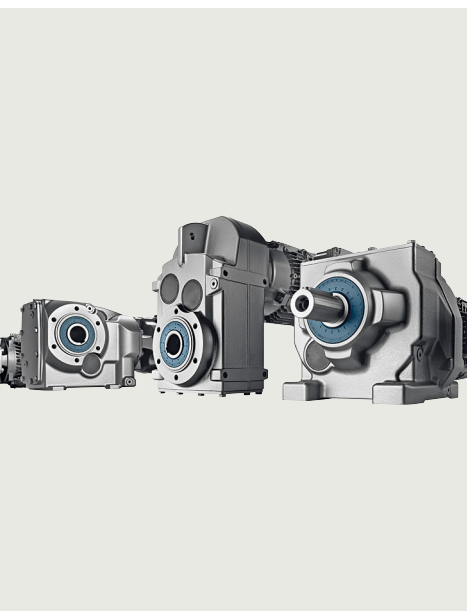


Introduction



1/2	Orientation
	<u>Geared motors</u>
1/2	Overview
1/4	Benefits
1/7	Integration
1/8	Configuration
1/9	Guidelines for selection and ordering
1/9	Article No. code
1/11	Type designation
1/13	Designs
	<u>Notes on selection tables</u>
1/19	Structure of the tables for geared motors up to 55 kW
1/19	Structure of the tables for transmission ratios and torques
1/20	Structure of the tables for efficiencies for helical worm geared motors
1/20	Structure of the tables for motors
	<u>Notes on the dimensional drawings</u>
1/24	Overview
1/25	General technical specifications
	<u>Geared motors for use worldwide</u>
1/25	Overview
1/26	Converter World Motor
1/27	Motors for the North American market
1/27	Motors for the Chinese market
1/27	Motors for the Eurasian Customs Union
1/27	Motors for the Indian market
1/26	Without CE, UKCA marking for export
	<u>EU directives</u>
1/28	WEEE directive
1/28	European RoHS directive
1/28	<u>Explosion protection according to ATEX</u>
1/28	Overview
	<u>General information regarding efficiency in accordance with International Efficiency</u>
1/29	Efficiency classes for converter operation according to IEC 60034-30-2
1/29	Efficiency classes and efficiencies according to IEC 60034-30-1
	<u>Noise</u>
1/31	Geared motor noise
1/31	Motor noise in line operation
	<u>Direction of rotation</u>
1/31	Overview

Introduction

Orientation

Geared motors

Overview

SIMOGEAR is the new generation of geared motors from Siemens. SIMOGEAR gearboxes are available as helical, parallel shaft, bevel, helical worm, and worm geared motors.

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

SIMOGEAR geared motors listed in this catalog are dimensioned up to a motor power of 55 kW. When an adapter is mounted, a motor power of up to 200 kW is possible.

[More information about gearboxes with adapter mounting is provided in Catalog D 50.11 as well as SiePortal.](#)

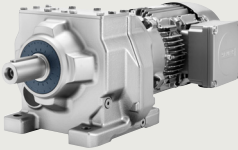
Gearbox type	Gearbox designation	Number of sizes	Maximum output torque T_{2N} Nm	Transmission ratio i –	Maximum motor power ¹⁾ P_1 kW	Supported motors
Helical geared motors						
	Z19 ... Z189 (2-stage)	13	100 ... 19000	3.4 ... 62.48	200	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors
	D19 ... D189 (3-stage)	13	100 ... 19000	36 ... 328	200	
	Cooling tower geared motors ZK89 ... ZK189	6	1060 ... 19000	3.85 ... 62.48	200	

Fig. 1/1 Helical geared motor Z/D

	E39 ... E149 (1-stage)	7	30 ... 1490	1.29 ... 9.79	90	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors
	Cooling tower geared motors EK89 ... EK149	4	280 ... 1490	1.3 ... 9.79	90	

Fig. 1/2 Helical geared motor E

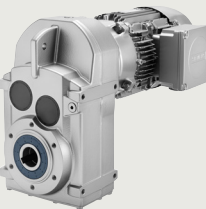
Parallel shaft geared motors						
	FZ29 ... FZ189 (2-stage)	11	150 ... 19000	3.5 ... 70.74	200	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors
	FD29 ... FD189 (3-stage)	11	150 ... 19000	32 ... 413	200	

Fig. 1/3 Parallel shaft geared motor FD/FZ

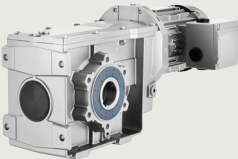
Bevel geared motors						
	B19 ... B49 (2-stage)	4	50 ... 450	3.5 ... 59	7.5	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors

Fig. 1/4 Bevel geared motor B

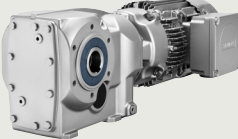
	K39 ... K189 (3-stage)	10	150 ... 19500	5.17 ... 244	200	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors

Fig. 1/5 Bevel geared motor K

¹⁾ With 4-pole motor up to 55 kW for a 50 Hz line frequency in integral type of construction. An adapter must be mounted for a motor power > 55 kW.

Overview

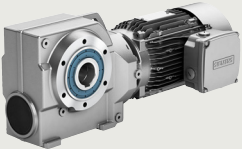
Gearbox type	Gearbox designation	Number of sizes	Maximum output torque T_{2N} Nm	Transmission ratio i –	Maximum motor power ¹⁾ P_1 kW	Supported motors
Helical worm geared motors						
	C29 ... C89 (2-stage)	5	61 ... 1450	6.48 ... 363	7.5	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors

Fig. 1/6 Helical worm geared motor C

Worm geared motors

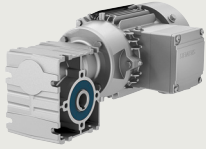
	S09 ... S29 (1-stage)	3	33 ... 116	5.0 ... 100	0.37	• Induction motors with B14 flange
---	-----------------------	---	------------	-------------	------	--

Fig. 1/7 Worm geared motor S

Electric-monorail geared motors EHB

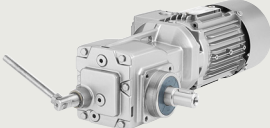
	BH29 ... BH.39	2	90 ... 200	7.32 ... 60.21	3	• Converter World Motor • Induction motors • Synchronous reluctance motors
--	----------------	---	------------	----------------	---	--

Fig. 1/8 Electric-monorail geared motors for light-load applications

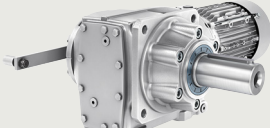
	KHF49 ... KHF79	3	420 ... 820	10.27 ... 244.25	7.5	• Converter World Motor • Induction motors • Synchronous reluctance motors
---	-----------------	---	-------------	------------------	-----	--

Fig. 1/9 Electric-monorail geared motors for heavy-load applications

Tandem geared motors

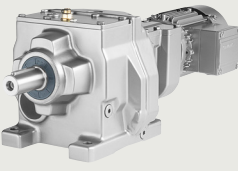
	Z.29-Z19 ... D.189-D69 (4 to 6-stage)	12	140 ... 19000	325 ... 27816	7.5	• Converter World Motor • Induction motors • Synchronous reluctance motors • VSD10 line motors • Explosion-protected motors
	FZ.29-Z19 ... FD.189-D69 (4 to 6-stage)	11	150 ... 19000	274 ... 29900	7.5	
	K.39-Z19 ... K.189-Z/D69 (5 or 6-stage)	10	220 ... 19500	170 ... 14900	7.5	
	C.29-Z19 ... C.89-D39 (4 or 5-stage)	5	80 ... 1310	270 ... 19000	7.5	

Fig. 1/10 Example of a tandem geared motor

¹⁾ With 4-pole motor up to 55 kW for a 50 Hz line frequency in integral type of construction. An adapter must be mounted for a motor power > 55 kW.

Introduction

Orientation

Geared motors

Overview

Torque classes

SIMOGEAR geared motors are classified according to fixed torque steps. Within a torque class, for the various gearbox types, almost the same output torques are achieved.

Helical gearboxes Z and D (2- stage and 3-stage)

Size		–	19	29	39	49	59	69	79	89	109	129	149	169	189
Maximum output torque	Nm	–	100	140	200	320	450	600	840	1680	3100	5000	8000	14000	19000
<u>Cooling tower gearboxes ZK (2-stage)</u>															
Maximum output torque	Nm	–	–	–	–	–	–	–	–	1680	3100	5000	8000	14000	19000

Helical gearbox E (1-stage)

Size		–	–	–	39	49	–	69	–	89	109	129	149	–	–
Maximum output torque	Nm	–	–	–	65	108	–	205	–	365	565	800	1490	–	–
<u>Cooling tower gearboxes EK (1-stage)</u>															
Maximum output torque	Nm	–	–	–	–	–	–	–	–	365	565	800	1490	–	–

Parallel shaft gearboxes FZ and FD (2-stage and 3-stage)

Size		–	–	29	39	–	49	69	79	89	109	129	149	169	189
Maximum output torque	Nm	–	–	150	290	–	480	600	1000	1850	3100	4850	8000	13600	19000

Bevel gearbox B (2-stage)

Size		–	19	29	39	–	49	–	–	–	–	–	–	–	–
Maximum output torque	Nm	–	50	110	250	–	450	–	–	–	–	–	–	–	–

Bevel gearbox K (3-stage)

Size		–	–	–	39	–	49	69	79	89	109	129	149	169	189
Maximum output torque	Nm	–	–	–	220	–	420	600	820	1600	2900	4400	8000	13000	19500

Helical worm gearbox C (2-stage)

Size		–	–	29	39A	–	49	69	–	89	–	–	–	–	–
Maximum output torque	Nm	–	–	110	235	–	400	675	–	1450	–	–	–	–	–

Worm gearbox S (1-stage)

Size		09	19	29	–	–	–	–	–	–	–	–	–	–	–
Maximum output torque	Nm	33	72	116	–	–	–	–	–	–	–	–	–	–	–

Electric-monorail geared motors EHB (light-load and heavy-load applications)

Size		–	–	29	39	–	49	69	79	–	–	–	–	–	–
Maximum output torque	Nm	–	–	90	200	–	420	600	820	–	–	–	–	–	–

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.

This means that frequently instead of 3-stage gearboxes with an efficiency of approx. 94 %, 2-stage helical and parallel shaft gearboxes with a high efficiency of ≥ 96 % can be used.

The 2-stage SIMOGEAR bevel geared motors B have a mechanical efficiency of ≥ 96 %. With a range of transmission ratios from $i = 3.5$ to 60, they have been specifically designed to address the requirements in conveyor technology.

Together with the new 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.

Extremely compact and low weight for easy handling in the machine or system in the smallest space

An integrated end shield instead of an adapter plate and end shield reduces the weight and space required in your machine or system.

In addition, interfaces and sealing joints are reduced as a result of the integrated end shield.

With the SIMOGEAR bevel gearboxes, the length was able to be significantly reduced through an optimized bearing design.

SIMOGEAR helical gearboxes Z/D19 to Z/D39 (200 Nm), parallel shaft gearboxes F29 (150 Nm) and bevel gearboxes B19 to B49 (450 Nm) as well as helical worm gearboxes C29 and 39A (235 Nm) have an aluminum gearbox housing.

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

The fine size graduations of SIMOGEAR gearboxes provide you 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)

Benefits***Fine ratio stages
to always obtain the output speed required***

With their wide range of transmission ratios, from very low up to very high, SIMOGEAR geared motors provide the necessary flexibility for your drive application.

As a result of the wide ratio range, 4-pole induction motors can be mainly used – the most cost-effective solution.

Further, the gearboxes are quieter as a result of the lower circumferential velocity of the first gearbox stage.

***Intelligent sealing concept
for a high degree of maintenance friendliness***

An optimally coordinated sealing concept is available for the SIMOGEAR gearbox output shaft to address the various application areas and ambient conditions.

Gearbox sizes 19 and 29 are lubricated for life. All SIMOGEAR geared motors with venting have as standard a pressure breather valve.

***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 55 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.

This guarantees high availability as well as short delivery times.

Motors for converter operation**Converter World Motor**

The Converter World Motor has been designed for worldwide use, taking into account the worldwide voltage networks and different converters. Since no derating has to be taken into account for line voltages in the range of 380 V to 480 V, the full rated power is always available during the configuration.

VSD10 line motors and synchronous reluctance motors

The VSD10 line motors and the synchronous reluctance motors have been specifically designed for converter operation.

The motors have compact dimensions in a surface-cooled, enclosed version with self-ventilation.

The high power density and compact design ensure low space requirements combined with low weight.

An optimally harmonized drive system is achieved because the motor is optimally coordinated and harmonized with the converters, e.g. no derating of the converter is required or low temperature rise.

Explosion-protected motors

Explosion protection has been fully harmonized by directive 2014/34/EU in Germany and in the other member states of the European Union.

SIMOGEAR explosion-protected geared motors are designed and built according to directive 2014/34/EU and comply with the requirements for using equipment in hazardous zones.

The plant manufacturer or plant operating company is responsible for correct selection and proper usage of the equipment.

Many selectable motor options are available for the explosion-protected motors (gas and dust protection, Zone 2 and Zone 22).

SIMOGEAR motor systems

Flexible combinations of SIMOTICS motors and SIMOGEAR gearboxes with adapters can be configured in the TIA Selection Tool.

In addition to the separate order of the gearbox-adapter unit and the motor, it is also possible to order assembled gearbox-adapter-motor combinations.

The order can directly be placed thanks to the direct connection of the TIA Selection Tool to SiePortal.

You can find additional information about the TIA Selection Tool at:

www.siemens.com/tia-selection-tool

Introduction

Orientation

1

Geared motors

Benefits

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 converter technology
- Controller
- Frequency converter

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. Using a mechanical clutch offers options for taking action in the following situations, for example:

- 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

Integration

SIMOGEAR geared motors are part of the Siemens Integrated Drive System (IDS).

Siemens Integrated Drive System (IDS) stands for standardized, tailored, and modular components, systems, and services. It encompasses the world's most extensive portfolio – from geared motors through motor starters and converters, identification systems and switchgear up to the automation.

The complete portfolio is exhaustively tested – also in the field – for maximum availability. The components are harmonized and

coordinated with one another with standard interfaces and power bus systems.

Siemens Integrated Drive System (IDS) therefore allows you to reduce your installation and commissioning costs, and at the same time increase flexibility and system availability.

Energy-efficient motors, motor starters, soft-starters, and converters as well as the Power Management system based on SIMATIC PCS 7, SIMATIC WinCC, and multi-function measuring devices ensure a high energy saving potential.

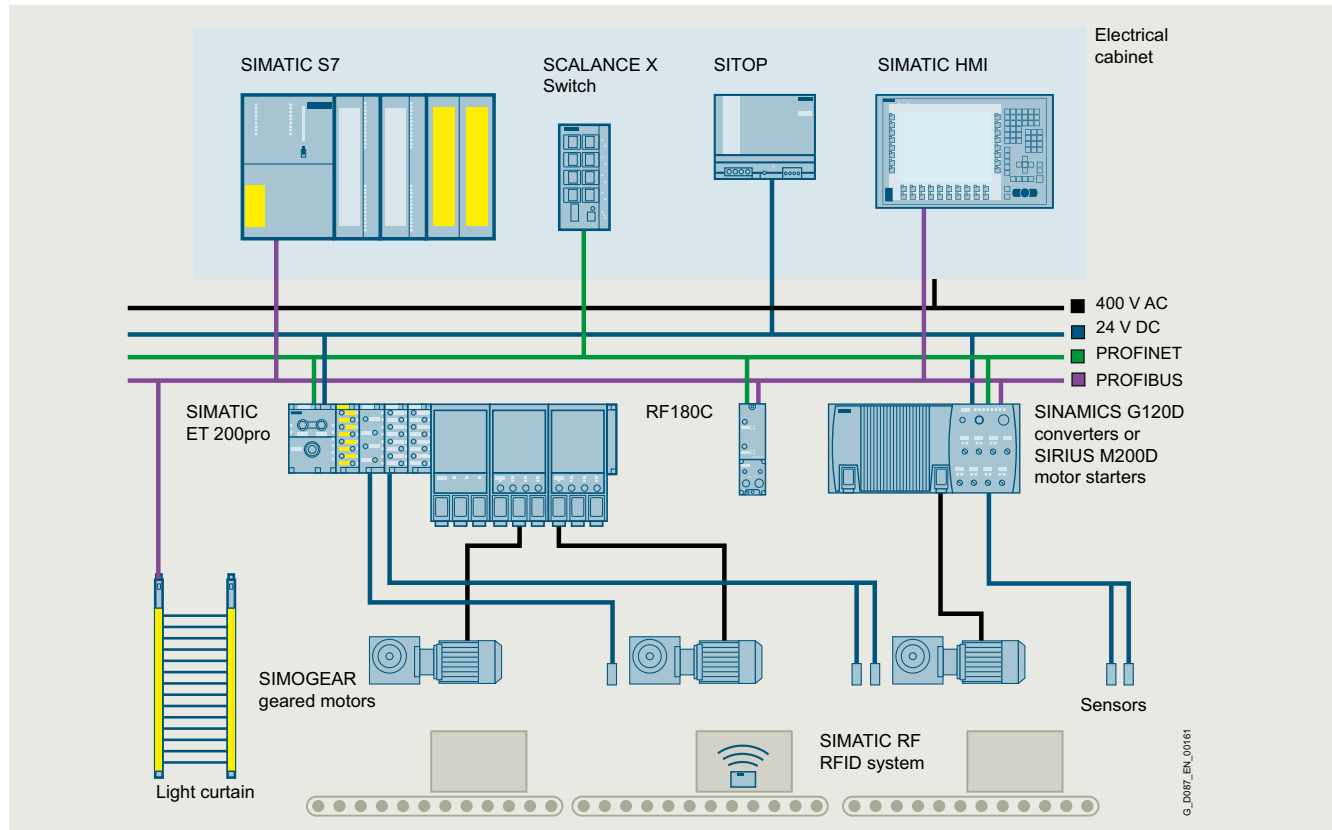


Fig. 1/11 Example of the Siemens Integrated Drive System (IDS) for sophisticated conveyor applications

Introduction

Orientation

Geared motors

Configuration

Siemens Product Configurator

The Siemens Product Configurator supports you when configuring the optimum drive technology products for a number of applications – from gearboxes, motors, converters as well as the associated options and components through to controllers, software licenses and connection systems.

The Siemens Product Configurator can be used on the internet without requiring any installation. The Siemens Product Configurator can be found in SiePortal at the following address:
www.siemens.com/spc

TIA Selection Tool

Selection guide and configurator for automation technology

Error-free configuration without expert knowledge through intelligent configurators and selection wizards. Desktop and cloud versions enable cross-team collaboration with maximum flexibility.

More information about the TIA Selection Tool is provided at:
www.siemens.com/tia-selection-tool

STARTER commissioning tool

The STARTER commissioning tool allows menu-prompted commissioning, optimization and diagnostics. Apart from the SINAMICS drives, STARTER is also suitable for MICROMASTER 4 devices.

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 converter family and is integrated into TIA Portal (V15.1 or higher).

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

More information

The latest technical documentation (catalogs, dimensional drawings, certificates, manuals and operating instructions as well as further technical specifications) are available on the internet at:

www.siemens.com/gearedmotors

and in the Siemens Product Configurator:
www.siemens.com/spc

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:

2KJ3105-1EM22-2AS1-Z +D01+M55

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:	Helical gearbox E, 1-stage	2	K	J	3	0															
Digit, letter,	Helical gearbox Z, 2-stage	2	K	J	3	1															
letter, digit, digit	Helical gearbox D, 3-stage	2	K	J	3	2															
	Parallel shaft gearbox FZ, 2-stage	2	K	J	3	3															
	Parallel shaft gearbox FD, 3-stage	2	K	J	3	4															
	Bevel gearbox B, 2-stage	2	K	J	3	5															
	Bevel gearbox K, 3-stage	2	K	J	3	5															
	Helical worm gearbox C, 2-stage	2	K	J	3	6															
	Worm gearbox S, 1-stage	2	K	J	3	7															
	Electric-monorail gearbox EHB	2	K	J	3	8															
6th to 7th position:	Gearbox size																				
Digit, digit																					
8th position:	Output shaft							-													
Digit																					
9th to 10th position:	Motor frame size																				
Letter, letter																					
11th position:	Converter World Motor												1								
Digit	Induction motor LE General Purpose (aluminum)												2								
	Induction motor LES Severe Duty; Basic Line (cast iron)												3								
	Explosion-protected motors MB (gas and dust protection, Zone 2 and Zone 22)												7								
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								
	Synchronous reluctance motors for converter operation (Super Premium Efficiency IE4)												7								
	VSD10 line motors for converter operation												8								
13th position:	Frequency, voltage														-	2, 4, 9					
Digit	With Article No. 9, additional order code required															9					
	Converter World Motor, star connection															6					
	Converter World Motor, delta connection															7					
14th position:	Foot-mounted design																A				
Letter	Foot/flange-mounted design																B				
	Torque arm Bevel gearbox K																C				
	Torque arm																D				
	Parallel shaft gearbox F, Bevel gearbox B																				
	Helical worm gearbox C																				
	Worm gearbox S																				
	Flange-mounted design																F				
	Housing flange design																H				
15th to 16th position:	Transmission ratio																				
Letter, digit																					
Special designs																					
Coded	Order code required																			-	Z
Non-coded	Plain text required																				

Introduction

Guidelines for selection and ordering

1

Article No. code

Overview

Additional order codes

Customer-specific data on the rating plate can be indicated with option **Y00** and plain text (e.g. Y00:*LSF@plain text*).

The following data is necessary for geared motors in ATEX version:

Information when ordering	Input speed in continuous operation and Input power Rated motor power
Order code	Y00
Plain text specification	Y00:*AND@input speed**ANL@input power*
Example of plain text specification	Y00:*AND@1450**ANL@1.5* (input speed 1450 rpm, input power 1,5 kW)
Information required	ATEX design

Ordering example

A helical geared motor is required:

- Gearbox type, size Z59
- Motor 1.5 kW, 4-pole with 50 Hz line frequency
- Output speed 49, transmission ratio $i = 28.89$
- Solid shaft V35 x 70
- Mounting position M1
- Terminal box position 1A

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	Helical gearbox Z, 2-stage	2	K	J	3	1	.	.	-	■	.	.	■	■	-	■	■	■	■	-	■	+	.	+
Gearbox size	Size 59	2	K	J	3	1	0	5		■			■	■		■	■	■	■		■			
Output shaft	Solid shaft V35 x 70	2	K	J	3	1	0	5	-	1			■	■		■	■	■	■		■			
Motor frame size	Frame size 90; 1.5 kW; 4-pole	2	K	J	3	1	0	5	-	1	E	M												
Motor type	Induction motor LE General Purpose	2	K	J	3	1	0	5	-	1	E	M	2											
Motor efficiency	Premium Efficiency IE3	2	K	J	3	1	0	5	-	1	E	M	2	3										
Line voltage, frequency	230 V Δ/400 V Y // 460 V Y, 50//60 Hz	2	K	J	3	1	0	5	-	1	E	M	2	3	-	2								
Mounting type	Foot-mounted design	2	K	J	3	1	0	5	-	1	E	M	2	3	-	2	A							
Transmission ratio	$i = 28.89$	2	K	J	3	1	0	5	-	1	E	M	2	3	-	2	A	S	1					
Mounting position	M1	2	K	J	3	1	0	5	-	1	E	M	2	3	-	2	A	S	1	-	Z	+	D01	
Terminal box position	1A	2	K	J	3	1	0	5	-	1	E	M	2	3	-	2	A	S	1	-	Z	+	D01	+
																								M55

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 its main technical features.

Example of gearbox type designation:		F	D	A	F	S	W	89	-	Z	39
Gearbox type	Helical gearbox	–									
	Cooling tower gearbox, 1-stage	EKF									
	Cooling tower gearbox, 2-stage	ZKF									
	Parallel shaft gearbox	F									
	Bevel gearbox, 2-stage	B									
	Bevel gearbox, 3-stage	K									
	Helical worm gearbox	C									
	Worm gearbox	S									
	Electric-monorail gearbox light-load	BH									
	Electric-monorail gearbox heavy-load	KH									
Stage	1-stage (for helical gearbox only)		E								
	2-stage		Z								
	3-stage		D								
Type											
Shaft	Solid shaft			–							
	Hollow shaft			A							
	Plug-in shaft			E							
Mounting	Foot-mounted design				–						
	Foot/flange-mounted design				B						
	Flange-mounted design				F						
	Housing flange design				Z						
	Torque arm				D						
Connection	Feather key/without feather key					–					
	Shrink disk					S					
	Splined shaft					T					
	SIMOLOC assembly system					R					
Special features	Reduced-backlash version						W				
Gearbox size	Helical gearbox, 1-stage							39 ... 149			
	Helical gearbox, 2-stage/3-stage							19 ... 189			
	Cooling tower gearbox, 1-stage							89 ... 149			
	Cooling tower gearbox, 2-stage							89 ... 189			
	Parallel shaft gearbox, 2-stage/3-stage							29 ... 189			
	Bevel gearbox, 2-stage							19 ... 49			
	Bevel gearbox, 3-stage							39 ... 189			
	Helical worm gearbox, 2-stage							29 ... 89			
	Worm gearbox, 1-stage							09 ... 29			
	Electric-monorail gearbox light-load							29 ... 39			
	Electric-monorail gearbox heavy-load							49 ... 79			
Gearbox type – intermediate gearbox											
Gearbox type	Helical gearbox								–		
Stage - intermediate gearbox	2-stage									Z	
	3-stage									D	
Gearbox size	Helical gearbox 2-stage/3-stage										19 ... 69

Introduction

Guidelines for selection and ordering

Type designation

Type designation of the motors

Example of motor type designation:			LE	90	ZLT	4	SV	-	FW	L	32/14	MN	-	IA	SI04	
Motor																
Motor type	Three-phase motor	Aluminum housing	LE													
		Cast-iron housing	LES													
	Explosion-protected motor	Aluminum housing	MB													
		Cast-iron housing	MBS													
Type	Integral mounting		-													
	IEC B14 flange		I													
Motor frame size	Defined according to EN 50347			63...250												
Overall length	Extended housing				Z, Y											
	Overall length defined according to EN 50347				S, L, M											
	Packet length/power value				A ... Z											
Number of poles	2-pole					2										
	4-pole					4										
	6-pole					6										
	8-pole					8										
Special features																
Efficiency class	Different to IE2 or IE3						-									
	IE2 (High Efficiency)						E									
	IE3 (Premium Efficiency)						P									
	IE4 (Super Premium Efficiency)						S									
Design	Converter World Motor						PV									
	Synchronous reluctance motor						SV									
	VSD10 line motor						V									
Ventilation	Self ventilation						-									
	Forced ventilation						F									
	High inertia fan						I									
Canopy	With protective cover						W									
Handwheel	With handwheel						D									
Backstop	With backstop						X									
Options																
Brake type	DC brake									L, LS, FDX						
Rated braking torque	L brakes									4 ... 400						
	LS brake									4 ... 400						
	FDX brakes									30, 40						
	Adjusted braking torque									/1.4 ... 1000						
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	Absolute encoder singleturn (DRIVE-CLiQ)													AS		
	Absolute encoder multiturn (DRIVE-CLiQ)													AM		
	Incremental encoder													IN		
	Absolute encoder													IA		
	Prepared for encoder mounting													IV		
	Functionally safe rotary encoder														SI04	
ATEX	Explosion protection according to ATEX															-1

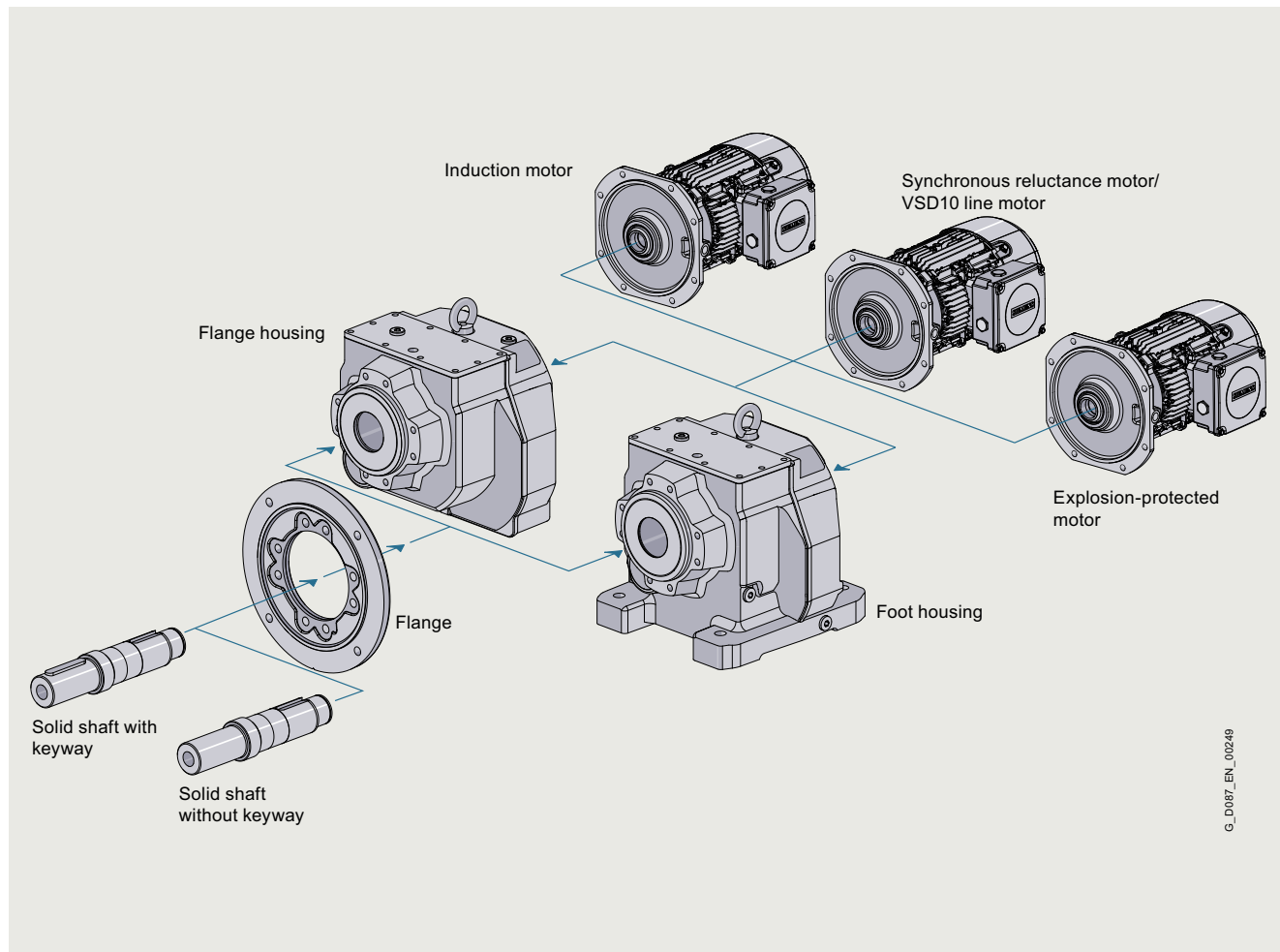
Overview
Helical geared motors


Fig. 1/12 Modular system, helical geared motor

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

- 2 or 3 stages
- 1 stage for high output speeds
- 4 to 6 stages for especially low output speeds
- Foot-mounted design
- Flange-mounted design
- Flange-mounted design with VLplus and XLplus reinforced bearing systems
- Design with integrated housing flange
- Combined foot/flange-mounted design (frame size 29 to 89)
- Cooling tower design
- Solid shaft design with and without feather key

Typical applications

Helical gearboxes are used where there is sufficient axial space and efficient and low-cost drives are required:

- Roller conveyors, belt conveyors, chain conveyors
- Pumping systems
- Fan systems
- Water/wastewater systems
- Agitators
- Cooling tower drives

Introduction

Guidelines for selection and ordering

Designs

Overview

Parallel shaft geared motors

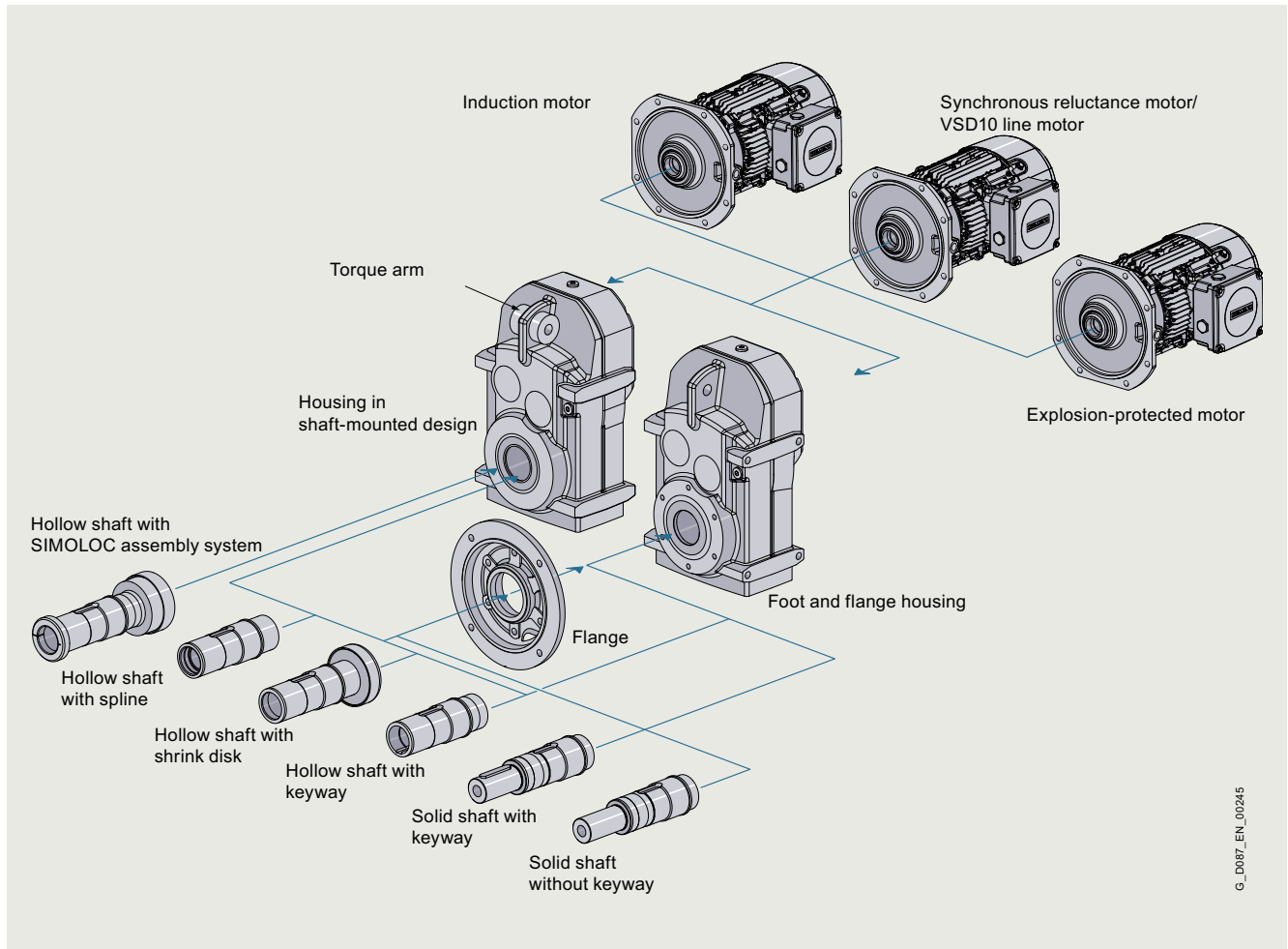


Fig. 1/13 Modular system, parallel shaft geared motor

SIMOGear parallel shaft geared motors are available in the following versions for mounting in any position:

- 2 or 3 stages
- 4 to 6 stages for especially low output speeds
- Shaft-mounted design with torque arm
- Flange-mounted design
- Flange-mounted design with VLplus reinforced bearing system
- Design with integrated housing flange
- Foot-mounted design
- Hollow shaft design with feather key, splined shaft, shrink disk or SIMOLOC assembly system
- Solid shaft design with and without feather key

Typical applications

The parallel shaft gearboxes are mainly used in applications where compact geared motors are required which are fitted to the drive shaft of the machine:

- Chain conveyors, belt & bucket elevators, belt conveyors, roller conveyors
- Screw conveyors
- Pumping systems
- Fan systems
- Agitators
- Extruders
- Cooling tower drives

G_D087_EN_00245

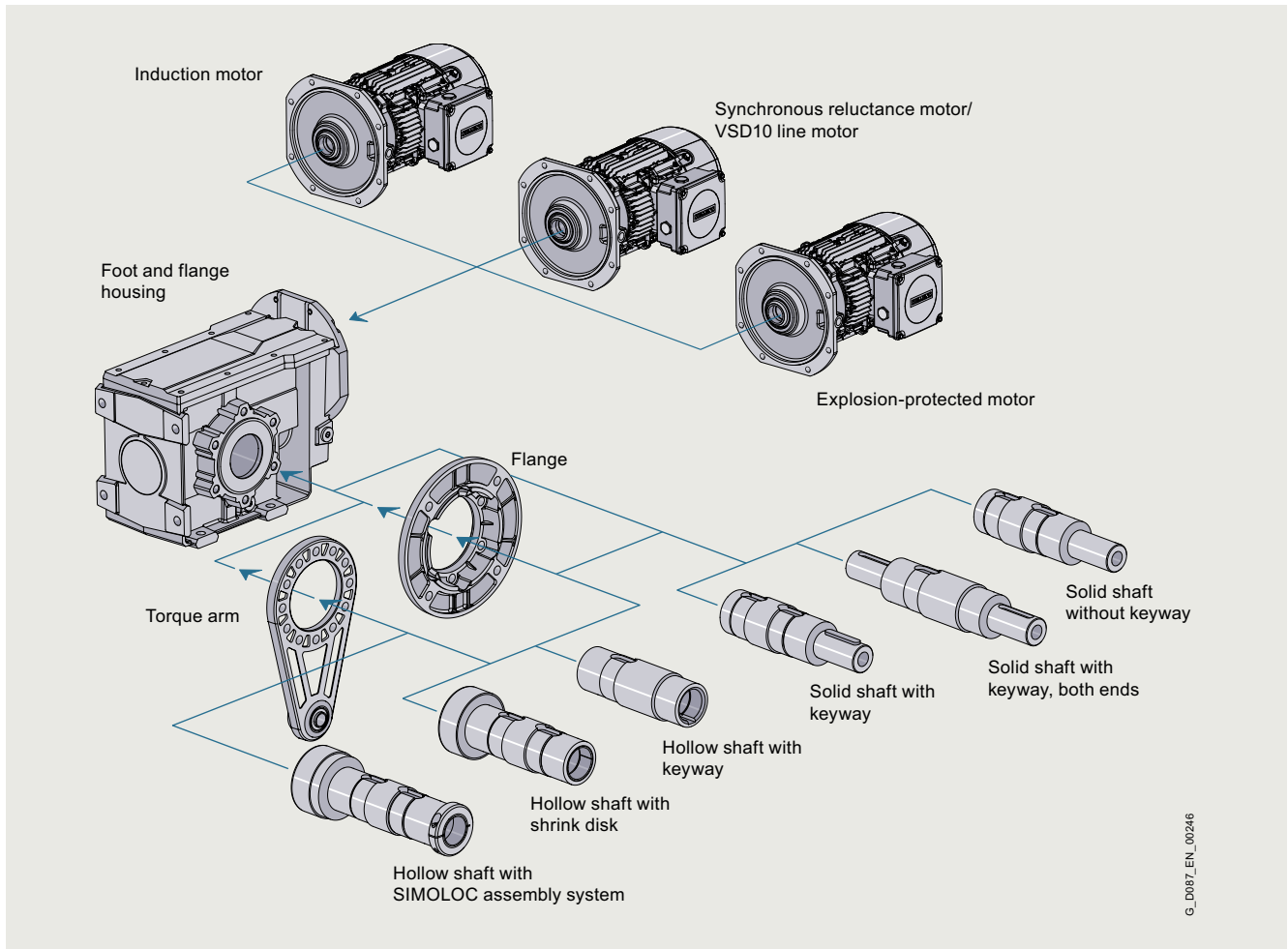
Overview
Bevel geared motors B


Fig. 1/14 Modular system, bevel geared motor B

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

- 2 stages
- Shaft-mounted design with torque arm
- Flange-mounted design
- Design with integrated housing flange
- Foot-mounted design
- Hollow shaft design with feather key, splined shaft, shrink disk or SIMOLOC assembly system
- Solid shaft design with and without feather key (at one end or both ends)

For 2-stage bevel gearboxes B, the torque arm is supplied loose to enable it to be mounted as required on site. The position of the torque arm can be freely selected.

Typical applications

The 2-stage right-angle gear units with maximum efficiency are used when there is little axial space available:

- Airport industry
- Automotive industry (electric overhead conveyors)
- General conveyor technology (general cargo and bulk goods)
- Agitators
- Cooling tower drives

Introduction

Guidelines for selection and ordering

1

Designs

Overview

Bevel geared motors K

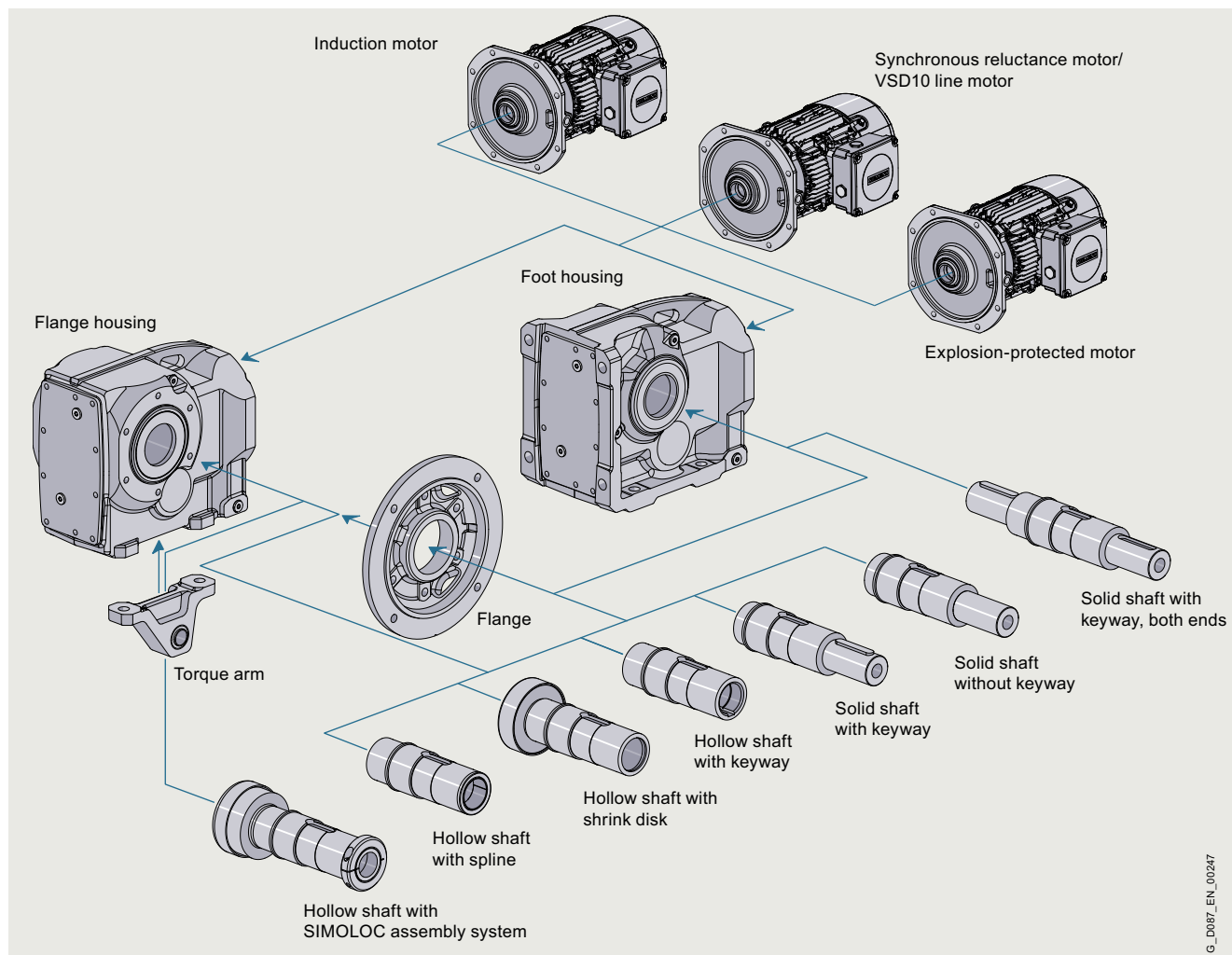


Fig. 1/15 Modular system, bevel geared motor K

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

- 3 stages
- 5 or 6 stages for very low output speeds
- Shaft-mounted design with torque arm
- Flange-mounted design
- Flange-mounted design with VLplus reinforced bearing system
- Design with integrated housing flange
- Foot-mounted design
- Hollow shaft design with feather key, splined shaft, shrink disk or SIMOLOC assembly system
- Solid shaft design with and without feather key (at one end or both ends)

Typical applications

The 3-stage right-angle gear units with high efficiency are used when there is little axial space available:

- Automotive industry (electric overhead conveyors)
- General conveyor technology (general cargo and bulk goods), pallet conveyor, belt conveyor, chain conveyor
- Hoisting gear
- Drives in storage and retrieval machines
- Agitators
- Cooling tower drives

G_D087_EN_00247

Overview

Helical worm geared motors

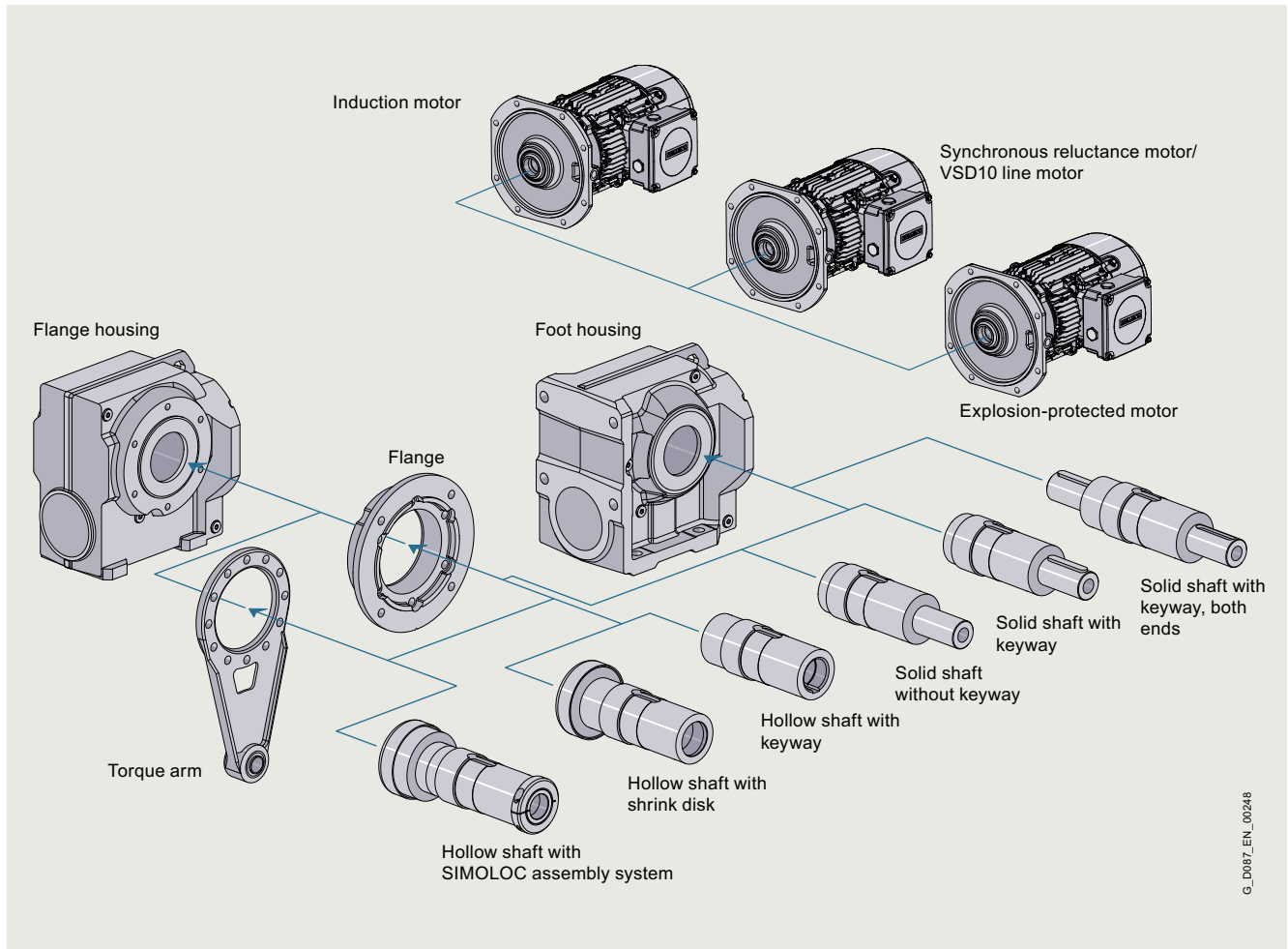


Fig. 1/16 Modular system, helical worm gearbox

SIMOGear helical worm gearboxes are available in the following versions for mounting in any position:

- 2 stages
- 4 or 5 stages for very low output speeds
- Shaft-mounted design with torque arm
- Flange-mounted design
- Design with integrated housing flange
- Foot-mounted design
- Hollow shaft design with feather key, shrink disk or SIMOLOC assembly system
- Solid shaft design with and without feather key (at one end or both ends)

For helical worm gearboxes, the torque arm is supplied loose to enable it to be mounted as required on site. The position of the torque arm can be freely selected.

Typical applications

The 2-stage helical worm gearboxes are used when compact and smooth-running right-angle gear units are required.

- Conveyor technology
- Rotary tables
- Drives in stage/theater applications

Introduction

Guidelines for selection and ordering

Designs

Overview

Worm geared motors

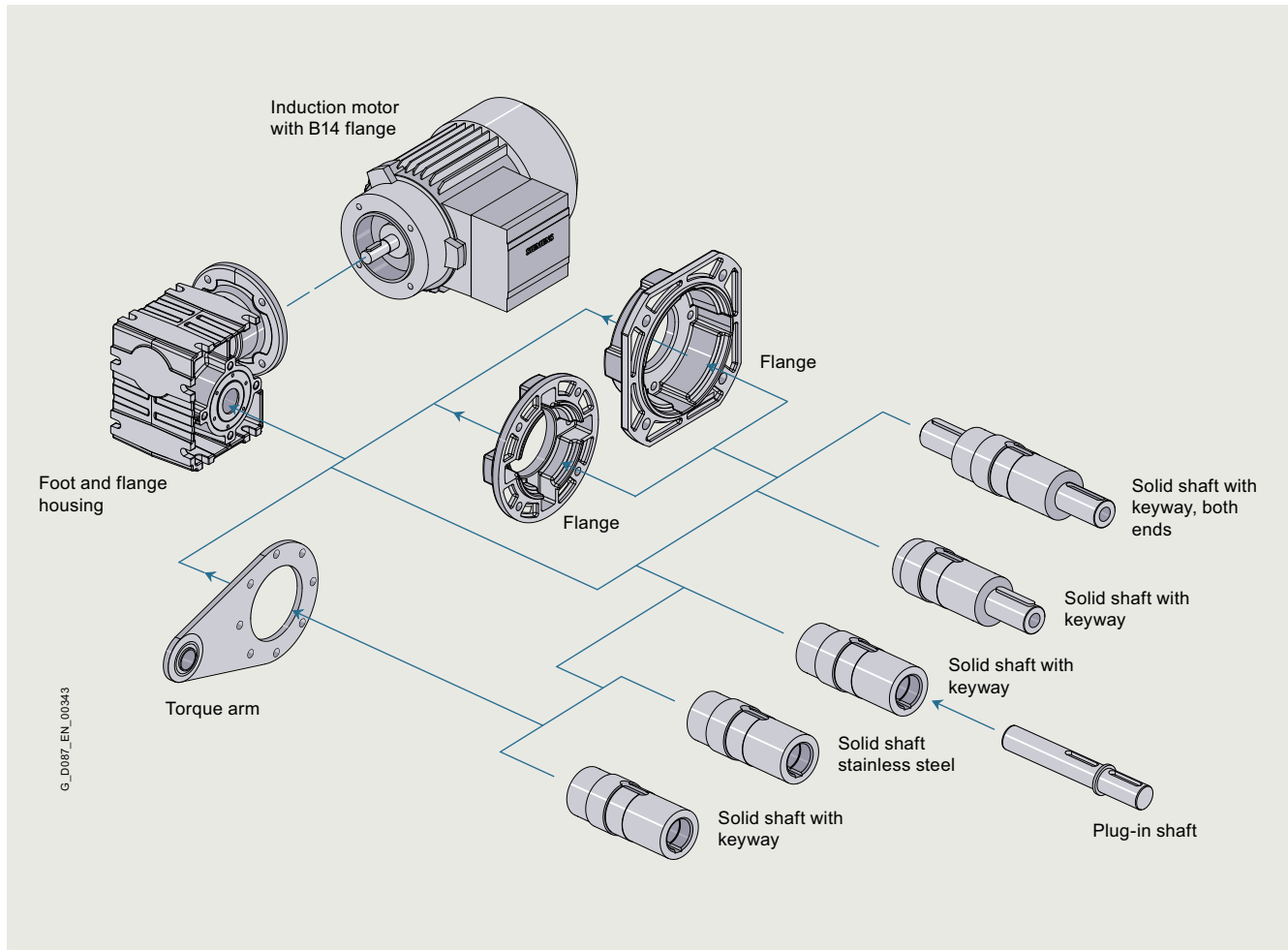


Fig. 1/17 Modular system, worm gearbox

SIMOGEAR worm gearboxes are available in the following versions for mounting in any position:

- 1 stage
- Shaft-mounted design with torque arm
- Flange-mounted design
- Design with integrated housing flange
- Foot-mounted design
- Solid shaft design with feather key (at one end or both ends)
- Hollow shaft design with feather key
- Hollow shaft design with plug-in shaft

For worm gearboxes, the torque arm is supplied loose to enable it to be mounted as required on site. The position of the torque arm can be freely selected.

Typical applications

The 1-stage worm gearboxes are mainly used in tight spaces where a low-cost and smooth-running drive is required:

- Small conveyor belts
- Rotary tables
- Corner transfer conveyors
- Agitators
- Drives in stage/theater applications

Introduction

Guidelines for selection and ordering

Notes on selection tables

Structure of the tables for efficiencies for helical worm geared motors

<i>i</i> –	<i>n</i> _{mot} = 2800 rpm				<i>n</i> _{mot} = 1400 rpm				<i>n</i> _{mot} = 900 rpm				Article No. (Article No. supplement, see below)	
	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>P</i> _{mot} kW	η %	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>P</i> _{mot} kW	η %	<i>n</i> ₂ rpm	<i>T</i> _{2N} Nm	<i>P</i> _{mot} kW	η %		
Type designation C.49														
127.64	22	300	0.95	73	11.0	355	0.56	73	7.1	355	0.37	71	2KJ3603 - ■ ■ ■ ■ ■ ■ - ■ ■ F2	
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
(1)	(2)	(3)	(4)	(5)	(2)	(3)	(4)	(5)	(2)	(3)	(4)	(5)	(6)	

- | | |
|---|-----------------|
| (1) Transmission ratio | (4) Input power |
| (2) Geared motor output speed at specified motor speed n_{mot} | (5) Efficiency |
| (3) Maximum gearbox output torque with service factor of $f_B = 1$ | (6) Article No. |

Structure of the tables for motors

Converter World Motor

Left-hand side

Frame size	Motor	P_N kW	Connection	f_N Hz	T_N Nm	I_N A	U_N V	$\cos \varphi$	η PDS (90, 100) %	Efficiency class acc. to IEC TS 60034-30-2 and IEC 60034-2-3
1500 rpm										
112	LE112ZMKB4PV	4	Y	51.5	26	9.58	330	0.83	87.46	3
1750 rpm										
112	LE112ZMKB4PV	4.7	Y	59.5	26	9.58	380	0.76	88.37	3
↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Motor frame size	(7) Rated current	(2) Motor designation	(8) Rated voltage	(3) Rated power	(9) Power factor	(4) Connection	(10) Efficiency acc. to PDS90 measurement (90 % rated speed; 100 % rated torque)	(5) Rated frequency	(11) Marking efficiency class	(6) Rated torque

Right-hand side

Frame size	Motor	Mech. speed limit	J_{mot}	m_{mot}	9th to 13th position of the Article No.									
		rpm	10^{-4} kgm^2	kg	2KJ3... - . ■ ■ ■ ■ - - ■ - ... - 2									
1500 rpm														
112	LE112ZMKB4PV	4200	145	57	2KJ3... - .		G	J	1	3	-	6	-	...
1750 rpm														
112	LE112ZMKB4PV	4200	145	57	2KJ3... - .		G	J	1	3	-	6	-	...
↓	↓			↓			↓	↓	↓	↓		↓		
(1)	(2)	(3)	(4)	(5)			(6)	(6)	(7)	(8)		(9)		
(1) Motor frame size					(6) Article No. of the motor frame size									
(2) Motor designation					(7) Article No. of the motor type Converter World Motor									
(3) Mechanical speed limit					(8) Article No. of the motor series									
(4) Moment of inertia					(9) Article No. of the Converter World Motor, star or delta connection									
(5) Weight (without end shield at DE)														

Structure of the tables for motors

Motors with Premium Efficiency IE3

Left-hand side

Frame size	Motor	P_N	n_N	T_N	I_N	$\cos \varphi$	η				Efficiency class	I_{St}/I_N	T_{St}/T_N	T_{Bk}/T_N
		kW	rpm	Nm	50 Hz: 400 V A	–	4/4 load %	3/4 load %	2/4 load %		acc. to IEC 60034-30	–	–	–
50 Hz power														

4-pole, 1500 rpm

80	LE80MH4P	0.55	1440	3.65	1.26	0.78	80.8	81.5	79.8	IE3	5.9	2.1	3.1
	LE80ZMQ4P	0.75	1450	4.95	1.75	0.75	82.5	82.3	80.1	IE3	7.1	2.7	3.9

2-pole, 3000 rpm

80	LE80ME2P	0.75	2850	2.50	1.56	0.86	80.7	82.2	81.9	IE3	6.2	2.6	3.0
	LE80ZMJ2P	1.1	2885	3.65	2.25	0.85	82.7	83.9	83.1	IE3	7.1	3.0	3.3

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

- | | |
|-----------------------|--------------------------------|
| (1) Motor frame size | (7) Power factor |
| (2) Motor designation | (8) Efficiency |
| (3) Rated power | (9) Marking efficiency class |
| (4) Rated speed | (10) Relative starting current |
| (5) Rated torque | (11) Relative starting torque |
| (6) Rated current | (12) Relative breakdown torque |

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_A/T_N	L_{p1A}	L_{WA}	Z_0	J_{mot}	m_{mot}	9th to 12th position of the Article No.	Additional identification code -Z with order code
		–	dB (A)	dB (A)	1/h	10^{-4} kgm ²	kg	2KJ3... - . ■ ■ ■ ■ - -Z	Number of poles
50 Hz power									

4-pole, 1500 rpm

80	LE80MH4P	2.3	52	60	15000	21	9	2KJ3... - . D C 2 3 -	–
	LE80ZMQ4P	3.0	58	66	15000	29	10	2KJ3... - . D F 2 3 -	–

2-pole, 3000 rpm

80	LE80ME2P	2.9	60	71	5100	11	9.3	2KJ3... - . D B 2 3 -	P00
	LE80ZMJ2P	3.3	60	71	8700	13	10	2KJ3... - . D M 2 3 -	P00

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

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

Introduction

Guidelines for selection and ordering

Notes on selection tables

Structure of the tables for motors

VSD10 line and synchronous reluctance motors for converter operation

Left-hand side

Frame size	Motor	P_N	Connection	f_N	T_N	I_N	$\cos \varphi$	η	L_{pFA}	L_{WA}
		kW		Hz	Nm	50/87 Hz: 400 V 60 Hz: 460 V A	–	4/4 load %	dB (A)	dB (A)

50 Hz power

4-pole, 1500 rpm

112	LE112ME4V	4	Y	52.3	25.5	8.6	0.85	83.1	77.4	89.4
-----	-----------	---	---	------	------	-----	------	------	------	------

60 Hz power

4-pole, 1800 rpm

112	LE112ME4V	4.55	Y	62.2	24.0	8.3	0.85	85.0	77.2	89.2
-----	-----------	------	---	------	------	-----	------	------	------	------

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

- (1) Motor frame size
- (2) Motor designation
- (3) Rated power
- (4) Connection
- (5) Rated speed
- (6) Rated torque

- (7) Rated current
- (8) Power factor
- (9) Efficiency
- (10) Measuring surface sound pressure level
- (11) Sound power level

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	Mech. speed limit	J_{mot}	m_{mot}	Preferred SINAMCS G120-PM240 Other SINAMCS converters also possible	Frame size	IES class acc. to EN 50598-2	9th to 12th position of the Article No.	Additional identification code -Z with order code
		rpm	10^{-4} kgm ²	kg	Type			2KJ3... - . ■ ■ ■ ■ - -Z	Power

50 Hz power

4-pole, 1500 rpm

112	LE112ME4V	4200	100	27	6SL3210-1PE21-1.L0	FSB	IES1	2KJ3... - . G H 2 8 -	P92
-----	-----------	------	-----	----	--------------------	-----	------	-----------------------------------	------------

60 Hz power

4-pole, 1800 rpm

112	LE112ME4V	4200	100	27	6SL3210-1PE21-1.L0	FSB	IES1	2KJ3... - . G H 2 8 -	P92
-----	-----------	------	-----	----	--------------------	-----	------	-----------------------------------	------------

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

- (1) Motor frame size
- (2) Motor designation
- (3) Mechanical speed limit
- (4) Moment of inertia
- (5) Weight (without end shield at DE)
- (6) Preferred SINAMCS G120-PM240

- (7) Frame size
- (8) IES class acc. to EN 50598-2
- (9) Article No. of the motor frame size
- (10) Article No. of the motor type
- (11) Article No. of the motor series
- (12) Order code for power

Structure of the tables for motors

Motors according to UL and CSA standards

Left-hand side

Frame size	Motor	P_N		n_N	T_N	EISA	I_N	$\cos \varphi$	η			I_{st}/I_N	T_{st}/T_N
		kW	hp	rpm	Nm	CC No. CC032A	460 V A	—	4/4 load %	3/4 load %	2/4 load %	—	—

60 Hz, 50 Hz power

4-pole, 1800 rpm

90	LE90SM4P	1.1	1.5	1750	6.00	✓	2.15	0.75	86.5	86.4	84.2	8.2	3.4
----	----------	-----	-----	------	------	---	------	------	------	------	------	-----	-----

2-pole, 3600 rpm

90	LE90SM2P	1.5	2	3525	4.05	✓	2.60	0.84	85.5	84.8	82.3	9.8	3.1
----	----------	-----	---	------	------	---	------	------	------	------	------	-----	-----

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

- | | |
|--|-------------------------------|
| (1) Motor frame size | (7) Rated current |
| (2) Motor designation | (8) Power factor |
| (3) Rated power | (9) Efficiency |
| (4) Rated speed | (10) Starting current |
| (5) Rated torque | (11) Relative starting torque |
| (6) Energy Independence and Security Act | |

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_{Bk}/T_N	T_A/T_N	L_{pfA}	L_{WA}	Z_0	J_{mot}	m_{mot}	9th to 12th position of the Article No.	Additional identification code -Z with order code	
		—	—	dB (A)	dB (A)	1/h	10^{-4} kgm ²	kg	2KJ3... - . ■ ■ ■ ■ - -Z	Num-ber of poles	Specifica-tion
										UL-R/CSA	

60 Hz, 50 Hz power

4-pole, 1800 rpm

90	LE90SM4P	4.4	3.7	O. R.	O. R.	O. R.	36	12	2KJ3... - . E K 2 3 -	—	N38
----	----------	-----	-----	-------	-------	-------	----	----	----------------------------	---	-----

2-pole, 3600 rpm

90	LE90SM2P	4.9	3.4	O. R.	O. R.	O. R.	21.0	12	2KJ3... - . E K 2 3 -	P00	N38
----	----------	-----	-----	-------	-------	-------	------	----	----------------------------	-----	-----

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

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

Introduction

Guidelines for selection and ordering

Notes on the dimensional drawings

Overview

Shaft heights

DIN 747 shaft heights for machines

Shaft height mm	Tolerance mm
≤ 250	-0.5
> 250	-1

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

Center holes according to DIN 332 type DR:

Diameter mm	Thread size
> 16 ... 21	M6
> 21 ... 24	M8
> 24 ... 30	M10
> 30 ... 38	M12
> 38 ... 50	M16
> 50 ... 85	M20
> 85 ... 130	M24
> 130	M30

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 °

Hollow shafts

Hollow shaft design with feather key

Diameter tolerance Ø: ISO H7 measured using a mandrel gauge

Feather keys: acc. to DIN 6885-1 (high form)

Hollow shafts with shrink disk

Diameter tolerance Ø: ISO H7 with mandrel gauge, measured in the area of the shrink disk seat. Hub seat, output side equipped with journal bearing sleeve.

Minimum requirement for the design of the customer shaft:

- Elastic limit $Re \geq 360 \text{ N/mm}^2$
- Module of elasticity, approx. 206 kN/mm^2
- Without threaded hole on the face
- Customer shaft must not be in contact with shaft shoulder

Hollow shafts with splines

Splined shaft according to DIN 5480

Hollow shafts for the SIMOLOC assembly system

The diameters of the taper bushing and the bronze bushing are designed to hold a customer shaft with tolerance h11.

Minimum requirement for the design of the customer shaft:

- Bright steel drawn EN 10278 (tolerance Ø: ISO h11)
- Elastic limit $Re \geq 360 \text{ N/mm}^2$
- Module of elasticity, approx. 206 kN/mm^2
- Straightness less than 0.5 mm/m

Note:

Deviation from the specified straightness will cause radial runout of the customer shaft. Customer shafts with minor radial runout ensure optimum operating conditions for geared motors. This has a positive impact on the service life of the drive train.

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.

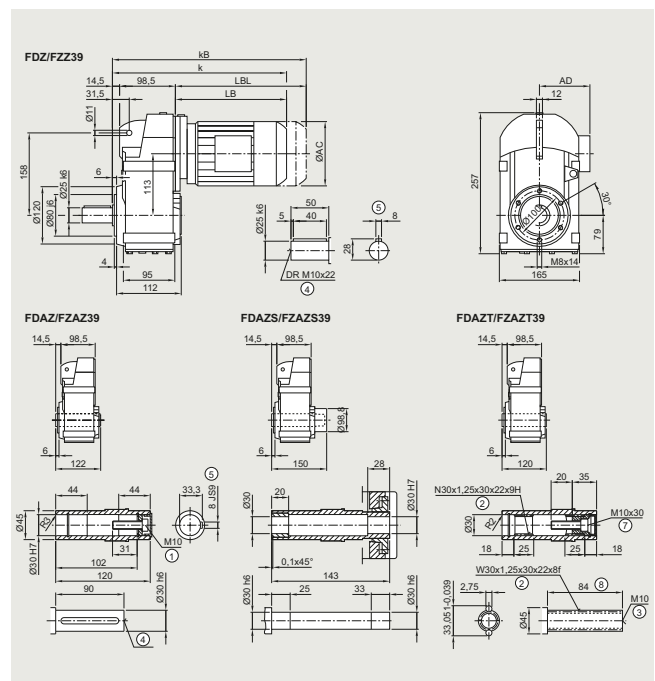


Fig. 1/18 Example, dimensional drawing

Overview

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

Specifications

Marking Examples	Legal/normative requirements
	Machinery directive 2006/42/EC
	United Kingdom Conformity Assessed Supply of Machinery (Safety) Regulations 2008
	Regulation (EU) 2019/1781 Requirements relating to electric motors and variable-speed controls according to guideline 2009/125/EC and change regulation (EU) 2021/341
MG1-12	NEMA MG1 Table 12-12 National standard
	UL 1004 Standard of the Underwriters Laboratories Inc. (testing and certification body)
CC032 A	EISA Energy Independence Security Act
	CSA-C22.2 No. 100 Standard of the Canadian Standards Association
Energy Verified	EER Energy Efficiency Regulations
	CCC China Compulsory Certification
	CEL – China Energy Label based on the national standard GB 18613-2020
	EAC TR CU EAC declaration for the Eurasian customs union
	BIS Indian standard IS 12615:2018
	ATEX EU directive 2014/34/EU

Introduction

General technical specifications

Geared motors for use worldwide

Converter World Motor

The Converter World Motors are available in frame sizes 71 to 250 in accordance with IEC TS 60034-30-2.

The following specifications and options are integrated with the Converter World Motor and do not require any additional order codes:

- Design in accordance with CE / UKCA, UL-/CSA and EAC
- Pt1000 resistance thermometer

The Converter World Motor is designed exclusively for converter operation; the rated frequency of the induction motors is not 50 Hz; they therefore do not fall within the scope of the following certifications:

- China Compulsory Certification (CCC)
- China Energy Label (CEL)
- Bureau of Indian Standards (BIS)
- Korea Energy Management Corporation (KEMCO)

Converter World Motor	11th and 13th position of the Article No.	
	2KJ3... -... ■ - - ■ ...-Z	
Converter World Motor, star connection	1	6
Converter World Motor, delta connection	1	7

UKCA – United Kingdom Conformity Assessed

The UKCA mark is the product marking for products placed on the market in the UK (England, Scotland and Wales). The UKCA marking applies to most products that were previously subject to CE marking and is mandatory for products placed on the market after December 31, 2022. The SIMOGEAR geared motors have the UKCA marking as standard.

For the explosion-protected SIMOGEAR geared motors, the UKCA marking is required additionally.

Motors for Great Britain	Additional identification code -Z with order code	
	2KJ3... -...-...-...-Z	
UKCA marking for explosion-protected geared motors		N76

Without CE, UKCA marking for export

To export geared motors to countries outside the European economic area, order option "without CE, UKCA marking for export" for motors with a power rating of 0.75 kW or more is available. The CE, UKCA 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, UKCA marking.

Motors without CE, UKCA marking for export	Additional identification code -Z with order code	
	2KJ3... -...-...-...-Z	
Without CE, UKCA marking		N68

Motors for the North American market

Motors in frame sizes 63 to 250 are available in designs which meet the UL-R and CSA standards.

Motors for the North American market	Additional identification code -Z with order code	
	2KJ3... -...-...-...-Z	
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.

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.

There is no approval for explosion-protected motors.

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 250.

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

Motors for the Chinese market	Additional identification code -Z with order code	Order code
	2KJ3... -.....-Z	N67
Design for the Chinese market		

CCC – China Compulsory Certification

Motors with small powers (small power motors) that 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

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:

- Explosion-protected motors
- Multi-voltage motors
- Multi-speed motors with powers higher than those listed above
- Synchronous reluctance motors
- Repair parts

CEL – China Energy Label

According to the current CEL007-2021 directive, China has a mandatory energy efficiency labeling for electric motors.

The scope includes SIMOGEAR geared motors and explosion-protected geared motors:

- Line voltage: ≤ 1000 V
- Line frequency: 50 Hz
- Power range: 0.75 kW to 375 kW
- Number of poles: 2, 4, 6, 8-pole
- Continuous duty: S1, S3 ≥ 80%
- Self-ventilated

The motors for the SIMOGEAR gearboxes are classified according to the minimum requirements corresponding to the International Efficiency (IE) in the efficiency classes (Minimum allowable values of energy efficiency and values of efficiency grades for motors) defined in Chinese standard GB 18613-2020.

IEC IE class	GB 18613-2020
IE5	Grade 1
IE4	Grade 2
IE3	Grade 3

Motors for the Eurasian Customs Union

To import geared motors into the Eurasian Customs Union area, the TR CU EAC declaration (Russia, Belarus, Kazakhstan, Armenia, Kyrgyzstan) is required.

TR CU = Technical Regulation Customs Union EAC = Eurasian Conformity

The motors have the "EAC" logo marked on the rating plate and the packaging.

The "TR CU EAC declaration" must be available; however, it is generally not included with the delivery. The customs authorities use the motor article number to check the motor certification.

The following are available in SiePortal
<https://support.industry.siemens.com/cs/ww/en/>
 and the Siemens Product Configurator
www.siemens.com/spc:

- TR CU EAC declaration in line with the low-voltage directive
- Additional TR CU EAC declaration according to the EMC Directive.

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

Motors for the Eurasian Customs Union	Additional identification code -Z with order code	Order code
	2KJ3... -.....-Z	N30
Design in accordance with EAC		

Motors for the Indian market

For export to India, the motors are available in accordance with the IS 12615:2018 standard. The IS 12615:2018 standard covers the efficiency classes IE2, IE3 and IE4 for operation at sinusoidal voltage sources. It is also valid for:

- 2, 4, 6 or 8-pole
- Rated power from 0.12 kW to 1000 kW
- Rated voltage up to 1000 V with rated frequency of 50 Hz
- Ambient temperature -20 °C to +60 °C
- Operating mode S1 (continuous duty)
Operating modes from S2 with comparably measured motors in operating mode S1 are also covered. The motors must be marked with the power corresponding to S1 and the associated IE class.
- Cooling method: IC411, IC511 and IC611

The motors must meet the requirements of the starting current limit from the IS 12615:2018 standard and are tested individually.

Motors for the Indian market	Additional identification code -Z with order code	Order code
	2KJ3... -.....-Z	N27
Design in accordance with BIS		

Note:

For motors with forced ventilation (order code **M23**), no certification is required up to motor frame size 112; sizes 225 and 250 on request.

Introduction

General technical specifications

EU directives

WEEE directive

Recycling and disposal of SIMOGEAR geared motors

EU directive 2012/19/EU governs the disposal of used electrical and electronic devices that are placed on the market in the EU. Since August 15, 2018, geared motors have also been subject to EU directive 2012/19/EU and are marked accordingly:



Information on proper disposal is provided in the latest operating instructions of the geared motors.

European RoHS directive

SIMOGEAR geared motors comply with the stipulations set up in the directive 2011/65/EU and "The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012" regarding the restriction of the use of certain hazardous substances.

Explosion protection according to ATEX

Overview

The motors and gearboxes for use in hazardous zones are designed and built according to the EU directive 2014/34/EU (ATEX). Suitable versions are available for many application conditions and hazardous zones, e.g. in explosive gas atmospheres in the chemical/ petrochemical sector or in explosive dust atmospheres in mining or food & beverage sectors. The explosion-protected geared motors are approved for use in Zone 2 (gases) and Zone 22 (dusts).

4-pole motors with efficiency classes IE3 and IE2 are available in the power range from 0.25 to 22 kW. Different types of construction, voltage versions and a wide variety of options/add-ons are available to precisely adapt the geared motors to application and customer-specific requirements.

Note:

The electric-monorail geared motors EHB are not available as explosion-protected geared motors.

Ex atmosphere / Zone		Category	Frequency	SIMOGEAR gearbox available
G (gas and steam)	D (dust)			
0	20	1	constantly or long-term	No
1	21	2	infrequently	Yes
2	22	3	rarely or briefly	Yes

Use in explosive atmospheres G (gases) is permissible for temperature classes T1 to T3. When used in explosive atmosphere D (dusts), it must be noted that the maximum permissible surface temperature for the gearbox is 120 °C. An oil level sensor can be integrated for monitoring in inaccessible areas.

Designs for SIMOGEAR explosion-protected geared motors in Zone 2 and Zone 22

Explosive zone	Explosion group	Equipment category	Equipment protection level	Marking		Additional identification code -Z with order code	
				Gearbox type of protection	Motor type of protection	2KJ3... -Z	Order code
Gas (G) Zone 2 ¹⁾	IIC	3G	Gc	Ex II 3G Ex h IIC T4 Gc Ex II 3D Ex h IIIC T120 °C Dc	Ex II 3G Ex ec IIC T3 Gc		K72 + K82 + K78 ²⁾
	IIB	3G	Gc	Ex II 3G Ex h IIB T4 Gc Ex II 3D Ex h IIIB T120 °C Dc	Ex II 3G Ex ec IIB T3 Gc		K72 + K81 + K78 ²⁾
Dust (D) Zone 22	IIIB	3D	Dc	Ex II 3G Ex h IIB T4 Gc Ex II 3D Ex h IIIB T120 °C Dc	EX II 3D Ex tc IIIB T120 °C Dc		K74 + K81 + K75 ³⁾

¹⁾ SIMOGEAR explosion-protected geared motors for use in hazardous Zone 2 (order code **K72**) may only be supplied with an electrically conductive paint finish or unpainted.

²⁾ Explosion group IIC (order code **K82**) or IIB (order code **K81**) must be selected for hazardous Zone 2. It is not necessary to separately select the temperature class (order code **K78**). This is specified automatically.

³⁾ With the selection of hazardous Zone 22, the additional order codes **K75** and **K81** are specified. These indicate the explosion group and the temperature class. It is not necessary to separately select the temperature class.

Efficiency classes for converter operation according to IEC 60034-30-2**Determination of the efficiency classes of converter-fed motors**

For the determination of the efficiency of the Converter World Motor, the method according to IEC 60034-2-3 is used. The efficiency class (IE) is defined in accordance with IEC TS 60034-30-2.

The motor is part of a frequency-variable drive system (PDS). Due to the operation on the converter, there are various motor losses:

- Fundamental frequency (e.g. iron, friction, ventilation, rotor winding, stator winding and additional losses)
- Harmonics due to the clock frequency of the feeding converter

When the measuring data is determined, the motor is fed by a SINAMICS drive converter (S120 or G120 with standard parameterization) that matches the motor size.

As converter-fed motors can be operated at different speeds, the so-called PDS90 measurement is defined by seven characteristic load points (see figure). The operating point decisive for the efficiency class is that of 90 % speed and rated torque (100 %).

Frequency converters usually have a voltage drop, so the maximum voltage at the motor terminals is lower than the line-side input voltage of the converter. The standard accommodates this and demands efficiency with the reduced speed of 90 % rated speed compared to line motors or converter motors, which are defined according to the IES class.

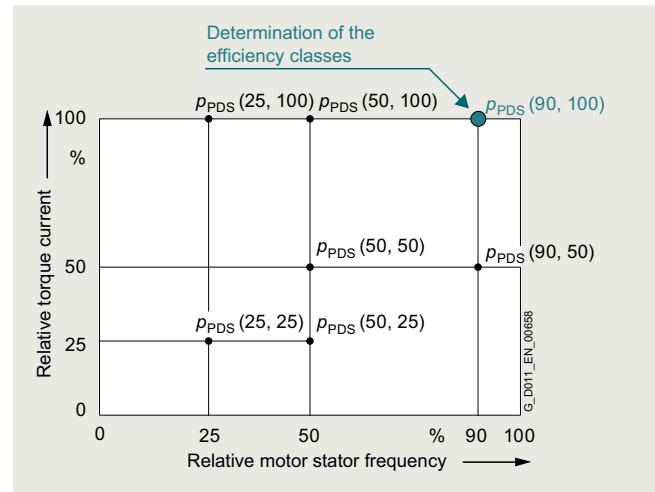


Fig. 1/19 Power Drive System (PDS) – Determination of the efficiency class

Efficiency classes and efficiencies according to IEC 60034-30-1**Harmonization of the efficiency classes**

Various energy efficiency standards exist worldwide for induction motors. To promote global standardization, the international standard IEC 60034-30-1:2014 (Rotating electrical machines – Part 30-1: Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)) was drawn up.

Applicability (excerpt)

- Low-voltage motors up to 1000 V (50/60 Hz for line operation)
- Power rating: 0.12 to 1000 kW; 2, 4, 6, or 8 poles
- Operating mode: S1

The efficiencies in IEC 60034-30-1 are based on the method for determining losses according to IEC 60034-2-1:2014.

IE efficiency classes

The efficiency classes are grouped according to the following nomenclature (IE = International Efficiency):

- IE1 (Standard Efficiency)
- IE2 (High Efficiency)
- IE3 (Premium Efficiency)
- IE4 (Super Premium Efficiency)

IEC 60034-30-1 EU and other countries	NEMA MG1	GB 18613-2020
IE4 ¹⁾		Grade 1 (IE5)
IE3	Premium Efficient (60 Hz)	Grade 2 (IE4)
IE2	Energy Efficient (60 Hz)	Grade 3 (IE3)

¹⁾ Defined in IEC/TS 60034-31.

Note:

All efficiency classes are stated with reference to 50 Hz data (unless specified otherwise).

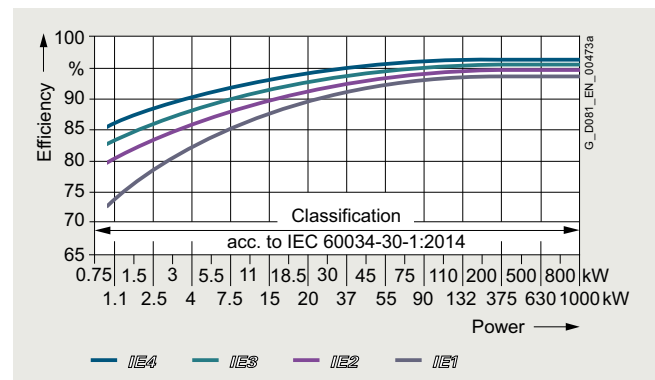
Measuring method according to IEC 60034-2-1:2014 for determining the efficiency

With this measuring method, motor losses are no longer applied as a percentage, but are determined by standard methods. The nominal efficiencies are therefore reduced from EFF1 to IE2 and from EFF2 to IE1, even though there have been no technical or physical changes to the motors.

Previously: $P_{LL} = 0.5 \% \text{ of } P_1$ (consumed power;
IEC 60034-2)

Now: $P_{LL} = \text{individual measurement (IEC 60034-1)}$

P_{LL} = Load-dependent supplementary losses



Introduction

General technical specifications

General information regarding efficiency in accordance with International Efficiency

Efficiency classes and efficiencies according to IEC 60034-30-1

Minimum efficiency according to IEC 60034-30-1:2014

Rated power P_N kW	Efficiency η in % IEC IE class							
	IE1 Standard Efficiency				IE2 High Efficiency			
	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole
0.18	52.8	57.0	45.5	38.0	60.4	64.7	56.6	45.9
0.20	54.6	58.5	47.6	39.7	61.9	65.9	58.2	47.4
0.25	58.2	61.5	52.1	43.4	64.8	68.5	61.6	50.6
0.37	63.9	66.0	59.7	49.7	69.5	72.7	67.6	56.1
0.40	64.9	66.8	61.1	50.9	70.4	73.5	68.8	57.2
0.55	69.0	70.0	65.8	56.1	74.1	77.1	73.1	61.7
0.75	72.1	72.1	70.0	61.2	77.4	79.6	75.9	66.2
1.1	75.0	75.0	72.9	66.5	79.6	81.4	78.1	70.8
1.5	77.2	77.2	75.2	70.2	81.3	82.8	79.8	74.1
2.2	79.7	79.7	77.7	74.2	83.2	84.3	81.8	77.6
3.0	81.5	81.5	79.7	77.0	84.6	85.5	83.3	80.0
4.0	83.1	83.1	81.4	79.2	85.8	86.6	84.6	81.9
5.5	84.7	84.7	83.1	81.4	87.0	87.7	86.0	83.8
7.5	86.0	86.0	84.7	83.1	88.1	88.7	87.2	85.3
11	87.6	87.6	86.4	85.0	89.4	89.8	88.7	86.9
15	88.7	88.7	87.7	86.2	90.3	90.6	89.7	88.0
18.5	89.3	89.3	88.6	86.9	90.9	91.2	90.4	88.6
22	89.9	89.9	89.2	87.4	91.3	91.6	90.9	89.1
30	90.7	90.7	90.2	88.3	92.0	92.3	91.7	89.8
37	91.2	91.2	90.8	88.8	92.5	92.7	92.2	90.3
45	91.7	91.7	91.4	89.2	92.9	93.1	92.7	90.7
55	92.1	92.1	91.9	89.7	93.2	93.5	93.1	91.0
75	92.7	92.7	92.6	90.3	93.8	94.0	93.7	91.6
90	93.0	93.0	92.9	90.7	94.1	94.2	94.0	91.9
110	93.3	93.3	93.3	91.1	94.3	94.5	94.3	92.3
132	93.5	93.5	93.5	91.5	94.6	94.7	94.6	92.6
160	93.8	93.8	93.8	91.9	94.8	94.9	94.8	93.0
200 ... 375	94.0	94.0	94.0	92.5	95.0	95.1	95.0	93.5

Rated power P_N kW	Efficiency η in % IEC IE class							
	IE3 Premium Efficiency				IE4 Super Premium Efficiency			
	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole
0.18	65.9	69.9	63.9	58.7	70.8	74.7	70.1	67.2
0.20	67.2	71.1	65.4	60.6	71.9	75.8	71.4	68.4
0.25	69.7	73.5	68.6	64.1	74.3	77.9	74.1	70.8
0.37	73.8	77.3	73.5	69.3	78.1	81.1	78.0	74.3
0.40	74.6	78.0	74.4	70.1	78.9	81.7	78.7	74.9
0.55	77.8	80.8	77.2	73.0	81.5	83.9	80.9	77.0
0.75	80.7	82.5	78.9	75.0	83.5	85.7	82.7	78.4
1.1	82.7	84.1	81.0	77.7	85.2	87.2	84.5	80.8
1.5	84.2	85.3	82.5	79.7	86.5	88.2	85.9	82.6
2.2	85.9	86.7	84.3	81.9	88.0	89.5	87.4	84.5
3.0	87.1	87.7	85.6	83.5	89.1	90.4	88.6	85.9
4.0	88.1	88.6	86.8	84.8	90.0	91.1	89.5	87.1
5.5	89.2	89.6	88.0	86.2	90.9	91.9	90.5	88.3
7.5	90.1	90.4	89.1	87.3	91.7	92.6	91.3	89.3
11	91.2	91.4	90.3	88.6	92.6	93.3	92.3	90.4
15	91.9	92.1	91.2	89.6	93.3	93.9	92.9	91.2
18.5	92.4	92.6	91.7	90.1	93.7	94.2	93.4	91.7
22	92.7	93.0	92.2	90.6	94.0	94.5	93.7	92.1
30	93.3	93.6	92.9	91.3	94.5	94.9	94.2	92.7
37	93.7	93.9	93.3	91.8	94.8	95.2	94.5	93.1
45	94.0	94.2	93.7	92.2	95.0	95.4	94.8	93.4
55	94.3	94.6	94.1	92.5	95.3	95.7	95.1	93.7
75	94.7	95.0	94.6	93.1	95.6	96.0	95.4	94.2
90	95.0	95.2	94.9	93.4	95.8	96.1	95.6	94.4
110	95.2	95.4	95.1	93.7	96.0	96.3	95.8	94.7
132	95.4	95.6	95.4	94.0	96.2	96.4	96.0	94.9
160	95.6	95.8	95.6	94.3	96.3	96.6	96.2	95.1
200 ... 375	95.8	96.0	95.8	94.6	96.5	96.7	96.3	95.4

Background information

Comprehensive laws have been introduced in the European Union (EU) with the objective of reducing energy consumption and therefore CO₂ emissions. EU directive 2019/1781 handles the energy consumption or efficiency of induction motors in the industrial environment. This regulation is in force in every country of the European Economic Area. The main contents of and exceptions are explained below.

For more information on internationally applicable standards and legal requirements, visit:

www.siemens.com/international-efficiency

Regulation (EU) 2019/1781

Exceptions

- Motors that are designed to be operated totally submerged in a liquid
- Motors fully integrated into a product (e.g. a gearbox, pump, fan or compressor) whose energy efficiency cannot be measured independently of this product
- Motors that are specially designed for operation under the following conditions:
 - At altitudes greater than 4000 meters above sea level
 - Where ambient temperatures exceed 60 °C
 - At maximum operating temperatures above 400 °C
 - At ambient temperatures below -30 °C
 - With cooling liquid temperatures at the product intake of below 0 °C or above 32 °C
- Motors in hazardous zones in the sense of directive 2014/34/EU of the European Parliament and the Council that are designed and certified for mining applications
- Motors with an integrated brake that is an integral part of the inner motor design and can neither be removed or powered from a separate source when testing the motor efficiency
- Motors with an integrated speed control (compact drives), whose energy efficiency cannot be tested independently of the speed control

The following motors are not involved:

- Pole-changing motors
- Synchronous motors
- Totally enclosed, naturally ventilated motors (TENV motors);
- Motors specifically developed for converter operation according to IEC 60034-25

Note:

Different minimum efficiency class requirements apply in China, Korea, and Australia. Other countries will be available soon.

Motors for the North American market

The Energy Policy Act (EPA) was superseded in December 2010 by the Energy Independence Security Act (EISA).

The following motors must fulfill the NEMA Premium Efficient Level:

- 1 hp (0.75 kW) ... 500 hp (373 kW): 2 and 4-pole
- 1 hp (0.75 kW) ... 350 hp (261 kW): 6-pole
- 1 hp (0.75 kW) ... 250 hp (186 kW): 8-pole
- 2, 4, 6 and 8-pole
- ≤ 600 V
- NEMA Design A, B or C. IEC Design N or H

For details, see NEMA MG1 Table 12-12.1

Abbreviations

NEMA: National Electrical Manufacturers Association

IEC: International Electrotechnical Commission

Geared motor noise

SIMOGEAR geared motors have noise levels below the permissible noise levels defined for gearboxes in VDI Guideline 2159 and for motors in IEC 60034-9.

When used in conjunction with gearboxes, the motor noise values L_{pFA} or L_{WA} increase on average by 3 to 5 dB (A).

The circumferential velocity of the motor pinion has a significant influence on the additional gearbox noise level. This is the reason that higher speeds or low transmission ratios result in higher noise.

Here, SIMOGEAR geared motors provide a decisive advantage, as the motor plug-on pinion allows transmission ratios of up to 12 in the input stage.

Code	Description	Unit
L_{pFA}	A-weighted measuring-surface sound pressure level	dB (A)
L_{WA}	Sound power level	dB (A)

Motor noise in line operation

The noise level is measured according to ISO 1680 in a low-reflection room and is specified as an A-weighted measuring surface sound pressure level L_{pFA} in dB (A). This value is the spatial average value of the sound pressure levels measured at the measuring surface. The measuring surface is a cube 1 m away from the surface of the motor. The sound power level L_{WA} is also specified in dB (A).

The values specified in the motor selection tables apply to the motor without gearbox at 50 Hz

[Selection and ordering data, see page 9/18.](#)

The tolerance is +3 dB. At 60 Hz, the values are approximately 4 dB (A) higher. Noise values for converter operation on request.

Direction of rotation

Overview

All geared motors are connected as standard so that the motor rotates in the clockwise direction.

It is necessary to specify the desired direction of rotation of the output shaft when ordering a geared motor with backstop.

Note:

For bevel gearboxes B and K, helical worm gearboxes C, and worm gearboxes S, the direction of rotation must be specified when viewing the DE (A) or NDE (B).

The direction of rotation of the output shaft cannot be selected for explosion-protected motors (MB motors) and electric-monorail geared motors.

Direction of rotation	Abbreviation	Description	Additional identification code -Z with order code 2KJ3... -.....-Z	Order code
Clockwise	CW	Clockwise direction of rotation (when viewing the input/output shaft)		K18
Counterclockwise	CCW	Counterclockwise direction of rotation (when viewing the input/output shaft)		K19

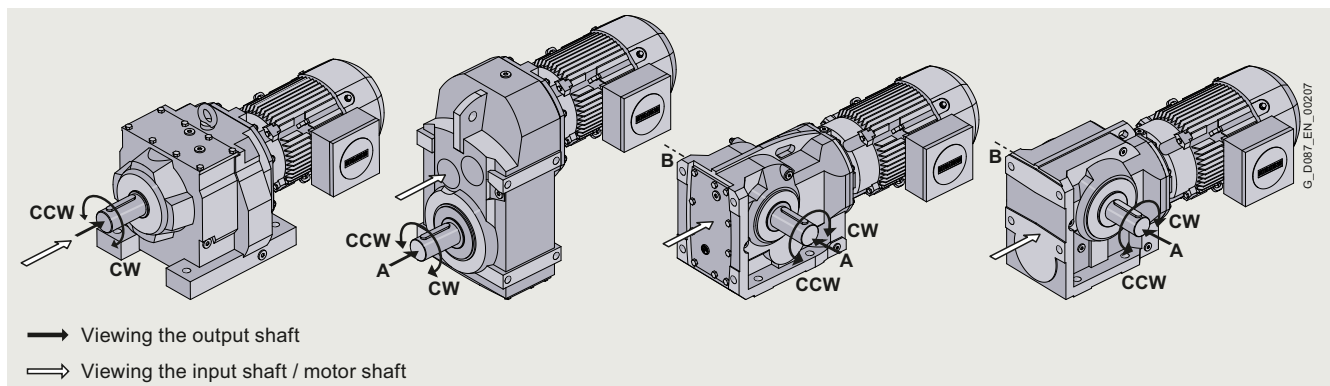


Fig. 1/20 Definition of the direction of rotation

Direction of rotation, input to output

Gearbox type	Gearbox size	Gearbox stages	Output side	Direction of rotation	
				Input shaft	Output shaft
Z	19 ... 189	2	–	CW	CW
D	19 ... 189	3	–	CW	CCW
FZ	29 ... 189	2	–	CW	CW
FD	29 ... 189	3	–	CW	CCW
B	19 ... 49	2	A	CW	CW
			B	CW	CCW
K	39 ... 189	3	A	CW	CCW
			B	CW	CCW
C	29 ... 89	2	A	CW	CW
			B	CW	CCW
S	09 ... 29	1	A	CW	CCW
			B	CW	CW

Introduction

Notes

1