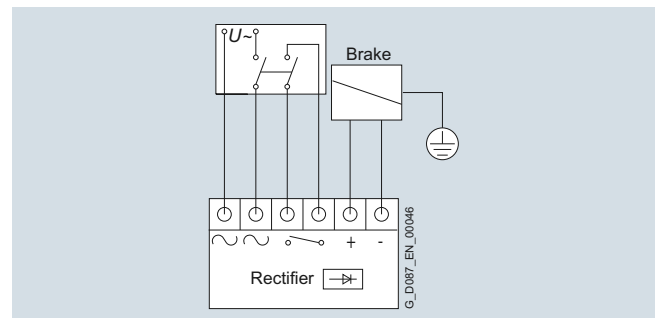


Fig. 6/36 Function diagram of a brake switched on the DC and AC sides

Supply voltages

The following supply voltages are available for brakes.

Supply voltage	Possible specifications					Motor frame sizes	Brake type	Rectifier	Coil voltage	Order code	Design in accordance with VDI 3643
	CE	UL-R/CSA	China	EAC	Export						
DC voltages											
24 V DC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	-	-	C66	✓
103 V DC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	-	-	C52	✓
180 V DC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	-	-	C53	✓
205 V DC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	-	-	C64	✓
AC voltages											
200 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	Rectifier bridge	180 V DC	C45	-
230 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓	Half-wave rectifier	103 V DC	C46	-
380 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓		180 V DC	C48	-
400 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓		180 V DC	C47	-
415 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓		180 V DC	C50	-
460 V AC ± 10 %	✓	✓	✓	✓	✓	63 ... 132	✓		205 V DC	C63	-
AC voltages with function rectifier with disconnection on the DC side using current or voltage sensing											
230 V AC ± 10 %	✓		✓	✓	✓	63 ... 132	✓	Function rectifier	103 V DC	C72	-
400 V AC ± 10 %	✓		✓	✓	✓	63 ... 132	✓		205 V DC	C47	-
460 V AC ± 10 %	✓		✓	✓	✓	63 ... 132	✓		215 V DC	C74	-

Motor options

Mounted components

Brake

Function rectifier

The following table provides an overview of brake control with function rectifiers.

Function rectifier		High-speed rectifier + disconnection on the DC side using	
Technical specifications	Unit	Current sensing	Voltage sensing
Supply voltage	$V_{AC} \pm 10\%$	220 ... 460	220 ... 500
Supply frequency	Hz	40 ... 60	40 ... 60
Max. output current up to an ambient temperature of +40 °C ¹⁾	A_{DC}	1.2	1.2
Output voltage	V_{DC}	0.445 x supply voltage (0.89 - max. 8 %) x supply voltage	0.445 x supply voltage (0.89 - max. 8 %) x supply voltage
Permissible continuous current of the current sensor	A_{DC}	0.27 ... 34	-
Max. switching frequency ²⁾	rpm	76 ²⁾³⁾	76 ²⁾³⁾
Supported motors		Max. motor current 34 A	No restrictions
Supported brakes		L4 ... L400	L4 ... L400
Suitable for		Braking operation for fast brake release + application	Braking operation for fast brake release + application
Inverter operation		Not suitable	Separate power supply required
Line operation		Direct-on-line starting	Direct-on-line Y/Δ starting
Motor starters		Not suitable	No restrictions
Operation with driving loads and/or high moment of inertia		No restrictions	Separate power supply required
Suppressor circuit		Spark suppressor	Spark suppressor
Order code		C59⁴⁾	C60

¹⁾ At higher ambient temperatures the output current decreases.

²⁾ The specified maximum switching frequencies are upper limit values. They are essentially dependent on the braking power and the permissible operating energy of the brakes.

³⁾ The maximum switching frequency is obtained from the overexcitation times and recovery times as well as switching-off in holding operation.

⁴⁾ The function rectifier **C59** is connected to the terminal board at the factory depending on the selected circuit or voltage.

Duty cycle, function rectifier

The high-speed rectifier releases the brake with overexcitation and thus reduces the maximum duty cycle (on-load factor) of the brake.

Depending on the supply voltage and the switching frequency, the maximum duty cycle of the brake solenoid can be taken from the following diagrams and tables.

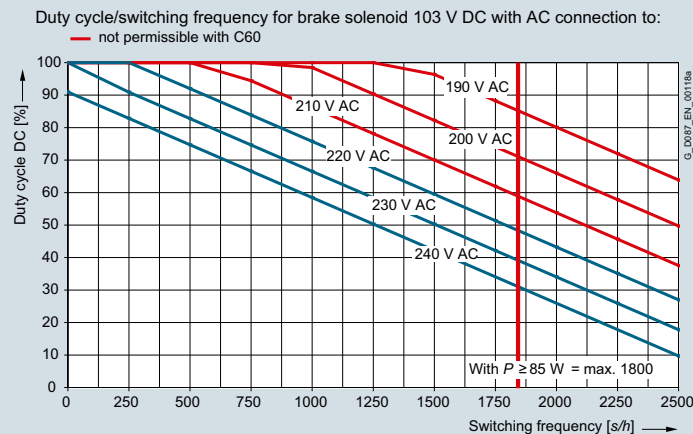


Fig. 6/37 Duty cycle/switching frequency for the 103 V DC brake solenoid

Supply voltage	Switching frequency											
	s/h^{-1}											
V_{AC}	1	250	500	750	1 000	1 250	1 500	1 750	Up to brake size L80			
	2 000	2 250	2 500									
220 ... 240 V AC for separate power supply												
220	100	100	91	83	75	67	59	51	43	35	26	
230	100	90	82	74	66	58	50	42	34	25	17	
240	100	82	74	66	58	50	42	34	25	17	9	

Function rectifier (continued)

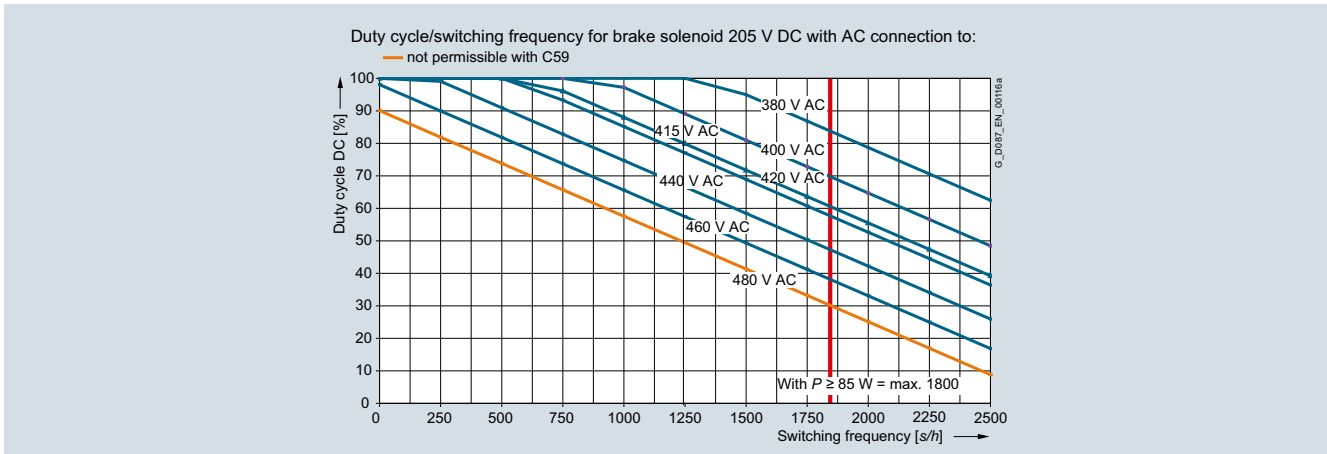


Fig. 6/38 Duty cycle/switching frequency for the 205 V DC brake solenoid

Supply voltage V_{AC}	Switching frequency s/h^{-1}										
	1	250	500	750	1 000	1 250	1 500	1 750	2 000	2 250	2 500
400 V AC for connection at the motor terminal board											
380	100	100	100	100	100	100	94	86	78	70	62
400	100	100	100	100	97	89	80	72	64	56	48
420	100	100	100	93	85	77	68	60	52	44	36
380 ... 440 V AC for separate power supply											
380	100	100	100	100	100	100	94	86	78	70	62
400	100	100	100	100	97	89	80	72	64	56	48
440	100	99	90	82	74	66	58	50	42	34	25

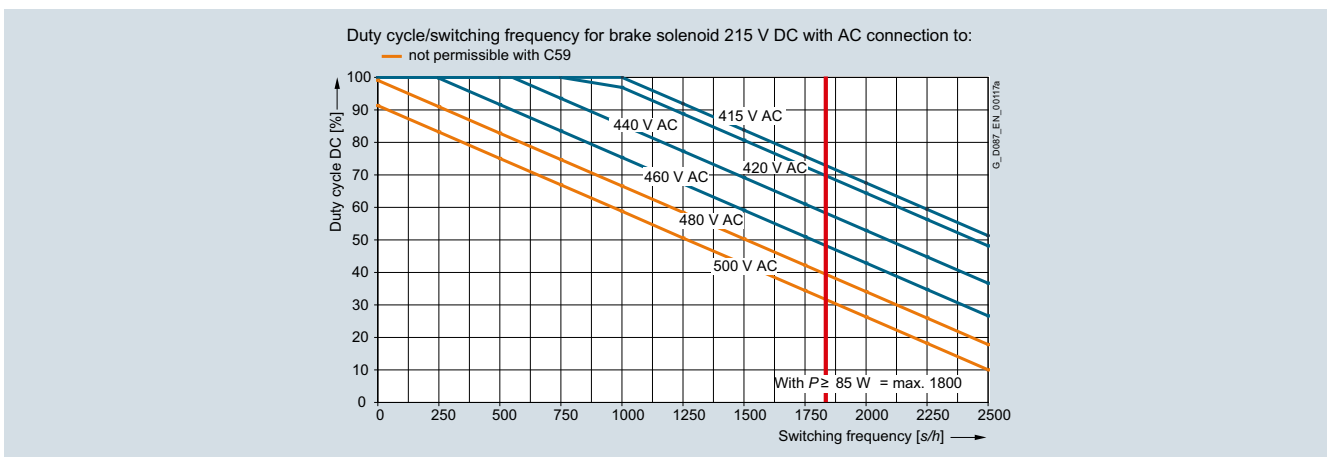


Fig. 6/39 Duty cycle/switching frequency for the 215 V DC brake solenoid

Supply voltage V_{AC}	Switching frequency s/h^{-1}										
	1	250	500	750	1 000	1 250	1 500	1 750	2 000	2 250	2 500
410 ... 480 V AC for separate power supply¹⁾											
410	100	100	100	100	100	95	87	78	70	62	54
460	100	99	91	83	75	67	59	51	42	34	26
480	100	90	82	74	66	58	50	42	34	25	17

¹⁾ The brake power supply voltage can be limited by the rectifier.

Motor options

Mounted components

Brake

Brake options

Manual brake release

The brakes L can be supplied with a manual brake release lever. The manual brake release lever can be used to release the brake at zero current. When the brake has been released, the motor shaft can rotate freely in order to bring the output shaft to a certain position or for use as an emergency release in the event of a power failure, for example.

The manual brake release lever can be fixed in the released position using an additional locking mechanism mounted on the brake.

The manual brake release lever can be mounted in various different positions. The position of the manual brake release lever relates to the standard design of the motor. The standard position is "2".

Order code:

Manual brake release lever	C02
Manual brake release lever with locking mechanism	C03

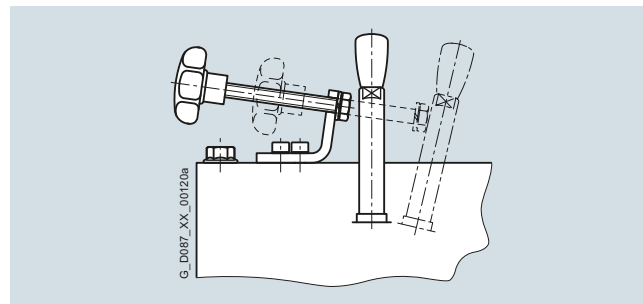


Fig. 6/40 Example of manual brake release lever with locking mechanism for brake L

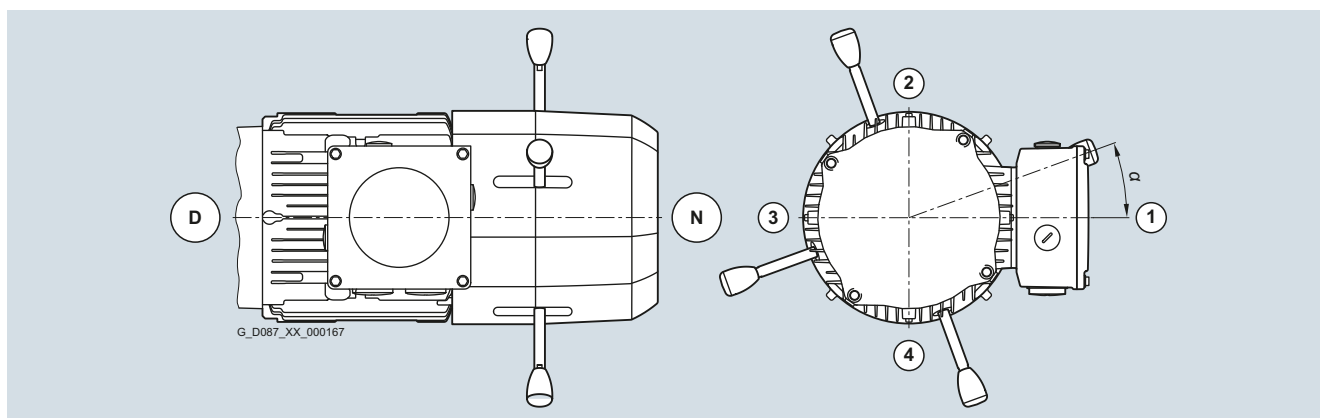


Fig. 6/41 Manual brake release lever position

Manual brake release lever position	Motor frame size							Order code
	63	71	80	90	100	112	132	
	Angle α							
1	0°	10°	0°	0°	0°	0°	0°	C26
2	90°	100°	90°	90°	90°	90°	90°	C27
3	180°	190°	180°	180°	180°	180°	180°	C28
4	270°	280°	270°	270°	270°	270°	270°	C29

Brake options (continued)

The dimensions of the manual brake release lever depend on the size.

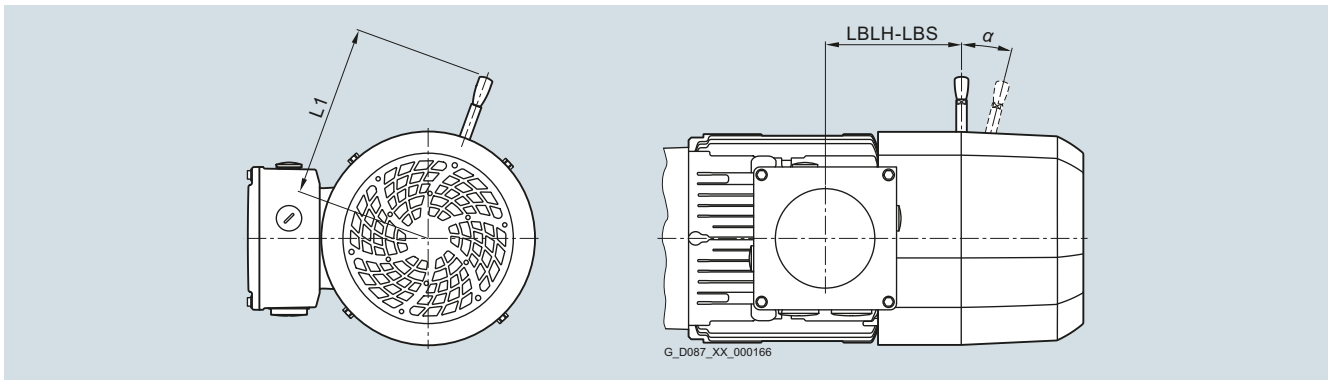


Fig. 6/42 Dimensions, manual brake release lever

Motor frame size	Brake type	Terminal box position	Distance		Center of the terminal box up to the center of the manual brake release lever		Angle, manual brake release lever
			Without locking mechanism	With locking mechanism	Standard corrosion protection	Increased corrosion protection	With the brake released
			mm	mm	mm	mm	Tolerance +3°
			L1	L1	LBLH-LBS	LBLH-LBS	χ
63	L4	1A, 2A, 3A, 4A	107	127	83.3	83.3	12°
71	L4	1A, 2A, 3A, 4A	107	127	71.8	71.8	12°
	L8	1A, 2A, 3A, 4A	116	136	72.3	72.3	10°
80	L4	1A, 2A, 3A, 4A	107	127	97.3	97.3	12°
	L8	1A, 2A, 3A, 4A	116	136	97.8	97.8	10°
	L16	1A, 2A, 3A, 4A	132	151	108.9	108.9	9°
90	L8	1A, 2A, 3A, 4A	116	136	102.8	102.8	10°
	L16	1A, 2A, 3A, 4A	132	151	113.9	113.9	9°
	L32	1A, 2A, 3A, 4A	161	161	115.9	115.9	10°
100	L16	1A, 2A, 3A, 4A	132	151	126.9	126.9	9°
	L32	1A, 2A, 3A, 4A	161	161	128.9	128.9	10°
	L60	1A, 2A, 3A, 4A	195	195	132.5	132.5	9°
112	L32	1A, 2A, 3A, 4A	161	161	128.9	128.9	10°
	L60	1A, 2A, 3A, 4A	195	195	132.5	132.5	9°
132	L80	1A, 2A, 3A, 4A	240	240	158.0	158.0	10°
	L150	1A, 2A, 3A, 4A	279	279	171.1	171.1	9°
132Z	L80	1A, 2A, 3A, 4A	240	240	158.0	158.0	10°
	L150	1A, 2A, 3A, 4A	279	279	171.1	171.1	9°

Motor options

Mounted components

Brake

Brake options (continued)

Monitoring

Brake with microswitch to monitor the release

The air gap s_{gap} of the brake is monitored by a microswitch mounted on the base plate of the solenoid assembly.

The motor does not start up until the brake has been fully released ($s_{\text{gap}} = 0$) and the armature disk is in contact with the solenoid assembly. The microswitch is actuated and controls the motor contactor.

When the brake is switched off, the armature disk reaches the maximum air gap (s_{gapmax}) and the microswitch opens. This means that the motor contactor is not controlled and the motor does not start.

This method is used for machines and units which require a precisely defined starting and braking procedure, as well as for fault monitoring of faulty rectifiers, interrupted connecting cables, faulty solenoids, and excessively large air gaps (brake solenoid cannot fully attract the armature disk).

The microswitch for air gap monitoring is available for brakes in sizes L32 to L150.

Note:

The mechanical components of the microswitch must be protected against icing at low temperatures.

Order code:

Microswitch for monitoring brake release

C04

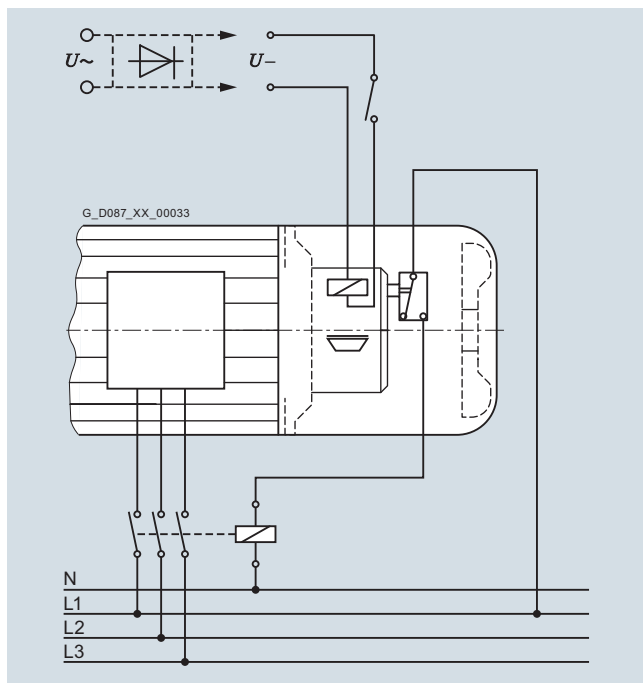


Fig. 6/43 Circuit principle with microswitch

Brake cable protection

The brake cable of the geared motors is normally routed through the cable gland of the terminal box.

We are offering an optional version of brake cable routing which ensures enhanced protection for the brake cable. In this version, the brake cable is brought into the motor directly under the fan cover through a hole in the base of the terminal box. This arrangement ensures that most of the cable is covered and protected against mechanical damage.

Order code:

Brake cable protection

C80

Enclosed brake

The brakes L can be supplied as enclosed brakes.

Enclosed brakes include a dust protection ring around the circumference and an integrated shaft sealing ring at the shaft outlet. This prevents the release and penetration of dust, moisture, and other pollution. Other advantages are reduced noise when applying the brake as well as, in combination with a motor anti-condensation heater, a reduced risk of the rotor freezing on the friction surfaces.

In addition, a condensation drain hole can be incorporated in the dust protection ring for brakes L.

The enclosed brake can also be shipped in combination with a manual brake release lever and a manual brake release lever with locking mechanism.

Order code:

Enclosed brake

C01

Enclosed brake with condensation drain hole

C11

Corrosion protection

The brakes L are supplied as standard with corrosion protection. A friction plate or adapter flange is always mounted between the mating friction surface (end shield on the ventilation side) and the rotor. The rotor is made of a rustproof material.

Brake with increased corrosion protection

The adapter flanges and armature disks of the brakes are chromium-plated for increased protection against corrosion. This prevents the friction surfaces from seizing up.

Increased corrosion protection is employed when a motor is used in corrosive environmental conditions (high air humidity, dripping water, crane systems, for example) and/or during prolonged standstill periods.

Order code:

Increased corrosion protection

C10

Corrosion protection		Brake type						
Design	Material	L4	L8	L16	L32	L60	L80	L150
Standard corrosion protection								
Friction surface to the motor	Friction plate of stainless steel	✓	✓	✓	✓	✓	✓	
	Adapter flange with thin zinc film							✓
Armature disk	Gas-nitrided	✓	✓	✓	✓			
	Thin zinc film					✓	✓	✓
Increased corrosion protection								
Friction surface to the motor	Friction plate of stainless steel	✓	✓	✓	✓	✓	✓	
	Chromium-plated adapter flange							✓
Armature disk	Chromium-plated	✓	✓	✓	✓	✓	✓	✓

Brake options (continued)

Reduced-noise rotor-hub connection

The brakes are supplied with a reduced-noise rotor-hub connection. This reduces rattling noise of the rotor, particularly at low speeds and in inverter operation.

Wear-resistant friction lining

The brakes L can also be selected with a wear-resistant friction lining.

Order code:

Wear-resistant friction lining

C06

Brake options for motor frame sizes 63 to 132

Option	Brake type						
	L4	L8	L16	L32	L60	L80	L150
Without rectifier	✓	✓	✓	✓	✓	✓	✓
Rectifier for disconnection on the DC and AC sides	✓	✓	✓	✓	✓	✓	✓
Function rectifier for quick brake release and application ¹⁾	✓	✓	✓	✓	✓	✓	✓
Standard friction lining	✓	✓	✓	✓	✓	✓	✓
Wear-resistant friction lining	✓	✓	✓	✓	✓	✓	✓
Microswitch for monitoring brake release	-	-	-	✓	✓	✓	✓
Manual brake release	✓	✓	✓	✓	✓	✓	✓
Manual brake release with locking mechanism	✓	✓	✓	✓	✓	✓	✓
Standard corrosion protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increased corrosion protection	✓	✓	✓	✓	✓	✓	✓
Enclosed brake	✓	✓	✓	✓	✓	✓	✓
Enclosed brake with condensation drain hole	✓	✓	✓	✓	✓	✓	✓
Brake cable protection	✓	✓	✓	✓	✓	✓	✓

Standard design

¹⁾ Not possible for UL-R or CSA versions

Possible modular system in combination with brake for motor frame sizes 63 to 132

Design	Motor plug	Encoder				Ventilation		Second shaft extension
		Incremental encoder	Absolute encoder	Resolver	Encoder under cover without canopy	Encoder accessories	Self ventilation Forced ventilation	
Brake	✓	✓	✓		✓	✓	✓	✓
Manual brake release	✓	✓	✓	-	✓	✓	✓	✓
• Without locking mechanism	✓	✓	✓	-	✓	✓	✓	✓
• With locking mechanism	✓	✓	✓	-	✓	✓	✓	✓
Microswitch	✓	✓	✓	-	✓	✓	✓	✓
• Air flow monitoring ¹⁾	✓	✓	✓	-	✓	✓	✓	✓

¹⁾ Can be selected for brake type L32 or higher

Motor options

Mounted components

Brake

Technical specifications ¹⁾

Braking torques as a function of speed and permissible speed limits with operating brake

Brake type	Maximum permissible operating speed		Braking torque measured at rated braking torque at 100 rpm			
	Friction lining Standard rpm	Wear-resistant (C06) rpm	1 500 rpm %	2 500 rpm %	3 000 rpm %	At max. speed %
L4	4 000	3 600	87	82	80	77
L8	4 000	3 600	85	79	78	75
L16	3 600	3 600	83	77	76	74
L32	3 600	3 600	81	76	74	72
L60	3 600	3 000	80	75	73	71
L80	3 600	3 000	79	73	72	69
L150	3 600	1 800	77	71	70	67

Braking torques as a function of speed and permissible speed limits with holding brake and emergency stop function

Brake type	Max. permissible no-load speed with emergency stop function		Braking torque measured at rated braking torque at 100 rpm			
	Friction lining Standard rpm	Wear-resistant (C06) rpm	1 500 rpm %	2 500 rpm %	3 000 rpm %	At max. speed %
L4	6 000	6 000	87	82	80	73
L8	5 000	4 500	85	79	78	72
L16	4 000	3 600	83	77	76	73
L32	3 600	3 600	81	76	74	72
L60	3 600	3 000	80	75	73	71
L80	3 600	3 000	79	73	72	69
L150	3 600	1 800	77	71	70	67

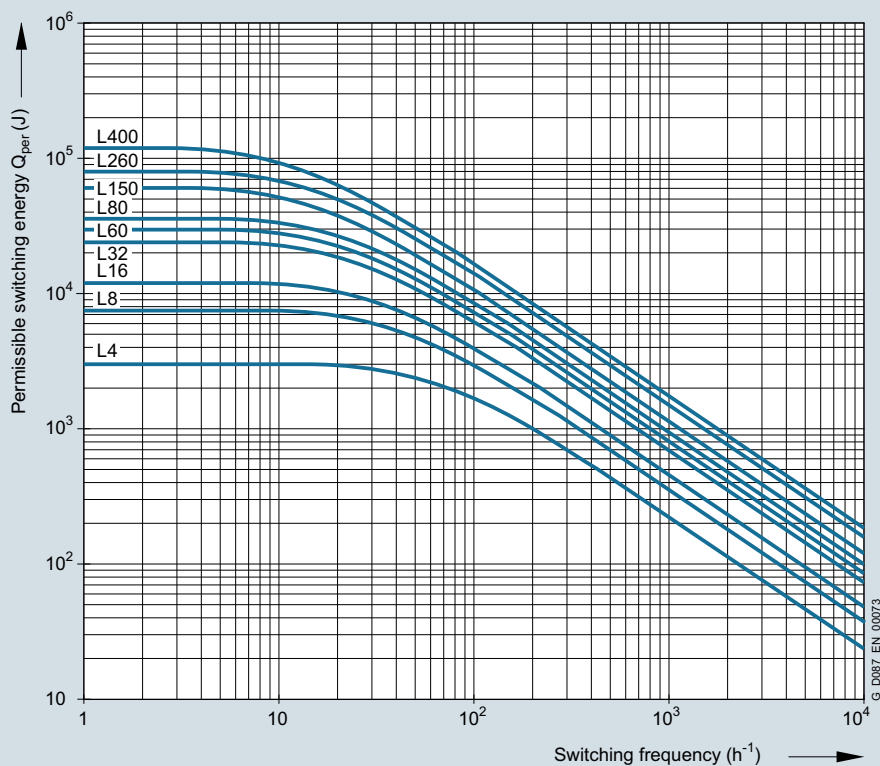


Fig. 6/44 Permissible operating energy

¹⁾ Values refer to brake in its delivery state

Technical specifications (continued) ¹⁾

Disconnection times, application times and moments of inertia for brakes L

Brake type	Rated braking torque T_{br} At 100 rpm Nm	Disconnection time		Application time		Response time		Rise time		Application time $t_1 = t_{11} + t_{12}$	Response time t_{11}	Rise time t_{12}	Weight kg	Moment of inertia	
		t_2 Standard excitation ms	Over-excitation ms	$t_1 = t_{11} + t_{12}$ AC and DC switched or DC switched ms	t_{11} ms	t_{12} ms	$t_1 = t_{11} + t_{12}$ AC switched ms	t_{11} ms	t_{12} ms					J_B 10^{-4} kgm^2	For wear-resistant lining
L4/1.4	1.4	20	13	31	13.0	18.0	250	110	140	0.85	0.15	0.15	0.85	0.15	0.15
L4/2	2.0	27	17	22	9.0	13.0	175	77	98	0.85	0.15	0.15			
L4/3	3.0	29	18	30	12.0	18.0	230	101	129						
L4	4.0	45	28	28	15.0	13.0	190	120	70						
L4/5	5.0	56	35	25	13.0	12.0	158	100	58						
L8/3	3.0	21	12	65	39.0	26.0	510	326	184				1.5	0.61	0.61
L8/4	4.0	30	17	50	30.0	20.0	390	250	140						
L8/5	5.0	35	20	40	24.0	16.0	310	200	110						
L8/6.3	6.3	45	30	38	18.0	20.0	315	174	141						
L8	8.0	57	38	31	15.0	16.0	245	135	110						
L8/10	10.0	71	47	26	12.5	13.5	205	113	92						
L16/8	8.0	55	41	36	22.0	14.0	350	183	167	2.6	2	2			
L16/10	10.0	48	36	58	35.0	23.0	680	355	325						
L16/13	13.0	60	34	50	30.0	20.0	560	293	267						
L16	16.0	76	48	47	28.0	19.0	460	240	220						
L16/20	20.0	93	59	38	23.0	15.0	390	204	186						
L32/14	14.0	65	50	46	27.0	19.0	400	210	290				3.9	4.5	4.5
L32/18	18.0	65	44	70	45.0	25.0	600	325	275						
L32/23	23.0	82	56	75	40.0	35.0	680	300	380						
L32	32.0	115	78	53	28.0	25.0	490	215	275						
L32/40	40.0	140	95	45	24.0	21.0	440	194	246						
L60/25	25.0	130	66	47	25.0	22.0	540	220	320	5.8	6.3	6.3			
L60/38	38.0	140	60	60	24.0	36.0	800	290	510						
L60/50	50.0	175	75	50	20.0	30.0	665	240	425						
L60	60.0	210	90	42	17.0	25.0	580	210	370						
L80/25	25.0	95	56	103	48.0	55.0	1 600	690	710				8.4	15	15
L80/35	35.0	128	75	73	34.0	39.0	1 200	520	680						
L80/50	50.0	160	94	90	42.0	48.0	1 920	830	1 090						
L80/63	63.0	170	100	72	34.0	38.0	1 550	670	880						
L80	80.0	220	130	57	27.0	30.0	1 200	520	680						
L80/100	100.0	280	165	49	24.0	25.0	990	430	560						
L150/60	60.0	135	81	55	27.5	27.5	920	470	450	12.5	29	29			
L150/80	80.0	180	108	40	20.0	20.0	690	350	340						
L150/100	100.0	180	108	93	48.0	45.0	1 300	700	600						
L150/125	125.0	225	135	85	44.0	41.0	1 200	650	550						
L150	150.0	270	160	78	33.0	45.0	1 080	480	600						

¹⁾ Values refer to brake in its delivery state

Motor options

Mounted components

Brake

Technical specifications (continued) ¹⁾

Working capacity for brakes L

Brake type	Rated braking torque T_{br}	Power consumption	Working capacity				Working capacity with wear-resistant friction lining								
			Per braking operation W_{1max}	Friction energy until the brake lining is replaced W_{Tot}	Friction energy until the air gap is readjusted W_y		Per braking operation W_{1max}	Friction energy until the brake lining is replaced W_{Tot}	Friction energy until the air gap is readjusted W_y						
	At 100 rpm	At +20 °C				With over-excitation				With over-excitation					
	Nm	W	kJ	MJ	MJ	MJ	kJ	MJ	MJ	MJ					
L4/1.4	1.4	20	3	156	46.8	52	3	312	94	104					
L4/2	2.0			176				59			351	117			
L4/3	3.0			170				39.6			57	339	80	113	
L4	4.0			180				36.0			60	360	72	120	
L4/5	5.0			176				23.4			59	351	46	117	
L8/3	3.0	25	7.5	324	86.4	108	7.5	648	173	216					
L8/4	4.0														
L8/5	5.0							75.6					151		
L8/6.3	6.3										75.6		648	130	
L8	8.0										64.8		648	108	
L8/10	10.0			54.0											
L16/8	8.0	30	12	405	108.0	162	12	810	216	324					
L16/10	10.0														
L16/13	13.0														
L16	16.0														
L16/20	20.0							396			80.0	158	792	160	317
L32/14	14.0	40	24	948	285.0	284	7	1 896	570	568					
L32/18	18.0										283				
L32/23	23.0										260.0		1 885	518	
L32	32.0										212.0	284	1 888	425	
L32/40	40.0										165.0		1 893	331	
L60/25	25.0	50	30	1 276	306.0	306	18	2 560	612	612					
L60/38	38.0										280.0		2 553	560	
L60/50	50.0							1 320			238.0	317	2 640	476	635
L60	60.0							1 322							
L80/25	25.0	55	36	2 310	396.0	396	11	4 536	792	792					
L80/35	35.0														
L80/50	50.0														
L80/63	63.0														
L80	80.0														
L80/100	100.0				260.0	389		519	778						
L150/60	60.0	85	60	2 295	612.0	612	36	4 590	1 224	1 224					
L150/80	80.0														
L150/100	100.0														
L150/125	125.0														
L150	150.0														

¹⁾ Values refer to brake in its delivery state

Technical specifications (continued) ¹⁾
No-load switching frequency for brakes L

Motor type	Power 4-pole At 50 Hz kW	Brake type	Overexcitation							
			Without		With		Without		With	
			No-load switching frequency (Z_A)							
		1/h		1/h		1/h		1/h		
		4-pole		2-pole		6-pole		8-pole		
LA63..	0.12	L4/5, L4	-	-	-	-	-	-	-	-
	0.18	L4/3, L4/2, L4/1.4	-	-	-	-	-	-	-	-
LA71..	0.25	L4/5, L4	7 300	9 500	2 500	3 200	10 500	14 000	14 500	19 000
	0.37	L4/3, L4/2, L4/1.4	12 500	13 500	4 300	4 500	18 500	20 000	25 000	27 000
		L8/10, L8, L8/6.3	6 000	7 600	1 800	2 500	9 000	11 000	12 000	15 000
		L8/5, L8/4	8 900	11 000	2 900	3 500	13 000	16 000	17 500	22 000
		L8/3	11 000	12 000	3 500	4 000	16 500	18 000	22 000	24 000
LE80.. LE80..E LE80..P	0.55	L4/5, L4	9 000	9 500	2 900	3 100	13 500	14 000	-	-
	0.75	L4/3, L4/2, L4/1.4	10 500	11 500	3 500	3 800	15 500	16 500	-	-
		L8/10, L8, L8/6.3	6 300	7 500	2 100	2 500	9 400	11 000	-	-
		L8/5, L8/4, L8/3	9 500	10 000	3 100	3 300	14 000	15 000	-	-
		L16	6 500	7 500	2 100	2 500	9 700	11 000	-	-
		L16/13, L16/10, L16/8	7 500	8 000	2 500	2 600	11 000	12 000	-	-
LE90.. LE90..E LE90..P	1.1	L8/10, L8, L8/6.3	6 500	7 000	2 100	2 300	9 700	10 500	-	-
	1.5	L8/5, L8/4, L8/3	8 000	8 500	2 600	2 800	12 000	12 500	-	-
		L16/20, L16	3 200	4 300	1 000	1 400	4 800	6 400	-	-
		L16/13, L16/10, L16/8	6 500	7 000	2 100	2 300	9 700	10 500	-	-
		L32	2 200	3 000	700	1 000	3 300	4 500	-	-
		L32/23, L32/18	3 300	4 200	1 100	1 400	4 900	6 300	-	-
		L32/14	5 500	6 000	1 800	2 000	8 200	12 000	-	-
LE100.. LE100..E LE100..P	2.2	L16/20, L16	6 000	6 500	2 000	2 100	9 000	9 700	12 000	13 000
	3.0	L16/13, L16/10, L16/8	6 500	7 000	2 100	2 300	9 700	10 500	14 000	14 000
		L32/40, L32	3 200	4 600	1 000	1 500	4 800	6 900	6 400	9 200
		L32/23, L32/18, L32/14	6 000	6 500	2 000	2 100	9 000	9 700	12 000	13 000
		L60/50	1 100	2 100	350	700	1 600	3 100	2 200	4 200
		L60/38, L60/25	3 200	4 600	1 000	1 500	4 800	6 900	9 200	9 200
LE112.. LE112..E LE112..P	4.0	L32/40, L32	3 300	3 500	1 100	1 100	4 900	5 200	6 600	7 000
		L32/23, L32/18, L32/14	3 600	3 800	1 200	1 200	5 400	5 700	7 600	7 600
		L60, L60/50	2 600	3 200	850	1 050	3 900	4 800	5 200	6 400
		L60/38, L60/25	3 200	3 600	1 050	1 200	4 800	5 400	7 200	7 200
LE132.. LE132..E LE132..P	5.5 7.5	L80/100, L80	1 850	2 050	600	6 500	2 700	3 000	3 700	4 100
		L80/63, L80/50	2 050	2 200	650	700	3 000	3 300	4 100	4 400
		L80/35, L80/25	2 200	2 350	700	750	3 300	3 500	4 400	4 700
		L150, L150/125	1 200	1 500	400	500	1 800	2 200	2 400	3 000
		L150/100, L150/80, L150/60	1 900	2 050	600	650	2 800	3 000	3 800	4 100

Conversion factors for no-load switching frequency:

 60 Hz operation $0.75 \times Z_A$

 IE3 motors $0.1 \times Z_A$

No-load switching frequencies for IE1 motors on request.

¹⁾ Values refer to brake in its delivery state

Motor options

Mounted components

Encoder

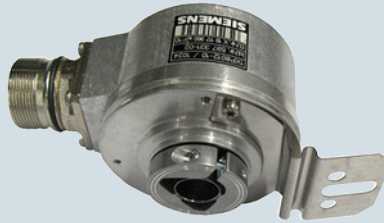
Overview

Encoder	Motor frame size							Order code	Technical information → page
	63	71	80	90	100	112	132		
Incremental encoder									
<i>Incremental encoder 1XP8012</i>									
1XP8012-20	✓	✓	✓	✓	✓	✓	✓	Q50	6/37
1XP8012-21	✓	✓	✓	✓	✓	✓	✓	Q51	6/37
1XP8012-22	✓	✓	✓	✓	✓	✓	✓	Q52	6/37
1XP8012-10	✓	✓	✓	✓	✓	✓	✓	Q53	6/37
1XP8012-11	✓	✓	✓	✓	✓	✓	✓	Q54	6/37
1XP8012-12	✓	✓	✓	✓	✓	✓	✓	Q55	6/37
<i>Incremental encoder 1XP8032</i>									
1XP8032-20	✓	✓	✓	✓	✓	✓	✓	Q44	6/38
1XP8032-21	✓	✓	✓	✓	✓	✓	✓	Q45	6/38
1XP8032-22	✓	✓	✓	✓	✓	✓	✓	Q46	6/38
1XP8032-10	✓	✓	✓	✓	✓	✓	✓	Q47	6/38
1XP8032-11	✓	✓	✓	✓	✓	✓	✓	Q48	6/38
1XP8032-12	✓	✓	✓	✓	✓	✓	✓	Q49	6/38
<i>Incremental encoder 1XP8022</i>									
1XP8022-20	✓	✓	✓	✓	✓	✓	✓	Q56	6/39
1XP8022-21	✓	✓	✓	✓	✓	✓	✓	Q57	6/39
1XP8022-22	✓	✓	✓	✓	✓	✓	✓	Q58	6/39
1XP8022-10	✓	✓	✓	✓	✓	✓	✓	Q59	6/39
1XP8022-11	✓	✓	✓	✓	✓	✓	✓	Q60	6/39
1XP8022-12	✓	✓	✓	✓	✓	✓	✓	Q61	6/39
Resolver ¹⁾									
1XP8013-10	✓	✓	✓	✓	✓	✓	✓	Q85	6/40
1XP8023-11	✓	✓	✓	✓	✓	✓	✓	Q86	6/40
1XP8013-11	✓	✓	✓	✓	✓	✓	✓	Q87	6/40
1XP8023-10	✓	✓	✓	✓	✓	✓	✓	Q88	6/40
Absolute encoder									
1XP8024-21	✓	✓	✓	✓	✓	✓	✓	Q79	6/42
1XP8014-20	✓	✓	✓	✓	✓	✓	✓	Q80	6/41
1XP8024-20	✓	✓	✓	✓	✓	✓	✓	Q81	6/41
1XP8014-10	✓	✓	✓	✓	✓	✓	✓	Q82	6/41
1XP8024-10	✓	✓	✓	✓	✓	✓	✓	Q83	6/41
Rugged encoders									
Leine und Linde LL 861 900 220						✓	✓	Q92	6/40
Hübner HOG 9 D 1024						✓	✓	Q93	6/40
Hübner HOG 10 D 1024							✓	Q94	6/40
Mechanical protection									
Encoder under cover	✓	✓	✓	✓	✓	✓	✓	Q95	6/45

¹⁾ Cannot be combined with brake motor

Incremental encoders
Incremental encoder 1XP8012

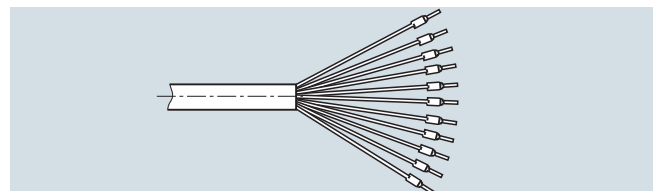
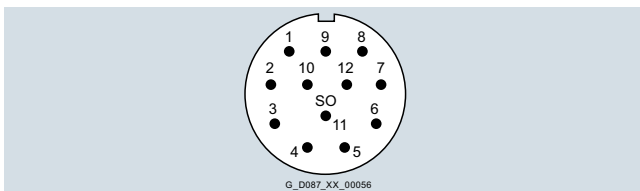
The incremental encoder is available up to motor frame size 132.


Technical specifications

Incremental encoder 1XP8012	-11	-10	-12	-21	-20	-22
Pulses per revolution	2 048	1 024	512	2 048	1 024	512
Incremental signals	HTL			TTL		
Supply voltage U_P	10 ... 30 V _{DC}			5 V _{DC} ± 10 %		
Maximum current consumption without load	150 mA			120 mA		
Permissible load per output	$I_{Load} \leq 100 \text{ mA}$ (except for $\overline{U_{aS}}$)			$I_{Load} \leq 20 \text{ mA}$		
Outputs	2 short-circuit-proof square-wave pulses U_{a1} , U_{a2} (maximum 1 min) 2 short-circuit-proof square-wave pulses $\overline{U_{a1}}$, $\overline{U_{a2}}$ (maximum 1 min) Zero pulse U_{a0} Zero pulse $\overline{U_{a0}}$ Fault-detection signal $\overline{U_{aS}}$			Square-wave pulses U_{a1} , U_{a2} Square-wave pulses $\overline{U_{a1}}$, $\overline{U_{a2}}$ Zero pulse U_{a0} Zero pulse $\overline{U_{a0}}$ Fault-detection signal $\overline{U_{aS}}$		
Signal level	$U_{High} \geq 21 \text{ V}$ at $-I_{High} = 20 \text{ mA}$ $U_{Low} \leq 2.8 \text{ V}$ $I_{Low} = 20 \text{ mA}$ $(U_P = 24 \text{ V})$			$U_{High} \geq 2.5 \text{ V}$ at $-I_{High} = 20 \text{ mA}$ $U_{Low} \leq 0.5 \text{ V}$ $I_{Low} = 20 \text{ mA}$		
Minimum edge interval	0.8 μs at 160 kHz			0.45 μs at 300 kHz		
Switching times (10 ... 90 %)	$t_+ t_- \leq 200 \text{ ns}$ (with 1 m cable), except for $\overline{U_{aS}}$			$t_+ t_- \leq 30 \text{ ns}$ (with 1 m cable)		
Maximum frequency	160 kHz			300 kHz		
Moment of inertia of rotor	$4.3 \times 10^{-6} \text{ kgm}^2$					
Maximum mechanical speed	6 000 rpm					
Vibration (55 ... 2 000 Hz)	$\leq 150 \text{ m/s}^2$ (EN 60068-2-6)					
Shock (6/2 ms)	$\leq 1\,000 \text{ m/s}^2$ (EN 60068-2-27)/ $\leq 2\,000 \text{ m/s}^2$ (EN 60068-2-27)					
Degree of protection	IP66					
Ambient temperature range	-20 °C to +40 °C					
Connection system → page 6/47	12-pole flange socket, 0° coding					
Weight, approx.	0.30 kg					
Certification	CE, cUL-Rus					
Order code	Q54	Q53	Q55	Q51	Q50	Q52

Connection assignment

For cable available as an option, see "Encoder accessories (continued)" from page 6/48



	Voltage supply				Incremental signals				Other signals			
Connection	U_P	Sensor U_P	0 V	Sensor 0 V	U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	U_{a0}	$\overline{U_{a0}}$	$\overline{U_{aS}}$	Free
Flange socket	12	2	10	11	5	6	8	1	3	4	7	9
Core color	brown/green	blue	white/green	white	brown	green	gray	pink	red	black	violet	yellow

Motor options

Mounted components

Encoder

Incremental encoders (continued)

Incremental encoder 1XP8032

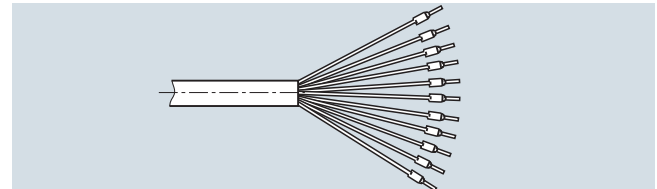
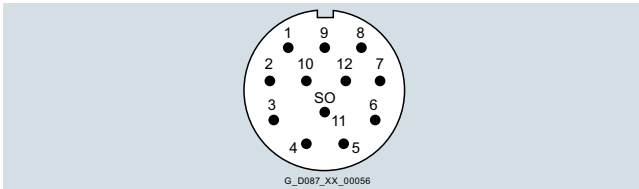
The incremental encoder is available up to motor frame size 132.

Technical specifications

Incremental encoder 1XP8032	-11	-10	-12	-21	-20	-22
Pulses per revolution	2 048	1 024	512	2 048	1 024	512
Incremental signals	HTL			TTL		
Supply voltage U_p	10 ... 30 V _{DC}			5 V _{DC} ± 10 %		
Maximum current consumption without load	150 mA			120 mA		
Permissible load per output	$I_{Load} \leq 100$ mA (except for $\overline{U_{aS}}$)			$I_{Load} \leq 20$ mA		
Outputs	2 short-circuit-proof square-wave pulses U_{a1} , U_{a2} (maximum 1 min) 2 short-circuit-proof square-wave pulses $\overline{U_{a1}}$, $\overline{U_{a2}}$ (maximum 1 min) Zero pulse U_{a0} Zero pulse $\overline{U_{a0}}$ Fault-detection signal $\overline{U_{aS}}$			Square-wave pulses U_{a1} , U_{a2} Square-wave pulses $\overline{U_{a1}}$, $\overline{U_{a2}}$ Zero pulse U_{a0} Zero pulse $\overline{U_{a0}}$ Fault-detection signal $\overline{U_{aS}}$		
Signal level	$U_{High} \geq 21$ V at $-I_{High} = 20$ mA $U_{Low} \leq 2.8$ V $I_{Low} = 20$ mA ($U_p = 24$ V)			$U_{High} \geq 2.5$ V at $-I_{High} = 20$ mA $U_{Low} \leq 0.5$ V $I_{Low} = 20$ mA		
Minimum edge interval	0.8 μs at 160 kHz			0.45 μs at 300 kHz		
Switching times (10 ... 90 %)	$t_+ t_- \leq 200$ ns (with 1 m cable), except for $\overline{U_{aS}}$			$t_+ t_- \leq 30$ ns (with 1 m cable)		
Maximum frequency	160 kHz			300 kHz		
Moment of inertia of rotor	4.3×10^{-6} kgm ²					
Maximum mechanical speed	6 000 rpm					
Vibration (55 ... 2 000 Hz)	≤ 150 m/s ² (EN 60068-2-6)					
Shock (6/2 ms)	$\leq 1 000$ m/s ² (EN 60068-2-27)/ $\leq 2 000$ m/s ² (EN 60068-2-27)					
Degree of protection	IP66					
Ambient temperature range	-20 °C to +40 °C					
Connection system → page 6/47	0.8 m cable with 12-pole coupling socket, 0° coding					
Weight, approx.	0.30 kg					
Certification	CE, cUL-Rus					
Order code	Q48	Q47	Q49	Q45	Q44	Q46

Connection assignment

For cable available as an option, see "Encoder accessories (continued)" from page 6/48



	Voltage supply				Incremental signals					Other signals		
Connection	U_p	Sensor U_p	0 V	Sensor 0 V	U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	U_{a0}	$\overline{U_{a0}}$	$\overline{U_{aS}}$	Free
Flange socket	12	2	10	11	5	6	8	1	3	4	7	9
Core color	brown/green	blue	white/green	white	brown	green	gray	pink	red	black	violet	yellow

Incremental encoders (continued)

Incremental encoder 1XP8022

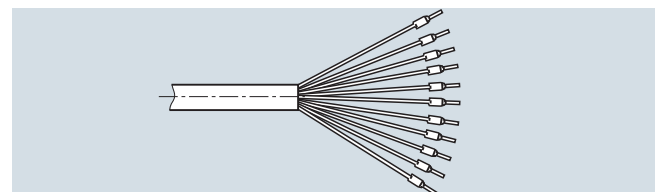
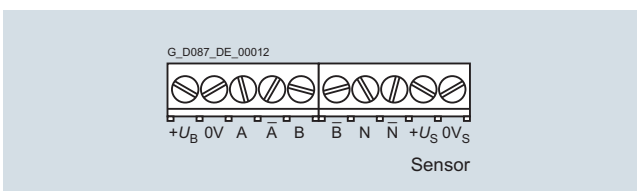
The incremental encoder is available up to motor frame size 132.


Technical specifications

Incremental encoder 1XP8022	-11	-10	-12	-21	-20	-22
Pulses per revolution	2 048	1 024	512	2 048	1 024	512
Incremental signals	HTL			TTL		
Supply voltage U_B	8 ... 30 V _{DC} (reverse-polarity protected)			5 V _{DC} ± 5 % (reverse-polarity protected)		
Maximum current consumption without load	≤ 100 mA					
Permissible load per output	$I_L \leq 70$ mA					
Outputs	2 square-wave pulses A, B 2 square-wave pulses \bar{A} , \bar{B} Zero pulse N Zero pulse \bar{N}					
Signal level	$U_{High} \geq U_B - 3$ V $U_{Low} \leq 1.5$ V			$U_{High} \geq 2.5$ V $U_{Low} \leq 0.5$ V		
Minimum edge interval	500 ns			≤ 200 ns		
Switching times (10 ... 90 %)	≤ 1 μs					
Maximum frequency	120 kHz					
Moment of inertia of rotor	6×10^{-6} kgm ²					
Maximum mechanical speed	8 000 rpm					
Vibration (55 ... 2 000 Hz)	≤ 100 m/s ² (EN 60068-2-6)					
Shock (11 ms)	≤ 1 000 m/s ² (EN 60068-2-27)					
Degree of protection	IP66					
Ambient temperature range	-20 °C to +40 °C					
Connection system → page 6/47	Cable terminal box					
Weight, approx.	0.35 kg					
Certification	CE, cUL-Rus					
Order code	Q60	Q59	Q61	Q57	Q56	Q58

Connection assignment

For cable available as an option, see "Encoder accessories (continued)" from page 6/48


Connections

Connection	+U _B	0V	A	\bar{A}	B	\bar{B}	N	\bar{N}	+U _S	0V _S
Cable terminal box										
Core color	red	blue	green	brown	gray	black	pink	white	yellow	violet

Motor options

Mounted components

Encoder

Resolvers 1XP8013 and 1XP8023 ¹⁾

Resolvers are available up to motor frame size 132.

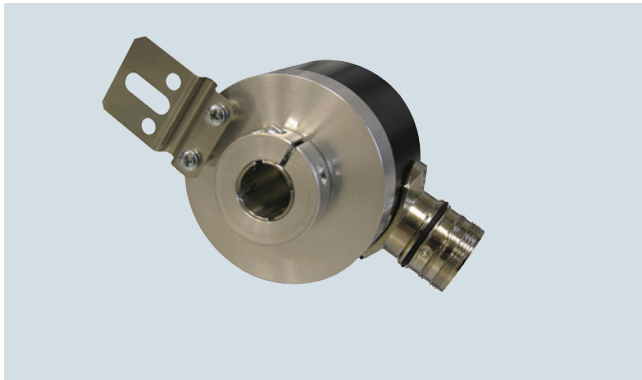


Fig. 6/45 Resolver 1XP8013

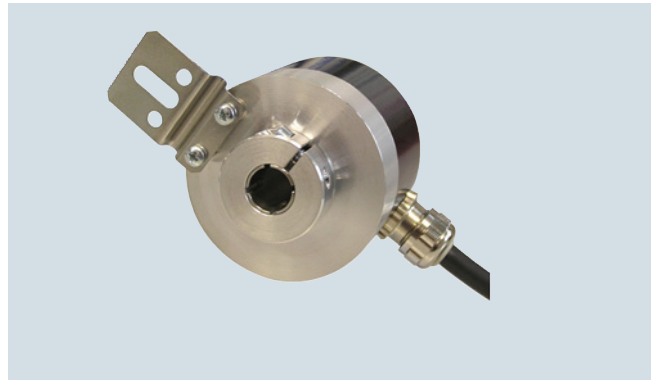


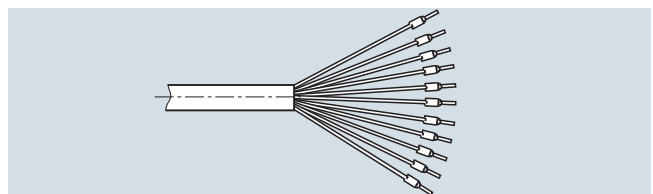
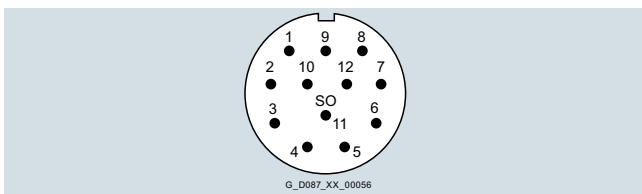
Fig. 6/46 Resolver 1XP8023

Technical specifications

Resolver	1XP8013-10	1XP8023-10	1XP8013-11	1XP8023-11
Input voltage	7 V _{RMS}		7 V _{RMS}	
Current consumption (maximum)	120 mA		65 mA	
Input frequency	5 kHz		10 kHz	
Phase shift	0° (+25°)		0° (± 10°)	
Zero voltage (maximum)	50 mV		50 mV	
Pole pairs	1		1	
Primary side	R1 - R2		R1 - R2	
Impedance				
Z _{To}	55 + j50 (± 20 %) Ω		70 + j100 (± 20 %) Ω	
Z _{so}	115 + j175 (± 20 %) Ω		180 + j300 (± 20 %) Ω	
Z _{ss}	115 + j160 (± 20 %) Ω		175 + j275 (± 20 %) Ω	
DC resistance				
Rotor	36 (± 10 %) Ω		36 (± 10 %) Ω	
Stator	60 (± 10 %) Ω		60 (± 10 %) Ω	
Maximum permissible mechanical speed	≤ 8 000 rpm		≤ 8 000 rpm	
Permissible electrical speed	≤ 8 000 rpm		≤ 8 000 rpm	
Vibration (55 ... 2 000 Hz)	≤ 100 m/s ²		≤ 100 m/s ²	
Shock (6 ms)	≤ 1 000 m/s ²		≤ 1 000 m/s ²	
Ambient temperature range	-20 °C to +40 °C			
Connection system → page 6/47	Flange socket, 0° coding	1 m cable with coupling socket	Flange socket, 0° coding	1 m cable with coupling socket
Degree of protection	IP65			
Weight, approx.	320 g	500 g	320 g	500 g
Certification	CE, cUL-Rus			
Order code	Q85	Q88	Q87	Q86

Connection assignment

For cable available as an option, see "Encoder accessories (continued)" from page 6/48



	Input voltage		Sine tap		Cosine tap	
Connection	R1	R2	S1	S3	S2	S4
Flange socket	10	7	11	12	1	2
Core color	pink	white	red	blue	yellow	violet

¹⁾ Resolver cannot be combined with brake motor

Absolute encoders 1XP8014 and 1XP8024

Absolute encoders are available up to motor frame size 132.

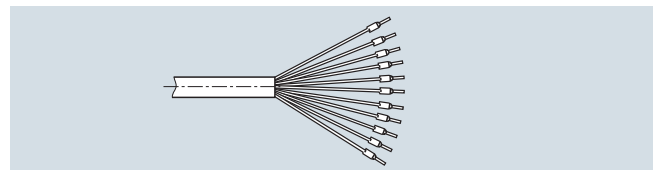
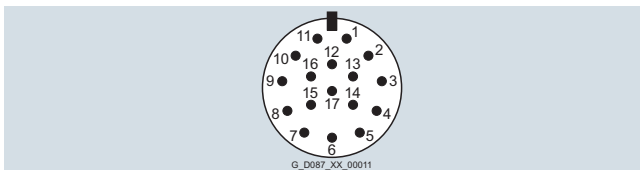
The multiturn absolute encoder can be shipped with EnDAT protocol or SSI protocol and mounted on the shaft.

Technical specifications

Absolute encoder	1XP8014-20	1XP8024-20	1XP8014-10	1XP8024-10
Supply voltage U_p	10 ... 30 V		5 V \pm 5 %	
Maximum current consumption without load	\leq 200 mA			
Absolute position values	SSI		EnDAT 2.1	
• Code	Gray		Dual	
• Positions per revolution	8 192 (13 bit)			
• Differentiable revolutions	4 096			
Incremental signals	\sim 1 V _{PP}			
• Pulses per revolution	512		2 048	
• Outputs	Sine/cosine pulses A, B			
• Limit frequency -3 dB	\geq 200 kHz			
• Signal size	0.8 ... 1.2 V _{PP}			
Moment of inertia of rotor	4.3×10^{-6} kgm ²			
Maximum permissible mechanical speed	\leq 6 000 rpm			
Permissible electrical speed with system accuracy	\leq 1 500 rpm/ \pm 1 LSB \leq 10 000 rpm/ \pm 50 LSB			
Vibration (55 ... 2 000 Hz)	15 g	30 g	15 g	30 g
Shock (6 ms)	100 g			
Degree of protection	IP66			
Ambient temperature range	-20 °C to +40 °C			
Connection system → page 6/47	Flange socket, 17-pole with 0° coding	1 m cable with coupling socket	Flange socket, 17-pole with 0° coding	1 m cable with coupling socket
Weight, approx.	0.3 kg			
Certification	CE, cUL-Rus			
Order code	Q80	Q81	Q82	Q83

Connection assignment

For cable available as an option, see "Encoder accessories (continued)" from [page 6/48](#)



	Voltage supply					Incremental signals				Absolute position values				Other signals	
Connection	U_p	Sen- sor U_p	0 V	Sen- sor 0 V	Inner shield	A+	A-	B+	B-	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$	Rot. direction	Zeros
	● — ●		● — ●												
Flange socket (SSI)	7	1	10	4	11	15	16	12	13	14	17	8	9	2	5
Core color	brown/ green	blue green	white/ green	white		green/ black	yellow/ black	blue/ black	red/ black	gray	pink	violet	yellow	black	green
	Voltage supply					Incremental signals				Absolute position values					
Connection	U_p	Sen- sor U_p	0 V	Sen- sor 0 V	Inner shield	A+	A-	B+	B-	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$	-	-
	● — ●		● — ●												
Flange socket (EnDAT 2.1)	7	1	10	4	11	15	16	12	13	14	17	8	9		
Core color	brown/ green	blue green	white/ green	white		green/ black	yellow/ black	blue/ black	red/ black	gray	pink	violet	yellow	black	green

Motor options

Mounted components

Encoder

Absolute encoder 1XP8024-21

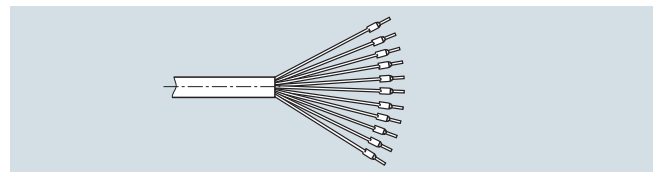
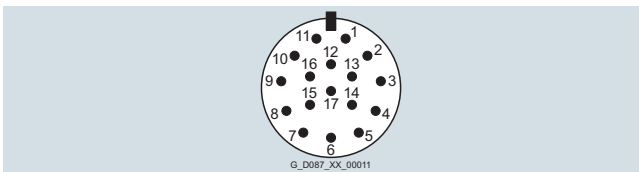
The absolute encoder is available with SSI protocol and HTL incremental signals up to motor frame size 132. This is ideally suited to SINAMICS G120D.

Technical specifications

Absolute encoder	1XP8024-21
Supply voltage U_p	10 ... 30 V
Maximum current consumption without load	28 mA at 24 V
Absolute position values	SSI
• Code	Gray
• Positions per revolution	8 192 (13 bit)
• Differentiable revolutions	4 096
• Calculation time t_{cal}	$\leq 5 \mu s$
Incremental signals	HTL
• Outputs	2 short-circuit-proof square-wave pulses U_{a1} , U_{a2} (maximum 1 min) 2 short-circuit-proof square-wave pulses $\overline{U_{a1}}$, $\overline{U_{a2}}$ (maximum 1 min)
• Signal level	$U_{High} U_p - 2.5 V$ $I_{High} = 20 mA$ $U_{Low} \leq 1.6 V$ $I_{Low} = 20 mA$
• Pulses per revolution	2 048
• Sampling rate	$\geq 205 kHz$
• Edge interval	0.43 μs
Starting torque at 20 °C	$\leq 0.01 Nm$
Moment of inertia of rotor	$4.3 \times 10^{-6} kgm^2$
Maximum permissible mechanical speed	$\leq 6 000 rpm$
Vibration (55 ... 2 000 Hz)	$\leq 150 m/s^2$ (EN 60068-2-6)
Shock (6 ms)	$\leq 1 000 m/s^2$ (EN 60068-2-27)
Degree of protection	IP66
Ambient temperature range	-20 °C to +40 °C
Connection system → page 6/47	1 m cable with 17-pole coupling socket, 0° coding
Weight, approx.	0.3 kg
Certification	CE, cUL-Rus
Order code	Q79

Connection assignment

For cable available as an option, see "[Encoder accessories \(continued\)](#)" from [page 6/48](#)



	Voltage supply				Incremental signals				Absolute position values				Other signals		
Connection	U_p	Sen- sor U_p	0 V	Sen- sor 0 V	Inner shield	U_{a1}	$\overline{U_{a1}}$	U_{a2}	$\overline{U_{a2}}$	DATA	DATA	CLOCK	\overline{CLOCK}	Count. direction	Zeros
	● — ●		● — ●												
Flange socket (SSI)	7	1	10	4	11	15	16	12	13	14	17	8	9	2	5
Core color	brown/ green	blue	white/ green	white		green/ black	yellow/ black	blue/ black	red/ black	gray	pink	violet	yellow	black	green

Rugged encoders
Rotary pulse encoder LL 861 900 220


Fig. 6/47 Leine und Linde LL 861 900 220

With its rugged design, this rotary pulse encoder is also suitable for demanding operating environments. It is resistant to shock and vibration and has insulated bearings.

The rotary pulse encoder LL 861 900 220 is available in combination with self-ventilated motors in frame size 112 or larger.

The version of the rotary pulse encoder with a diagnostics system (ADS) can be supplied by Leine and Linde.

Technical specifications

Supply voltage U_p	+9 ... +30 V
Current consumption without load	max. 80 mA
Permissible load current per output	40 mA
Pulses per revolution	1 024
Outputs	6 short-circuit proof square-wave pulses A, A', B, B', 0, 0', high current HTL
Pulse offset between the two outputs	$90^\circ \pm 25^\circ$ electrical
Output amplitude	$U_{\text{High}} \geq U_B - 4 \text{ V}$ $U_{\text{Low}} \leq 2.5 \text{ V}$
Pulse duty factor	$1:1 \pm 10 \%$
Rate of change	50 V/ μs (without load)
Maximum frequency	100 kHz for 350 m cable
Maximum speed	4 000 rpm
Degree of protection	IP66
Ambient temperature range	-20 °C to +40 °C
Maximum permissible radial cantilever force	300 N
Maximum permissible axial force	100 N
Connection system → page 6/47	Terminal strips in the encoder Cable connection, M20 x 1.5 radial
Weight, approx.	1.3 kg
Order code	Q92

Manufacturer:

Leine und Linde (Germany) GmbH
 Bahnhofstrasse 36
 73430 Aalen, Germany
 Phone: +49 (0) 73 61-78093-0
 Fax: +49 (0) 73 61-78093-11
www.leinelinde.com
 Email: info@leinelinde.de

Rotary pulse encoder HOG9 D 1024 I


Fig. 6/48 Hübner HOG9 D 1024 I

The encoder is equipped with insulated bearings.

The rotary pulse encoder HOG9 D 1024 I is available in combination with self-ventilated motors in frame size 112 or larger.

Technical specifications

Supply voltage U_p	+9 ... +30 V
Current consumption without load	50 ... 100 mA
Permissible load current per output	60 mA, 300 mA peak
Pulses per revolution	1 024
Outputs	4 short-circuit proof square-wave pulses A, B and A', B'
Pulse offset between the two outputs	$90^\circ \pm 20^\circ$
Output amplitude	$U_{\text{High}} \geq U_B - 3.5 \text{ V}$ $U_{\text{Low}} \leq 1.5 \text{ V}$
Pulse duty factor	$1:1 \pm 20 \%$
Rate of change	10 V/ μs (without load)
Maximum frequency	120 kHz
Maximum speed	7 000 rpm
Degree of protection	IP56
Ambient temperature range	-20 °C to +40 °C
Maximum permissible radial cantilever force	300 N
Maximum permissible axial force	200 N
Connection system → page 6/47	Radial connector (counterplug is part of the scope of delivery)
Mechanical design acc. to Hübner Ident. No.	73 522 E
Weight	0.7 kg
Order code	Q93

Manufacturer:

Baumer Hübner GmbH
 Max-Dohrn-Str. 2+4
 10589 Berlin, Germany
 Phone: +49 (0) 30-6 90 03-0
 Fax: +49 (0) 30-6 90 03-1 04
www.baumerhuebner.com
 Email: info@baumerhuebner.com

Motor options

Mounted components

Encoder

Rugged encoders (continued)

Rotary pulse encoder HOG10 D 1024 I

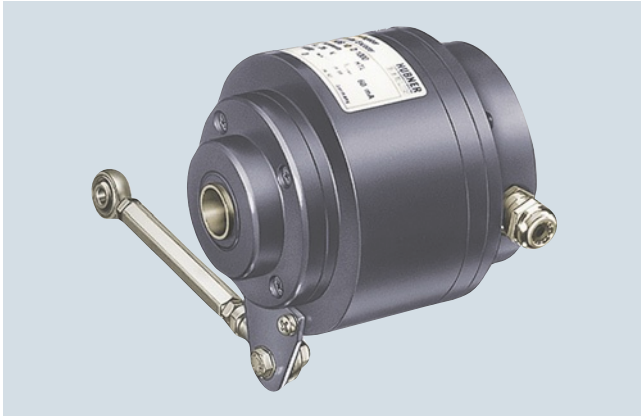


Fig. 6/49 Hübner HOG10 D 1024 I

This encoder is extremely rugged and is therefore suitable for harsh operating conditions. It is equipped with insulated bearings.

The rotary pulse encoder HOG10 D 1024 I is available for motor frame size 132.

Technical specifications

Supply voltage U_p	+9 ... +30 V
Current consumption without load	Approx. 100 mA
Permissible load current per output	60 mA, 300 mA peak
Pulses per revolution	1 024
Outputs	4 short-circuit-proof square-wave pulses A, B and A', B'
Pulse offset between the two outputs	$90^\circ \pm 20\%$
Output amplitude	$U_{\text{High}} \geq U_B - 3.5 \text{ V}$ $U_{\text{Low}} \leq 1.5 \text{ V}$
Pulse duty factor	$1:1 \pm 20\%$
Rate of change	10 V/ μs (without load)
Maximum frequency	120 kHz
Maximum speed	7 000 rpm
Degree of protection	IP66
Ambient temperature range	-20 °C to +40 °C
Maximum permissible radial cantilever force	400 N
Maximum permissible axial force	250 N
Connection system → page 6/47	Terminals, cable connection M20x1.5
Mechanical design acc. to Hübner Ident. No.	74 055 E
Weight, approx.	1.6 kg
Order code	Q94

Manufacturer:

Baumer Hübner GmbH

Max-Dohrn-Str. 2+4

10589 Berlin, Germany

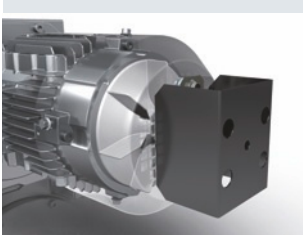
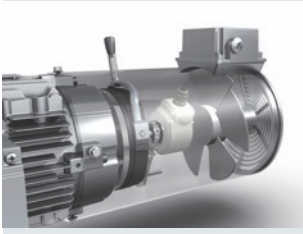
Phone: +49 (0) 30-6 90 03-0

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www.baumerhuebner.com

Email: info@baumerhuebner.com

Mechanical protection

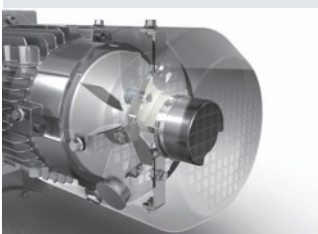
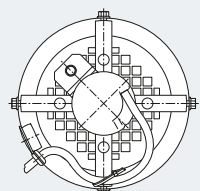
Design	Figure	Encoder type	Encoder order code	Connection system	Mounting of flange/coupling socket	
Protection plate						
For self-ventilated motors up to frame size 90, the encoder is mounted outside the fan cover. In the standard version, the encoder is covered by a protective metal plate (painted red).		1XP8012-..	Q50, Q51, Q52, Q53, Q54, Q55	Flange socket		
		1XP8014-..	Q80, Q82			
		1XP8013-..	Q85, Q87			
		1XP8022-..	Q56, Q57, Q58, Q59, Q60, Q61	Cable terminal box		
		1XP8032-..	Q44, Q45, Q46, Q47, Q48, Q49	0.8 m cable + coupling socket		
		1XP8024-..	Q79, Q81, Q83	1 m cable + coupling socket		
		1XP8023-..	Q86, Q88	1 m cable + coupling socket		
Canopy						
From motor frame size 100, the encoder is protected by a canopy.		1XP8012-..	Q50, Q51, Q52, Q53, Q54, Q55	Flange socket		
		1XP8014-..	Q80, Q82			
		1XP8013-..	Q85, Q87			
		1XP8022-..	Q56, Q57, Q58, Q59, Q60, Q61	Cable terminal box		
		1XP8032-..	Q44, Q45, Q46, Q47, Q48, Q49	0.8 m cable + coupling socket		
		1XP8024-..	Q79, Q81, Q83	1 m cable + coupling socket		
		1XP8023-..	Q86, Q88	1 m cable + coupling socket		
		Leine und Linde LL 861 900 220	Q92	Cable terminal box		
		HOG9 D 1024 I	Q93	Flange socket		
HOG10 D 1024 I	Q94	Cable terminal box				
Fan cover of the motor (with separately driven fan)						
For force-ventilated motors the encoder is mounted inside the fan cover.		1XP8012-..	Q50, Q51, Q52, Q53, Q54, Q55	Flange socket (from motor frame size 132)		
		1XP8014-..	Q80, Q82			
		1XP8013-..	Q85, Q87			
		1XP8022-..	Q56, Q57, Q58, Q59, Q60, Q61	Cable terminal box		
		1XP8032-..	Q44, Q45, Q46, Q47, Q48, Q49	0.8 m cable + coupling socket		The coupling socket is attached to the motor cooling fins using a claw.
		1XP8024-..	Q79, Q81, Q83	1 m cable + coupling socket		The cable is freely fed out of the fan cover.
		1XP8023-..	Q86, Q88	1 m cable + coupling socket		
		Leine und Linde LL 861 900 220	Q92	Cable terminal box		
		HOG9 D 1024 I	Q93	Flange socket		
		HOG10 D 1024 I	Q94	Cable terminal box		

Motor options

Mounted components

Encoder

Mechanical protection

Design	Figure	Encoder type	Encoder order code	Connection system	Mounting of flange/coupling socket
Encoder under cover					
Optionally, for motor frame sizes 71 to 200, instead of the protective metal plate, a protective cover can be ordered. This provides additional mechanical protection for the encoder. Order code for encoder under cover: Q95		1XP8022-..	Q56, Q57, Q58, Q59, Q60, Q61	Cable terminal box	The coupling socket is attached to the cover by a bracket.
		1XP8032-..	Q44, Q45, Q46, Q47, Q48, Q49	0.8 m cable + coupling socket	
		1XP8024-..	Q79, Q81, Q83	1 m cable + coupling socket	The cable is brought out through a cutout with protective envelope.
		1XP8023-..	Q86, Q88		

Motors prepared for encoder mounting

The interface for the modular encoder-mounting shaft is designed for a total maximum weight of $m = 500\text{g}$. The connections and wiring for the encoder system must be selected such that the rotary encoder is not subjected to any additional forces. The encoder must be mounted in such a way that normal linear expansion does not subject the torque arm to any impermissible forces.

In the delivery state, the encoder-mounting shaft has a maximum radial runout of $\leq 0.1\text{mm}$. When the encoder is selected, it must be ensured that the minimum immersion depth of the solid shaft into the hollow shaft corresponds to the encoder manufacturer's specifications. The encoder manufacturer's instructions and recommendations must also be observed.

The interface "Prepared for encoder mounting" is always shipped with an encoder protection device for protection during transportation. The encoder protection device should be used in order to protect the mounted encoder and the mounting system against mechanical damage.

For the dimensions of the available mounting space and other dimensions, please refer to [page 4/20](#).

This option is suitable for applications with medium shock and vibration requirements. At medium cycle frequencies of the application, speeds up to 3 600 rpm are possible.

Order code:

Prepared for encoder mounting (12 mm)

N50

MOTION-CONNECT signal cables

MOTION-CONNECT signal cables for encoder types incremental encoder (HTL/TTL), absolute encoder (SSI/EnDat 2.1) and resolver are available for connecting SIEMENS 1XP8 encoders to SINAMICS S110/120 and G120.


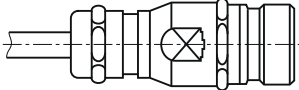
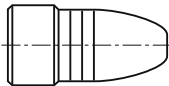
These cables can be ordered in precise 10 cm lengths.

Description	Article No.:
Incremental encoder (HTL/TTL) 1XP8012; 1XP8032 and 1XP8022	
Pre-assembled signal cable (fixed routing/with D-sub connector on control side)	6FX5002-2CR00-■■■■■
Pre-assembled signal cable (fixed routing/with bare wire ends on control side)	6FX5002-2CA12-■■■■■
Pre-assembled signal cable (trailing type/with bare wire ends on control side)	6FX8002-2CA12-■■■■■

Description	Article No.:
Absolute encoder (SSI) 1XP8014-20; 1XP8024-20; 1XP8024-21	
Pre-assembled signal cable (fixed routing)	6FX5002-2CC06-■■■■■
Pre-assembled signal cable (trailing type)	6FX8002-2CC06-■■■■■
Absolute encoder (EnDat 2.1) 1XP8014-10; 1XP8024-10	
Pre-assembled signal cable (fixed routing/with D-sub connector on control side)	6FX5002-2CH00-■■■■■
Pre-assembled signal cable (trailing type/with D-sub connector on control side)	6FX8002-2CH00-■■■■■
Resolvers 1XP8013 and 1XP8023	
Pre-assembled signal cable (fixed routing)	6FX5002-2CF06-■■■■■
Pre-assembled signal cable (trailing type)	6FX8002-2CF06-■■■■■

For further selection options and information about MOTION-CONNECT signal cables, please refer to [Catalog D 21.4](#) and [the Industry Mall](#).

Encoder accessories
Connection system

Connection system	Description	Design
M23 flange socket		
	The flange socket is mounted directly on the encoder.	Pin contacts External thread
M23 coupling socket		
	The coupling socket is connected to the encoder via a cable.	Pin contacts External thread
M23 connector		
	The connector is connected to the flange/coupling socket.	Socket contacts Union nut

Technical specifications

	Cable suitable for cable carriers	Cable unsuitable for cable carriers
Approvals		
• VDE	yes	yes
• cULus or UL/CSA	yes	yes
• UL-CSA File No.	AWM STYLE 20963 80 °C 30 V E63216	E242293
Operating temperature on the surface		
• Permanently installed	-40 °C ... +80 °C	-40 °C ... +100 °C
• Moving	-10 °C ... +80 °C	-30 °C ... +100 °C
Smallest bending radius		
• Permanently installed	≥ 70 mm	≥ 35 mm
• Moving	≥ 100 mm	≥ 70 mm
Bending operations	Typ. 5×10^6 cycles	-
Oil resistance	EN 50363-10-2	Oil-resistant
Outer jacket	Polyurethane (PUR)	Polyurethane (PUR)
Design	4x2x0.14+4x0.5 (for incremental encoder) 4x2x0.14+4x0.5+4x0.5 (for absolute encoder)	5x2x0.14 mm ²
Outer diameter	8 mm	7 mm ± 0.2 mm

Motor options

Mounted components

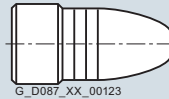
Encoder

Encoder accessories (continued)

Connector

A straight connector for shielded cables up to 8 mm in diameter is available for encoders with flange/coupling socket.

Selection table

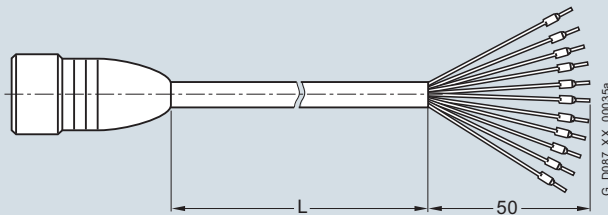


Encoder type	Order code Article No.
	M23 connector
Incremental encoders 1XP8012, 1XP8032, IN 8.5834 Resolvers 1XP8013 and 1XP8023	Q62 FDU:55190000565002
Absolute encoders 1XP8014, 1XP8024, IA 8.5883	Q62 FDU:55190000565003

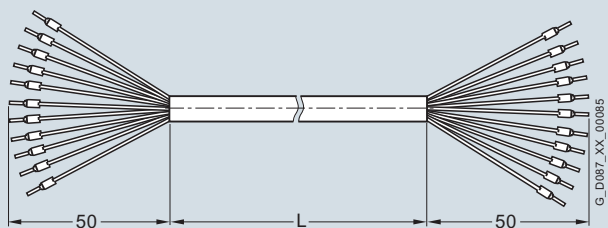
Cable with end sleeves

A pre-assembled cable with end sleeves and three different cable lengths can be supplied for the encoders.

Selection table



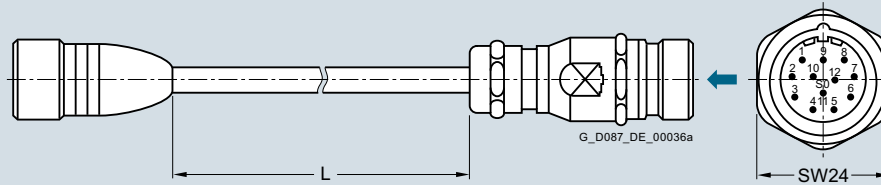
Encoder type	Suitable for cable carrier Yes/no	Order code Article No.		
Free cable length L		2 m	8 m	15 m
Incremental encoders 1XP8012, 1XP8032	yes	Q69 FDU:70000004013446	Q70 FDU:70000004013447	Q71 FDU:70000004013448
Resolvers 1XP8013 and 1XP8023	no	Q69 FDU:70000004013576	Q70 FDU:70000004013577	Q71 FDU:70000004013578
Absolute encoders 1XP8014 and 1XP8024	yes	Q69 FDU:70000004013454	Q70 FDU:70000004013455	Q71 FDU:70000004013456



Encoder type	Suitable for cable carrier Yes/no	Order code Article No.		
Free cable length L		2 m	8 m	15 m
Incremental encoder 1XP8022	no	Q63 FDU:70000004013418	Q64 FDU:70000004013419	Q65 FDU:70000004013420

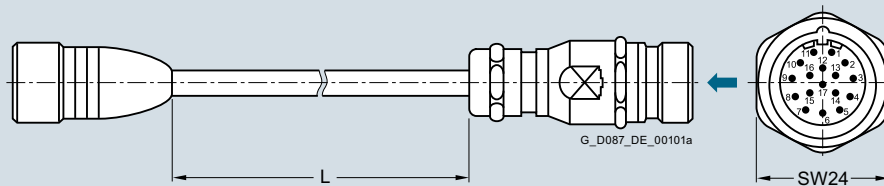
Encoder accessories (continued)
Cable with coupling socket

A cable with a straight coupling socket can be supplied for the encoders.

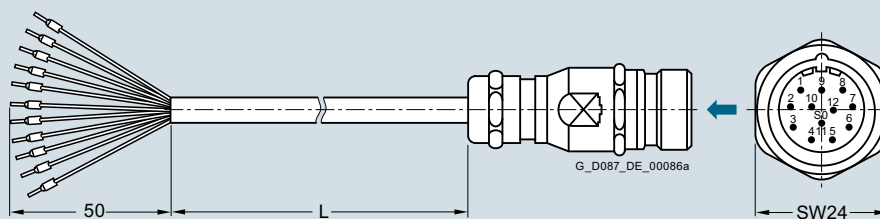
Selection table


Encoder type	Suitable for cable carrier Yes/no	Order code		
		Article No.		
Free cable length L		2 m	8 m	15 m
Incremental encoders 1XP8012, 1XP8032	yes	Q72 FDU:70000004013449	Q73 FDU:70000004013450	Q74 FDU:70000004013451
Resolvers 1XP8013 and 1XP8023	no	Q72 FDU:70000004013579	Q73 FDU:70000004013580	Q74 FDU:70000004013581

For the connection assignment, see the [encoder flange socket](#).



Encoder type	Suitable for cable carrier Yes/no	Order code		
		Article No.		
Free cable length L		2 m	8 m	15 m
Absolute encoders 1XP8014 and 1XP8024	yes	Q72 FDU:70000004013457	Q73 FDU:70000004013458	Q74 FDU:70000004013459



Encoder type	Suitable for cable carrier Yes/no	Order code		
		Article No.		
Free cable length L		2 m	8 m	15 m
Incremental encoder 1XP8022	no	Q66 FDU:70000004013421	Q67 FDU:70000004013422	Q68 FDU:70000004013443

Motor options

Mounted components

Encoder

Encoder accessories (continued)

EnDAT gateways for absolute encoders

Using interface converters (gateways), EnDAT absolute encoders can be integrated in networks with a serial bus system (PROFIBUS DP, CANopen and DeviceNET).

The absolute encoder can be connected to the gateway using cables for absolute encoders **Q72**, **Q73** or **Q74**.



Fig. 6/50 EnDAT gateways

Technical specifications

Gateways	PROFINET	PROFIBUS DP	CANopen	DeviceNET
Supply voltage	9-36 Vdc	9-30 Vdc	9-30 Vdc	9-30 Vdc
Encoder data				
Connection	EnDat			
Supply voltage	5 Vdc ± 5 %			
Absolute encoder	1XP8014-10 (Q82) and 1XP8024-10 (Q83)			
Accessories				
Cable with coupling socket	Q72, Q73, Q74			
Order code	Q01	Q02	Q03	Q04

Manufacturer:

Leine und Linde (Germany) GmbH
 Bahnhofstrasse 36
 73430 Aalen, Germany
 Phone: +49 (0) 73 61-78093-0
 Fax: +49 (0) 73 61-78093-11
www.leinelinde.com
 Email: info@leinelinde.de

Modular system in combination with encoder systems

Encoder	Motor plug	Brake	Self ventilation			Forced ventilation ¹⁾
			Standard fan	Metal fan	High inertia fan ¹⁾	
Incremental encoder						
1XP8012-..	✓	✓	✓	✓	✓	✓
1XP8022-..	✓	✓	✓	✓	✓	✓
1XP8032-..	✓	✓	✓	✓	✓	✓
Absolute encoder						
1XP8014-..	✓	✓	✓	✓	✓	✓
1XP8024-..	✓	✓	✓	✓	✓	✓
Resolver						
1XP8013-..	✓	-	✓	✓	✓	✓
1XP8023-..	✓	-	✓	✓	✓	✓
Rugged encoders						
LL 861 900 220	✓	-	✓	✓	✓	✓
HOG9 D 1024 I	✓	-	✓	✓	✓	✓
HOG10 D 1024 I	✓	-	✓	✓	✓	✓

¹⁾ Can be selected for motor frame size 71 or higher

Application terminal box for sensors

The application terminal box contains the connections for the sensors in the motor (temperature measurement) and on the motor (encoder). This is used to isolate the connections for the power section from those for the sensor section.

The application terminal box is available for motor frame sizes 63 to 132.

The following encoders are possible in combination with the application terminal box:

- Incremental encoder 1XP8022 (**Q56 ... Q61**)
- Incremental encoder LL 861 900 220 (**Q92**)

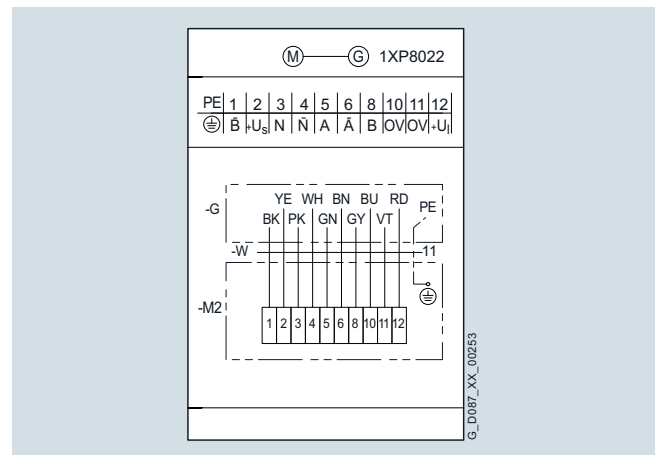


Fig. 6/51 Connection circuit diagram

Order code:

Application terminal box

Q75

Second shaft extension and handwheel
Second shaft extension

For 4-pole motors a free, second shaft extension can be supplied on the non-drive end (NDE). The second shaft extension has a 60° centering hole to DIN 332, Part 2 with M3 to M24 tapped hole depending on the shaft diameter.

For a coupling output, the second shaft extension can transmit the full rated power. Please also inquire about the power that can be transmitted and permissible cantilever force if belt pulleys, chains, or gear pinions are used on the second shaft extension.

A second shaft extension cannot be provided if a rotary pulse encoder and/or a separately driven fan has been mounted to the motor.

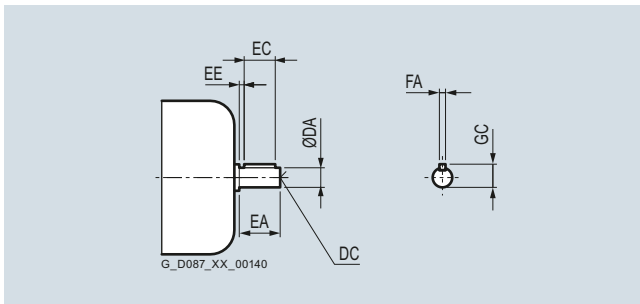


Fig. 6/52 Second motor shaft extension

Handwheel

Motors of frame sizes 71 to 132 can be supplied with a second shaft extension and additionally with a handwheel.

The handwheel is a disk-type handwheel in accordance with DIN 3670. By mounting it on the second shaft extension of the motor, the geared motor can be rotated even when the motor winding is in a no-voltage state.

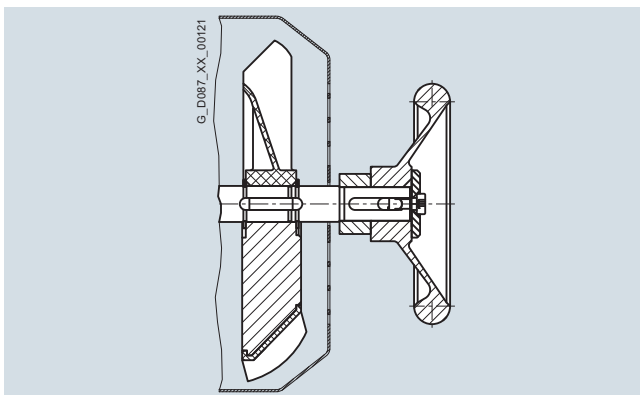


Fig. 6/53 Handwheel

Order code:

Handwheel

N40
Modular system in combination with second shaft extension

Modular system	Motor plug	Brake	Encoder	Self ventilation	Forced ventilation
Second shaft extension					
Without handwheel	✓	✓	-	✓	-
With handwheel	✓	✓	-	✓	-

Order code:

Second shaft extension

N39
Technical specifications

Motor frame size	DA	EA	Distance between fan cover and shaft shoulder	DC	EC	EE	FA	GC
63	-	-	-	-	-	-	-	-
71	14	30	4	M5	22	4	5	16.0
80	14	30	4	M5	22	4	5	16.0
90	19	40	5	M6	32	4	6	21.5
100	19	40	5	M6	32	4	6	21.5
112	24	50	6	M8	40	5	8	27.0
132	28	60	8	M10	50	5	8	31.0

Motor options

Mounted components

SINAMICS G110M motor integrated frequency inverter

Overview

SINAMICS G110M is a modular, motor integrated inverter system with IP65/66 degree of protection comprising various function units. The main units are:

- Control Unit (CU)
- Power Module (PM)

The Control Unit controls and monitors the Power Module and the connected motor using several different closed-loop control types that can be selected. The digital and analog inputs and digital outputs on the device support the simple wiring of sensors and actuators directly at the drive. The input signals can either be directly linked within the Control Unit and initiate local responses independently or they can be transferred to the central control via PROFIBUS, PROFINET or AS-Interface for further processing within the context of the overall plant.

The Power Module supplies the motor in a power range from 0.37 kW to 4 kW. The Power Module is controlled by a micro-processor in the Control Unit. It features state-of-the-art IGBT technology with pulse width modulation for highly reliable and flexible motor operation. Comprehensive protection functions provide a high degree of protection for the Power Module and the motor.

Type designation *SINAMICS G110M (integrated in the motor in SIMOGEAR)*¹⁾

Motor frame size	
71	A
80, 90	B
100, 112	C

Power Module	
0.37 kW	0037
0.75 kW	0075
1.1 kW	0110
1.5 kW	0150
2.2 kW	0220
3.0 kW	0300

Control Unit	
Connection (line voltage and 24 V DC)	
Terminal strip, cable entry via cable gland	A
HAN Q4/2 + connector 7/8"	B
Bus system	
USS	1
AS-Interface	2
PROFIBUS	3
PROFINET	4

Motor connection	
Star	S
Delta	D

Braking resistor	
Without	0
Internal (FSA)	1
Internal (FSB)	2

Externally mounted components	
Without	0
24 V DC power supply	1
Repair switch	2

Example:

G110M	- B	0110	- A	1	S	- 0	0
	↓	↓	↓	↓	↓	↓	↓
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

- (1) Motor frame size
- (2) Power Module rated power
- (3) Control Unit: Connection (line voltage and 24 V DC)
- (4) Control Unit: Bus system
- (5) Motor connection
- (6) Braking resistor
- (7) Externally mounted components

¹⁾ Further information about the SINAMCS G110 M motor integrated frequency inverter can be found in Catalog [MD 50.1](#).

SINAMICS G110M motor integrated frequency inverter

Selection and ordering data ¹⁾

Motor frame size	Power Module power kW	Motor connection	Type designation	Order code
71	0.37	Star	G110M - A0037 - ■ ■ S - ■ ■	U01
	0.75	Delta	G110M - A0075 - ■ ■ D - ■ ■	U02
80	0.75	Star	G110M - B0075 - ■ ■ S - ■ ■	U07
	1.1	Delta	G110M - B0110 - ■ ■ D - ■ ■	U08
		Star	G110M - B0110 - ■ ■ S - ■ ■	U09
	1.5	Delta	G110M - B0150 - ■ ■ D - ■ ■	U10
90	1.1	Star	G110M - B0110 - ■ ■ S - ■ ■	U09
	1.5	Star	G110M - B0150 - ■ ■ S - ■ ■	U11
	2.2	Delta	G110M - B0220 - ■ ■ D - ■ ■	U12
		Star	G110M - B0220 - ■ ■ S - ■ ■	U13
3.0	Delta	G110M - B0300 - ■ ■ D - ■ ■	U14	
100	2.2	Star	G110M - C0220 - ■ ■ S - ■ ■	U19
	3.0	Star	G110M - C0300 - ■ ■ S - ■ ■	U21
	4.0	Delta	G110M - C0400 - ■ ■ D - ■ ■	U22
		Star	G110M - C0400 - ■ ■ S - ■ ■	U23
112	4.0	Star	G110M - C0400 - ■ ■ S - ■ ■	U23

Type designation supplement and additional order code

Control Unit	Connection (400 V 3 AC/24 V DC) Cable gland ^{*)}	Bus system			
		USS/Modbus RTU	A 1		U40
		AS-Interface	A 2		U41
		PROFIBUS DP (DP)	A 3		U42
		PROFINET/ EtherNet IP (PN)	A 4		U43
	HAN Q4/2 + connector 7/8*	AS-Interface	B 2		U51
		PROFIBUS DP (DP)	B 3		U52
		PROFINET/ EtherNet IP (PN)	B 4		U53
Braking resistor	Without			0	-
	Internal (FSA)			1	U60
	Internal (FSB)			2	U61
Externally mounted components	Without			0	-
	24 V DC power supply			1	U70
	Repair switch			2	U71

* On delivery, the openings in the housing for line voltage, 24 V DC and brake are sealed with a dummy screw cap (exception: on brake motors, the brake cable is already connected via a cable gland).

¹⁾ Further information about the SINAMCS G110 M motor integrated frequency inverter can be found in Catalog MD 50.1.

Motor options

Designs for special environmental conditions

Condensation drain hole

Condensation can accumulate inside the motor as the result of environmental effects. This can result in corrosion and lower clearances and creepage distances.

The condensation is drained to the outside through the condensation drain hole. Depending on the mounting position, the drain holes are located at the DE and/or NDE of the motor.

Order code:

Condensation drain hole

N46

The option "condensation drain hole" can only be used for the following applications under certain conditions:

Motor	Gearbox type		Mounting position	
	BH.	KHF	Possible	Not possible
LA71	-	49 ... 79	M4	M1, M2, M3, M5, M6
LE100	29, 39	-	M2	M1, M3, M4, M5, M6

Internal motor corrosion protection

The outer surfaces of the geared motors have a high quality paint finish.

For special applications, it may be necessary to apply a protective coating to the inner surfaces of the motor as well.

Order code:

Internal motor corrosion protection

N41

General options



7/2	Environmental conditions
7/2	Standard ambient temperature of the geared motors
7/2	Increased protection against humidity and tropical climates
7/2	Extreme ambient temperatures
7/3	Surface treatment and preservation
7/3	Surface treatment
7/3	• Surface pretreatment
7/4	• Painting flange surfaces
7/4	• Colors
7/5	Preservation
7/5	• Long-term preservation up to 36 months
7/6	Rating plate
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7/6	Rating plate
7/7	Second rating plate
7/8	Documentation
7/8	Safety instruction sheet and operating instructions
7/8	Test certificates

General options

Environmental conditions

Standard ambient temperature of the geared motors

The SIMOGEAR geared motors can be deployed in the following standard ambient temperature ranges:

Gearbox type	Ambient temperature	Order code
Bevel geared motor KH	-15 °C to +40 °C	-
Bevel geared motor KH	-20 °C to +40 °C ¹⁾	K95
Bevel geared motor BH	-20 °C to +40 °C	-
Geared motors with SINAMICS G110M motor integrated frequency inverter	-10 °C to +40 °C	-

¹⁾ Only in combination with lubricants suitable for use in this temperature range, see [page 5/7](#).

Increased protection against humidity and tropical climates

Increased protection against humidity and tropical climates can be optionally supplied for the (geared) motors, frame sizes 63 to 200. This design is suitable for air humidity in the range between 30 and 60 g water per m³ air as a function of the temperature (see [page 6/8](#)).

The increased protection against humidity and tropical climates includes surface treatment with corrosivity category C2 (**L03**), increased winding protection against moisture and acid (**N54**) and internal motor corrosion protection (**N41**).

Please contact Siemens, if the motor requires other functions (brake, backstop, encoder systems).

Order code:

Increased protection against humidity and tropical climates	N43
-------------------------------------------------------------	------------

Extreme ambient temperatures

When operating the SIMOGEAR geared motors outside the specified standard ambient temperatures, the geared motors must be adapted to the special environmental conditions. Please contact Siemens in this regard.

Surface treatment

To protect the drives against corrosion and external influences, five high-quality paint systems are available in various colors.

The corrosion protection system is designed in accordance with the corrosivity categories of EN ISO 12944-2.

Geared motors, frame size 49 and higher, are painted in RAL 7016 (anthracite gray) to corrosivity category C1 as standard. This ensures that they are protected against corrosion for indoors use.

All of the unpainted parts of the products are treated with corrosion protection for 6 months.

Surface pretreatment

For especially demanding applications, the drives can also be pretreated in order to achieve a uniform paint coat thickness also at hidden locations or those difficult to access.

Order code:

Special pretreatment

L19

Corrosivity category	Paint system			Description	Order code
	Primer	Intermediate coat	Top coat		
Surface protection					
C1 Normal environmental stress	-	-	1-component hydro paint	<ul style="list-style-type: none"> Indoor installation Heated buildings with neutral atmospheres Resistant to greases, conditionally resistant to mineral oils, aliphatic solvents Standard paint 	L02
C2 Low environmental stress	2-component polyurethane	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Unheated buildings with condensation, production areas with low humidity, e.g. warehouses and sports facilities Atmospheres with little pollution, rural areas Resistant to greases, mineral oils and sulfuric acid (10 %), caustic soda (10 %) and conditionally resistant to aliphatic solvents 	L03
C3 Average environmental stress	2-component polyurethane	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Production areas with high humidity and some air pollution, e.g. food production areas, dairies, laundries and breweries Urban and industrial atmospheres, moderate contamination from sulfur dioxide, coastal areas with low salt levels Resistant to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %) 	L04
C4 High environmental stress	2-component epoxy zinc phosphate	-	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Chemical plants, swimming pools, wastewater treatment plants, electroplating shops, and boathouses above seawater Industrial areas and coastal areas with moderate salt levels Resistant to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (10 %) 	L20
C5 Very high environmental stress	2-component epoxy zinc phosphate	2-component epoxy iron mica	2-component polyurethane	<ul style="list-style-type: none"> Indoor and outdoor installation Buildings/areas with almost constant condensation and high degrees of pollution, e.g. malt factories and aseptic areas Industrial areas with high humidity and aggressive atmosphere, coastal areas and offshore environments with high salt levels Resistant to greases, mineral oils, aliphatic solvents, sulfuric acid (10 %), caustic soda (20 %) 	L05
Primer				Ability to be painted	
C2 G	2-component polyurethane	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 	L01
C4 G	2-component epoxy zinc phosphate	-	-	<ul style="list-style-type: none"> 2-component polyurethane paint, 2-component epoxy paint and acid-hardening paint, 2-component acrylic paint 	L09
Unpainted	-	-	-	<ul style="list-style-type: none"> Plastic paint, synthetic resin paint, oil paint, 2-component polyurethane paint, 2-component epoxy paint 	L00

General options

Surface treatment and preservation

Surface treatment (continued)

Painting flange surfaces

For flange-mounted designs, the flange surface and centering are not painted. The versions listed in the table can be optionally selected.

Design	Figure	Possible for	Order code
Centering not painted		<ul style="list-style-type: none"> • Flange-mounted design • Housing flange design 	L11
Flange completely painted		<ul style="list-style-type: none"> • Flange-mounted design • Housing flange design 	L12
Centering flange not painted on both sides		<ul style="list-style-type: none"> • Housing flange design for bevel gearbox and helical worm gearbox 	L27

Colors

In addition to anthracite gray (RAL 7016), you can select from other standard colors.

RAL color	Designation	Color, example	Order code
RAL 7016	Anthracite gray (standard)		L75
RAL 5015	Sky blue		L50
RAL 7011	Iron gray		L51
RAL 7030	Stone gray		L55
RAL 7031	Blue gray		L53
RAL 7035	Light gray		L54
RAL 7012	Basalt gray		L83

You can find additional colors in our electronic catalog www.siemens.com/dt-configurator

Note

For light colors in corrosivity category C1 we recommend selection of surface treatment in the corrosivity category one level higher to ensure adequate and uniform coloring for the geared motor.

Preservation

All gearboxes and geared motors are preserved as standard for 6 months.

Long-term preservation up to 36 months

If the gearboxes are stored for longer than 6 months, then we recommend the "Long-term preservation" option. A VCI (volatile corrosion inhibitor) is added to the gearbox oil.

Until commissioning, it is not permissible that the gearbox is opened, as otherwise the VCI will vaporize. The oil level must be checked before commissioning. Corrosion protection is also applied to the flange contact surfaces and shaft extensions. We recommend that the gearbox is stored in the appropriate mounting position.

Storage conditions

Geared motors, stored in dry, dust free and evenly tempered rooms do not require any special packaging.

In all other areas, the units must be packaged in foil with desiccant and moisture indicator. If required, protection must be provided against mold and termites. The storage location must be vibration- and shock-free. The storage conditions must be regularly checked.

Order code:

Long-term preservation up to 36 months

K17

[For information about storage and commissioning please refer to the operating instructions.](#)

General options

Rating plate

Overview

The rating plates on the gearboxes and geared motors are made of coated aluminum foil. They are covered with a special masking film which ensures permanent resistance to UV radiation and media of all kinds (oils, greases, salt water, cleaning agents, etc.).

The adhesive and the material ensure firm adhesion and long-term legibility within the operating temperature range from -40 to +155 °C.

For geared motors, the rating plate is attached to a stainless steel plate on the motor.

For specific designs, additional rating plates are attached to the motor.

Rating plate


SIEMENS FDU0412/8999999 nnn 2KJ3105-1EM22-2AV1-Z ZF59-LE90SG4E-L32/14N-IN SI04 IP55 30kg Tamb -15...+40°C K-ID: 1234567890 1.5L OIL CLP VG220 i: 28 50Hz n2: 49.3r/min 60Hz n2: 59.7r/min T2: 213Nm fB: 2.1 T2: 203Nm fB: 2.2 3-Mot. ThCl.155(F) 14 Nm 230V +-10% AC 50Hz 230/400V +-10% D/Y 60Hz 460V +-10% Y 4.33/2.5A cosφ 0.78 2.2 A cosφ 0.78 1.1kW S1 IE2-81.4% 1425r/min 1.27kW S1 IE2-84% 1725r/min Mot. 1AV2090B 1LE1001-0EB0 SIEMENS AG, Bahnhofstr. 40, DE-72072 Tübingen		IEC60034  (IM)M1	SIEMENS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 17 20 21 16 18 19 22 23 24 25 26 27 28 29 30 31 37 38 39 32 33 40 41 34 35 36 42 43 44 45 46 SIEMENS AG, Bahnhofstr. 40, DE-72072 Tübingen
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Fig. 7/1 Example, rating plate on helical geared motor

General data

- 1 Data matrix code
- 2 Applicable standard
- 3 Serial No.
FDU: Siemens AG, Bahnhofstr. 40, 72072 Tübingen, Germany
- 4 CE marking or other marking, if required
- 5 Article No.
- 6 Type designation - SI04 functional safety designation
- 7 Mounting position
- 8 Degree of protection acc. to IEC 60034-5
- 9 Weight m [kg]
- 10 Ambient temperature
- 11 Customer-specific data¹⁾ (customer ID/free text), max. 20 characters
- 12 Oil quantity [l] main gearbox/intermediate gearbox
- 13 Oil type
- 14 Oil viscosity ISO VG class to DIN 51519/ISO 3448
- 15 Total transmission ratio i

Frequency 1

- 16 Rated frequency f [Hz]
- 17 Gearbox output speed n_2 [rpm]
- 18 Geared motor output torque T_2 [Nm]
- 19 Service factor f_B

Frequency 2

- 20 Rated frequency f [Hz]
- 21 Gearbox output speed n_2 [rpm]
- 22 Geared motor output torque T_2 [Nm]
- 23 Service factor f_B

Motor and brake data

- 24 Phase number and type of current for the motor
- 25 Temperature class Th.Cl.
- 26 Symbols (IEC 60617-2): = brake
- 27 Rated braking torque T_{br} [Nm]
- 28 Brake supply voltage U [V]

Frequency 1

- 29 Rated frequency f [Hz]
- 30 Rated voltage range U [V]
- 31 Circuit, graphic symbols acc. to EN 60617 Part 6/IEC 60617-6
- 32 Rated current I_{rated} [A]
- 33 Power factor $\cos \varphi$
- 34 Rated power P_{rated} [kW], duty type (if \neq S1)
- 35 Efficiency class marking according to IEC 60034-30
- 36 Rated speed n_{rated} [rpm]

Frequency 2

- 37 Rated frequency f [Hz]
- 38 Rated voltage range U [V]
- 39 Rated current I_{rated} [A]
- 40 Power factor $\cos \varphi$
- 41 Circuit, graphic symbols acc. to EN 60617 Part 6/IEC 60617-6
- 42 Rated power P_{rated} [kW], duty type (if \neq S1)
- 43 Efficiency class
- 44 Rated speed n_{rated} [rpm]
- 45 Motor series
- 46 Motor designation

When ordering a replacement/spare part, always specify the serial No.

- ¹⁾ The customer-specific data are used to specify the customer ID/serial number. The following data are not permissible:
- Technical specifications for the geared motor (e.g. ambient temperature, voltage data, etc.)
 - Details of Siemens Article No. (MLFB)
 - Unlawful texts

Second rating plate

Second rating plate, supplied loose

For the gearboxes and geared motors, an additional rating plate can be supplied loose.

Order code:

Second rating plate, supplied loose

K41

Second rating plate, attached

When requested, a second rating plate can be attached to the motor.

Order code:

Second rating plate, attached

K68



Fig. 7/2 Example, rating plate on the motor

General options

Documentation

Safety instruction sheet and operating instructions

The geared motors are shipped with a multi-language safety instruction sheet for each delivery batch.

Geared motors with the G110M motor integrated frequency inverter are shipped with the safety instruction sheet and the documentation for the G110M for each delivery batch.

Geared motors with a functionally safe rotary encoder are shipped with the safety instruction sheet and one set of operating instructions in German or English for each delivery batch.

One set of operating instructions is enclosed for each geared motor using the following ordering option.

Enclosed documentation	Language	Order code
1 set of operating instructions for each geared motor	German	W21
	English	W22

The operating instructions include the following documents:

- Replacement part drawings and lists
- Declaration of incorporation of partly completed machinery according to the EC Machinery Directive 2006/42/EC (gearboxes)
- EC Declaration of Conformity according to Directive 2006/95/EC (motors)

The latest versions of the operating instructions, the declaration of incorporation and the declarations of conformity are available in the Industry Online Support:

<https://support.industry.siemens.com/cs/ww/en/ps/13424/man>

Test certificates

On request, the following documents are available by email:

Additional documentation	The following is checked:	Order code
Declaration of compliance with the order EN 10204-2.1 and factory test report EN 10204-2.2, geared motor	-	On request
Factory test report EN 10204-2.2 for material	-	On request
Acceptance test certificate EN 10204-3.1 for the motor	<ul style="list-style-type: none"> • 3 no-load currents of the 3 phases • Power loss for no-load operation • No-load speed 	W10
Acceptance test certificate EN 10204-3.1 for gearboxes	<ul style="list-style-type: none"> • Output shaft diameter • Concentricity of the output shaft • Concentricity of the input shaft (for gearboxes with input unit A only) • Input shaft diameter (for gearboxes with input unit A only) • Noise (subjective assessment) 	W11
Acceptance test certificate EN 10204-3.1 for paint finish	-	W12

Appendix



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8/2	List of order codes
8/6	List of variables to dimension the drive
8/10	Subject index
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8/15	SITRAIN - Training for Industry
8/16	Partners at Siemens
8/17	Online Services
	<u>Information and Ordering Options on the Internet and DVD</u>
8/17	The Future of Manufacturing on the Internet
8/17	Product Selection Using the Interactive CA 01 Automation and Drives Catalog
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Appendix

Lists

List of order codes

Order code	Special version Designation	Detailed data Chapter/Page
Brake type		
B00 to B66	Brake types according to size and braking torque	6/24
Brake design		
C01	Enclosed brake	6/30
C02	Manual brake release lever	6/28
C03	Manual brake release lever with locking mechanism	6/28
C04	Microswitch for monitoring brake release	6/30
C06	Wear-resistant friction lining	6/31
C10	Increased corrosion protection for brake	6/30
C11	Enclosed brake with condensation drain hole	6/30
Manual brake release lever position		
C26	1	6/28
C27	2	6/28
C28	3	6/28
C29	4	6/28
Brake supply voltage		
C46 ... C74	Standard voltages, brake	6/25
Function rectifier		
C59	Function rectifier with disconnection on the DC side by sensing the current	6/26
C60	Function rectifier with disconnection on the DC side by sensing the voltage	6/26
Brake cable protection		
C80	Brake cable protection	6/30
Mounting positions		
D11 ... D16	Mounting positions of the geared motors	5/2
Oil level control		
G34	Oil sight glass	5/8
Gearbox venting		
G45	Pressure breather valve	5/8
Degree of protection		
K01	IP55	6/9
K03	IP65	6/9
Flange diameter		
H05, H06	Flange diameter	5/5
Clutch for heavy-load applications		
H21	Clutch operating travel 1-3	5/6
H22	Clutch operating travel 1-2	5/6
H23	Short clutch lever	5/6
H25	Clutch lever facing inwards (position B)	5/6
Lubricants		
K07	CLP ISO PG VG220	5/7
K08	CLP ISO PG VG460	5/7
K11	CLP ISO H1 VG460	5/7
K12	CLP ISO PAO VG220	5/7
K13	CLP ISO PAO VG68	5/7
K14	CLP ISO H1 VG100	5/7
Long-term preservation		
K17	Long-term preservation up to 36 months	7/5
Rating plate and additional rating plates		
K41	Second rating plate, supplied loose	7/7
K68	Second rating plate, attached	7/7
VDI guideline 3643		
K42	Design acc. to VDI guideline 3643	2/4

Order code	Special version Designation	Detailed data Chapter/Page
HAN Q8 motor plug with cable		
K50	HAN Q8 motor plug with 0.5 m cable	6/21
K51	HAN Q8 motor plug with 1 m cable	6/21
K52	HAN Q8 motor plug with 2 m cable	6/21
K53	HAN Q8 motor plug with 3 m cable	6/21
K54	HAN Q8 motor plug with 4 m cable	6/21
K55	HAN Q8 motor plug with 5 m cable	6/21
Surface treatment		
L00	Unpainted	7/3
L01	Primer according to corrosivity category C2 G	7/3
L02	Surface protection for normal environmental stress C1	7/3
L03	Surface protection for low environmental stress C2	7/3
L04	Surface protection for average environmental stress C3	7/3
L05	Surface protection for very high environmental stress C5	7/3
L09	Primed according to corrosivity category C4 G	7/3
Surface treatment		
L11	Centering not painted	7/4
L12	Flange completely painted	7/4
L19	Special pretreatment	7/3
L20	Surface protection for high environmental stress C4	7/3
L27	Centering flange not painted on both sides	7/4
RAL colors		
L50	RAL 5015 sky blue	7/4
L51	RAL 7011 iron gray	7/4
L53	RAL 7031 blue gray	7/4
L54	RAL 7035 basalt gray	7/4
L55	RAL 7030 stone gray	7/4
L75	RAL 7016 anthracite gray	7/4
	Other colors on request	7/4
Insulating material class		
M08	Temperature class 180 (H)	6/8
N54	Increased air humidity/temperature with 30 to 60 g water per m ³ of air	6/8
Thermal motor protection		
M10	PTC thermistor for disconnection (PTC)	6/4
M11	PTC thermistor for warning and disconnection (PTC)	6/4
M12	Winding thermostat for disconnection (WT)	6/4
M13	Winding thermostat for warning and disconnection (WT)	6/4
Thermal motor protection		
M16	KTY 84-130 temperature sensor	6/5
M19	1x PT100 resistance thermometer	6/5
Fan		
M21	Metal fan	6/9
M22	High inertia fan	6/9
M23	Separately driven fan	6/10
Anti-condensation heating		
M40	Supply voltage 115 V	6/6
M41	Supply voltage 230 V	6/6
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M55 ... M70	Location and position of the terminal box	6/11

Appendix

Lists

List of order codes

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N01	HAN 10E motor plug (2 brackets) EMC	6/16
N04	HAN 10E motor plug (1 bracket)	6/16
N06	HAN 10E motor plug (1 bracket) EMC	6/16
N08	HAN K4/4 motor plug (1 bracket)	6/17
N09	HAN K4/4 motor plug (1 bracket) EMC	6/17
N10	HAN K4/4 motor plug (2 brackets)	6/17
N11	HAN K4/4 motor plug (2 brackets) EMC	6/17
N12	HAN Q8 motor plug (1 bracket) EMC	6/19
N13	HAN Q12 motor plug (1 bracket) EMC	6/23
N18	HAN 10E counterplug	6/16
N19	HAN K4/4 counterplug	6/17
Designs for special environmental conditions		
N41	Internal motor corrosion protection	6/54
N43	Increased protection against humidity and tropical climates	7/2
N46	Condensation drain hole	6/54
External grounding		
N53	External grounding	6/15
Motors prepared for encoder mounting		
N50	Prepared for encoder mounting	6/46
Pole number of the motor		
P00	2-pole	Chapter 4
P01	6-pole	Chapter 4
P02	8-pole	Chapter 4
Duty types		
P90	Duty type S3 - 75 %	6/2
P91	Duty type S1//Inv. Duty	6/2
P92	Duty type Inv. Duty	6/2
EnDAT gateways for absolute encoders		
Q01	Gateway EnDAT PROFINET	6/50
Q02	Gateway EnDAT PROFIBUS DP	6/50
Q03	Gateway EnDAT CANopen	6/50
Q04	Gateway EnDAT DeviceNET	6/50
Application terminal box for sensors		
Q75	Application terminal box	6/50
Incremental encoder IN		
Q44	Rotary pulse encoder 1XP8032-20 (IN 1024 TTL with coupling socket)	6/38
Q45	Rotary pulse encoder 1XP8032-21 (IN 2048 TTL with coupling socket)	6/38
Q46	Rotary pulse encoder 1XP8032-22 (IN 512 TTL with coupling socket)	6/38
Q47	Rotary pulse encoder 1XP8032-10 (IN 1024 HTL with coupling socket)	6/38
Q48	Rotary pulse encoder 1XP8032-11 (IN 2048 HTL with coupling socket)	6/38
Q49	Rotary pulse encoder 1XP8032-12 (IN 512 HTL with coupling socket)	6/38
Q50	Rotary pulse encoder 1XP8012-20 (IN 1024 TTL with flange socket)	6/37
Q51	Rotary pulse encoder 1XP8012-21 (IN 2048 TTL with flange socket)	6/37
Q52	Rotary pulse encoder 1XP8012-22 (IN 512 TTL with flange socket)	6/37
Q53	Rotary pulse encoder 1XP8012-10 (IN 1024 HTL with flange socket)	6/37
Q54	Rotary pulse encoder 1XP8012-11 (IN 2048 HTL with flange socket)	6/37
Q55	Rotary pulse encoder 1XP8012-12 (IN 512 HTL with flange socket)	6/37
Q56	Rotary pulse encoder 1XP8022-20 (IN 1024 TTL with cable box)	6/39
Q57	Rotary pulse encoder 1XP8022-21 (IN 2048 TTL with cable box)	6/39

Order code	Special version Designation	Detailed data Chapter/Page
Incremental encoder IN		
Q58	Rotary pulse encoder 1XP8022-22 (IN 512 TTL with cable box)	6/39
Q59	Rotary pulse encoder 1XP8022-10 (IN 1024 HTL with cable box)	6/39
Q60	Rotary pulse encoder 1XP8022-11 (IN 2048 HTL with cable box)	6/39
Q61	Rotary pulse encoder 1XP8022-12 (IN 512 HTL with cable box)	6/39
Modular set of cables for encoders 1XP8012, 1XP8032, 1XP8013, 1XP8023, 1XP8014 and 1XP8024		
Q62	Connector	6/48
Q69	Cable with connector and end sleeves, 2 m	6/48
Q70	Cable with connector and end sleeves, 8 m	6/48
Q71	Cable with connector and end sleeves, 15 m	6/48
Modular set of cables for encoders 1XP8012, 1XP8032, 1XP8013, 1XP8023, 1XP8014 and 1XP8024		
Q72	Cable with coupling socket, 2 m	6/49
Q73	Cable with coupling socket, 8 m	6/49
Q74	Cable with coupling socket, 15 m	6/49
Modular set of cables for encoder 1XP8022		
Q63	Cable with end sleeves, 2 m	6/48
Q64	Cable with end sleeves, 8 m	6/48
Q65	Cable with end sleeves, 15 m	6/48
Q66	Cable with coupling socket, 2 m	6/49
Q67	Cable with coupling socket, 8 m	6/49
Q68	Cable with coupling socket, 15 m	6/49
Absolute encoder IA		
Q79	Absolute encoder 1XP8024-21 (IA SSI protocol with coupling socket)	6/42
Q80	Absolute encoder 1XP8014-20 (IA SSI protocol with flange socket)	6/41
Q81	Absolute encoder 1XP8024-20 (IA SSI protocol cable with coupling socket)	6/41
Q82	Absolute encoder 1XP8014-10 (IA EnDAT protocol with flange socket)	6/41
Q83	Absolute encoder 1XP8024-10 (IA EnDAT protocol cable with coupling socket)	6/41
Resolver IR		
Q85	Resolver 1XP8013-10 (IR with flange socket)	6/40
Q86	Resolver 1XP8023-11 (IR cable with coupling socket)	6/40
Q87	Resolver 1XP8013-11 (IR with flange socket)	6/40
Q88	Resolver 1XP8023-10 (IR cable with coupling socket)	6/40
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Q92	Rotary pulse encoder LL 861 900 220	6/43
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Q94	Rotary pulse encoder HOG10 D 1024 I	6/44
Mechanical protection		
Q95	Encoder under cover	6/46
SINAMICS G110M		
U01 ... U23	Power Module	6/53
U40 ... U43	Control Unit with cable gland	6/53
U52 ... U53	Control Unit, plug-in version	6/53
U60	Internal braking resistor (FSA)	6/53
U61	Internal braking resistor (FSB)	6/53
U70	24 V DC power supply	6/53
Documentation		
W10	Acceptance test certificate EN 10204-3.1 for the motor	7/8
W11	Acceptance test certificate EN 10204-3.1 for gearboxes	7/8
W12	Acceptance test certificate EN 10204-3.1 for paint finish	7/8

Appendix

Lists

List of variables to dimension the drive

Overview of data to dimension drives

Code	Description	Unit
a	Gearbox constant for calculating the radial force	kNmm
α	Force application angle	°
b, d, l, y, z	Gearbox constants	mm
C	Additional factor to calculate the radial force	-
$\cos \varphi$	Power factor	-
d	Diameter of the input element	mm
d_0	Average diameter of the mounted transmission element	mm
DC	Cyclic duration factor	%
f	Rated frequency	Hz
F_{ax}	Permissible axial force	N
f_B	Service factor	-
f_{B1}	Required service factor	-
f_{br}	Braking torque correction factor	-
f_{Btot}	Service factor of the driven machine	-
f_{limit}	Limit frequency	Hz
F_r	Radial force at the output shaft	N
F_{R2}	Permissible radial force at the center of shaft extension (l/2)	N
f_{rated}	Rated motor frequency	Hz
F_{Ravail}	Available radial force from the mounted transmission element	N
F_x	Permissible radial force from out of center force application point	N
F_{xperm1}	Permissible radial force, limited by the bearing service life, at a distance of x from the shaft shoulder	N
F_{xperm2}	Permissible radial force, limited by the shaft strength, at a distance of x from the shaft shoulder	N
η	Efficiency	%
i	Transmission ratio	-
I_{rated}	Rated current	A
I_{St}	Starting current	A
J_2	Moment of inertia referred to the output speed of the gearbox	kgm ²
J_{AD}	Moment of inertia of the adapter	kgm ²
J_{add}	Additional moment of inertia, reduced to motor shaft	kgm ²
J_B	Moment of inertia of the brake	kgm ²
J_{Bstp}	Moment of inertia of cage and inner ring	kgm ²
J_G	Moment of inertia of the gearbox reduced to the input shaft	kgm ²
J_{mot}	Moment of inertia of the motor	kgm ²
J_X	Moment of inertia of the load, reduced to motor shaft	kgm ²
J_Z	Additional moment of inertia of the high inertia fan	kgm ²
k	Factor for taking into account operating conditions	-
k_{DC}	Factor for increased power	-
k_{FI}	Factor for taking into account the additional moment of inertia	-
k_{HT}	Factor for abnormal coolant temperature and installation altitude	-

Code	Description	Unit
k_M	Factor for taking into account the load torque while accelerating	-
k_P	Factor for taking into account the required power and duty cycle	-
L_{h10}	Nominal bearing service life	h
L_n	Service life of the brake lining until readjustment	h
L_{na}	Modified bearing service life	h
L_{nmax}	Service life of the brake lining until replacement	h
L_{pfA}	Measuring surface sound pressure level	dB (A)
L_{WA}	Sound power level	dB (A)
m	Drive weight without any oil	kg
m_{AF}	Mass acceleration factor	-
m_{fan}	Fan weight	kg
m_{mot}	Motor weight (without end shield at DE)	kg
m_{Bstp}	Weight of the backstop	kg
n_1	Input speed of the gearbox	rpm
n_2	Output speed of the gearbox	rpm
n_{dis}	Disengage speed	rpm
n_{br}	Braking speed	rpm
n_{max}	Maximum speed	rpm
n_{rated}	Rated speed	rpm
P_1	Actual steady-state power of the motor	kW
P_{DC}	Power for the new duty cycle	kW
P_{mot}	Motor power	kW
P_{perm}	Permissible motor power	kW
P_{rated}	Rated motor power	kW
P_{req}	Required input power	kW
P_S	Actual steady-state power of the motor	kW
Q_{perm}	Permissible operating energy	J
r	Radius of the output element	m
R_{ex}	Exact number of teeth ratio	-
s_{br}	Braking distance	m
s_{Gap}	Brake air gap	mm
s_{Gapmax}	Maximum brake air gap	mm
t_1	Application time of the brake	ms
t_2	Disconnection time	ms
t_3	Slipping time	ms
t_{11}	Response time	ms
t_{12}	Rise time	ms
t_{br}	Braking time	s
t_R	Duty cycle (decimal)	-
t_{sp}	Cycle duration	ms
T_2	Geared motor output torque	Nm
T_{2req}	Required output torque of the driven machine	Nm
T_{2N}	Maximum output torque of the gearbox	Nm

Overview of data to dimension drives (continued)

Code	Description	Unit
T_A	Acceleration torque of the motor	Nm
T_{Bk}	Breakdown torque	Nm
T_{br}	Rated braking torque	Nm
T_{DC}	Torque for the new duty cycle	Nm
T_{rated}	Rated motor torque	Nm
T_{req}	Required torque	Nm
T_{SP}	Rated backstop torque	Nm
T_{St}	Relative starting torque	Nm
T_x	Load torque, reduced to motor shaft	Nm
U	Rated voltage	V
v	Travel velocity	m/s
W	Friction energy per braking operation	J
W_{tot}	Friction energy until the brake lining is replaced	MJ
W_V	Friction energy until the brake is readjusted	MJ
x	Distance from the shaft shoulder up to the force application point	mm
Z	Switching frequency	1/h
Z_0	No-load switching frequency, motor without brake	1/h
Z_A	No-load switching frequency, motor with brake	1/h
Z_{perm}	Permissible switching frequency	1/h
ϑ_{amb}	Ambient temperature	°C

Appendix

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List of variables to dimension the drive

Important drive technology variables

SI unit Size	Symbol		Unit symbol		Designation or conversion factor*
	SI	Previously	SI	Previously	
Length (distance)	l	L, s	m	m	1 km = 1 000 m
Area	A	F	m ²	m ²	1 m ² = 100 dm ²
Volume	V	V	m ³	m ³	1 m ³ = 1 000 dm ³ 1 dm ³ = 1 l
Plane angle	α, β, γ	α, β, γ	rad	Degrees °	1 rad = 1 m/m 1 L = π/2 rad 1° = π/180 rad
Rotation angle	φ	φ		Degrees °	1' = 1°/60; 1'' = 1'/60
Time					1 min = 60 s 1 h = 60 min
Time period/duration	t	t	s	s	1 d = 24 h
Frequency	f	f	Hz	1/s	1 Hz = 1/s
Speed	n	n	rpm	rpm	Rotations per minute
Velocity	v	v	m/s	m/s	1 km/h = $\frac{1}{3.6}$ m/s
Acceleration	a	b	m/s ²	m/s ²	g = 9.81 m/s ²
Acceleration due to gravity	g	g			
Angular velocity	ω	Ω	rad/s	1/s	
Angular acceleration	α	ζ	rad/s ²	1/s ²	
Mass	m	m	kg	kg	1
Density		d	kg/dm ³	kg/dm ³	10 ³
Force	F	P, K	N	kp	9.81
Force due to weight	G	G			1 N = 1 kg · 1 m/s ²
Pressure	p	p	Pa N/m ²	kp/cm ²	1 Pa = 1 N/m ² 9.81 · 10 ⁴
Mechanical tension	σ	σ	N/mm ²	kp/mm ²	9.81
Work	W	A		kpm	9.81
Energy	W	E	J	kcal	4187
Quantity of heat	Q	Q			1 J = 1 Nm = 1 Ws
Torque of a force		M _t			9.81
Torque	T	M _d	Nm	kpm	1 Nm = 1 J
Bending torque		M _b			
Power	P	N	W	PS	735.5 1 W = 1 J/s = 1 Nm/s = $\frac{\text{kgm}^2}{\text{s}^3}$
Moment of inertia	J	θ	kgm ²	kpm ²	9.81

* The numerical value of a variable in previously used units multiplied by the conversion rate gives the numerical value of the variable in SI units.

Conversion from kW to hp:

$$1 \text{ kW} = 1.34102 \text{ hp}$$

$$1 \text{ hp} = 0.745700 \text{ kW}$$

$$1 \text{ hp} = 1.01387 \text{ PS}$$

hp = horse power (US)

PS = Pferdestärke (horse power in German)

List of variables to dimension the drive

Important drive technology variables (continued)

SI unit Size	Symbol		Unit symbol		Designation or conversion factor [*])
	SI	Previously	SI	Previously	
Dynamic viscosity	η	η	Pa · s	P	10^{-1}
Kinematic viscosity	ν	ν	m ² /s	St	10^{-4}
Electrical current	I	I	A	A	1 A = 1 W/V = 1 V/Ω
Electrical voltage	U	U	V	V	1 V = 1 W/A
Electrical resistance	R	R	Ω	Ω	1 Ω = 1 V/A = 1/S
Electrical conductance	G	G	S	S	1 S = 1/Ω
Electrical capacitance	C	C	F	F	1 F = 1 C/V
Electric charge	Q	Q	C	C	1 C = 1 A · s
Inductance	L	L	H	H	1 H = 1 Vs/A
Magnetic flux density Induction	B	B	T	G	10^4 1 T = 1 Wb/m ²
Magnetic field strength	H	H	A/m	A/m	
Magnetic flux	ϕ	ϕ	Wb	M	10^8 1 Wb = 1 V · s
Temperature	T(θ)	t	K(°C)	°C	0 K = -273.15 °C

* The numerical value of a variable in previously used units multiplied by the conversion rate gives the numerical value of the variable in SI units.

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List of abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
AC	Alternating Current, three-phase	NAT	Rated response temperature
CAD	Computer-Aided Design	NDE	Non-drive end
CCC	China Compulsory Certification	NEE	NEMA Energy Efficient
CEL	China Energy Label	NN	Sea level
CEMEP	Comité Européen de Constructeurs de Machines Électriques et d'Électronique de Puissance (European sector committee of manufacturers of electrical machines)	NPT	National Pipe Thread
CONT	Continuous duty	PAO	Polyalphaolefine
CQC	China Quality Certification Center	PE	Protective Earth, grounding
CSA	Canadian Standards Association	PG	Polyglycol
CT	Coolant temperature	PTC	Positive Temperature Coefficient
DC	Direct Current	SSI	Simple Sensor Interface
DC	Duty cycle	SW	Width across flats
DE	Drive end	TIA	Totally Integrated Automation
DIN	Deutsches Institut für Normen e. V. (German Institute for Standardization)	TIP	Totally Integrated Power
DT-C	Drive Technology Configurator	TTL	Transistor Transistor Logic
EAC	Eurasian conformity	UL-R	Underwriters Laboratories Inc. - Recognition Mark
EBPG	Energy-related products directive	VDE	Verband der Elektrotechnik Elektronik Informationstechnik e. V. (Association of Electrical Engineering, Electronics and Information Technology)
EC	European Community	VDI	Verein Deutscher Ingenieure (Association of German Engineers)
EFF	Efficiency	WGK	Class, signifying risk of water pollution
EGE	Europäische Größeneinheit (European Size Unit (ESU))		
EISA	Energy Independence and Security Act		
EMC	Electromagnetic compatibility		
EN	European standard		
EPAct	Energy Policy Act		
EU	European Union		
EuP	Energy Using Products		
FVA	Forschungsvereinigung Antriebstechnik e. V. (Research Association for Drive Technology)		
HF	High frequency		
HTL	High Transistor Logic		
IA	Installation altitude		
IDS	Integrated Drive System		
IE	International Efficiency		
IEC	International Electrotechnical Commission		
IP	International Protection		
ISO	International Organization for Standardization		
MODULOG	Modular logistically optimized design (motor)		



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We offer a total of about 300 classroom-based courses. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You can find which course is offered at which location at:

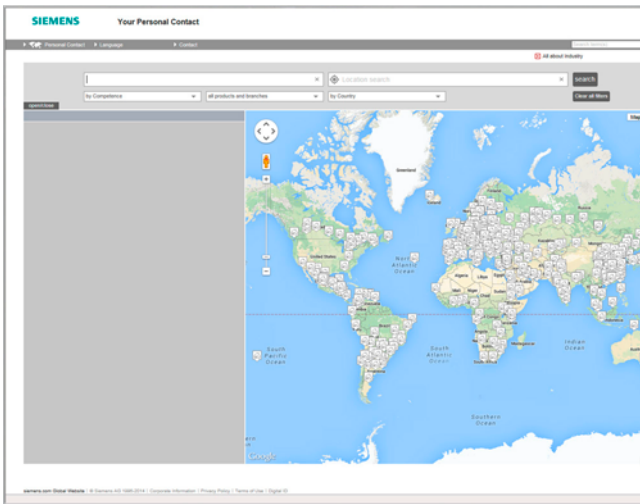
www.siemens.com/sitrain

Skills development

Do you want to develop skills and fill in gaps in your knowledge? Our solution: We will provide a program tailored exactly to your personal requirements. After an individual requirements analysis, we will train you in our training centers near you or directly at your offices. You will practice on the most modern training equipment with special exercise units. The individual training courses are optimally matched to each other and help with the continuous development of knowledge and skills. After finishing a training module, the follow-up measures make success certain, as well as the refreshment and deepening of the knowledge gained.

Appendix

Partners at Siemens



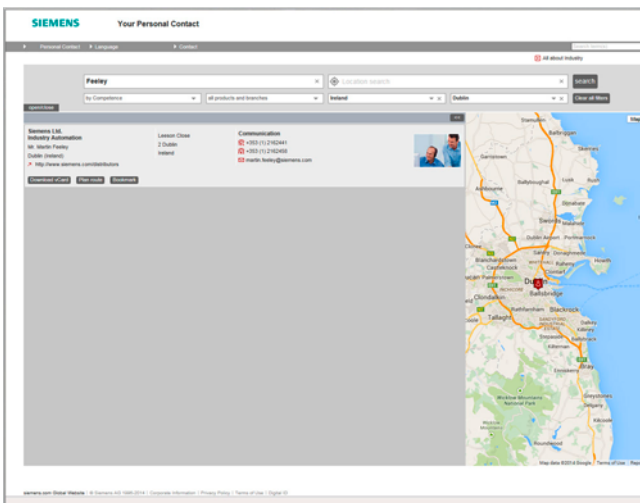
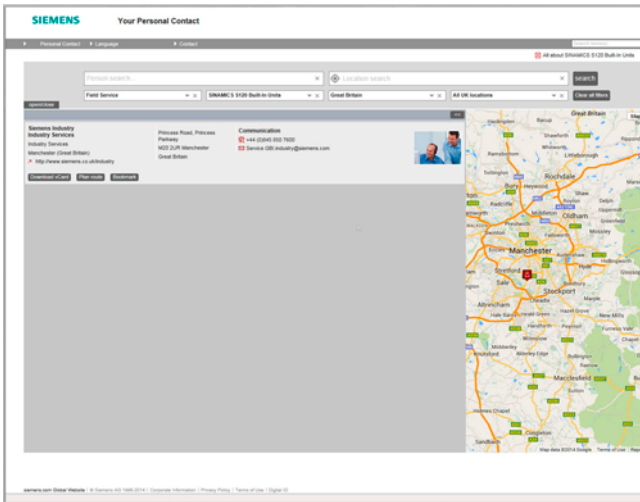
At Siemens we are resolutely pursuing the same goal: long-term improvement of your competitive ability. We are committed to this goal. Thanks to our commitment, we continue to set new standards in automation and drive technology. In all industries – worldwide.

At your service locally, around the globe for consulting, sales, training, service, support, spare parts on the entire portfolio of Digital Factory and Process Industries and Drives.

Your personal contact can be found in our Contacts Database at: www.siemens.com/automation-contact

You start by selecting

- the required competence,
 - products and branches,
 - a country,
 - a city
- or by a
- location search or
 - person search.



Information and Ordering Options on the Internet and DVD

The Future of Manufacturing on the Internet



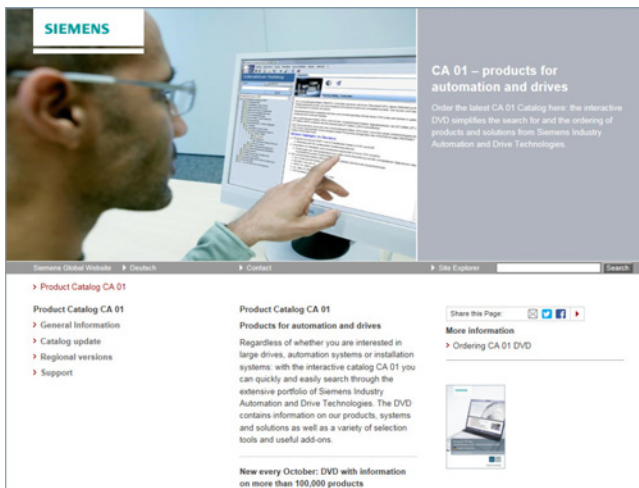
Detailed knowledge of the range of products and services available is essential when planning and engineering automation systems. It goes without saying that this information must always be as up-to-date as possible.

Industry is on the threshold of the fourth industrial revolution as digitization now follows after the automation of production. The goals are to increase productivity and efficiency, speed, and quality. In this way, companies can remain competitive on the path to the future of industry.

You will find everything you need to know about products, systems and services on the internet at:

www.siemens.com/industry

Product Selection Using the Interactive CA 01 Automation and Drives Catalog



Detailed information together with user-friendly interactive functions:

The CA 01 interactive catalog covers more than 100,000 products, thus providing a comprehensive overview of the product range provided by Siemens.

You will find everything you need here for solving tasks in the fields of automation, switching, installation and drives. All information is provided over a user interface that is both user-friendly and intuitive.

You can order the CA 01 product catalog from your Siemens sales contact or in the Information and Download Center:

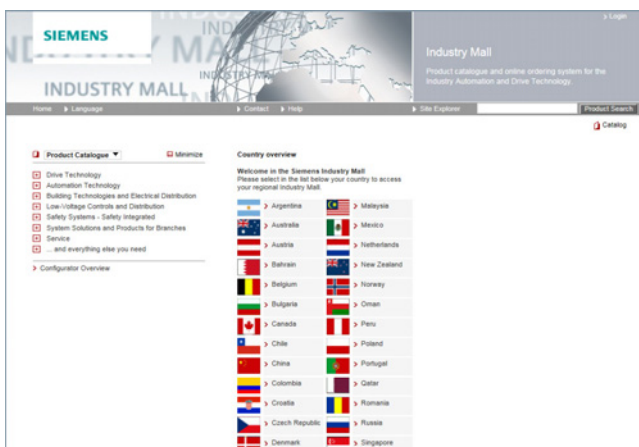
www.siemens.com/industry/infocenter

Information about the CA 01 interactive catalog can be found on the Internet at:

www.siemens.com/automation/ca01

or on DVD.

Easy Shopping with the Industry Mall



The Industry Mall is the electronic ordering platform of Siemens AG on the Internet. Here you have online access to a huge range of products presented in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure, from selection through ordering to tracking and tracing, to be carried out online. Availability checks, customer-specific discounts and bid creation are also possible.

Numerous additional functions are provided for your support. For example, powerful search functions make it easy to select the required products. Configurators enable you to configure complex product and system components quickly and easily. CAx data types are also provided here.

You can find the Industry Mall on the Internet at:

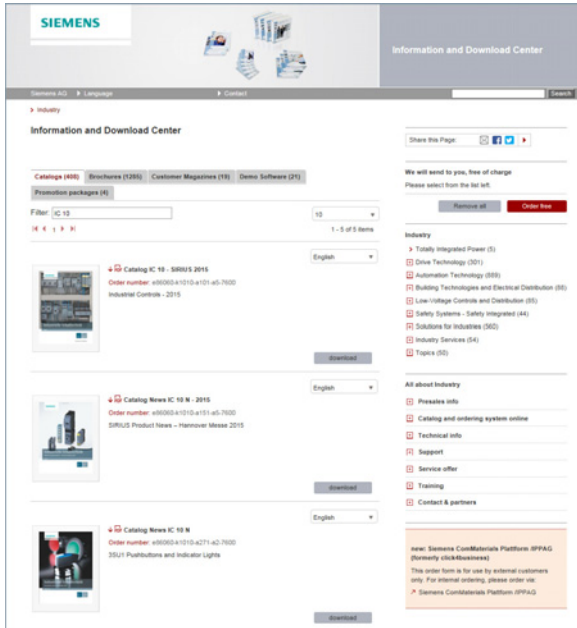
www.siemens.com/industrymall

Appendix

Online Services

Information and Download Center, Social Media, Mobile Media

Downloading Catalogs



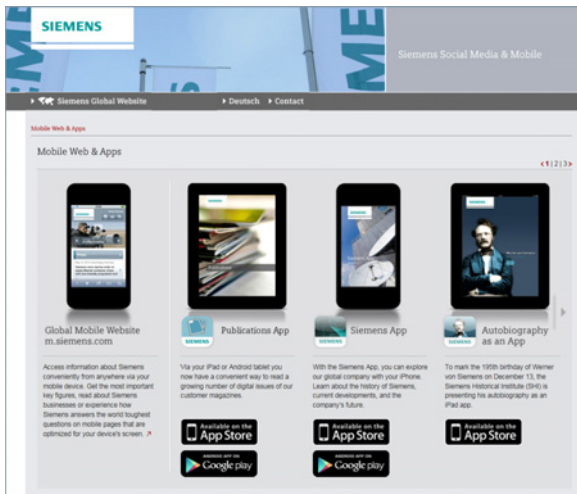
In addition to numerous other useful documents, you can also find the catalogs listed on the back inside cover of this catalog in the Information and Download Center. You can download these catalogs in PDF format without having to register.

The filter dialog above the first catalog displayed makes it possible to carry out targeted searches. If you enter "MD 3" for example, you will find both the MD 30.1 and MD 31.1 catalogs. If you enter "IC 10", both the IC 10 catalog and the associated news or add-ons are displayed.

Visit us at:

www.siemens.com/industry/infocenter

Social and Mobile Media



Connect with Siemens through social media: visit our social networking sites for a wealth of useful information, demos on products and services, the opportunity to provide feedback, to exchange information and ideas with customers and other Siemens employees, and much, much more. Stay in the know and follow us on the ever-expanding global network of social media.

To find out more about Siemens' current social media activities, visit us at:

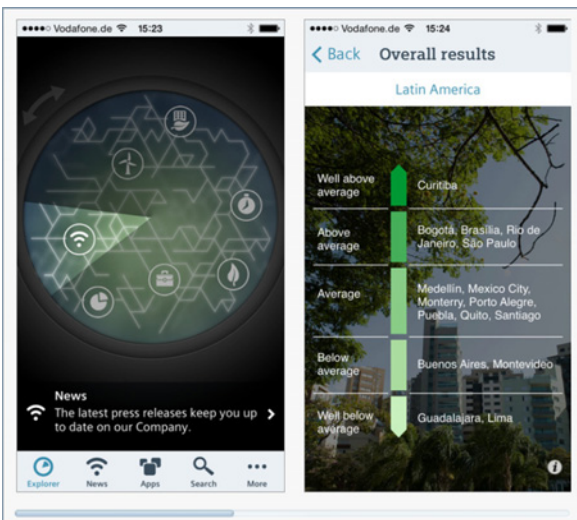
www.siemens.com/socialmedia

Or via our product pages at:

www.siemens.com/automation or www.siemens.com/drives

Connect with Siemens Industry at our central access point to read all the news on the future of manufacturing, watch current videos and inform yourself about all the latest industry developments:

www.siemens.com/future-of-manufacturing



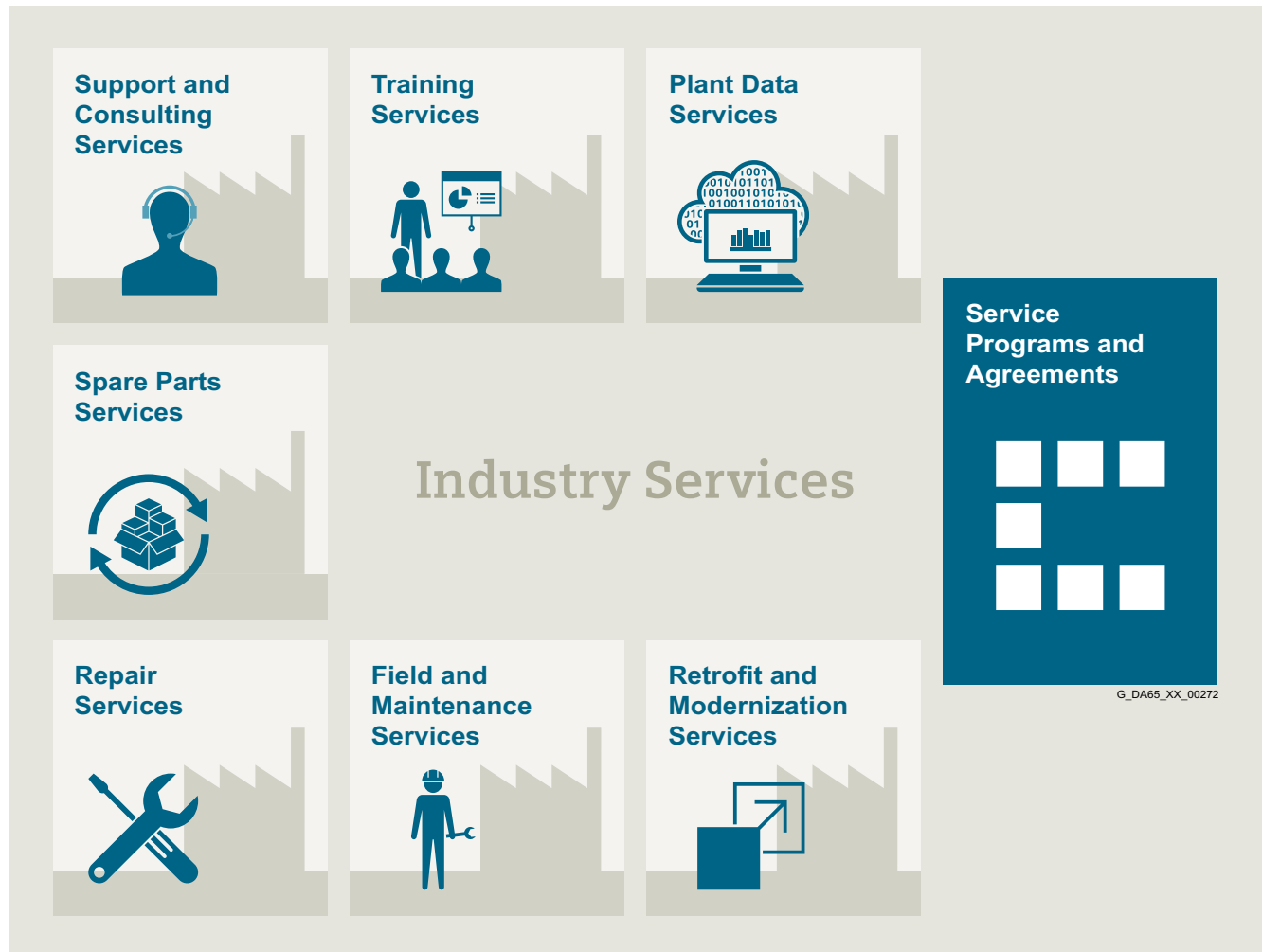
Discover the world of Siemens.

We are also constantly expanding our offering of cross-platform apps for smartphones and tablets. You will find the current Siemens apps at the App Store (iOS) or at Google Play (Android):

<https://itunes.apple.com/en/app/siemens/id452698392?mt=8>

<https://play.google.com/store/search?q=siemens>

The Siemens app, for example, tells you all about the history, latest developments and future plans of the company – with informative pictures, fascinating reports and the most recent press releases.

Overview
Unleash potential – with services from Siemens

Increase your performance – with Industry Services

Optimizing the productivity of your equipment and operations can be a challenge, especially with constantly changing market conditions. Working with our service experts makes it easier. We understand your industry's unique processes and provide the services needed so that you can better achieve your business goals.

You can count on us to maximize your uptime and minimize your downtime, increasing your operations' productivity and reliability. When your operations have to be changed quickly to meet a new demand or business opportunity, our services give you the flexibility to adapt. Of course, we take care that your production is protected against cyber threats. We assist in keeping your operations as energy and resource efficient as possible and reducing your total cost of ownership. As a trendsetter, we ensure that you can capitalize on the opportunities of digitalization and by applying data analytics to enhance decision making: You can be sure that your plant reaches its full potential and retains this over the longer lifespan.

You can rely on our highly dedicated team of engineers, technicians and specialists to deliver the services you need – safely, professionally and in compliance with all regulations. We are there for you, where you need us, when you need us.

Appendix

Industry Services

Industry Services – Portfolio overview

Overview

Plant Data Services



Make your industrial processes transparent to gain improvements in productivity, asset availability, and energy efficiency.

Production data is generated, filtered and translated with intelligent analytics to enhance decision-making.

This is done whilst taking data security into consideration and with continuous protection against cyber attack threats.

www.industry.siemens.com/services/global/en/portfolio/plant-data-services/Pages/index.aspx

Support and Consulting Services



Industry Online Support site for comprehensive information, application examples, FAQs and support requests.

Technical and Engineering Support for advice and answers for all inquiries about functionality, handling, and fault clearance.

Information & Consulting Services, e.g. SIMATIC System Audit; clarity about the state and service capability of your automation system or Lifecycle Information Services; transparency on the lifecycle of the products in your plants.

www.industry.siemens.com/services/global/en/portfolio/support-consulting/Pages/index.aspx

Training Services



From the basics and advanced to specialist skills, SITRAIN courses provide expertise right from the manufacturer – and encompass the entire spectrum of Siemens products and systems for the industry.

Worldwide, SITRAIN courses are available wherever you need a training course in more than 170 locations in over 60 countries.

www.industry.siemens.com/services/global/en/portfolio/training/Pages/index.aspx

Spare Parts Services



Are available worldwide for smooth and fast supply of spare parts – and thus optimal plant availability. Genuine spare parts are available for up to ten years. Logistic experts take care of procurement, transport, custom clearance, storage and order management. Reliable logistics processes ensure that components reach their destination as needed.

Asset optimization services help you design a strategy for parts supply where your investment and carrying costs are reduced and the risk of obsolescence is avoided.

www.industry.siemens.com/services/global/en/portfolio/spare_parts/Pages/index.aspx

Overview (continued)

Repair Services



Are offered on-site and in regional repair centers for fast restoration of faulty devices' functionality.

Also available are extended repair services, which include additional diagnostic and repair measures, as well as emergency services.

www.industry.siemens.com/services/global/en/portfolio/repair_services/Pages/index.aspx

Retrofit and Modernization Services

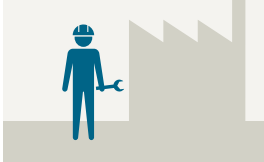


Provide a cost-effective solution for the expansion of entire plants, optimization of systems or upgrading existing products to the latest technology and software, e.g. migration services for automation systems.

Service experts support projects from planning through commissioning and, if desired over the entire extended lifespan, e.g. Retrofit for Integrated Drive Systems for an extended lifetime of your machines and plants

www.industry.siemens.com/services/global/en/portfolio/retrofit-modernization/Pages/index.aspx

Field and Maintenance Services



Siemens specialists are available globally to provide expert field and maintenance services, including commissioning, functional testing, preventive maintenance and fault clearance. All services can be included in customized service agreements with defined reaction times or fixed maintenance intervals.

www.industry.siemens.com/services/global/en/portfolio/field_service/Pages/index.aspx

Service Programs and Agreements



A technical Service Program or Agreement enables you to easily bundle a wide range of services into a single annual or multi-year agreement.

You pick the services you need to match your unique requirements or fill gaps in your organization's maintenance capabilities.

Programs and agreements can be customized as KPI-based and/or performance-based contracts.

www.industry.siemens.com/services/global/en/portfolio/service_programs/Pages/index.aspx

Appendix

Industry Services

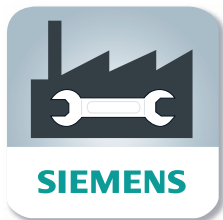
Online Support

Overview



Online Support is a comprehensive information system for all questions relating to products, systems, and solutions that Siemens has developed for industry over time. With more than 300,000 documents, examples and tools, it offers users of automation and drive technology a way to quickly find up-to-date information. The 24-hour service enables direct, central access to detailed product information as well as numerous solution examples for programming, configuration and application.

Online Support App



Using the Online Support app, you can access over 300,000 documents covering all Siemens industrial products – anywhere, any time. Regardless of whether you need help implementing your project, fault-finding, expanding your system or are planning a new machine.

You have access to FAQs, manuals, certificates, characteristic curves, application examples, product notices (e.g. announcements of new products) and information on successor products in the event that a product is discontinued.

Just scan the product code printed on the product directly using the camera of your mobile device to immediately see all technical information available on this product at a glance. The graphical CAx information (3D model, circuit diagrams or EPLAN macros) is also displayed. You can forward this information to your workplace using the e-mail function.

The search function retrieves product information and articles and supports you with a personalized suggestion list. You can find your favorite pages – articles you need frequently – under “mySupport”. You also receive selected news on new functions, important articles or events in the News section.

The content, in six languages, is increasingly multimedia-based – and now also available as a mobile app. Online support’s “Technical Forum” offers users the opportunity to share information with each other. The “Support Request” option can be used to contact Siemens’ technical support experts. The latest content, software updates, and news via newsletters and Twitter ensure that industry users are always up to date.

www.siemens.com/industry/onlinesupport

Scan the QR code
for information on
our Online Support
app.



The app is available free of charge from the Apple App Store (iOS) or from Google Play (Android).

<https://support.industry.siemens.com/cs/ww/en/sc/2067>

Conversion tables

Rotary inertia (to convert from A to B, multiply by entry in table)

A	B	lb-in ²	lb-ft ²	lb-in-s ²	lb-ft-s ² slug-ft ²	kg-cm ²	kg-cm-s ²	gm-cm ²	gm-cm-s ²	oz-in ²	oz-in-s ²
lb-in ²	1		6.94×10^{-3}	2.59×10^{-3}	2.15×10^{-4}	2.926	2.98×10^{-3}	2.92×10^3	2.984	16	4.14×10^{-2}
lb-ft ²	144	1		0.3729	3.10×10^{-2}	421.40	0.4297	4.21×10^5	429.71	2304	5.967
lb-in-s ²	386.08	2.681	1		8.33×10^{-2}	1.129×10^3	1.152	1.129×10^6	1.152×10^3	6.177×10^3	16
lb-ft-s ² slug-ft ²	4.63×10^3	32.17	12	1		1.35×10^4	13.825	1.355×10^7	1.38×10^4	7.41×10^4	192
kg-cm ²	0.3417	2.37×10^{-3}	8.85×10^{-4}	7.37×10^{-5}	1		1.019×10^{-3}	1000	1.019	5.46	1.41×10^{-2}
kg-cm-s ²	335.1	2.327	0.8679	7.23×10^{-2}	980.66	1		9.8×10^5	1000	5.36×10^3	13.887
gm-cm ²	3.417×10^{-4}	2.37×10^{-6}	8.85×10^{-7}	7.37×10^{-8}	1×10^{-3}		1.01×10^{-6}	1	1.01×10^{-3}	5.46×10^{-3}	1.41×10^{-5}
gm-cm-s ²	0.335	2.32×10^{-3}	8.67×10^{-4}	7.23×10^{-5}	0.9806	1×10^{-3}		980.6	1	5.36	1.38×10^{-2}
oz-in ²	0.0625	4.34×10^{-4}	1.61×10^{-4}	1.34×10^{-5}	0.182	1.86×10^{-4}		182.9	0.186	1	2.59×10^{-3}
oz-in-s ²	24.13	0.1675	6.25×10^{-2}	5.20×10^{-3}	70.615	7.20×10^{-2}		7.09×10^4	72.0	386.08	1

Torque (to convert from A to B, multiply by entry in table)

A	B	lb-in	lb-ft	oz-in	N-m	kg-cm	kg-m	gm-cm	dyne-cm
lb-in	1		8.333×10^{-2}	16	0.113	1.152	1.152×10^{-2}	1.152×10^3	1.129×10^6
lb-ft	12	1		192	1.355	13.825	0.138	1.382×10^4	1.355×10^7
oz-in	6.25×10^{-2}	5.208×10^{-3}	1		7.061×10^{-3}	7.200×10^{-2}	7.200×10^{-4}	72.007	7.061×10^4
N-m	8.850	0.737	141.612	1		10.197	0.102	1.019×10^4	1×10^7
kg-cm	0.8679	7.233×10^{-2}	13.877	9.806×10^{-2}	1		10^{-2}	1000	9.806×10^5
kg-m	86.796	7.233	1.388×10^3	9.806	100	1		1×10^5	9.806×10^7
gm-cm	8.679×10^{-4}	7.233×10^{-5}	1.388×10^{-2}	9.806×10^{-5}	1×10^{-3}	1×10^{-5}		1	980.665
dyne-cm	8.850×10^{-7}	7.375×10^{-8}	1.416×10^{-5}	10^{-7}	1.0197×10^{-6}	1.019×10^{-8}		1.019×10^{-3}	1

Length (to convert from A to B, multiply by entry in table)

A	B	inches	feet	cm	yd	mm	m
inches	1		0.0833	2.54	0.028	25.4	0.0254
feet	12	1		30.48	0.333	304.8	0.3048
cm	0.3937	0.03281	1		1.09×10^{-2}	10	0.01
yd	36	3	91.44	1		914.4	0.914
mm	0.03937	0.00328	0.1	1.09×10^{-3}	1		0.001
m	39.37	3.281	100	1.09	1000	1	

Force (to convert from A to B, multiply by entry in table)

A	B	lb	oz	gm	dyne	N
lb	1		16	453.6	4.448×10^5	4.4482
oz	0.0625	1		28.35	2.780×10^4	0.27801
gm	2.205×10^{-3}	0.03527	1		1.02×10^{-3}	N.A.
dyne	2.248×10^{-6}	3.59×10^{-5}	980.7	1		0.00001
N	0.22481	3.5967	N.A.	100000	1	

Mass (to convert from A to B, multiply by entry in table)

A	B	lb	oz	gm	kg	slug
lb	1		16	453.6	0.4536	0.0311
oz	6.25×10^{-2}	1		28.35	0.02835	1.93×10^{-3}
gm	2.205×10^{-3}	3.527×10^{-2}	1		10^{-3}	6.852×10^{-5}
kg	2.205	35.27	10^3	1		6.852×10^{-2}
slug	32.17	514.8	1.459×10^4	14.59	1	

Rotation (to convert from A to B, multiply by entry in table)

A	B	rpm	rad/s	degrees/s
rpm	1		0.105	6.0
rad/s	9.55	1		57.30
degrees/s	0.167	1.745×10^{-2}	1	

Power (to convert from A to B, multiply by entry in table)

A	B	hp	Watts
hp (English)	1		745.7
(lb-in) (deg./s)	2.645×10^{-6}		1.972×10^{-3}
(lb-in) (rpm)	1.587×10^{-5}		1.183×10^{-2}
(lb-ft) (deg./s)	3.173×10^{-5}		2.366×10^{-2}
(lb-ft) (rpm)	1.904×10^{-4}		0.1420
Watts	1.341×10^{-3}	1	

Appendix

Conversion tables

Temperature Conversion

°F	°C	°C	°F
0	-17.8	-10	14
32	0	0	32
50	10	10	50
70	21.1	20	68
90	32.2	30	86
98.4	37	37	98.4
212	100	100	212
subtract 32 and multiply by $\frac{5}{9}$		multiply by $\frac{9}{5}$ and add 32	

Mechanism Efficiencies

Acme-screw with brass nut	~0.35–0.65
Acme-screw with plastic nut	~0.50–0.85
Ball-screw	~0.85–0.95
Chain and sprocket	~0.95–0.98
Preloaded ball-screw	~0.75–0.85
Spur or bevel-gears	~0.90
Timing belts	~0.96–0.98
Worm gears	~0.45–0.85
Helical gear (1 reduction)	~0.92

Friction Coefficients

Materials	μ
Steel on steel (greased)	~0.15
Plastic on steel	~0.15–0.25
Copper on steel	~0.30
Brass on steel	~0.35
Aluminum on steel	~0.45
Steel on steel	~0.58
Mechanism	μ
Ball bushings	<0.001
Linear bearings	<0.001
Dove-tail slides	~0.2++
Gibb ways	~0.5++

Material Densities

Material	lb-in ³	gm-cm ³
Aluminum	0.096	2.66
Brass	0.299	8.30
Bronze	0.295	8.17
Copper	0.322	8.91
Hard wood	0.029	0.80
Soft wood	0.018	0.48
Plastic	0.040	1.11
Glass	0.079–0.090	2.2–2.5
Titanium	0.163	4.51
Paper	0.025–0.043	0.7–1.2
Polyvinyl chloride	0.047–0.050	1.3–1.4
Rubber	0.033–0.036	0.92–0.99
Silicone rubber, without filler	0.043	1.2
Cast iron, gray	0.274	7.6
Steel	0.280	7.75

Wire Gauges¹⁾

Cross-section mm ²	Standard Wire Gauge (SWG)	American Wire Gauge (AWG)
0.2	25	24
0.3	23	22
0.5	21	20
0.75	20	19
1.0	19	18
1.5	17	16
2.5	15	13
4	13	11
6	12	9
10	9	7
16	7	6
25	5	3
35	3	2
50	0	1/0
70	000	2/0
95	00000	3/0
120	0000000	4/0
150	–	6/0
185	–	7/0

¹⁾ The table shows approximate SWG/AWG sizes nearest to standard metric sizes; the cross-sections do not match exactly.

Appendix

Conditions of sale and delivery

1. General Provisions

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following Terms and Conditions of Sale and Delivery (hereinafter referred to as "T&C"). Please note that the scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following T&C apply exclusively for orders placed with Siemens Aktiengesellschaft, Germany.

1.1 For customers with a seat or registered office in Germany

For customers with a seat or registered office in Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office in Germany"¹⁾ and,
- for other supplies and services, the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry"¹⁾.

1.2 For customers with a seat or registered office outside Germany

For customers with a seat or registered office outside Germany, the following applies subordinate to the T&C:

- the "General Terms of Payment"¹⁾ and,
- for software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or Registered Office outside of Germany"¹⁾ and
- for other supplies and/or services, the "General Conditions for Supplies of Siemens Industry for Customers with a Seat or Registered Office outside of Germany"¹⁾.

2. Prices

The prices are in € (Euro) ex point of delivery, exclusive of packaging.

The sales tax (value added tax) is not included in the prices. It shall be charged separately at the respective rate according to the applicable statutory legal regulations.

Prices are subject to change without prior notice. We will charge the prices valid at the time of delivery.

To compensate for variations in the price of raw materials (e.g. silver, copper, aluminum, lead, gold, dysprosium and neodym), surcharges are calculated on a daily basis using the so-called metal factor for products containing these raw materials. A surcharge for the respective raw material is calculated as a supplement to the price of a product if the basic official price of the raw material in question is exceeded.

The metal factor of a product indicates the basic official price (for those raw materials concerned) as of which the surcharges on the price of the product are applied, and with what method of calculation.

An exact explanation of the metal factor can be downloaded at:

www.siemens.com/automation/salesmaterial-as/catalog/en/terms_of_trade_en.pdf

To calculate the surcharge (except in the cases of dysprosium and neodym), the official price from the day prior to that on which the order was received or the release order was effected is used.

To calculate the surcharge applicable to dysprosium and neodym ("rare earths"), the corresponding three-month basic average price in the quarter prior to that in which the order was received or the release order was effected is used with a one-month buffer (details on the calculation can be found in the explanation of the metal factor).

3. Additional Terms and Conditions

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches apply only to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the individual pages of this catalog - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

4. Export regulations

We shall not be obligated to fulfill any agreement if such fulfillment is prevented by any impediments arising out of national or international foreign trade or customs requirements or any embargoes and/or other sanctions.

Export of goods listed in this catalog may be subject to licensing requirements. We will indicate in the delivery details whether licenses are required under German, European and US export lists. Goods labeled with "AL" not equal to "N" are subject to European or German export authorization when being exported out of the EU. Goods labeled with "ECCN" not equal to "N" are subject to US re-export authorization.

The export indications can be viewed in advance in the description of the respective goods on the Industry Mall, our online catalog system. Only the export labels "AL" and "ECCN" indicated on order confirmations, delivery notes and invoices are authoritative.

Even without a label, or with label "AL:N" or "ECCN:N", authorization may be required i .a. due to the final disposition and intended use of goods.

If you transfer goods (hardware and/or software and/or technology as well as corresponding documentation, regardless of the mode of provision) delivered by us or works and services (including all kinds of technical support) performed by us to a third party worldwide, you must comply with all applicable national and international (re-)export control regulations.

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