SEW EURODRIVE

Catalog

MOVIMOT® Gearmotors
With DR. AC Motors

Edition 05/2013

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Contents

1 Introduction

1.1 The SEW-EURODRIVE Group of Companies

1.1.1 Global presence

Driving the world – with innovative drive solutions for all industries and for every application. Products and systems from SEW-EURODRIVE are used all over the world. Be it in the automotive, building materials, food and beverage or metal-processing industry: The decision to use drive technology "made by SEW-EURODRIVE" stands for reliability for both functionality and investment.

We are represented in the most important branches of industry all over the world: with 15 manufacturing plants and 75 Drive Technology Centers worldwide and our customer support, which we consider an integrative service that continues our commitment to outstanding quality.

1.1.2 Always the right drive

The SEW-EURODRIVE modular concept offers millions of combinations. This wide selection enables you to choose the correct drive for any application, each based on the required speed and torque range, space available and the ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to face your drive challenges.

The gearmotors are electronically empowered by MOVITRAC® frequency inverters, MOVIDRIVE® drive inverters and MOVIAXIS® multi-axis servo inverters, a combination that blends perfectly with the existing SEW-EURODRIVE program. As in the case for mechanical systems, the development, production and assembly is also carried out completely by SEW-EURODRIVE. In combination with our drive electronics, these drives provide the utmost in flexibility.

Products of the servo drive system, such as low backlash servo gear units, compact servomotors or MOVIAXIS® multi-axis servo drives provide precision and dynamics. From single-axis or multi-axis applications all the way to synchronized process sequences, servo drive systems by SEW-EURODRIVE offer a flexible and customized implementation of your application.

For economical, decentralized installations, SEW-EURODRIVE offers components from its decentralized drive system, such as MOVIMOT®, the gearmotor with integrated frequency inverter or MOVI-SWITCH®, the gearmotor with integrated switching and protection function. SEW-EURODRIVE hybrid cables have been designed specifically to ensure cost-effective solutions, independent of the philosophy behind or the size of the system. The latest developments from SEW-EURODRIVE: DRC electronic motor, MOVIGEAR® mechatronic drive system, MOVIFIT® decentralized drive control, MOVIPRO® decentralized drive, positioning and application controller, and MOVITRANS® system components for contactless energy transfer.

Power, quality and sturdy design combined in one standard product: With high torque levels, industrial gear units from SEW-EURODRIVE realize major movements. The modular concept will once again provide optimum adaptation of industrial gear units to meet a wide range of different applications.

1.1.3 Your ideal partner

Its global presence, extensive product range and broad spectrum of services make SEW-EURODRIVE the ideal partner for the machinery and plant construction industry when it comes to providing drive systems for demanding drive tasks in all industries and applications.

1.2 Products and systems from SEW-EURODRIVE

The products and systems from SEW-EURODRIVE are divided into four product groups. These four product groups are:

1. Gearmotors and frequency inverters
2. Servo drive systems
3. Decentralized drive systems
4. Industrial gear units

Products and systems used in several group applications are listed in a separate group entitled "products and systems covering several product groups." Consult the following tables to locate the products and systems included in the respective product group:

1. Gearmotors and frequency inverters		
Gear units/gearmotors	**Motors**	**Frequency inverter**
• Helical gear units/helical gearmotors • Parallel shaft helical gear units / parallel shaft helical gearmotors • Helical-bevel gear units / helical-bevel gearmotors • Helical-worm gear units / helical-worm gearmotors • SPIROPLAN® right-angle gearmotors • EMS drives • Geared torque motors • Pole-changing gearmotors • Variable speed gear units/variable speed gearmotors • Aseptic gearmotors • Gear units/gearmotors to ATEX standard • Variable speed gear units/variable speed gearmotors to ATEX standard	• Asynchronous AC motors/AC brakemotors • Pole-changing AC motors/AC brakemotors • Energy-efficient motors • Explosion-proof AC motors/AC brakemotors • Torque motors • Single-phase motors/single-phase brakemotors • Asynchronous linear motors	• MOVITRAC® frequency inverters • MOVIDRIVE® inverters • Control, technology and communication options for inverters

2nd Servo drive systems		
Servo gear units/servo gearmotors	**Servomotors**	**Servo drive inverters/servo inverters**
• Low backlash planetary servo gear units/planetary gearmotors • Low backlash helical-bevel servo gear units/helical-bevel gearmotors • R, F, K, S, W gear units/gearmotors • Explosion-proof servo gear units/servo gearmotors	• Asynchronous servomotors/servo brakemotors • Synchronous servomotors/servo brakemotors • Explosion-proof servomotors/servo brakemotors • Synchronous linear motors	• MOVIDRIVE® servo inverters • MOVIAXIS® multi-axis servo inverters • Control, technology and communication options for servo drive inverters and servo inverters

3rd Decentralized drive systems		
Decentralized drives	**Communication and installation**	**Contactless energy transfer**
• DRC electronic motor / MOVIGEAR® mechatronic drive system – DBC – Direct Binary Communication – DAC – Direct AS-Interface Communication – DSC – Direct SBus Communication – SNI – Single Line Network Installation • MOVIMOT® gearmotors with integrated frequency inverter • MOVIMOT® motors/brakemotors with integrated frequency inverter • MOVI-SWITCH® gearmotors with integrated switching and protection function • MOVI-SWITCH® motors/brakemotors with integrated switching and protection function • Explosion-proof MOVIMOT® and MOVI-SWITCH® gearmotors	• Fieldbus interfaces • Field distributors for decentralized installation • MOVIFIT® product range – MOVIFIT® FDC for controlling MOVIGEAR® and DRC drive units – MOVIFIT® MC for controlling MOVIMOT® drives – MOVIFIT® SC with integrated electronic motor starter – MOVIFIT® FC with integrated frequency inverter • MOVIPRO® product range – MOVIPRO® SDC decentralized drive and position controller – MOVIPRO® ADC decentralized drive and application controller	• MOVITRANS® system – Stationary components for energy supply – Mobile components for energy consumption – Line cables and installation material

4. Industrial gear units
• Helical gear units • Bevel-helical gear units • Planetary gear units

Products and systems covering several product groups
• Operator terminals • MOVI-PLC® drive-based control system

In addition to products and systems, SEW-EURODRIVE offers a comprehensive range of services. These include:

- Technical consulting
- Application software
- Seminars and training
- Extensive technical documentation
- International customer service

Visit our homepage at

→ **www.sew-eurodrive.com**

The website provides comprehensive information and services.

1.3 Contents of this publication

This MOVIMOT® gearmotors price catalog/catalog includes the detailed technical data of the following SEW-EURODRIVE product groups:

- DR helical gearmotors with MOVIMOT® inverter

- DR parallel-shaft helical gearmotors with MOVIMOT® inverter
- DR helical-bevel gearmotors with MOVIMOT® inverter
- DR helical-worm gearmotors with MOVIMOT® inverter
- DR SPIROPLAN® gearmotors with MOVIMOT® inverter

The price catalogs and catalogs offer the following information:

- Product descriptions
- Type designations
- Project planning instructions for drives and gear units
- Description of mounting positions
- Explanation on the order information
- Design and Operating Notes
- Important information on tables and dimension sheets
- Description of the different types
- Overview of all permitted combinations
- Selection tables for DR gearmotors
- Dimension sheets for DR gearmotors
- Technical data
- Price catalog → prices and option pricing of options and accessories

1.4 Additional documentation

In addition to the "MOVIMOT® Gearmotors" catalog / price catalog, SEW-EURODRIVE also offers a "DR Gearmotors" catalog and a "DR AC Motors" catalog.

These catalogs offer the following information:

- Type designations
- Product descriptions
- Notes on the project planning for the motors
- Technical data of the motors
- Technical data of the options and additional features
- Important information on the dimensions sheets
- Dimension sheets of the motors
- Information on brakes from SEW-EURODRIVE
- Information on prefabricated cables
- Price catalog → prices and option pricing of options and accessories

For detailed information about the MOVIMOT® gearmotors with LSPM technology, refer to the "MOVIMOT® Gearmotors (LSPM Technology) DR.71SJ - DR.100LJ with R, F, K and W Gear Units" addendum.

The complete range of technical documentation is available from our website: **"www.sew-eurodrive.com"**

1.5 Copyright

1.6 Product names and trademarks

All product names in this documentation are trademarks or registered trademarks of their respective titleholders.

2 Product Description

2.1 General information

2.1.1 Operating temperature

Gear units and gearmotors from SEW-EURODRIVE can be operated in a wide ambient temperature range. The following standard temperature ranges are permitted for filling the gear units according to the lubricant table:

Gear unit	Filled with	Permitted standard temperature range
Helical, parallel shaft helical and helical-bevel gear units	CLP(CC) VG220	-15 °C to +40 °C
Helical-worm gear unit	CLP(CC) VG680	0 °C to +40 °C
SPIROPLAN® gear unit	CLP(SEW-PG) VG460	-20 °C to +40 °C

The rated data of the gear units and gearmotors specified in the catalog/price catalog refer to an ambient temperature of +25 °C.

Gear units and gearmotors from SEW-EURODRIVE can be operated outside the standard temperature range if project planning is adapted to ambient temperatures from as low as up to -30 °C in the intensive cooling range until up to +60 °C. Project planning must take special operating conditions into account and adapt the drive to the ambient conditions by selecting suitable lubricants and seals.

This kind of project planning is generally recommended for increased ambient temperatures as of size 97 and for helical-worm gear units with small gear ratios. SEW-EURODRIVE is happy to carry out this project planning for you.

If the drive is to be operated on a frequency inverter, you must also consider the project planning notes for the inverter and take into account the thermal effects of inverter operation.

2.1.2 Installation altitude

Due to the low air density at high installation altitudes, heat dissipation on the surface of motors and gear units decreases. The rated data listed in the catalog applies to an installation altitude of maximum 1000 m above sea level. Installation altitudes of more than 1000 m above sea level must be taken into account for project planning of gear units and gearmotors.

2.1.3 Power and torque

The power and torque ratings listed in the catalogs refer to mounting position M1 and similar mounting positions in which the input stage is not completely submerged in oil. In addition, the gearmotors are assumed to be standard versions with standard lubrication and under normal ambient conditions.

2.1.4 Speed ratings

The specified output speeds are recommended values. You can calculate the output speed based on the speed of the motor and the gear unit ratio.

2.1.5 Noise

The noise levels of all SEW-EURODRIVE gear units, motors and gearmotors are well within the maximum permitted noise levels set forth in the VDI guideline 2159 for gear units and IEC/EN 60034 for motors.

2.1.6 Painting

Gear units from SEW-EURODRIVE are painted as follows:

Gear unit	Coating according to standard 1843
R, F, K, S, W gear units	blue/gray RAL 7031

Special paints are available on request.

2.1.7 Surface and corrosion protection

If required, all gear units, motors and gearmotors can also be supplied with special surface protection for applications in extremely humid and chemically aggressive environments.

2.1.8 Weight

Please note that the weight information shown in the catalogs excludes the oil fill for the gear units and gearmotors. The weight varies according to gear unit design and gear unit size. The lubricant fill depends on the mounting position selected, which means that in this case no universally applicable information can be given. Refer to the "Design and Operating Notes / Lubricants" chapter for recommended lubricant fill quantities depending on the mounting position. For the exact weight, refer to the order confirmation.

2.1.9 Heat dissipation and accessibility

The gearmotors/brakemotors must be mounted on the driven machine in such a way that both axially and radially, there is enough space left for unimpeded air admission and heat dissipation, for maintenance work on the brake and, if required, for the MOVIMOT® inverter. Please also refer to the notes in the motor dimension sheets.

2.1.10 Reduced backlash variant

Helical, parallel-shaft helical and helical-bevel gear units with reduced backlash are available as of gear unit size 37. The circumferential backlash of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. The circumferential backlash is specified in angular minutes in the technical data. The circumferential backlash for the output shaft is specified without load (max. 1% of the rated output torque); the gear unit input end is blocked. The dimension drawings for the standard versions are applicable.

2.1.11 RM gear units, RM gearmotors

RM gear units and RM gearmotors are a special type of helical gear units with an extended output bearing hub. They were designed especially for agitating applications and allow for high overhung and axial loads and bending moments. The other data are the same as for standard helical gear units and standard helical gearmotors. You can find special project planning notes for RM gearmotors in the "Project Planning/RM gear units" chapter.

2.1.12 Spiroplan® right-angle gearmotors

SPIROPLAN® right-angle gearmotors are robust, single- and two-stage right-angle gearmotors with SPIROPLAN® gearing. The difference to the helical-worm gear units is the material combination of the steel-on-steel gearing, the special tooth meshing relationships and the aluminum housing. As a result, the SPIROPLAN® right-angle gearmotors are wear-free, very quiet-running and lightweight.

The particularly short design and the aluminum housing make for very compact and lightweight drive solutions.

The wear-free gearing and lifetime lubrication make for long periods of maintenance-free operation. The identical hole spacing in the foot and face as well as the same axle height to both makes for a number of mounting options.

Two different flange diameters are available. On request, SPRIOPLAN® right-angle gearmotors can be equipped with a torque arm.

2.1.13 Brakemotors

On request, the motors can be supplied with an integrated mechanical brake. The SEW-EURODRIVE brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. Due to its operating principle, the brake is applied if the power fails. It meets the basic safety requirements. The brake can also be released mechanically if equipped with manual brake release. For this purpose, the brake is supplied with either a hand lever with automatic reset or an adjustable setscrew. The brake is controlled by the MOVIMOT® inverter.

A characteristic feature of the brakes is their extremely short design. The brake bearing end shield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brakemotor permits particularly compact and sturdy solutions.

2.1.14 International markets

On request, SEW-EURODRIVE delivers UL-approved MOVIMOT® drives for the North American market or special variants for the Asian market.

Contact your sales representative to assist you in such cases.

2.2 Surface protection

2.2.1 General information

SEW-EURODRIVE offers the following optional protective measure for operating gear units under special environmental conditions.

- Surface protection OS for motors and gear units
- Special optional protective measures for the output shafts are also available.

2.2.2 OS surface protection

Instead of the standard surface protection, the motors and gear units are available with surface protection OS1 as an option.

Surface protection		Ambient conditions	Sample applications
Standard		Suitable for machines and systems in buildings and rooms indoors with neutral atmospheres. Similar to corrosivity category[1]: • C1 (negligible)	• Machines and systems in the automobile industry • Transport systems in logistics • Conveyor belts at airports
OS1		Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protection. According to corrosivity category[1]: • C2 (low)	• Systems in saw mills • Hall gates • Agitators and mixers

1) According to DIN EN ISO 12944-2, classification of ambient conditions

2.2.3 Special protection measures

Gearmotor output shafts can be treated with special optional protective measures for operation subject to severe environmental pollution or in particularly demanding applications.

Measure	Protection principle	Suitable for
Fluorocarbon rubber oil seal (Viton)	High quality material	Drives subject to chemical contamination
Coating on output shaft end	Surface coating of the contact surface of the oil seal	Severe environmental impact and in conjunction with fluorocarbon rubber oil seal (Viton)
Output shaft made of stainless steel	Surface protection with high-quality material	Particularly demanding applications in terms of surface protection

2.2.4 NOCO® fluid

As standard, SEW-EURODRIVE supplies NOCO® fluid corrosion protection and lubricant with every hollow shaft gear unit. Use NOCO® fluid when installing hollow shaft gear units. Using this fluid can help prevent contact corrosion and makes it easier to disassemble the drive at a later time. NOCO® fluid is also suitable for protecting machined metal surfaces that do not have corrosion protection. such as parts of shaft ends or flanges. You can also order larger quantities of NOCO® fluid from SEW-EURODRIVE.

NOCO® fluid is food grade according to USDA-H1. The food-grade NOCO® fluid has a corresponding NSF-H1 label on the packaging.

2.3 Extended storage

2.3.1 Variant

You can also order gear units designed for "extended storage". SEW-EURODRIVE recommends the extended storage type for storage periods longer than 9 months.

The lubricant of those gear units is then mixed with a VCI anti-corrosion agent (**v**olatile **c**orrosion **i**nhibitors). Please note that this VCI anti-corrosion agent is only effective in a temperature range of -25 °C to +50 °C. The flange contact surfaces and shaft ends are also treated with an anti-corrosion agent. If not specified otherwise in your order, the gear unit with "extended storage" option will be supplied with OS1 surface protection.

INFORMATION

The gear units must remain tightly sealed until taken into operation to prevent the VCI corrosion protection agent from evaporating.

The gear units come with the oil fill according to the specified mounting position (M1 – M6). Always check the oil level before you take the gear unit into operation.

2.3.2 Storage conditions

Observe the storage conditions specified in the following table for extended storage:

Climate zone	Packaging[1)]	Storage[2)]	Storage duration
Temperate (Europe, USA, Canada, China and Russia, excluding tropical zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap.	Under roof, protected against rain and snow, no shock loads.	Up to 3 years with regular checks of the packaging and moisture indicator (rel. humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks.	2 years or more with regular inspections. Check for cleanliness and mechanical damage during inspection. Check corrosion protection.
Tropical (Asia, Africa, Central and South America, Australia, New Zealand excluding temperate zones)	Packed in containers, with desiccant and moisture indicator sealed in the plastic wrap. Protected against insect damage and mildew by chemical treatment.	With roof, protected against rain and shocks.	Up to 3 years with regular checks of the packaging and moisture indicator (rel. humidity < 50%).
	Open	Under roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 50 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors, no shocks. Protected against insect damage.	2 years or more with regular inspections. Check for cleanliness and mechanical damage during inspection. Check corrosion protection.

1) The packaging must be carried out by an experienced company using the packaging materials that have been explicitly specified for the particular application.

2) SEW-EURODRIVE recommends to store the gear units according to the mounting position.

2.4 Condition monitoring: Oil aging and vibration sensor

2.4.1 Diagnostic unit DUO10A (oil aging sensor)

Gear unit diagnostics by means of thermal analysis

The DUO10A diagnostic unit allows for diagnostic analysis as a means of preventive maintenance. The DUO10A diagnostic unit determines the individual, remaining service life of the oil based on the known service life curves and the oil temperature. The diagnostic unit consists of a temperature sensor and the actual evaluation unit. The remaining service life and the temperature of the oil can be read off via the display at the evaluation unit. The diagnostic unit is characterized by simple operation and user-friendly handling.

2.4.2 Diagnostic unit DUV10A (vibration sensor)

Roller bearing diagnostics by means of vibration analysis

The DUV10A diagnostic unit monitors roller bearings, gearings for imbalance, and possible damages. Vibration analysis is used to detect possible damages at an early stage. This device allows for permanent vibration monitoring. The condition and development of the damage can be directly read off at the device, or can be visualized externally using switch outputs.

3 Overview of Types and Variants

3.1 Variants and gear unit options

Below an overview of type designations for R, F, K, S, and W gear units and their options.

3.1.1 Helical gear unit

Designation	
RX..	Single-stage foot-mounted design
RXF..	Single-stage B5 flange-mounted
R..	Foot-mounted
R..F	Foot-mounted and B5 flange-mounted
RF..	B5 flange-mounted
RZ..	B14 flange-mounted
RM..	B5 flange-mounted type with extended bearing hub

3.1.2 Parallel-shaft helical gear unit

Designation	
F..	Foot-mounted
FA..B	Foot-mounted and hollow shaft
FH..B	Foot-mounted and hollow shaft with shrink disk
FV..B	Foot-mounted and hollow shaft with splined hollow shaft to DIN 5480
FF..	B5 flange-mounted
FAF..	B5 flange-mounted and hollow shaft
FHF..	B5 flange-mounted and hollow shaft with shrink disk
FVF..	B5 flange-mounted and hollow shaft with splined hollow shaft to DIN 5480
FA..	Hollow shaft
FH..	Hollow shaft with shrink disk
FT..	Hollow shaft with TorqLOC® hollow shaft mounting system
FV..	Hollow shaft with splining to DIN 5480
FAZ..	B14 flange-mounted and hollow shaft
FHZ..	B14 flange-mounted and hollow shaft with shrink disk
FVZ..	B14 flange-mounted and hollow shaft with splined hollow shaft to DIN 5480

3.1.3 Helical-bevel gear unit

Designation	
K..	Foot-mounted
KA..B	Foot-mounted and hollow shaft
KH..B	Foot-mounted and hollow shaft with shrink disk
KV..B	Foot-mounted and hollow shaft with splined hollow shaft to DIN 5480
KF..	B5 flange-mounted
KAF..	B5 flange-mounted and hollow shaft
KHF..	B5 flange-mounted and hollow shaft with shrink disk
KVF..	B5 flange-mounted and hollow shaft with splined hollow shaft to DIN 5480
KA..	Hollow shaft
KH..	Hollow shaft with shrink disk
KT..	Hollow shaft with TorqLOC® hollow shaft mounting system
KV..	Hollow shaft with splining to DIN 5480
KAZ..	B14 flange-mounted and hollow shaft
KHZ..	B14 flange-mounted and hollow shaft with shrink disk
KVZ..	B14 flange-mounted and hollow shaft with splined hollow shaft to DIN 5480

3.1.4 Helical-worm gear unit

Designation	
S..	Foot-mounted
SF..	B5 flange-mounted
SAF..	B5 flange-mounted and hollow shaft
SHF..	B5 flange-mounted and hollow shaft with shrink disk
SA..	Hollow shaft
SH..	Hollow shaft with shrink disk
ST..	Hollow shaft with TorqLOC® hollow shaft mounting system
SAZ..	B14 flange-mounted and hollow shaft
SHZ..	B14 flange-mounted and hollow shaft with shrink disk

3.1.5 SPIROPLAN® gear unit

Designation	
W..	Foot-mounted
WF..	Flange-mounted
WAF..	Flange-mounted variant and hollow shaft
WA..	Hollow shaft
WA..B	Foot-mounted and hollow shaft
WH..B	Foot-mounted and hollow shaft with shrink disk
WHF..	Flange-mounted, hollow shaft with shrink disk
WH..	Hollow shaft with shrink disk
WT..	Hollow shaft with TorqLOC® hollow shaft mounting system

3.1.6 Options

R, F and K gear units:

Designation	
/R	Reduced backlash

K, S and W gear units:

Designation	
/T	With torque arm

F gear units:

Designation	
/G	With rubber buffer

3.1.7 Condition monitoring

Designation	Option
/DUO	Diagnostic Unit Oil = Oil aging sensor
/DUV	Diagnostic unit vibration = vibration sensor

3.2 Variants and options of the EDR motor series

3.2.1 AC motor series

Designation	
DRS...	Motor, Standard Efficiency IE1
DRE...	Energy-efficient motor, High Efficiency IE2
DRP...	Energy-efficient motor, Premium Efficiency IE3
DRE...J	Line start permanent magnet motor (LSPM motor)
DRU...J	Energy-efficient motor, Super Premium Efficiency IE4
71 – 132	Sizes: 71 / 80 / 90 / 100 / 112 / 132
K – L, LC	Lengths: K= very short / S = short / M = medium / L = long LC = Rotors with copper cage
4	Number of poles

3.2.2 Output variants

Designation	Option
/FI	IEC foot-mounted motor with specification of shaft height
/FG	7 series integral motor, as stand-alone motor
/FF	IEC flange-mounted motor with bore holes
/FT	IEC flange-mounted motor with threads
/FL	General flange-mounted motor (other than IEC)
/FM	7-series integral gearmotor with IEC feet, with specification of shaft height if required
/FE	IEC flange-mounted motor with bore holes and IEC feet, with specification of shaft height
/FY	IEC flange-mounted motor with thread and IEC feet, with specification of shaft height if required
/FK	General flange-mounted motor (other than IEC) with feet, with specification of shaft height if required
/FC	C-face flange-mounted motor, dimensions in inch

3.2.3 Mechanical attachments

Designation	Option
BE..	Spring-loaded brake with specification of size
HR	Manual brake release of the brake, automatic disengaging function
HF	Manual brake release, lockable
/RS	Backstop
/MSW	MOVI-SWITCH®
/MI	Motor identification module for MOVIMOT®
/MM03 – MM40	MOVIMOT®
/MO	MOVIMOT® option(s)

3.2.4 Encoder

Designation	Option
/EI7.	Mounted speed sensor with HTL interface EI7C with 24 periods EI76 with 6 periods EI72 with 2 periods EI71 with 1 period

3.2.5 Connection options

Designation	Option
/ASA.	Harting HAN®-10 ES pin element (built-on housing with two clips)
/AMA.	Harting HAN Modular® pin element (built-on housing with 2 clips)
/AMD.	Harting HAN Modular® pin element (built-on housing with 1 clip)
/AVT.	M12 x 1 round plug connector

3.2.6 Ventilation

Designation	Option
/V	Forced cooling fan
/C	Protection canopy for the fan guard
/LF	Air filter
/LN	Low-noise fan guard (for DR.71 – 100)

3.2.7 Condition monitoring

Designation	Option
/DUB	Diagnostic unit brake = brake monitoring
/DUV	Diagnostic unit vibration = vibration sensor

3.2.8 Other additional features

Designation	Option
/DH	Condensation drain hole
/RI	Reinforced winding insulation
/2W	Second shaft end on the motor/brakemotor

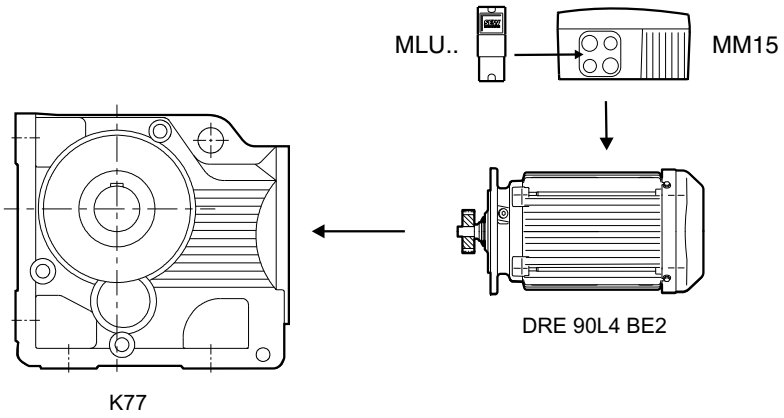
3.3 Example of the type designation of a DR gearmotor

The type designation of the gearmotor starts from the component on the output end. For example, a helical-bevel gearmotor with MOVIMOT® option has the following type designation:

K 77 DRE 90L4 BE2 / MM15 / MO

- **Additional feature: inverter** [1)]
- **MOVIMOT® inverter**
- **Optional design motor (brake)**
- **Size, number of poles on motor**
- **Motor series**
- **Gear unit size**
- **Gear unit series**

1) The nameplate only displays options installed at the factory.



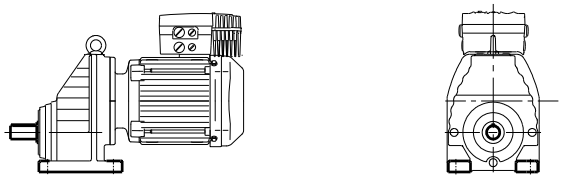
3.4 Gearmotor types

INFORMATION

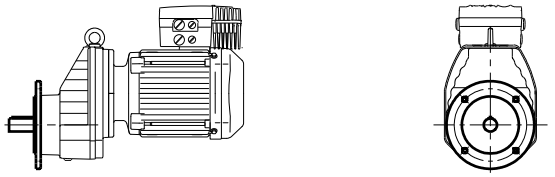
The types described in this chapter refer to DR gearmotors from SEW-EURODRIVE. They also apply to gear units without motors.

3.4.1 Helical gearmotors

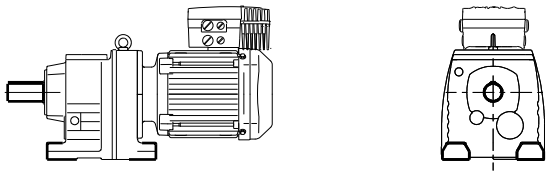
The following versions of helical gearmotors can be supplied:



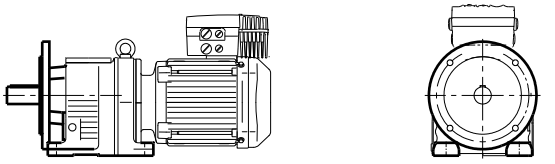
RX..DR../MM..
Single-stage foot-mounted helical gearmotor



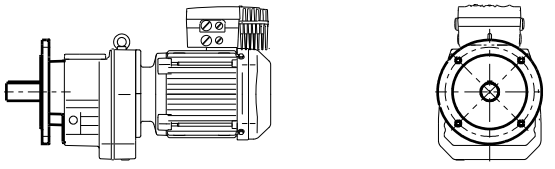
RXF..DR../MM..
Single-stage B5 flange-mounted helical gearmotor



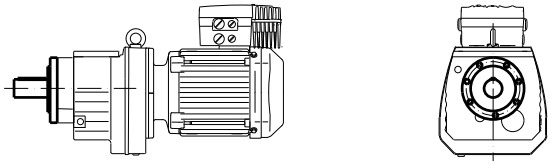
R..DR../MM..
Foot-mounted helical gearmotor



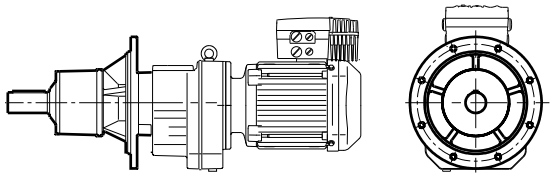
R..F DR../MM..
Foot- and B5 flange-mounted helical gearmotor



RF..DR../MM..
B5 flange-mounted helical gearmotor



RZ..DR../MM..
B14 flange-mounted helical gearmotor

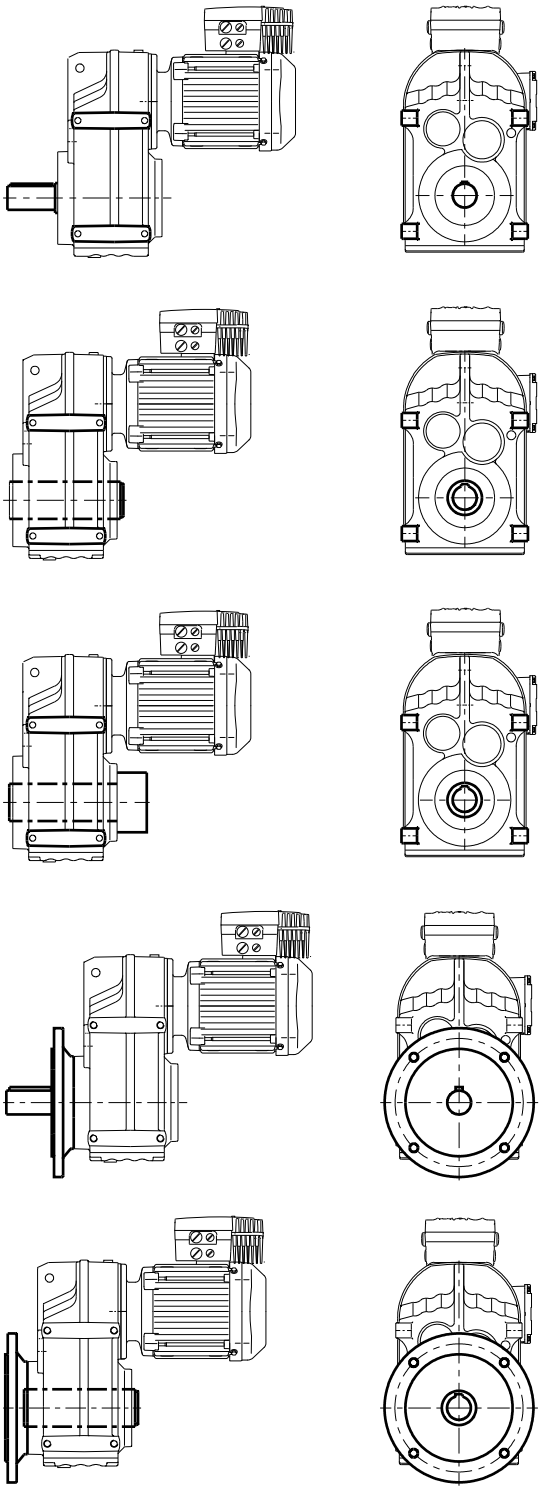


RM..DR../MM..
B5 flange-mounted helical gearmotor with extended bearing hub

5917862027

3.4.2 Parallel-shaft helical gearmotors

The following types of parallel-shaft helical gearmotors are available:



F..DR../MM..
Foot-mounted parallel-shaft helical gearmotor

FA..B DR../MM..
Foot-mounted parallel-shaft helical gearmotor with hollow shaft

FV..B DR../MM..
Foot-mounted parallel-shaft helical gearmotor with hollow shaft and splined hollow shaft to DIN 5480

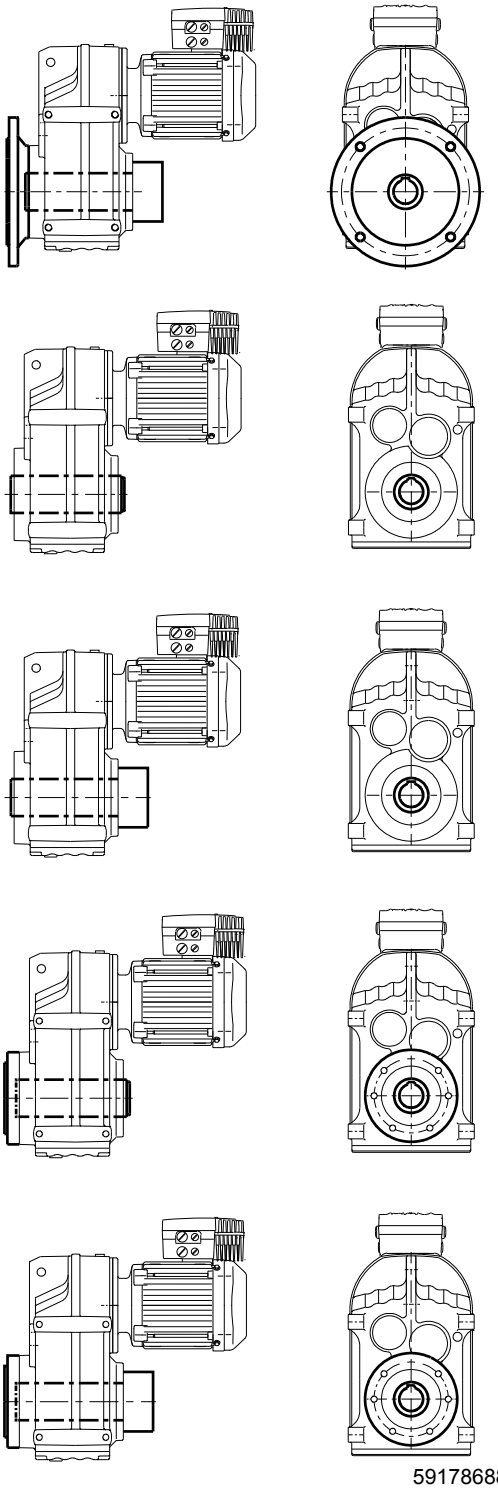
FH..B DR../MM..
Foot-mounted parallel-shaft helical gearmotor with hollow shaft and shrink disk

FF..DR../MM..
B5 flange-mounted parallel-shaft helical gearmotor

FAF..DR../MM..
B5 flange-mounted parallel-shaft helical gearmotor with hollow shaft

FVF..DR../MM..
B5 flange-mounted parallel-shaft helical gearmotor with hollow shaft and splined hollow shaft to DIN 5480

5917865227



FHF..DR../MM..
B5 flange-mounted parallel-shaft helical gearmotor with hollow shaft and shrink disk

FA..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft

FV..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft and splined hollow shaft to DIN 5480

FH..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft and shrink disk

FT..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system

FAZ..DR../MM..
B14 flange-mounted parallel-shaft helical gearmotor with hollow shaft

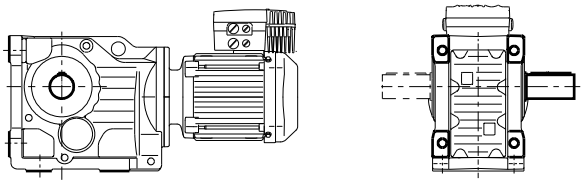
FVZ..DR../MM..
Parallel-shaft helical gearmotor in B14 flange-mounted design with hollow shaft and splined hollow shaft to DIN 5480

FHZ..DR../MM..
B14 flange-mounted parallel-shaft helical gearmotor with hollow shaft and shrink disk

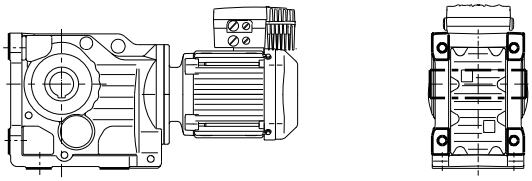
5917868811

3.4.3 Helical-bevel gearmotors

The following types of helical-bevel gearmotors can be supplied:

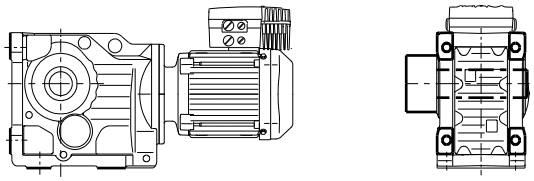


K..DR../MM..
Foot-mounted helical-bevel gearmotor

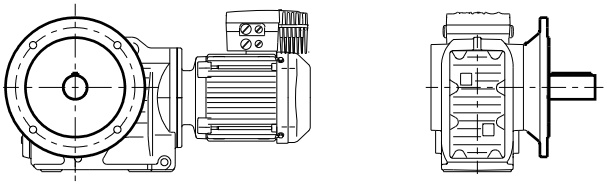


KA..B DR../MM..
Foot-mounted helical-bevel gearmotor with hollow shaft

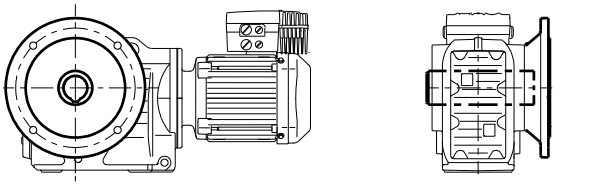
KV..B DR../MM..
Foot-mounted helical-bevel gearmotor with hollow shaft and splined hollow shaft to DIN 5480



KH..B DR../MM..
Foot-mounted helical-bevel gearmotor with hollow shaft and shrink disk



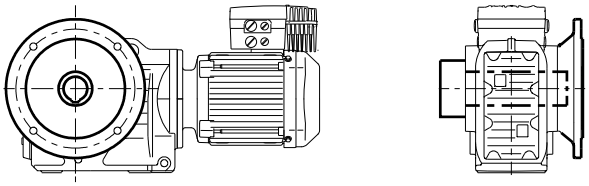
KF..DR../MM..
Helical-bevel gearmotor in B5 flange-mounted design



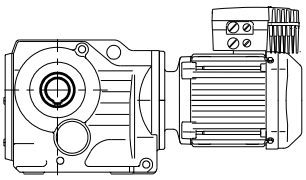
KAF..DR../MM..
Helical-bevel gearmotor in B5 flange-mounted design with hollow shaft

KVF..DR../MM..
Helical-bevel gearmotor in B5 flange-mounted version with hollow shaft and splined hollow shaft to DIN 5480

5917872779

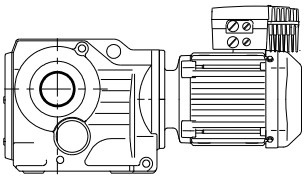


KHF..DR../MM..
B5 flange-mounted helical-bevel gearmotor with hollow shaft and shrink disk



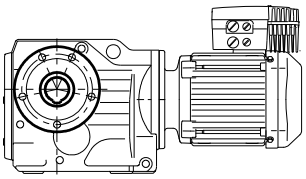
KA..DR../MM..
Helical-bevel gearmotor with hollow shaft

KV..DR../MM..
Helical-bevel gearmotor with hollow shaft and splined hollow shaft to DIN 5480



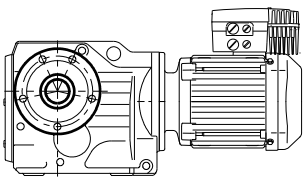
KH..DR../MM..
Helical-bevel gearmotor with hollow shaft and shrink disk

KT..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system



KAZ..DR../MM..
B14 flange-mounted helical-bevel gearmotor with hollow shaft

KVZ..DR../MM..
B14 flange-mounted helical-bevel gearmotor with hollow shaft and splined hollow shaft to DIN 5480

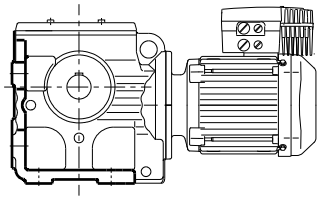
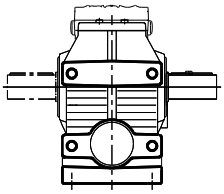


KHZ..DR../MM..
Helical-bevel gearmotor in B14 flange-mounted version with hollow shaft and shrink disk

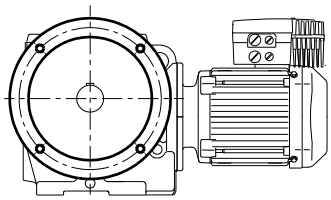
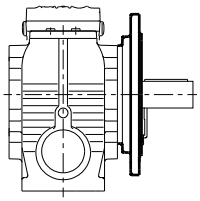
5917902731

3.4.4 Helical-worm gearmotors

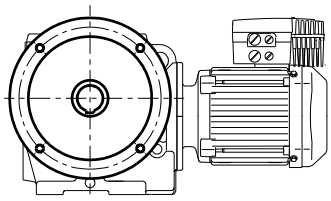
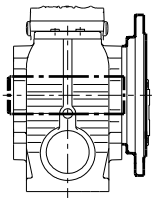
The following types of helical-worm gearmotors are available:

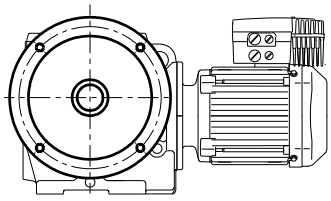
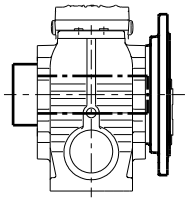
S..DR../MM..
Foot-mounted helical-worm gearmotor

SF..DR../MM..
B5 flange-mounted helical-worm gearmotor

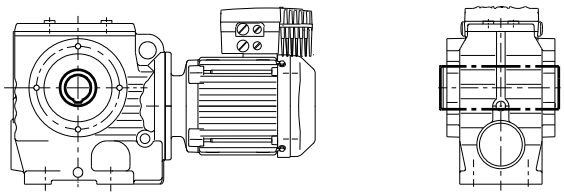



SAF..DR../MM..
B5 flange-mounted helical-worm gearmotor with hollow shaft

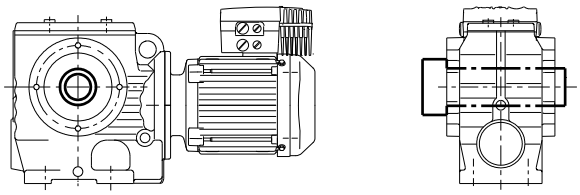



SHF..DR../MM..
B5 flange-mounted helical-worm gearmotor with hollow shaft and shrink disk

5917907467

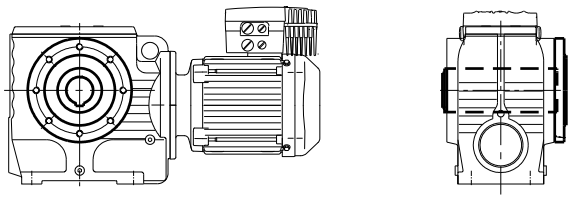


SA..DR../MM..
Helical-worm gearmotor with hollow shaft

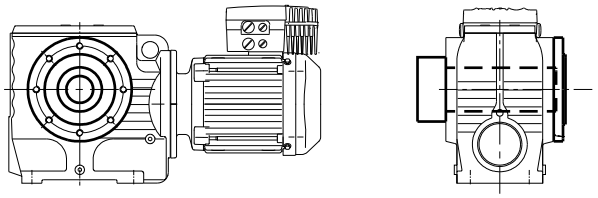


SH..DR../MM..
Helical-worm gearmotor with hollow shaft and shrink disk

ST..DR../MM..
Parallel-shaft helical gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system



SAZ..DR../MM..
B14 flange-mounted helical-worm gearmotor with hollow shaft

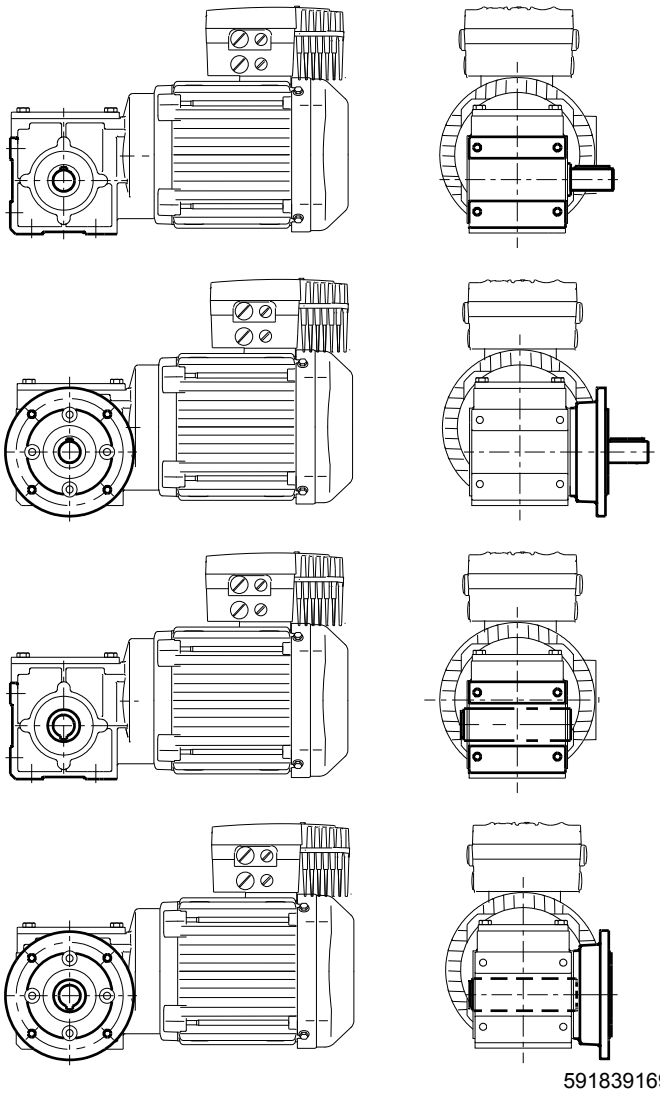


SHZ..DR../MM..
B14 flange-mounted helical-worm gearmotor with hollow shaft and shrink disk

5918386187

3.4.5 SPIROPLAN® gearmotors

The following variants of SPIROPLAN® gearmotors of size W..10 to W..37 are available:



W..DR../MM..
Foot-mounted SPIROPLAN® gearmotor

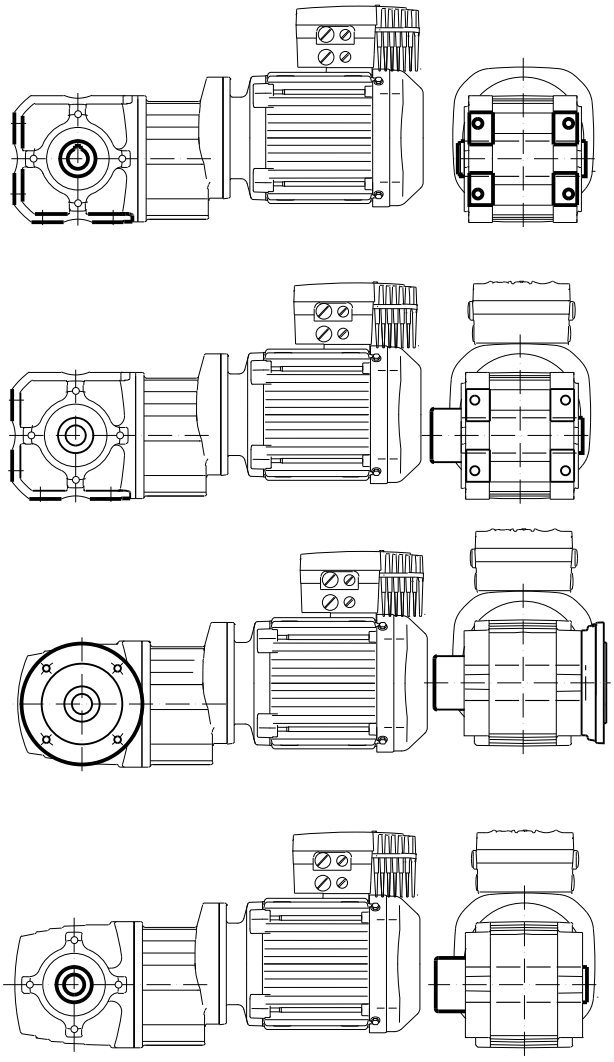
WF..DR../MM..
Flange-mounted SPIROPLAN® gearmotor

WA..DR../MM..
SPIROPLAN® gearmotor with hollow shaft

WAF..DR../MM..
Flange-mounted SPIROPLAN® gearmotor with hollow shaft

5918391691

The following variants of SPIROPLAN® gearmotors of size W..37 can also be supplied:



WA37B DR../MM..
Foot-mounted SPIROPLAN® gearmotor with hollow shaft

WH37B DR../MM..
Foot-mounted SPIROPLAN® gearmotor with hollow shaft and shrink disk

WHF37 DR../MM..
Flange-mounted SPIROPLAN® gearmotor with hollow shaft and shrink disk

WH37 DR../MM..
SPIROPLAN® gearmotor with hollow shaft and shrink disk

WT37 DR../MM..
SPIROPLAN® gearmotor with hollow shaft and TorqLOC®

5918397579

4 Project Planning for Drives

4.1 Additional documentation

In addition to the information in this catalog, SEW-EURODRIVE offers extensive documentation covering the entire topic of electrical drive engineering. These are mainly the publications of the "Drive Engineering - Practical Implementation" series as well as the manuals and catalogs for electronically controlled drives. You will find additional links to a wide selection of our documentation in many languages for download on the SEW-EURODRIVE website (**http://www.sew-eurodrive.com**). The list below includes other documents that are of interest in terms of project planning.

You can order these publications from SEW-EURODRIVE.

4.1.1 Drive Engineering – Practical Implementation

- Project Planning for Drives
- Controlled AC Drives
- EMC in Drive Engineering
- Explosion-Proof Drives to EU Directive 94/9/EC
- SEW Disk Brakes

4.2 Data for drive selection

Certain data is required to be able to precisely define the components for your drive. These are:

Drive selection data			Your entry
n_{amin}	Minimum output speed	[rpm]	
n_{amax}	Maximum output speed	[rpm]	
P_a at n_{amin}	Output power at minimum output speed	[kW]	
P_a at n_{amax}	Output power at maximum output speed	[kW]	
M_a at n_{amin}	Output torque at minimum output speed	[Nm]	
M_a at n_{amax}	Output torque at maximum output speed	[Nm]	
F_R	Overhung loads acting on the output shaft. Force application in center of shaft end is assumed. If not, specify the exact application point giving the application angle and direction of rotation of the shaft for recalculation.	[N]	
F_A	Axial load (tension and compression) on the input shaft	[N]	
J_{load}	Mass moment of inertia to be driven	[10^{-4}kgm²]	
R, F, K, S, W, M1 - M6	Required gear unit type and mounting position (see chapter "Mounting positions, churning losses")	–	
IP..	Required degree of protection	–	
ϑ Amb	Ambient temperature	[°C]	
H	Installation altitude	[m above sea level]	
S.., ..% cdf	Duty type and cyclic duration factor (cdf) or exact load cycle can be entered.	–	
Z	Starting frequency or exact load cycle can be specified.	[1/h]	
f_{line}	Line frequency	[Hz]	
V_{mot} V_{brake}	Operating voltage of motor and brake	[V]	
M_B	Required braking torque	[Nm]	
For inverter operation: Control type and setting range			

First, you require the data (mass, speed, setting range, etc.) of the machine to be driven to select the correct drive.

These data help determine the required power, torque and speed. Refer to the "Drive Engineering – Practical Implementation, Project Planning" publication or the "SEW Workbench" project planning software for assistance.

The appropriate drive can be determined with the calculated power and speed and with other mechanical requirements taken into account.

4.2.1 Installation above 1000 m asl

MOVIMOT® drives with line voltages of 200 – 240 V or 380 – 500 V, can be also used in altitudes of 1000 – 4000 m above sea level[1)]. Observe the following conditions:

- The nominal continuous power is reduced due to the reduced cooling above 1000 m (see chapter "Technical Data").
- Above 2000 m asl, the air and creeping distances are only sufficient for overvoltage class 2. If the installation calls for overvoltage class 3, you will have to install addi-

1) The maximum altitude is limited by creeping distances and flameproof components, such as capacitors.

tional external overvoltage protection to limit overvoltage peaks to 2.5 kV phase-to-phase and phase-to-ground.

- If safe electrical disconnection is required, it must be implemented outside the unit for altitudes of 2000 m above sea level and higher (safe electrical disconnection in accordance with EN 61800-5-1).
- In installation altitudes between 2000 m to 4000 msl, the permitted nominal power supply voltages are reduced as follows:
  - By 6 V per 100 m for MM..D-503-00
  - By 3 V per 100 m for MM..D-233-00

4.2.2 Operating temperature

MOVIMOT® gearmotors are intended for operation at ambient temperatures from −25 °C to +40 °C (from -30 °C depending on the motor).

Contact SEW-EURODRIVE if the MOVIMOT® gearmotors are operated outside the specified temperature range down to –40 °C or up to +60 °C.

4.2.3 Degree of protection to EN 60034 (IEC60034-5)

The standard degree of protection for DR. AC motors and AC brakemotors is IP54. Enclosures IP55, IP56, IP65 or IP66 are available upon request.

IP	1. digit		2nd digit
	Touch guard	Protection against foreign objects	Protection against water
0	No protection	No protection	No protection
1	Protected against access to hazardous parts with the back of your hand	Protection against solid foreign objects Ø 50 mm and larger	Protection against dripping water
2	Protected against access to hazardous parts with a finger	Protection against solid foreign objects Ø 12 mm and larger	Protected against dripping water when tilted up to 15°
3	Protected against access to hazardous parts with a tool	Protection against solid foreign objects Ø 2.5 mm and larger	Protection against spraying water
4	Protected against access to hazardous parts with a wire	Protection against solid foreign objects Ø 1 mm and larger	Protection against splashing water
5		Dust-proof	Protection against water jets
6		Dust-proof	Protection against powerful water jets
7	-	-	Protection against temporary immersion in water
8	-	-	Protection against permanent immersion in water

4.3 Project planning procedure

4.3.1 Example

The following flowchart presents a schematic view of the project planning procedure for a MOVIMOT® gearmotor:

Necessary information regarding the machine to be driven
- Technical data
- Ambient conditions
- Special application requirements
- Speed setting range
- Design features

↓

Calculation of the relevant application data
- Static, dynamic, regenerative power
- Speed profile
- Torque profile

↓

Gear unit selection
- Determining
  - Gear unit size
  - Gear unit reduction ratio
  - Gear unit type
- Checking the gear unit utilization ($M_{a\ max} \geq M_{a(t)}$)

↓

Motor selection
- Maximum torque
- Maximum speed
- Thermal load (setting range, cyclic duration factor)
- Motor equipment (brake, plug connector, etc.)

↓

Options
- Operation
- Communication
- Installation/wiring (field distributor)
- Diagnostic tools

↓

Make sure that all requirements have been met.

5 Project Planning for Gear Units

5.1 Efficiency of gear units

5.1.1 General information

The efficiency of gear units is mainly determined by the gearing and bearing friction. Keep in mind that the starting efficiency of a gear unit is always less than its efficiency at operating speed. This factor is especially pronounced in the case of helical-worm and SPIROPLAN® right-angle gearmotors.

5.1.2 R, F, K gear units

The efficiency of helical, parallel shaft and helical-bevel gear units varies with the number of gear stages, between 94 % (3-stage) and 98 % (1-stage).

5.1.3 S and W gear units

The gearing in helical-worm and SPIROPLAN® gear units produces a high proportion of sliding friction. As a result, these gear units have higher gearing losses than R, F or K gear units and therefore lower efficiency.

The efficiency depends on the following factors:

- Gear ratio of the helical-worm or Spiroplan® stage
- Input speed
- Gear unit temperature

Helical-worm gear units from SEW-EURODRIVE are helical gear/worm combinations that are significantly more efficient than plain worm gear units. The efficiency may reach $\eta < 0.5$ if the helical-worm or SPIROPLAN® stage has a very high ratio step.

Self-locking

Retrodriving torque in helical-worm or SPIROPLAN® gear units produces an efficiency of $\eta' = 2 - 1/\eta$, which is significantly less favorable than the forward efficiency η. The helical-worm or SPIROPLAN® gear unit is self-locking if the forward efficiency η is ≤ 0.5. Some Spiroplan® gear units are dynamically self-locking. Contact SEW-EURODRIVE if you want to make technical use of the braking effect of self-locking characteristics.

INFORMATION

Do not use the self-locking effect of helical-worm and SPIROPLAN® gear units as sole safety function for hoist.

Run-in phase

The tooth flanks of new helical-worm and Spiroplan® gear units are not yet completely smooth. This makes for a greater friction angle and less efficiency during the run-in phase than during later operation. This effect intensifies with increasing gear unit ratio. Subtract the following values from the listed efficiency during the run-in phase:

	Worm gear	
	i range	**η reduction**
1-start	About 50 – 280	About 12 %
2-start	About 20 – 75	About 6 %
3-start	About 20 – 90	About 3 %
5-start	About 6 – 25	About 3 %
6-start	About 7 – 25	About 2 %

SPIROPLAN® W10 – W30		SPIROPLAN® W37 / W47	
i range	**η reduction**	**i range**	**η reduction**
About 35 – 75	About 15 %	-	-
About 20 – 35	About 10 %	-	-
About 10 – 20	About 8 %	About 30 – 70	About 8 %
Approx. 8	About 5 %	About 10 – 30	About 5 %
Approx. 6	About 3 %	About 3 – 10	About 3 %

The run-in phase usually lasts 48 hours. Helical-worm and SPIROPLAN® gear units achieve their listed rated efficiency values when:

- The gear unit has been completely run-in,
- The gear unit has reached nominal operating temperature,
- the recommended lubricant has been filled in, and
- The gear unit is operating in the rated load range.

5.1.4 Churning losses

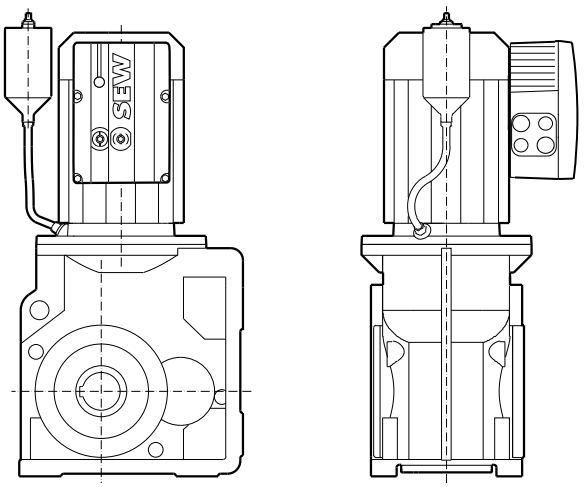
In certain gear unit mounting positions (see chapter "Gear Unit Mounting Positions" / "Order information"), the first gearing stage is completely immersed in the lubricant. When the circumferential velocity of the input stage is high, considerable churning losses occur in larger gear units that must be taken into account. Contact SEW-EURODRIVE if you wish to use gear units of this type.

If possible, use mounting position M1 for R, K and S gear units to keep the churning losses low.

5.2 Oil expansion tank

The oil expansion tank allows the lubricant/air space of the gear unit to expand. This means no lubricant can escape the breather valve at high operating temperatures.

SEW-EURODRIVE recommends to use oil expansion tanks for gear units and gearmotors in M4 mounting position and for input speeds > 2000 rpm.



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The oil expansion tank is provided as assembly kit. It is intended for mounting onto the gearmotor. However, if installation space is limited or if the expansion tank is intended for gear units without motor, it can be mounted to nearby machine parts.

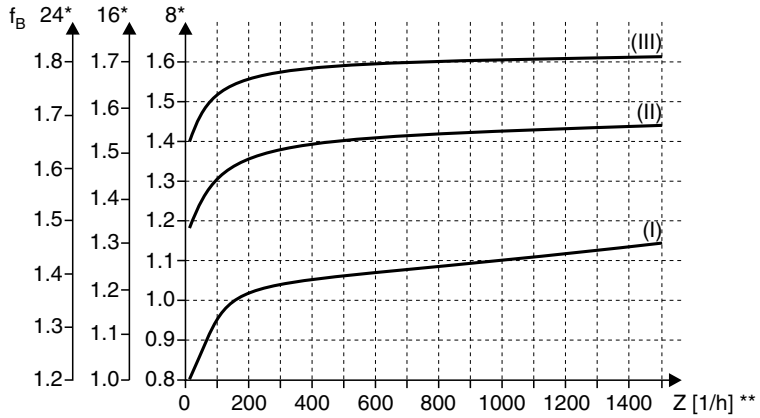
For further information, please contact your SEW-EURODRIVE sales representative.

5.3 Service factor

5.3.1 Determining the service factor

The effect of the driven machine on the gear unit is taken into account to a sufficient level of accuracy using the service factor f_B. The service factor is determined according to the daily operating time and the starting frequency Z. Three load classifications are taken into account depending on the mass acceleration factor. You can read the service factor applicable to your application from figure 3. The service factor determined from this diagram must be smaller than or equal to the service factor according to the selection tables.

$$M_a \times f_B \leq M_{a\max}$$



* Daily operating time in hours/day

** Starting frequency Z: The cycles include all starting and braking procedures as well as changeovers from low to high speed and vice versa.

Load classification

Three load classifications are distinguished:

(I) Uniform, permitted mass acceleration factor ≤ 0.2
(II) Non-uniform, permitted mass acceleration factor ≤ 3
(III) Heavy shock load, permitted mass acceleration factor ≤ 10

Mass acceleration factor

The mass acceleration factor is calculated as follows:

$$\textbf{Mass acceleration factor} = \frac{\textbf{All external mass moments of inertia}}{\textbf{Mass moment of inertia at motor end}}$$

"All external mass moments of inertia" are the mass moments of inertia of the driven machine and the gear unit, scaled down to the motor speed. The calculation for scaling down to motor speed is performed using the following formula:

$$J_X = J \times \left(\frac{n}{n_M} \right)^2$$

J_X = Mass moment of inertia scaled down to the motor shaft
J = Mass moment of inertia with reference to the output speed of the gear unit
n = Output speed of the gear unit
n_M = Motor speed

"Mass moment of inertia at the motor end" is the mass moment of inertia of the motor and, if installed, the brake and the flywheel fan (Z fan).

Service factors f_B > 1.8 may occur with large mass acceleration factors (> 10), high levels of backlash in the transmission elements or large overhung loads. Contact SEW-EURODRIVE in such cases.

5.3.2 Servicefactor: SEW f_B

The method for determining the maximum permitted continuous torque M_{amax} and using this value to derive the service factor $f_B = M_{amax} / M_a$ is not defined in a standard and varies greatly from manufacturer to manufacturer. Even at a SEW service factor of f_B = 1, the gear units afford an extremely high level of safety and reliability in the fatigue strength range (exception: wearing of the worm wheel in helical-worm gear units). The service factor may differ from specifications of other gear unit manufacturers. If you are in doubt, contact SEW-EURODRIVE for more detailed information on your specific drive.

Example

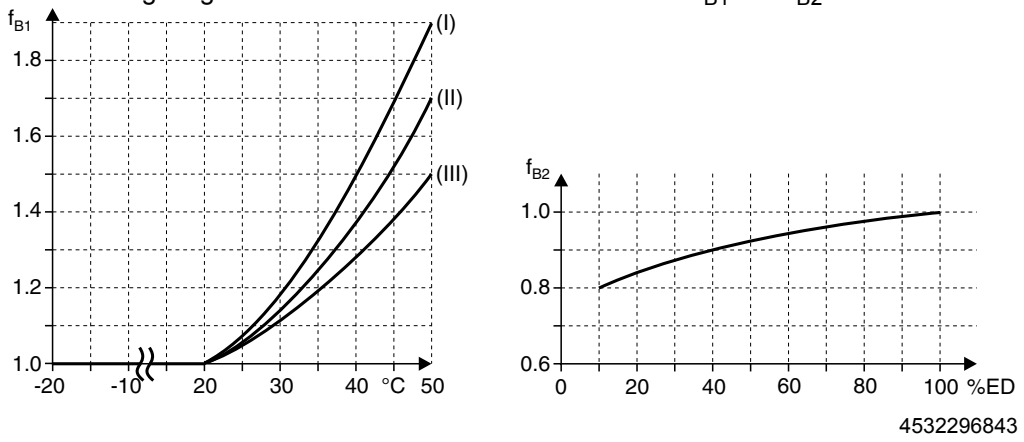
Mass acceleration factor 2.5 (load classification II), operating time 14 hours/day (read off at 16 h/d) and 300 cycles/hour produce a service factor f_B = 1.51 as shown in the figure on the previous page. According to the selection tables, the selected gearmotor must have an SEW f_B value of 1.51 or greater.

5.3.3 Helical-worm gear units

Two further service factors have to be taken into account with helical-worm gear units in addition to the service factor f_B shown the above diagram. These are:

- f_{B1} = Service factor from ambient temperature
- f_{B2} = Service factor from cyclic duration factor

The additional service factors f_{B1} and f_{B2} can be determined by referring to the diagram below. For f_{B1}, the load classification is taken into account in the same way as for f_B. The following diagram shows the additional service factors f_{B1} and f_{B2}:



$$cdf(\%) = \frac{Time\ under\ load\ in\ min/h}{60} \times 100$$

Contact SEW-EURODRIVE in case of temperatures below -20 °C (→ f_{B1}).

The total service factor for helical-worm gear units is calculated as follows:

$$f_{Bges} = f_B \times f_{B1} \times f_{B2}$$

Example

The gearmotor with the service factor f_B = 1.51 in the previous example is to be a helical-worm gearmotor.

Ambient temperature ϑ = 40 °C → f_{B1} = 1.38 (read off at load classification II)

Time under load = 40 min/h → cdf = 66.67 % → f_{B2} = 0.95

The total service factor is f_{Btot} = 1.51 × 1.38 × 0.95 = 1.98

According to the selection tables, the selected helical-worm gearmotor must have an SEW f_B service factor of 1.98 or greater.

5.4 Overhung and axial loads

5.4.1 Determining the overhung load

An important factor for determining the resulting overhung load is the type of transmission element mounted to the shaft end. The following transmission element factors f_Z must be considered for various transmission elements.

Transmission element	Transmission element factor f_Z	Comments
Gears	1.15	< 17 teeth
Chain sprockets	1.40	< 13 teeth
Chain sprockets	1.25	< 20 teeth
Narrow V-belt pulleys	1.75	Influence of pre-tensioning
Flat belt pulleys	2.50	Influence of pre-tensioning
Toothed belt pulleys	2.00 – 2.50	Influence of pre-tensioning
Gear rack pinion, pre-tensioned	2.00	Influence of pre-tensioning

The overhung load exerted on the motor or gear shaft is calculated as follows:

$$F_R = \frac{M_d \times 2000}{d_0} \times f_Z$$

F_R = Overhung load in N
M_d = Torque in Nm
d_0 = Mean diameter of the installed transmission element in mm
f_Z = Transmission element factor

5.4.2 Permitted overhung load

The basis for determining the permitted overhung loads is the computation of the rated bearing service life L_{10h} of the anti-friction bearings (according to ISO 281).

For special operating conditions, the permitted overhung loads can be determined with regard to the modified service life L_{na} on request.

The permitted overhung loads F_{Ra} for the output shafts of foot-mounted gear units with a solid shaft are listed in the selection tables for gearmotors. Contact SEW-EURODRIVE in case of other versions.

INFORMATION

The values refer to force applied to the center of the shaft end (in right-angle gear units as viewed onto the drive end). The values for the force application angle α and direction of rotation are based on the most unfavorable conditions.

- Only 50% of the F_{Ra} value specified in the selection tables is permitted in mounting position M1 with wall attachment on the front face for K and S gear units.
- Foot and flange-mounted helical gearmotors (R..F): A maximum of 50% of the overhung load F_{Ra} specified in the selection tables for torque transmission via flange mounting are permitted.

5.4.3 Higher permitted overhung loads

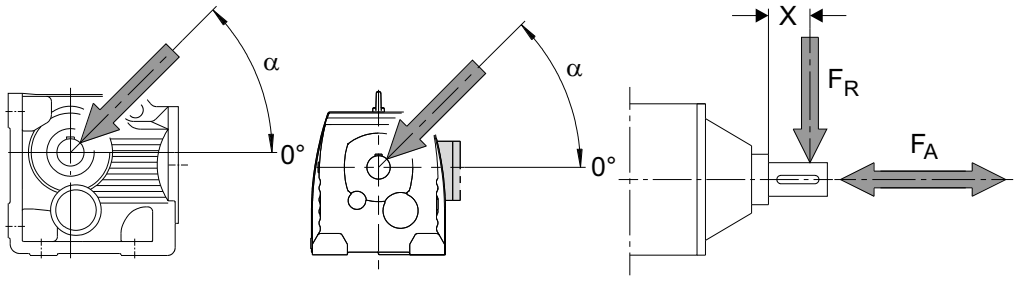
Exactly considering the force application angle α and the direction of rotation makes it possible to achieve a higher overhung load than listed in the selection tables.

Furthermore, higher output shaft loads are permitted if heavy duty bearings are installed, especially with R, F and K gear units.

Contact SEW-EURODRIVE in such cases.

5.4.4 Definition of the force application

Force application is defined according to the following figure:



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F_X = Permitted overhung load at point x [N]
F_A = Permitted axial load [N]

5.4.5 Permitted axial forces

If there is no overhung load, then an axial load F_A (tension or compression) amounting to 50 % of the overhung load given in the selection tables is permitted. This condition applies to the following gearmotors:

- Helical gearmotors except for R..137... to R..167...
- Parallel shaft and helical-bevel gearmotors with solid shaft except for F97...
- Helical-worm gearmotors with solid shaft

INFORMATION

Contact SEW-EURODRIVE for all other types of gear units and in the event of significantly greater axial loads or combinations of overhung load and axial load.

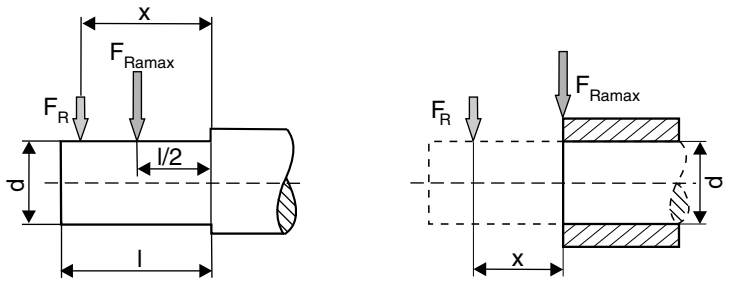
5.4.6 On the output side: Overhung load conversion for off-center force application

The permitted overhung load values F_{Ramax} and F_{Rapk} listed in the data tables are valid for force application at l / 2 (solid shaft) or force application at the shaft end face (hollow shaft). If the force is applied closer or further away from the gear unit, the permitted overhung loads must be redetermined again according to the project planning workflow. The following conditions must be met:

$$F_R \leq F_{Ra\max} \cdot \frac{a}{b+x}\ [N] \qquad F_R \leq \frac{c}{f+x}\ [N]$$

F_{Ramax} = Permitted overhung load [N]
x = Distance from the shaft shoulder to the force application point in [mm]
a, b, f = Gear unit constant for overhung load conversion [mm]
c = Gear unit constant for overhung load conversion [Nmm]

The following figure shows the overhung load F_R with increased distance x to the gear unit.



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Gear unit constants for overhung load conversion

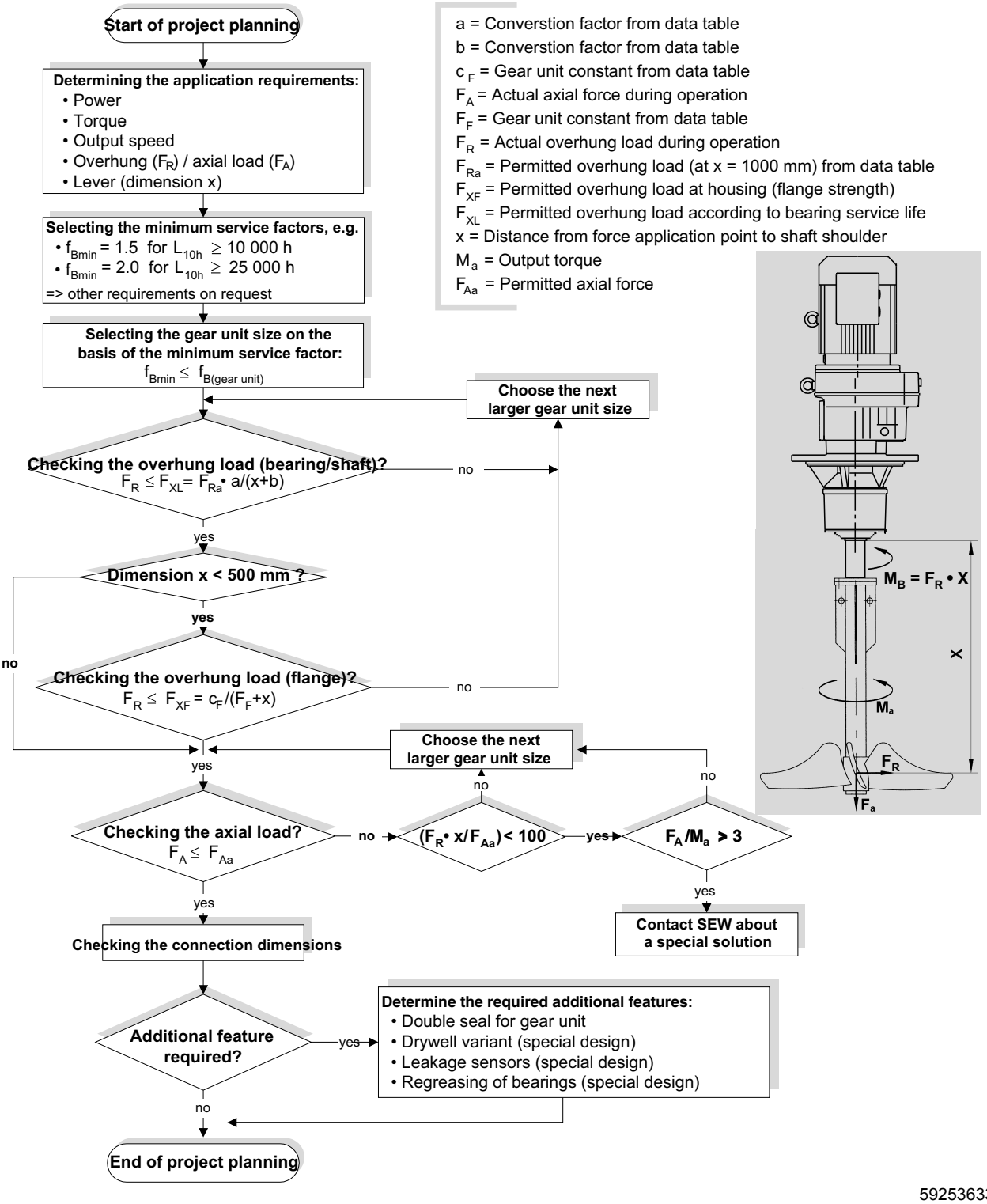
Gear unit type	a [mm]	b [mm]	c [Nmm]	f [mm]	d [mm]	l [mm]
RX57	43.5	23.5	1.51×10^5	34.2	20	40
RX67	52.5	27.5	2.42×10^5	39.7	25	50
RX77	60.5	30.5	1.95×10^5	0	30	60
RX87	73.5	33.5	7.69×10^5	48.9	40	80
RX97	86.5	36.5	1.43×10^6	53.9	50	100
RX107	102.5	42.5	2.47×10^6	62.3	60	120
R07	72.0	52.0	4.67×10^4	11	20	40
R17	88.5	68.5	$6{,}527 \times 10^4$	17	20	40
R27	106.5	81.5	1.56×10^5	11.8	25	50
R37	118	93	1.24×10^5	0	25	50
R47	137	107	2.44×10^5	15	30	60
R57	147.5	112.5	3.77×10^5	18	35	70
R67	168.5	133.5	2.65×10^5	0	35	70
R77	173.7	133.7	3.97×10^5	0	40	80
R87	216.7	166.7	8.47×10^5	0	50	100
R97	255.5	195.5	1.06×10^6	0	60	120
R107	285.5	215.5	2.06×10^6	0	70	140
R137	343.5	258.5	4.58×10^6	0	90	170
R147	402	297	8.65×10^6	33	110	210
R167	450	345	1.26×10^7	0	120	210
F27	109.5	84.5	1.13×10^5	0	25	50
F37	123.5	98.5	1.07×10^5	0	25	50
F47	153.5	123.5	1.40×10^5	0	30	60
F57	170.7	135.7	2.70×10^5	0	35	70
F67	181.3	141.3	4.12×10^5	0	40	80
F77	215.8	165.8	7.87×10^5	0	50	100
F87	263	203	1.06×10^6	0	60	120
F97	350	280	2.09×10^6	0	70	140
F107	373.5	288.5	4.23×10^6	0	90	170
F127	442.5	337.5	9.45×10^6	0	110	210
F157	512	407	1.05×10^7	0	120	210
K37	123.5	98.5	1.30×10^5	0	25	50
K47	153.5	123.5	1.40×10^5	0	30	60
K57	169.7	134.7	2.70×10^5	0	35	70
K67	181.3	141.3	4.12×10^5	0	40	80
K77	215.8	165.8	7.69×10^5	0	50	100
K87	252	192	1.64×10^6	0	60	120
K97	319	249	2.80×10^6	0	70	140
K107	373.5	288.5	5.53×10^6	0	90	170
K127	443.5	338.5	8.31×10^6	0	110	210
K157	509	404	1.18×10^7	0	120	210
K167	621.5	496.5	1.88×10^7	0	160	250
K187	720.5	560.5	3.04×10^7	0	190	320
S37	118.5	98.5	6.0×10^4	0	20	40
S47	130	105	1.33×10^5	0	25	50
S57	150	120	2.14×10^5	0	30	60
S67	184	149	3.04×10^5	0	35	70
S77	224	179	5.26×10^5	0	45	90
S87	281.5	221.5	1.68×10^6	0	60	120
S97	326.3	256.3	2.54×10^6	0	70	140
W10	84.8	64.8	3.6×10^4	0	16	40
W20	98.5	78.5	4.4×10^4	0	20	40
W30	109.5	89.5	6.0×10^4	0	20	40
W37	121.1	101.1	6.95×10^4	0	20	40
W47	145.5	115.5	4.26×10^5	35.6	30	60

Values for types not listed are available on request.

5.5 RM gear units

5.5.1 Project planning

You must take account of the higher overhung loads and axial forces when planning projects with RM helical gearmotors with extended bearing housing. Observe the following project planning procedure:



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5.5.2 Permitted overhung loads and axial forces

The permitted overhung loads F_{Ra} and axial forces F_{Aa} are specified for various service factors f_B and nominal bearing service life L_{10h}.

f_{Bmin} = 1.5; L_{10h} = 10 000 h

		n_a [rpm]							
		< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra} [N]	400	400	400	400	400	405	410	415
	F_{Aa} [N]	18800	15000	11500	9700	7100	5650	4450	3800
RM67	F_{Ra} [N]	575	575	575	580	575	585	590	600
	F_{Aa} [N]	19000	18900	15300	11900	9210	7470	5870	5050
RM77	F_{Ra} [N]	1200	1200	1200	1200	1200	1210	1210	1220
	F_{Aa} [N]	22000	22000	19400	15100	11400	9220	7200	6710
RM87	F_{Ra} [N]	1970	1970	1970	1970	1980	1990	2000	2010
	F_{Aa} [N]	30000	30000	23600	18000	14300	11000	8940	8030
RM97	F_{Ra} [N]	2980	2980	2980	2990	3010	3050	3060	3080
	F_{Aa} [N]	40000	36100	27300	20300	15900	12600	9640	7810
RM107	F_{Ra} [N]	4230	4230	4230	4230	4230	4230	3580	3830
	F_{Aa} [N]	48000	41000	30300	23000	18000	13100	9550	9030

f_{Bmin} = 2.0; L_{10h} = 25 000 h

		n_a [rpm]							
		< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra} [N]	410	410	410	410	410	415	415	420
	F_{Aa} [N]	12100	9600	7350	6050	4300	3350	2600	2200
RM67	F_{Ra} [N]	590	590	590	595	590	595	600	605
	F_{Aa} [N]	15800	12000	9580	7330	5580	4460	3460	2930
RM77	F_{Ra} [N]	1210	1210	1210	1210	1210	1220	1220	1220
	F_{Aa} [N]	20000	15400	11900	9070	6670	5280	4010	3700
RM87	F_{Ra} [N]	2000	2000	2000	2000	2000	1720	1690	1710
	F_{Aa} [N]	24600	19200	14300	10600	8190	6100	5490	4860
RM97	F_{Ra} [N]	3040	3040	3040	3050	3070	3080	2540	2430
	F_{Aa} [N]	28400	22000	16200	11600	8850	6840	5830	4760
RM107	F_{Ra} [N]	4330	4330	4330	4330	4330	3350	2810	2990
	F_{Aa} [N]	32300	24800	17800	13000	9780	8170	5950	5620

5.5.3 Conversion factors and gear unit constants

The following conversion factors and gear unit constants apply to calculating the permitted overhung load F_{xL} at point x ≠ 1000 mm for RM gearmotors:

Gear unit type	a	b	c_F (f_B = 1.5)	c_F (f_B = 2.0)	F_F
RM57	1047	47	1220600	1260400	277
RM67	1047	47	2047600	2100000	297.5
RM77	1050	50	2512800	2574700	340.5
RM87	1056.5	56.5	4917800	5029000	414
RM97	1061	61	10911600	11124100	481
RM107	1069	69	15367000	15652000	554.5

5.5.4 Additional weight of RM gear units

Type	Additional weight compared to RF with reference to the smallest RF flange Δm [kg]
RM57	12.0
RM67	15.8
RM77	25.0
RM87	29.7
RM97	51.3
RM107	88.0

5.6 Condition monitoring: Oil aging and vibration sensor

5.6.1 Diagnostic unit DUO10A (oil aging sensor)

The diagnostic unit consists of a temperature sensor and the actual evaluation unit. The temperature sensor is screwed into a screw plug bore of the gear unit via an adapter system and connected to the evaluation unit.

The service life curves of the oil grades common in SEW gear units are stored in the electronics of the evaluation unit. SEW-EURODRIVE can also customize any oil grade in the diagnostic unit. Standard parameterization is performed directly on the evaluation unit. During operation, the evaluation unit continuously calculates the remaining service life in days based on the oil temperature, i.e. the time until the next oil change. The remaining service life is displayed directly on the evaluation unit. The expiration of the service life can also be transferred to a higher-level system via a binary signal and be evaluated or visualized there. Other switch outputs signal when a prewarning stage has been reached, a preset temperature limit is exceeded or readiness for operation. The voltage supply is DC 24 V.

The system operator no longer has to replace the oil within predefined intervals, but can adapt the replacement interval individually to the actual load. The benefits are reduced maintenance and service costs and increased system availability.

5.6.2 Diagnostic unit DUV10A (vibration sensor)

The DUV10A diagnostics unit measures the structure-borne noise and uses this value to calculate the frequency spectrum. The structure-born noise sensor and evaluation electronics are fully integrated in the diagnostic unit. Data, such as vibration acceleration, damage frequencies, etc., can be recorded, processed and evaluated decentralized without any expert knowledge. The damage progress of the diagnosis objects is indicated by the LEDs directly on the DUV10A diagnostics unit. External visualization of the binary signals to the controller is also possible. A depth diagnosis can be displayed via the software.

The DUV10A diagnostic unit is attached to the gear unit or motor using a fastening element. The position where the diagnostic unit is installed depends on the objects to be diagnosed (gear unit/motor type, mounting position). The tightening torque for the screw connection is 7 Nm.

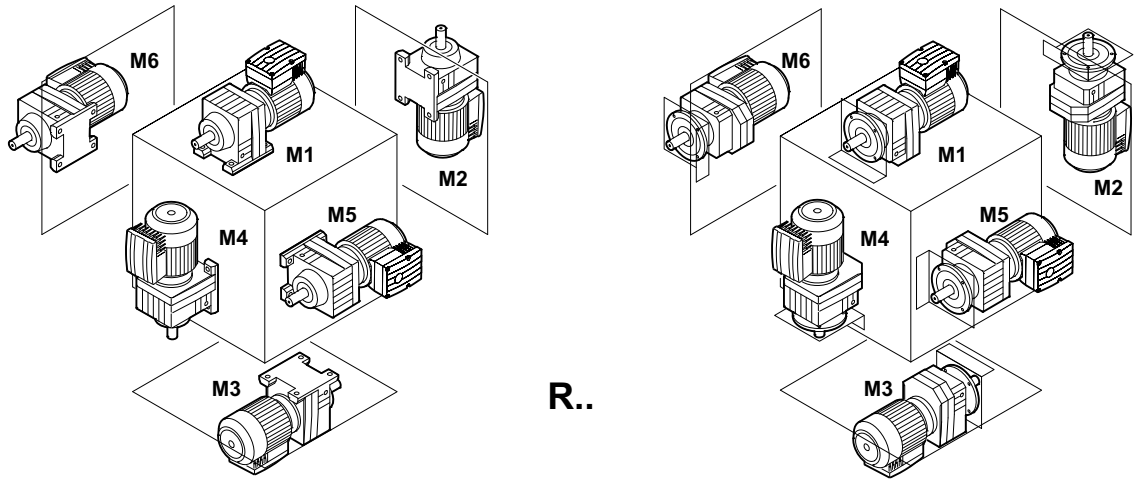
The diagnostic unit can be used to monitor up to 5 different objects or 20 individual frequencies. The diagnostic unit can be used with both constant and variable speeds. To ensure correct diagnosis when using variable speeds, a 0–20 mA current loop or a pulse signal must be supplied. The voltage supply is DC 24 V.

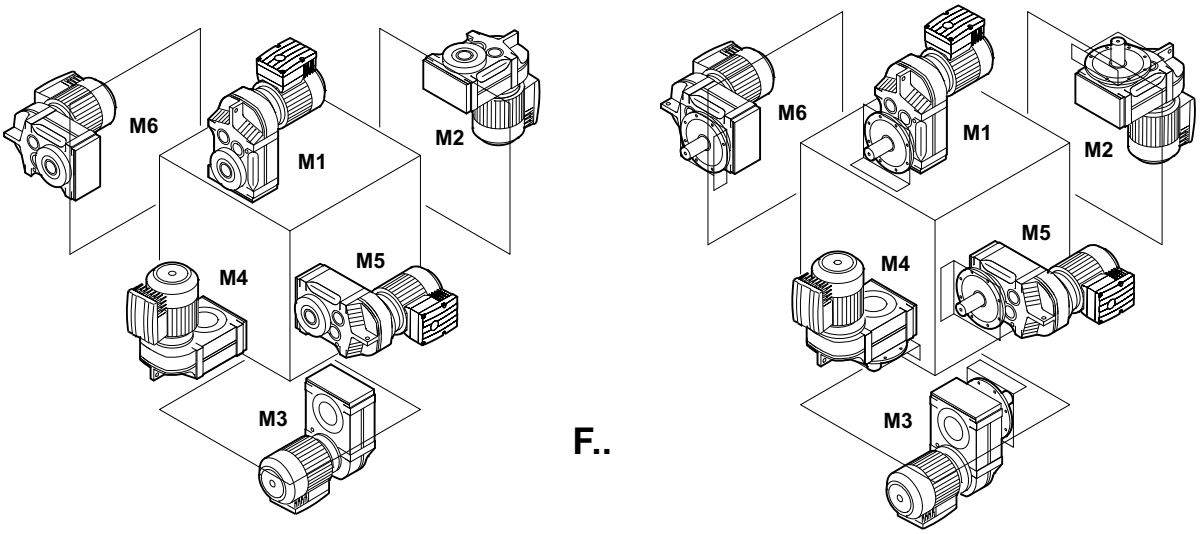
The parameters of the unit are set using the supplied software. When all data have been configured, a pulse test is carried out to check the signal level from the object to be monitored to the diagnostic unit. Next, all data is transferred to the sensor and a teach-in run can be performed. The teach-in is a self-learning process performed by the sensor under operating conditions. After successful teach-in, the unit is ready and enters monitoring mode. As the unit requires a certain measuring time at constant speed depending on the setting and number of objects to be monitored, you should consult SEW-EURODRIVE for applications where this time is < 16 seconds.

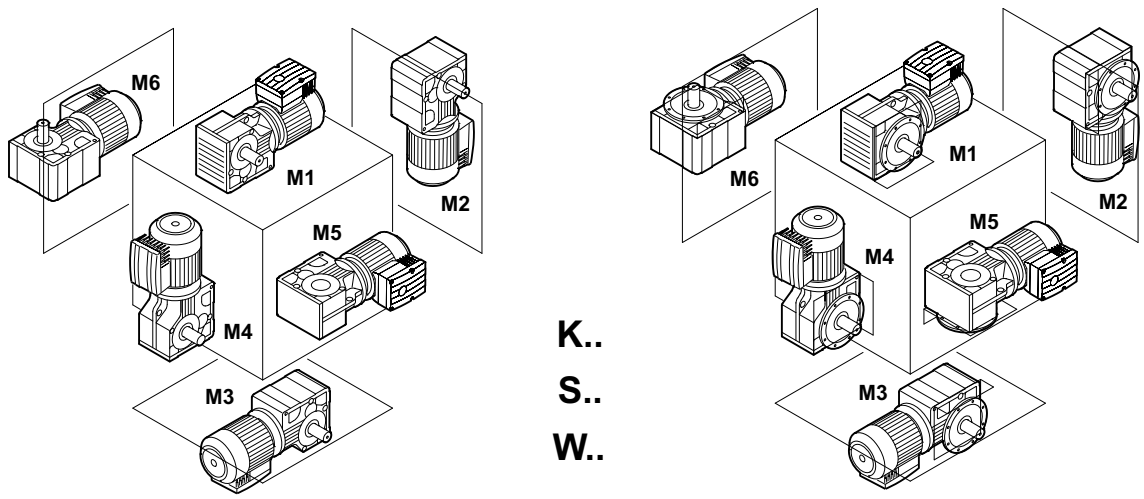
6 Mounting Positions of the Gear Units

6.1 General mounting position information – R, F, K, S, W gear units

SEW-EURODRIVE distinguishes between the 6 gear unit mounting positions M1 – M6. The following figure shows the spatial orientation of the gear unit in mounting positions M1 – M6:







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6.2 Order information

INFORMATION

The following order information is required for R, F, K and S gear units or gearmotors in addition to the mounting position to exactly determine the type of drive.

This information is also required for SPIROPLAN® gearmotors (W gearmotors) that do not depend on a particular mounting position.

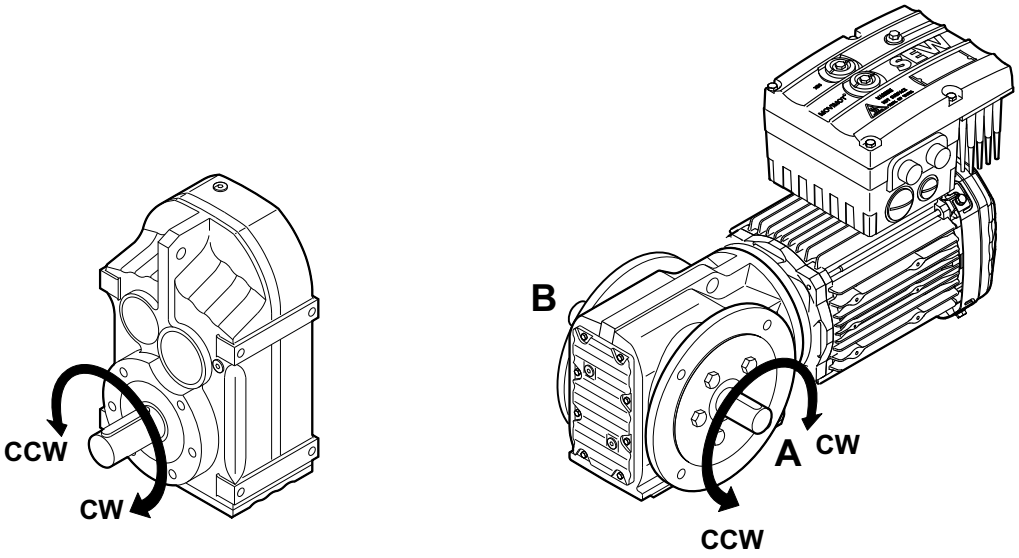
6.2.1 The following applies to all gear units and gearmotors

Output direction of rotation with backstop

Observe the following notes for all gear units and gearmotors from SEW-EURODRIVE.

If the drive has an RS backstop, you have to indicate the direction of rotation of the output for the drive. The following definition applies:

As viewed at the output shaft: Clockwise (CW) = Rotating clockwise
Counterclockwise (CCW) = Rotating counterclockwise



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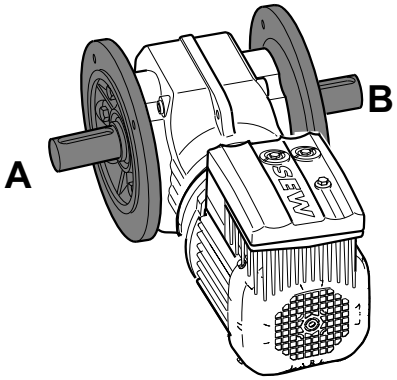
In right-angle gear units, you also have to indicate whether the direction of rotation is given looking onto the A or B end.

Position of the output shaft and output flange

In right-angle gear units, you also have to indicate the position of the output shaft and the output flange:

- A or B or AB



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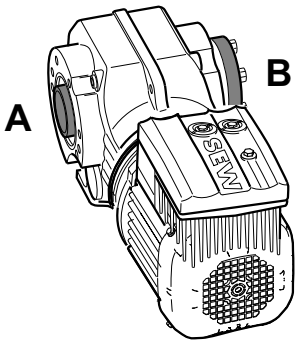
Position of the output end in right-angle gear units

In shaft mounted right-angle gear units with a shrink disk, you also have to indicate whether the A or B end is the output end. In the figure below, the A end is the output end. The shrink disk is located opposite the output end.

In shaft mounted right-angle gear units, the output end is equivalent to the shaft position of right-angle gear units with solid shaft.



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INFORMATION

For the permitted mounting surfaces (= hatched area), refer to the mounting position sheets.

Example: Only the mounting surface at the bottom is possible with helical-bevel gear units K167/K187 in mounting positions M5 and M6.

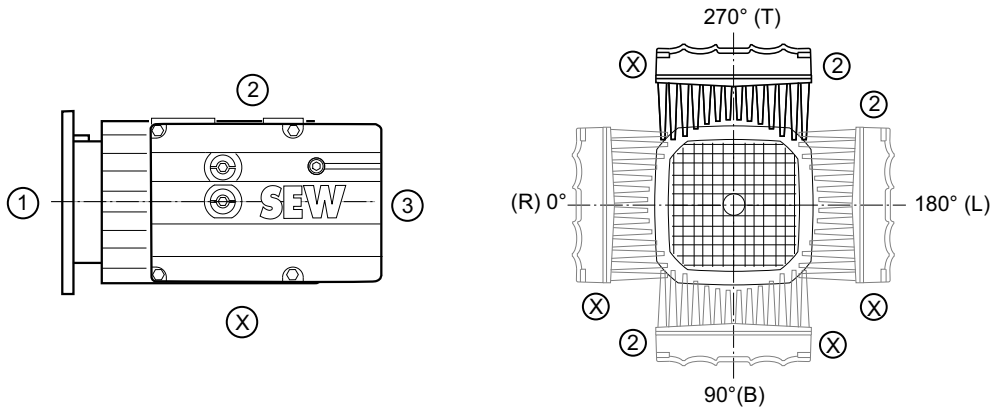
6.2.2 For all gearmotors

Position of terminal box and cable entry

The position of the connection box has so far been indicated with 0°, 90°, 180° or 270° as viewed onto the fan guard = B-end, see the following figure. A change in the product standard EN 60034 specifies that the following designations will have to be used for connection box positions for foot-mounted motors in the future:

- As viewed onto the output shaft = A-end
- Designation as R (right), B (bottom), L (left) and T (top)

This new designation applies to foot-mounted motors without a gear unit in mounting position B3 (= M1). The previous designation is maintained for gearmotors. The following figure shows both designations. If the mounting position of the motor changes, R, B, L and T are rotated accordingly. In motor mounting position B8 (= M3), T is at the bottom.



1456424715

INFORMATION

Not all connection box positions are possible with MOVIMOT® drives. For all positions other than the standard 270°, a type-specific individual verification by SEW-EURODRIVE is required.

Position of the cable entry:

You do not have to select the position of the cable entry for MOVIMOT® drives. Positions "X" (= standard position) and position "2" are always possible (see above figure).

INFORMATION

- If the connection box position deviates from the standard, you have to check whether the gear unit must be supported, depending on the mounting position.
- When using plug connectors or MOVIMOT® options, the choice of possible mounting positions might be limited. If in doubt, please consult SEW-EURODRIVE.

6.2.3 Sample orders

Type (Examples)	Mounting position	Shaft position	Flange position	Terminal box position	Output direction of rotation
K47 DRS71M4/RS	M2	A	-	0°	CW
SF77 DRE90L4	M6	Order confirmation	Order confirmation	90°	-
KA97 DRE100LC4	M4	B	-	270°	-
KH107 DRE132S4	M1	A	-	180°	-
WF20 DRS71S4	-	A	A	0°	-

6.2.4 Changing the mounting position

It is important that you read the following information when you operate the gearmotor in a mounting position other than indicated in the order:

- Adjust the lubricant fill quantity so that it matches the new mounting position.
- Adjust position of breather valve
- For helical-bevel gearmotors: Contact SEW-EURODRIVE customer service prior to changing to mounting position M5 or M6 and when changing from M5 to M6, or vice versa.
- For helical-worm gearmotors: Contact SEW-EURODRIVE customer service when changing to mounting position M2 or M3.

6.3 Key to the mounting position sheets

INFORMATION

SPIROPLAN® gearmotors are not dependant on the mounting position, except for W..37 and W..47 in mounting position M4. However, mounting positions M1 to M6 are also shown for SPIROPLAN® gearmotors to assist you in working with this documentation.

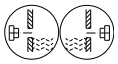
Important! Please note:

SPIROPLAN® gearmotors W..20 to W..30 cannot be equipped with breather valves, oil level plugs or drain plugs.

SPIROPLAN® gearmotors W..37 and W..47 can be equipped with breather valve, oil level plug or drain plug.

6.3.1 Symbols used

The following table shows the symbols used in the mounting position sheets and their meaning:

Symbol	Meaning
	Breather valve
	Oil level plug[1)]
	Oil drain plug

1) Does not apply to the first gear unit (large gear unit) in double gear units.

6.3.2 Churning losses

* → (Page XX)

Churning losses may occur in some mounting positions. Contact SEW-EURODRIVE in case of the following combinations:

Mounting position	Gear unit type
M2, M4	R
M2, M3, M4, M5, M6	F
	K
	S

6.3.3 Displayed shaft

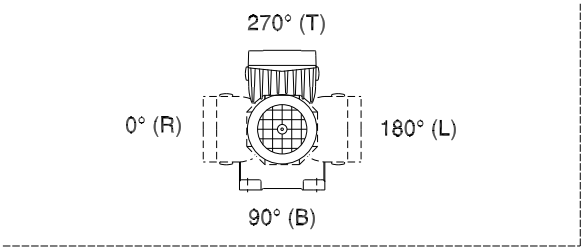
Observe the following information regarding the illustrations on the mounting position sheets:

INFORMATION

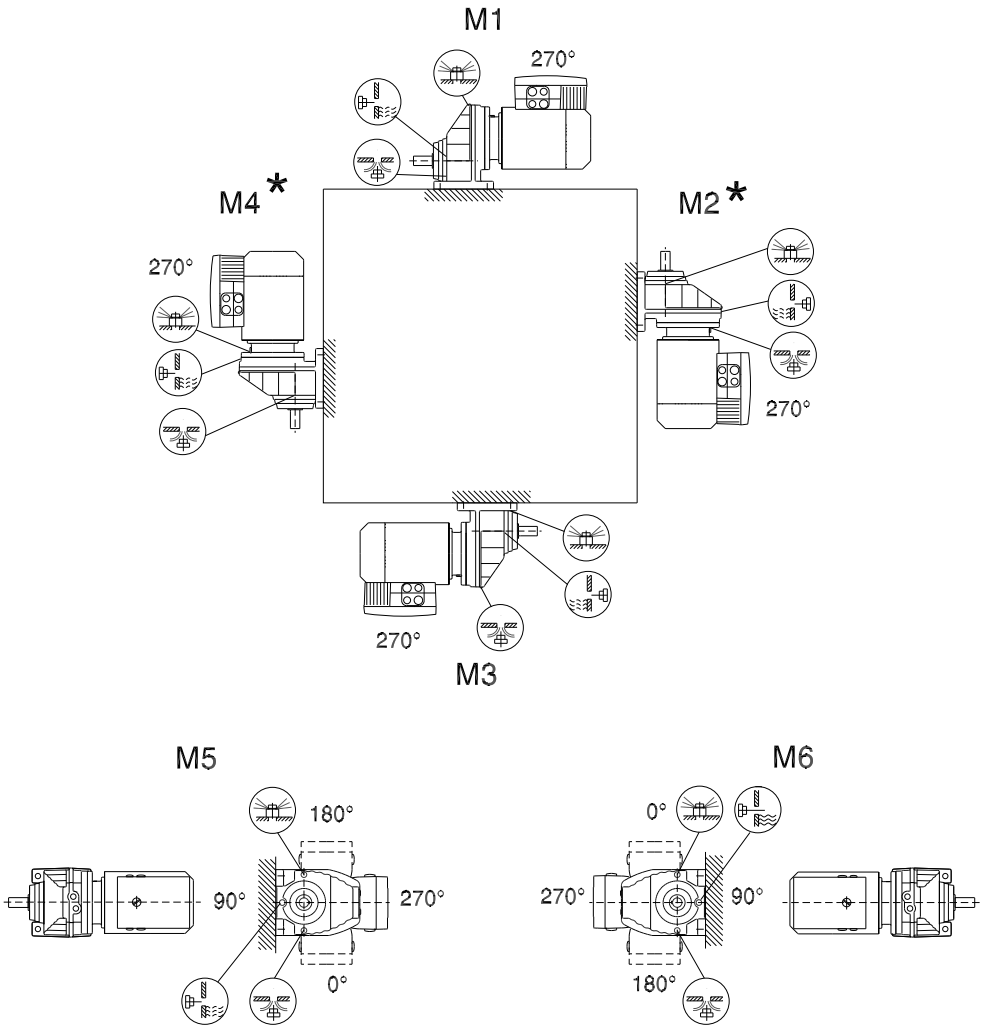
- **For gear units with solid shaft:** The displayed shaft is always on the A end.
- **For shaft-mounted gear units:** The shaft with dashed lines represents the customer shaft. The output end (= shaft position) is always shown on the A end.

6.4 Mounting positions of helical gearmotors

6.4.1 RX57 – RX107

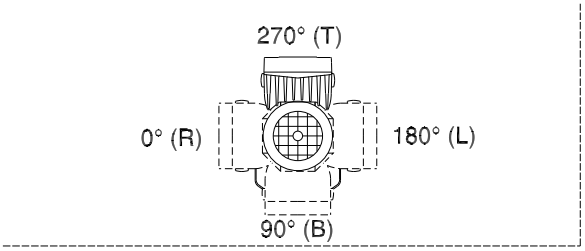


04 036 02 01

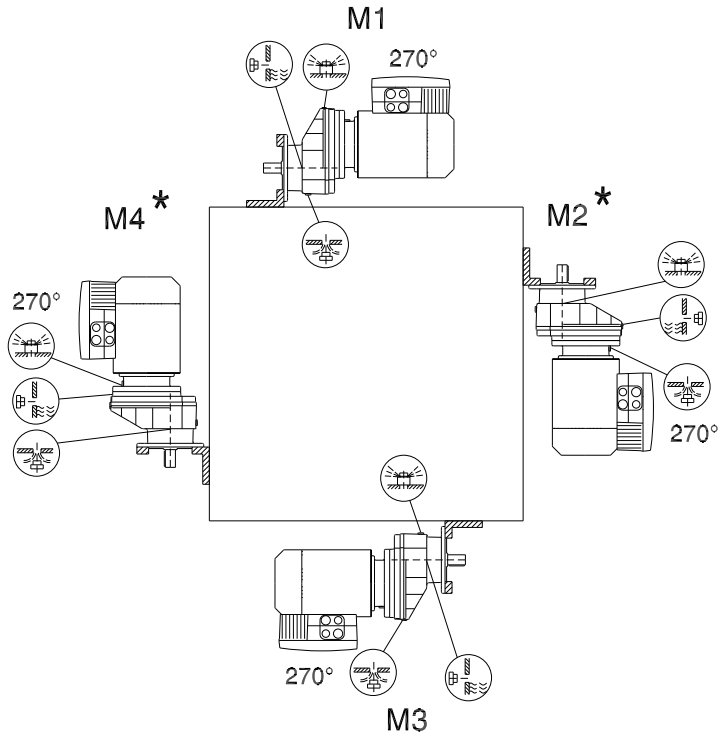


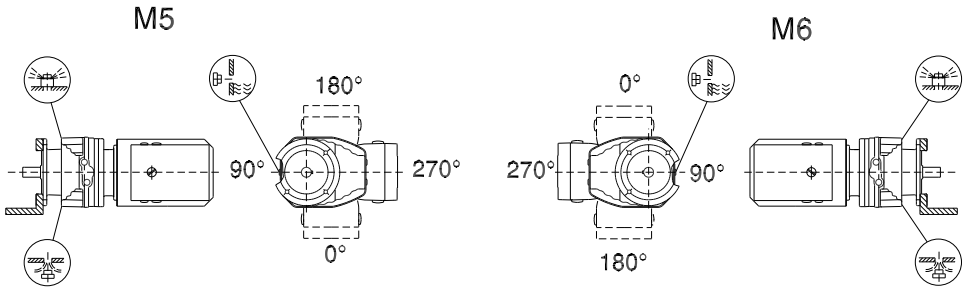
* → (page 57)

6.4.2 RXF57 – RXF107



04 037 02 01

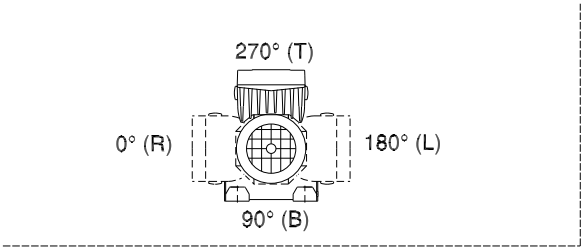


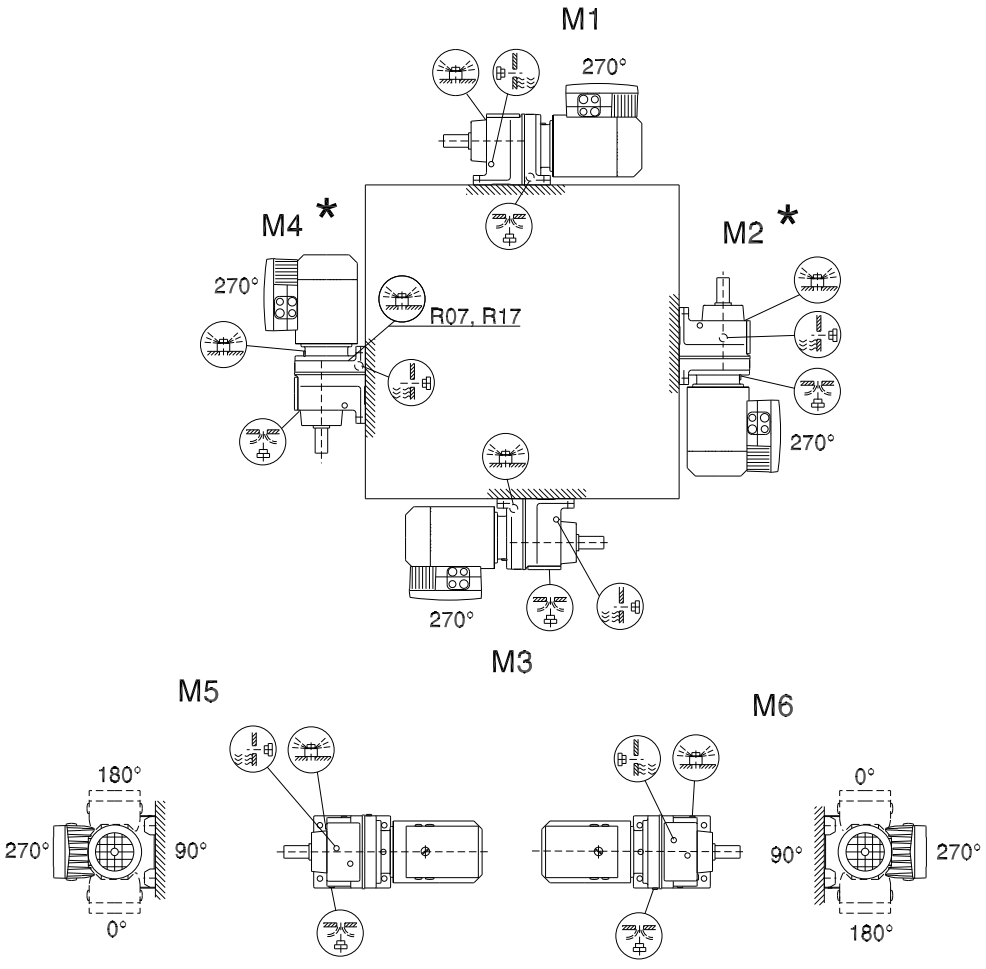


* → (page 57)

6.4.3 R07 – R107

04 033 03 01

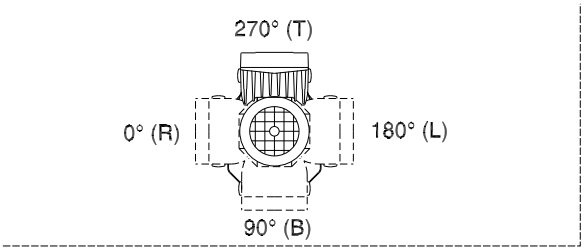




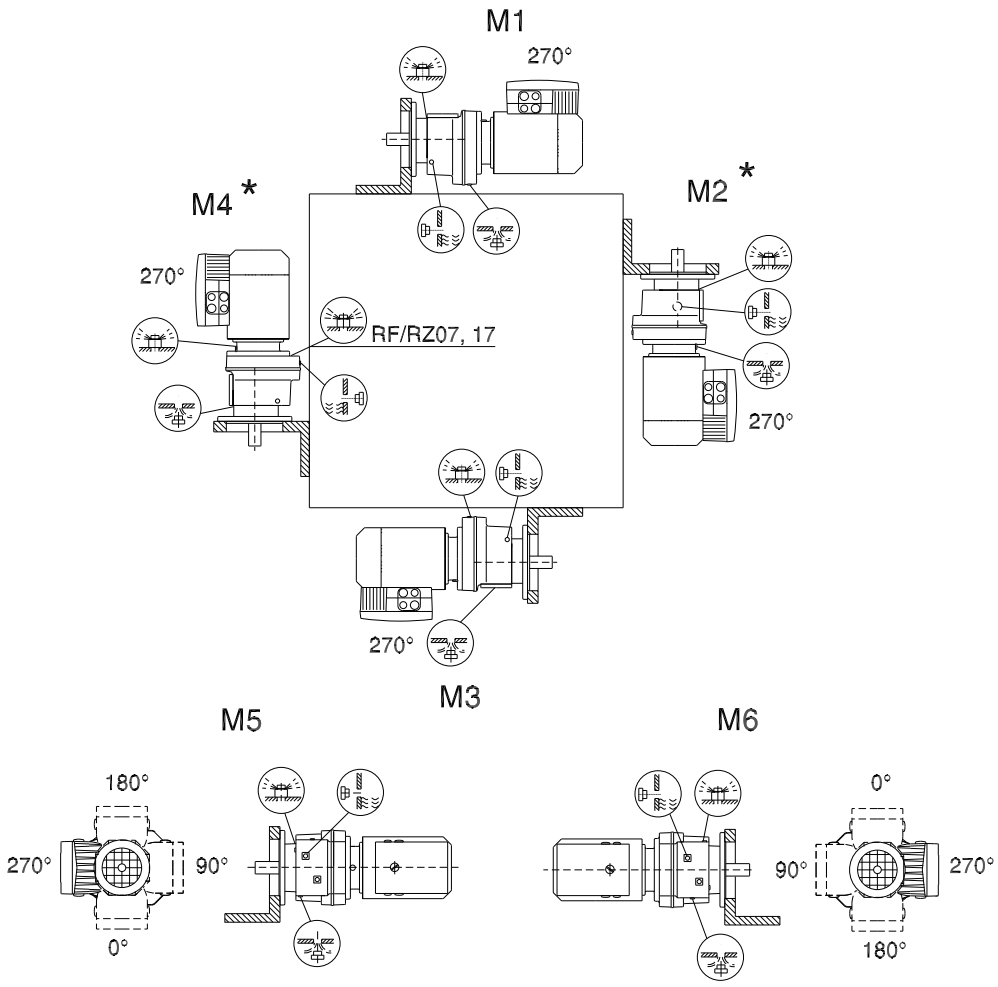
R07		M1, M2 , M3 , M5 , M6
R17, R27		M1, M3 , M5 , M6
R07, R17, R27		
R47, R57		M5

* → (page 57)

6.4.4 RF07 – RF107 / RZ07 – RZ87



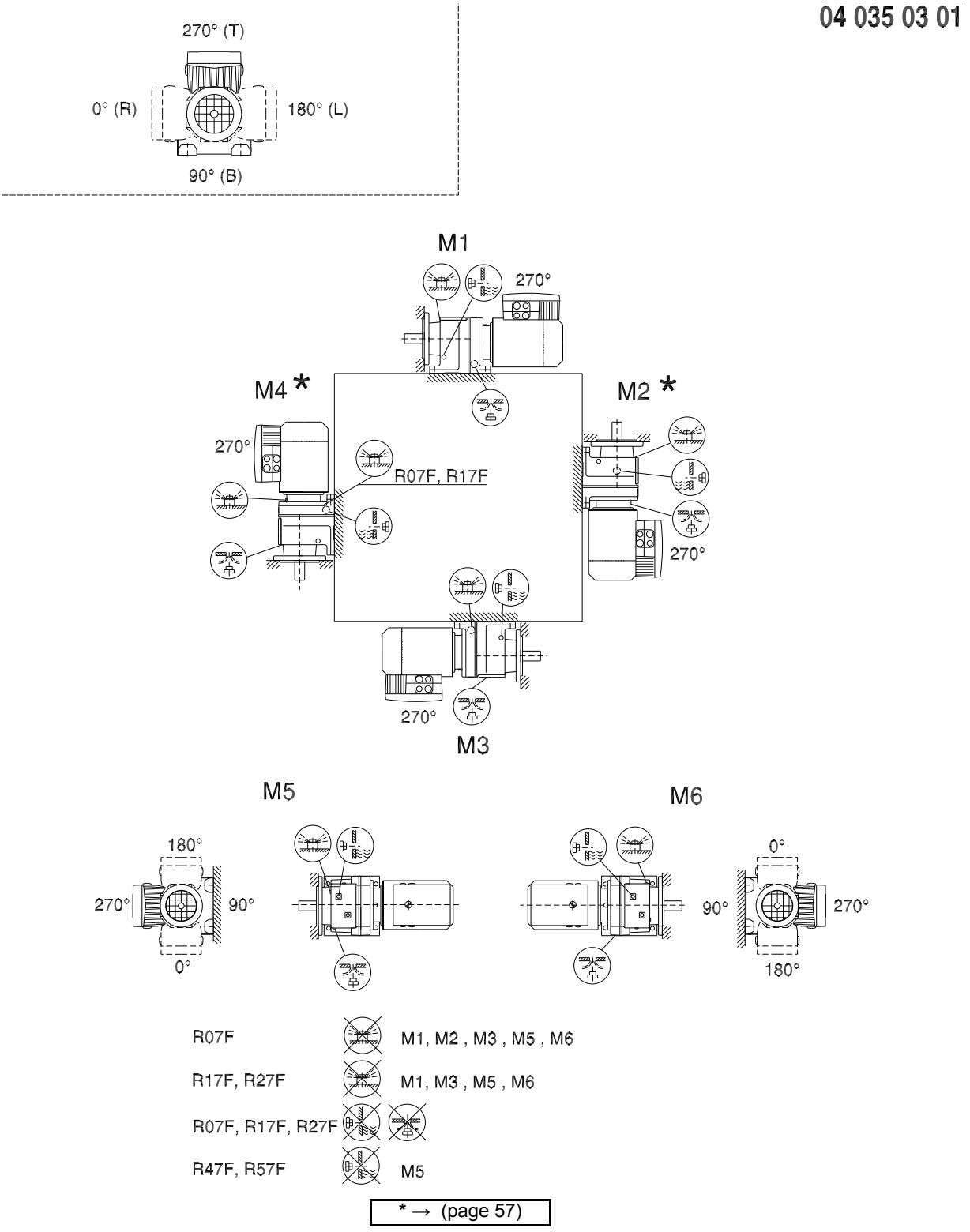
04 034 02 01



RF/RZ07		M1, M2 , M3 , M5 , M6
RF/RZ17, 27		M1, M3 , M5 , M6
RF/RZ07, 17, 27		
RF/RZ47, 57		M5

* → (page 57)

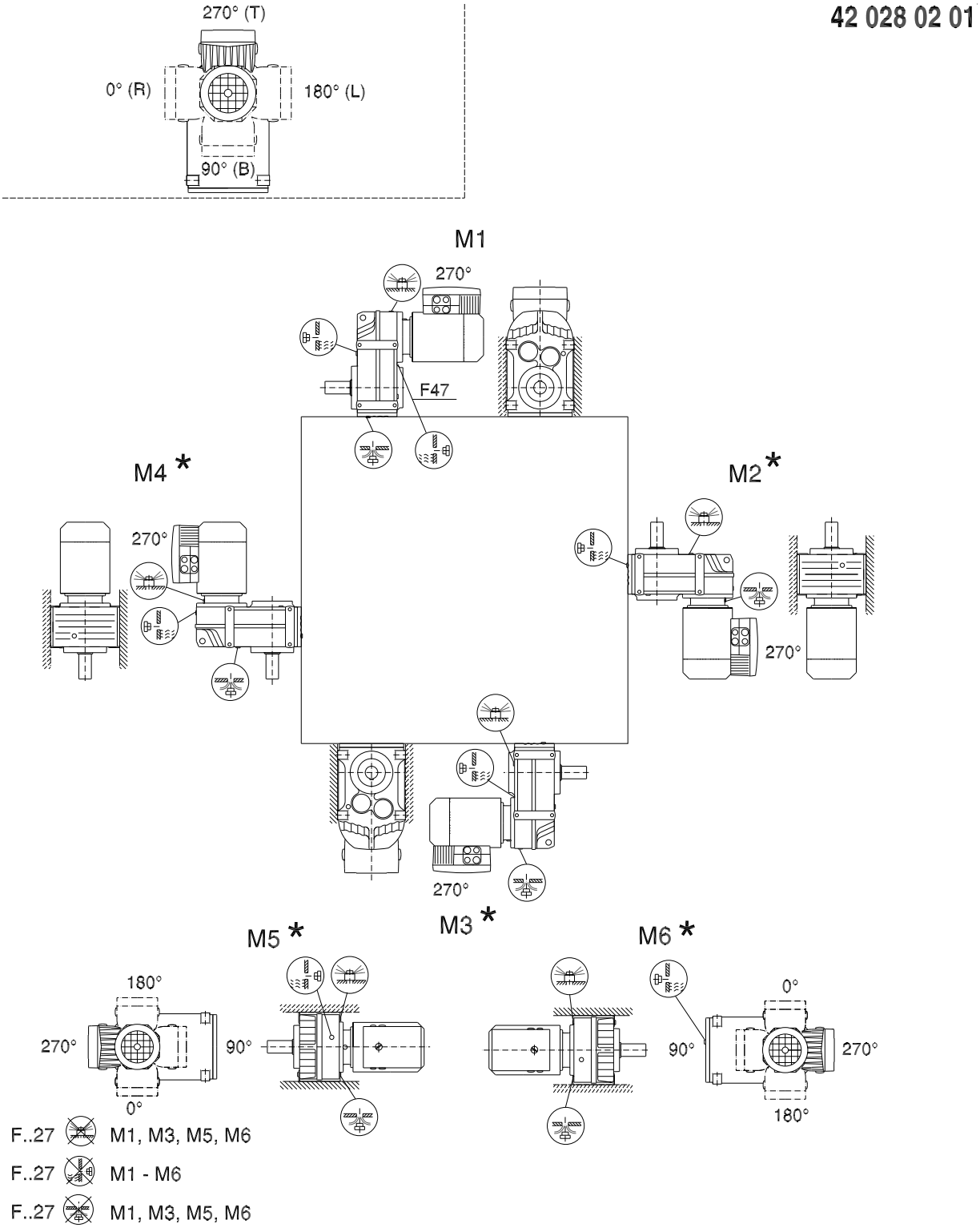
6.4.5 R07F – R87F



Important: Observe the notes in chapter "Project Planning for Gear Units" / "Overhung and axial loads".

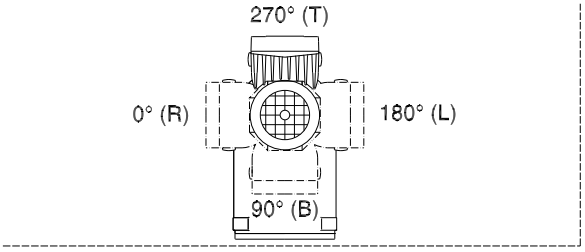
6.5 Mounting positions of parallel-shaft helical gearmotors

6.5.1 F / FA..B / FH..B / FV27B – 107B

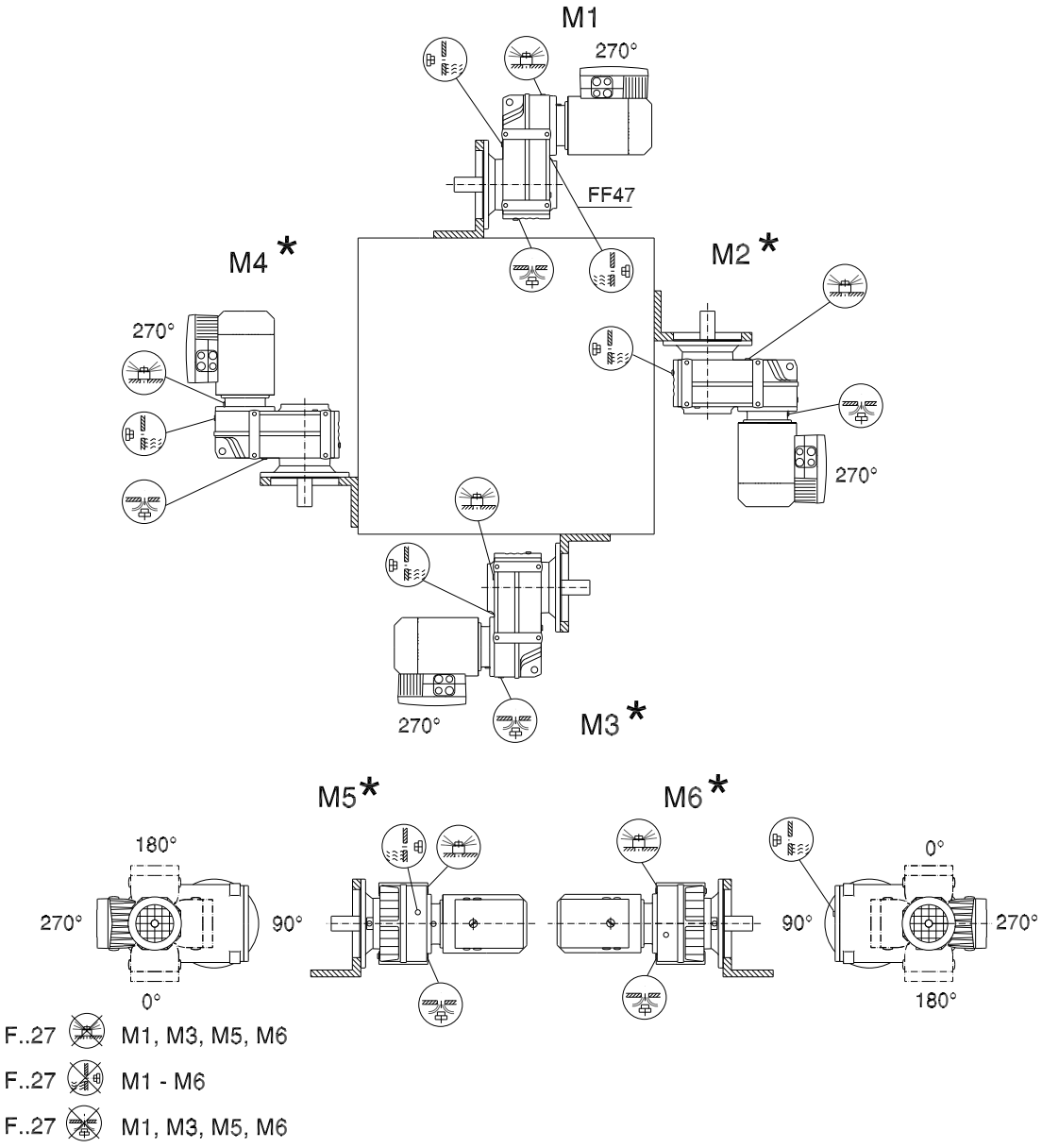


* → (page 57)

6.5.2 FF / FAF / FHF / FAZ / FHZ / FVF / FVZ27 – 107



42 029 02 01



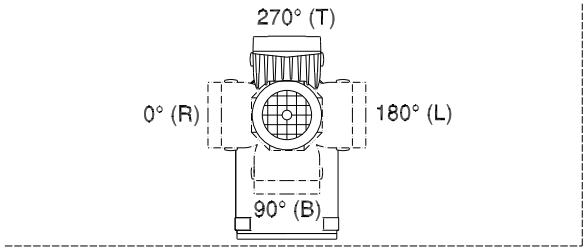
F..27 M1, M3, M5, M6

F..27 M1 - M6

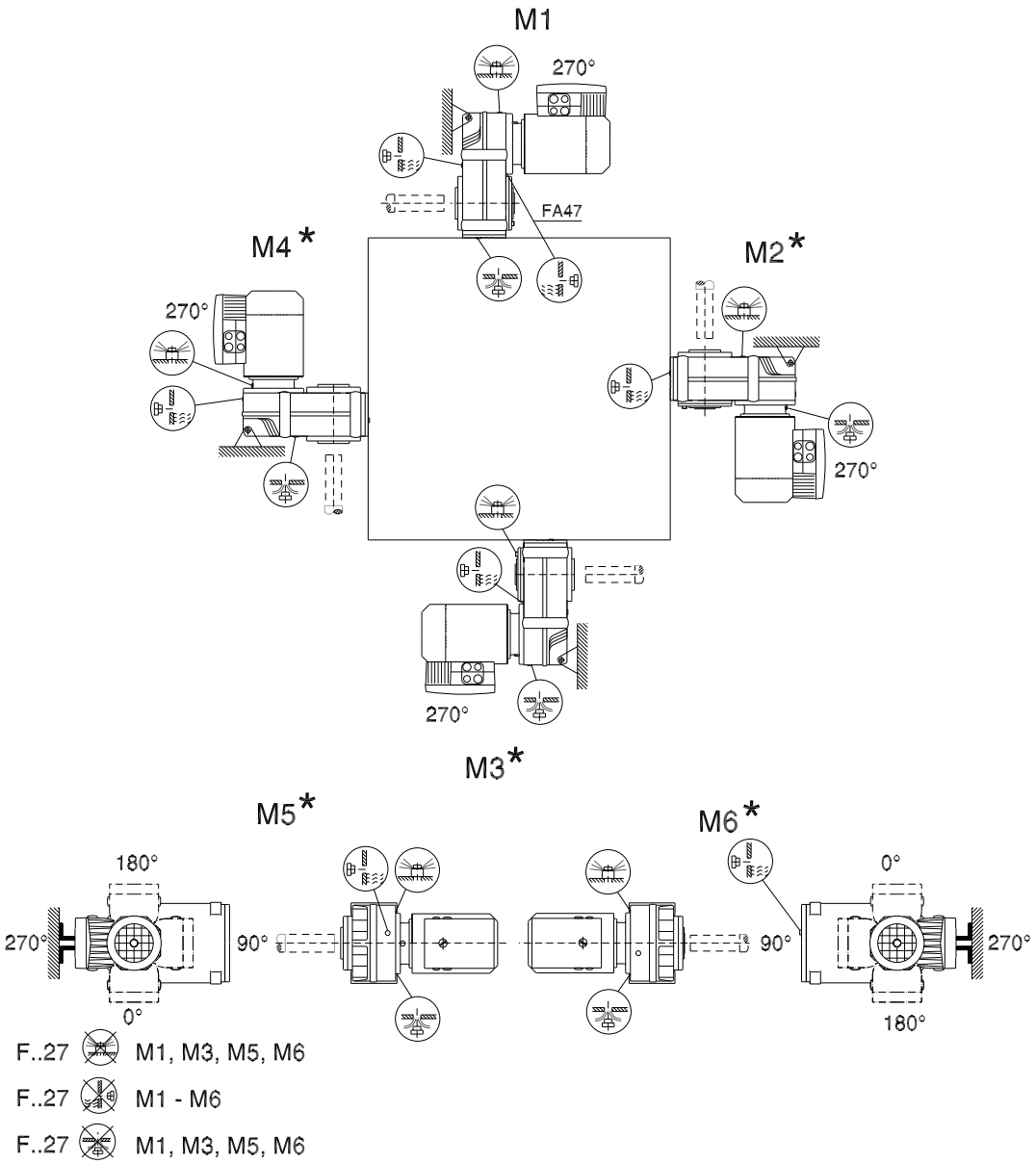
F..27 M1, M3, M5, M6

* → (page 57)

6.5.3 FA / FH / FV / FT37 0150 – 107



42 030 02 01



F..27 M1, M3, M5, M6

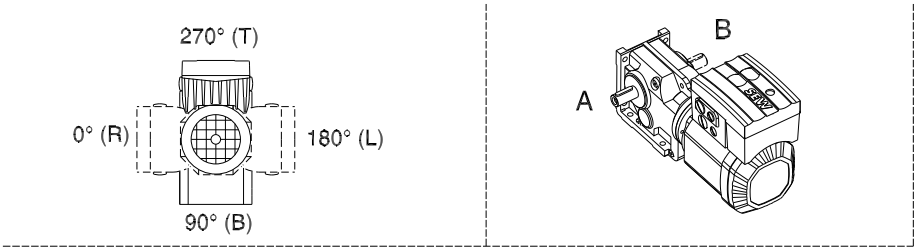
F..27 M1 - M6

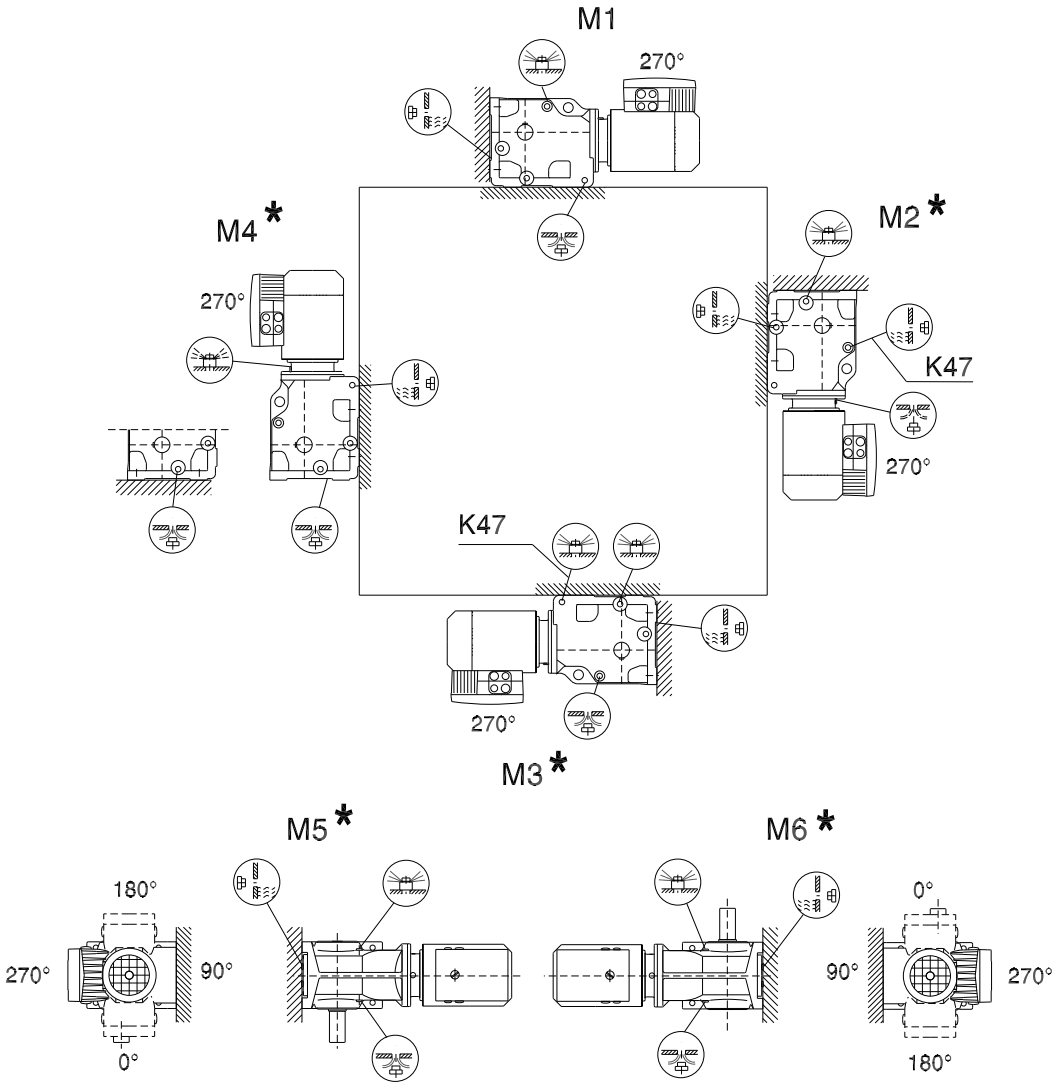
F..27 M1, M3, M5, M6

* → (page 57)

6.6 Mounting positions of helical-bevel gearmotors

6.6.1 K / KA..B / KH / KV37B – 107B

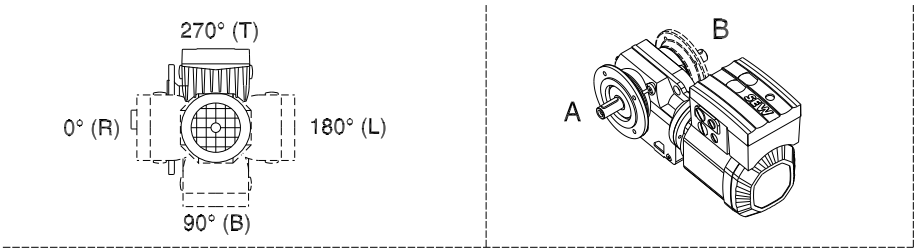




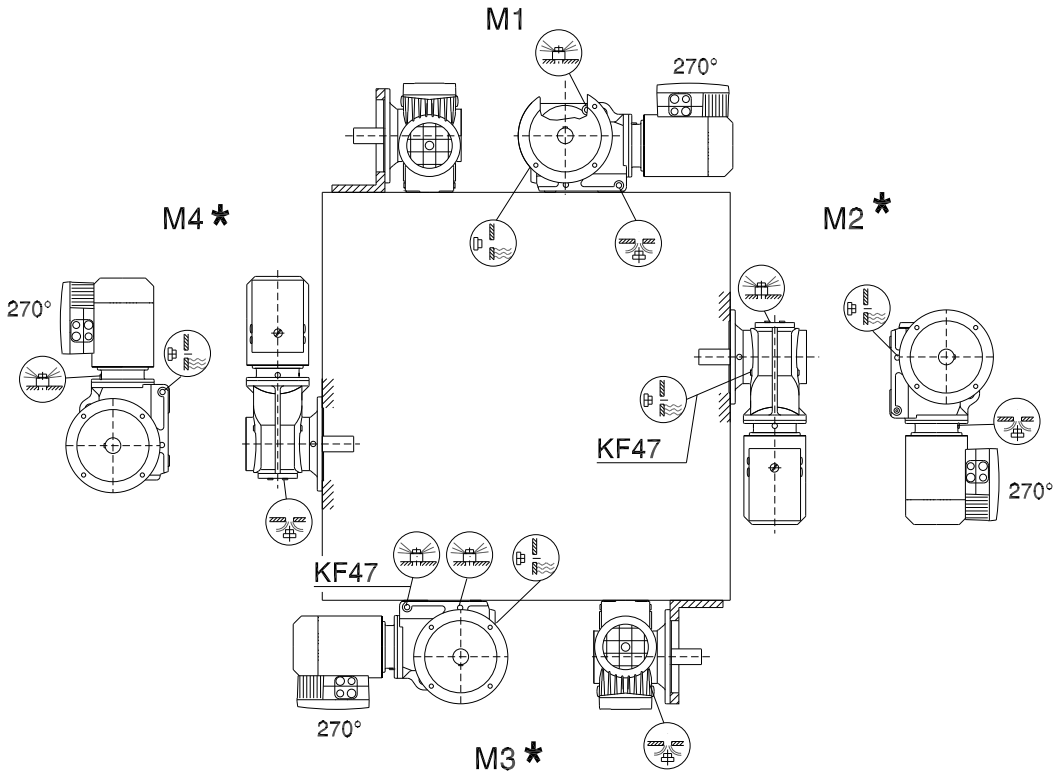
* → (page 57)

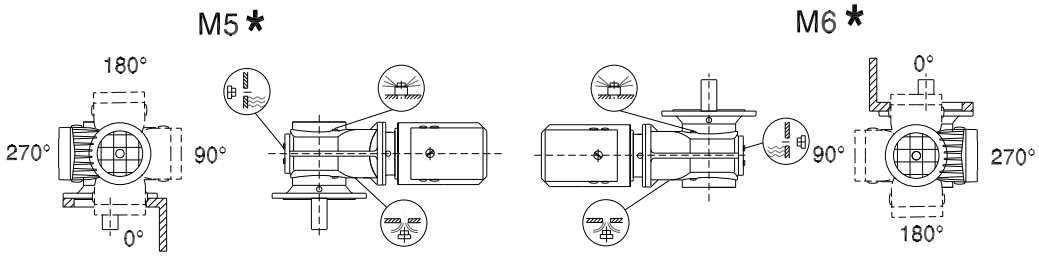
Important: Please also refer to the information in chapter "Project Planning for Gear Units" / "Overhung and axial loads".

6.6.2 KF / KAF / KHF / KAZ / KHZ / KVF / KVZ37 – 107



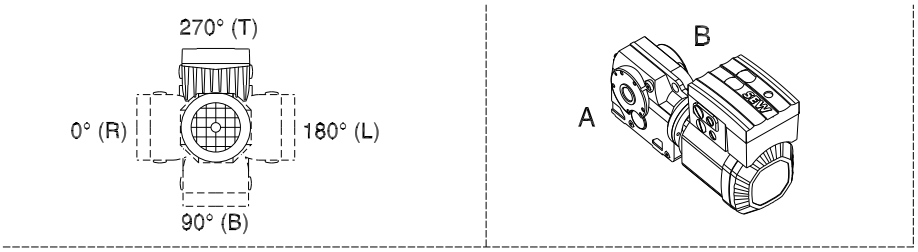
34 018 02 01

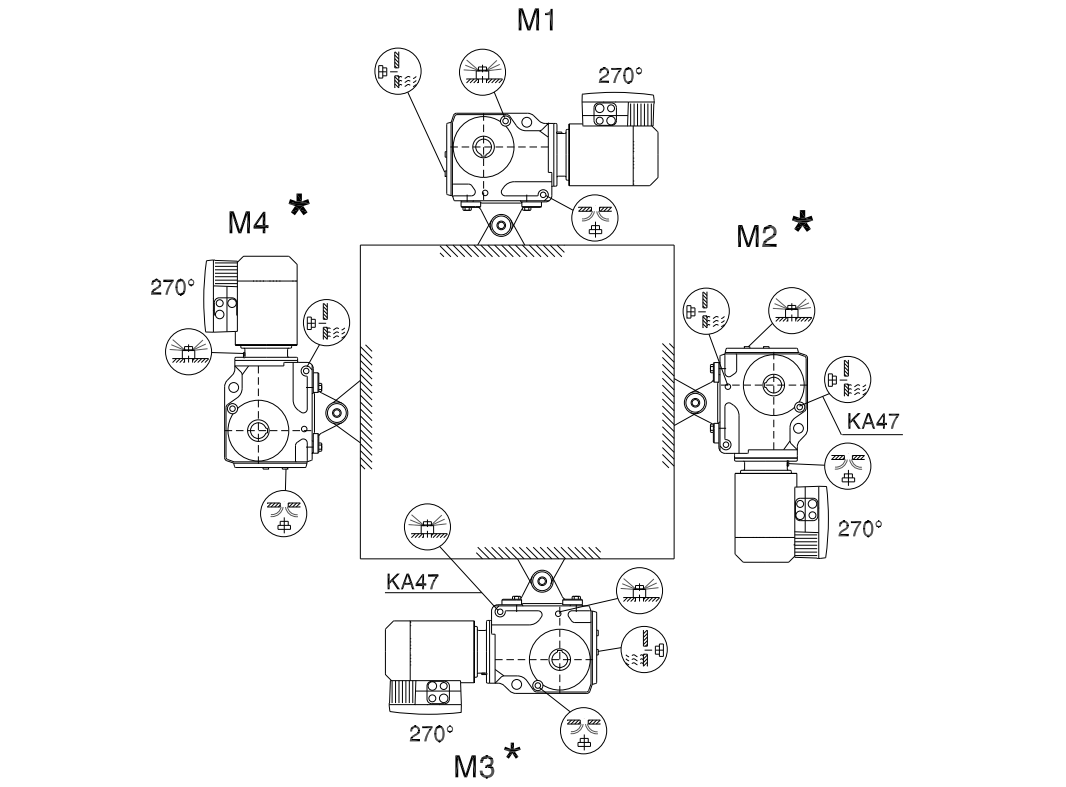


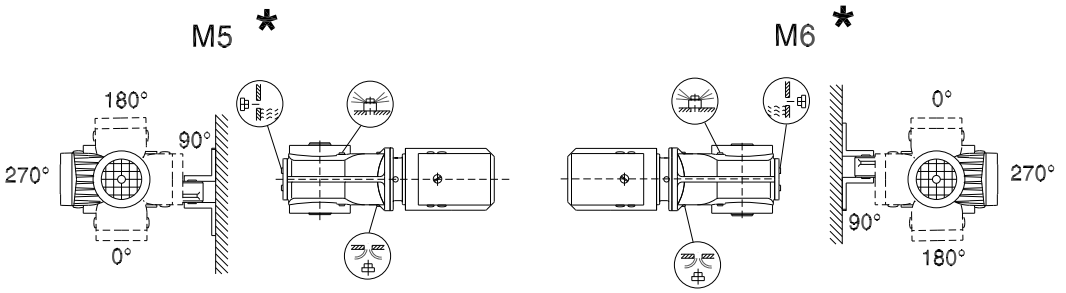


* → (page 57)

6.6.3 KA / KH / KV / KT37 – 107



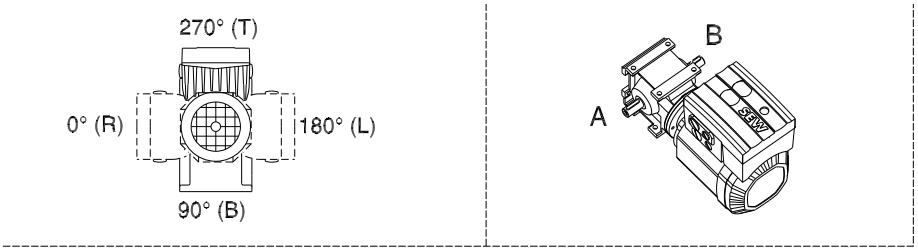


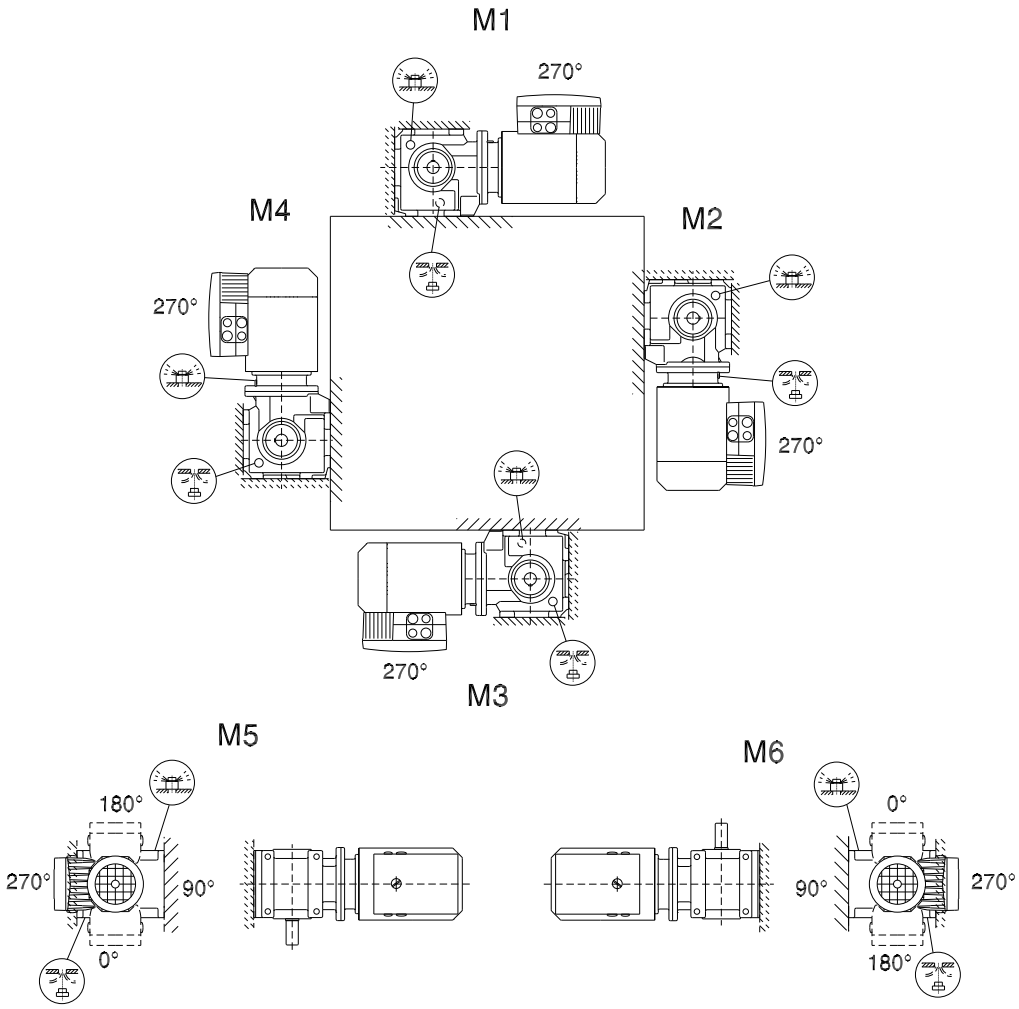


* → (page 57)

6.7 Mounting positions of helical-worm gearmotors

6.7.1 S37

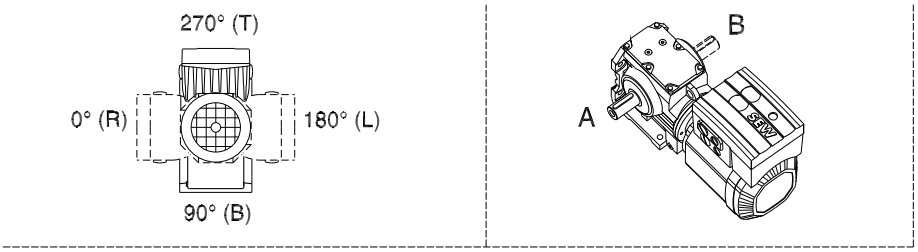


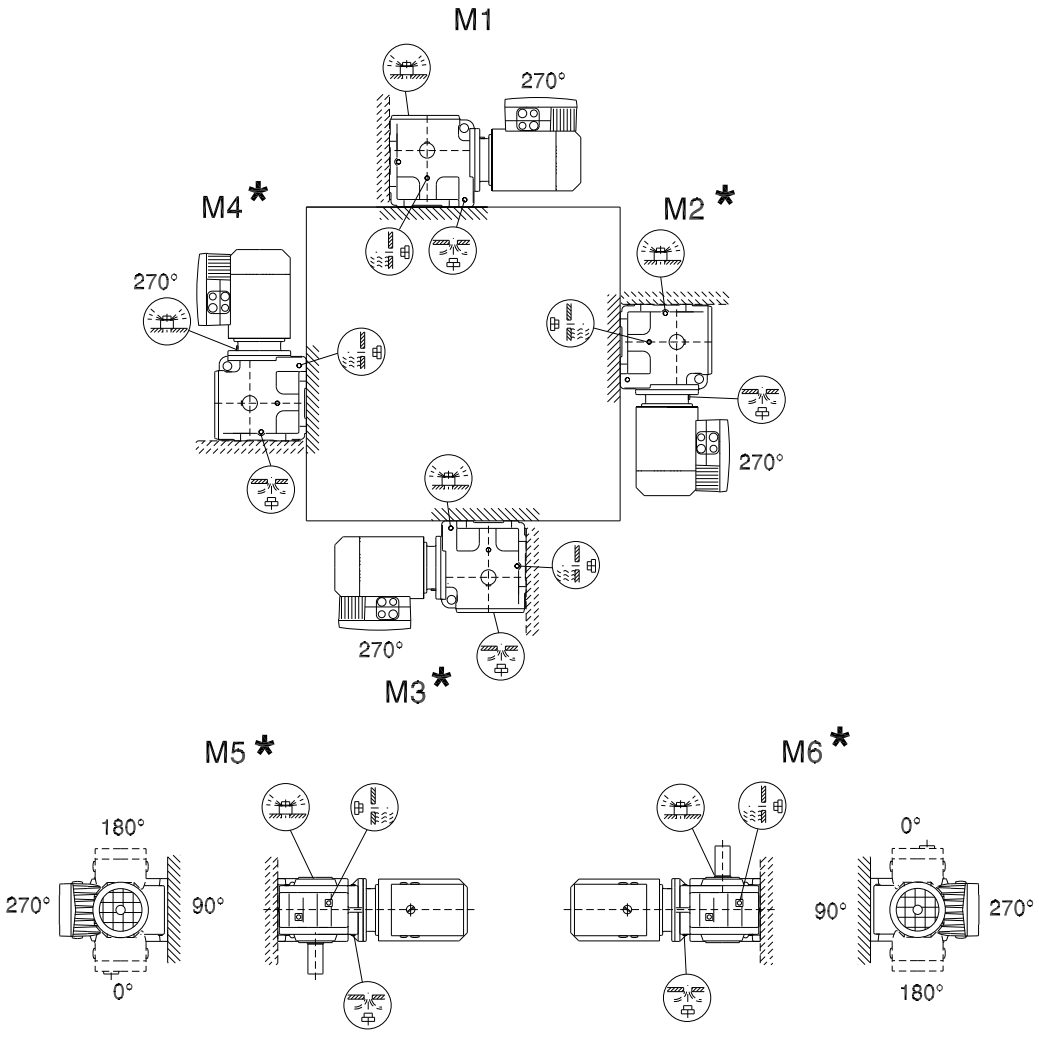


* → (page 57)

Important: Observe the notes in chapter "Project Planning for Gear Units" / "Overhung and axial loads".

6.7.2 S47 – S97

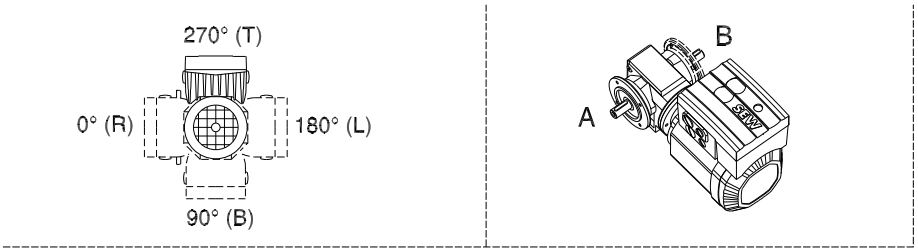


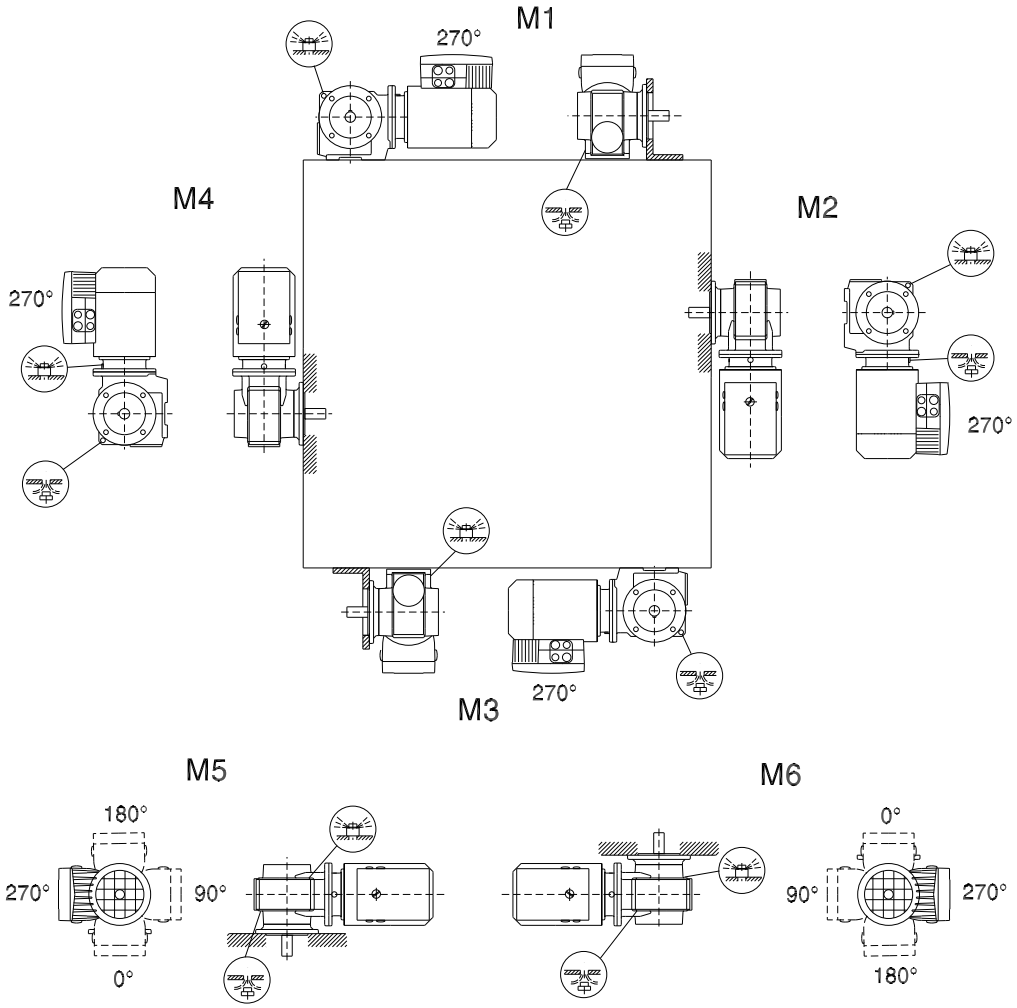


* → (page 57)

Important: Observe the notes in chapter "Project Planning for Gear Units" / "Overhung and axial loads".

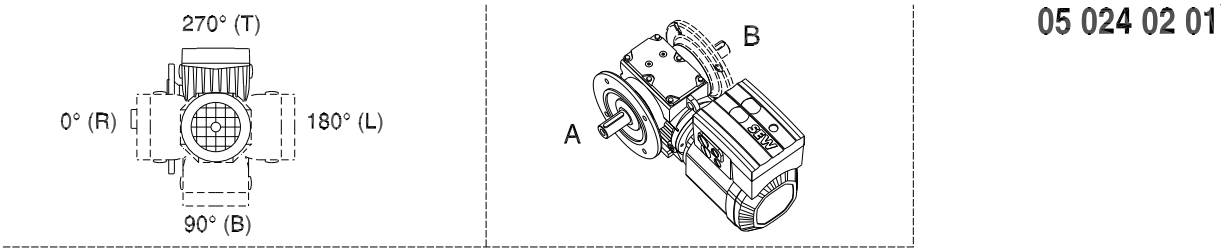
6.7.3 SF / SAF / SHF37

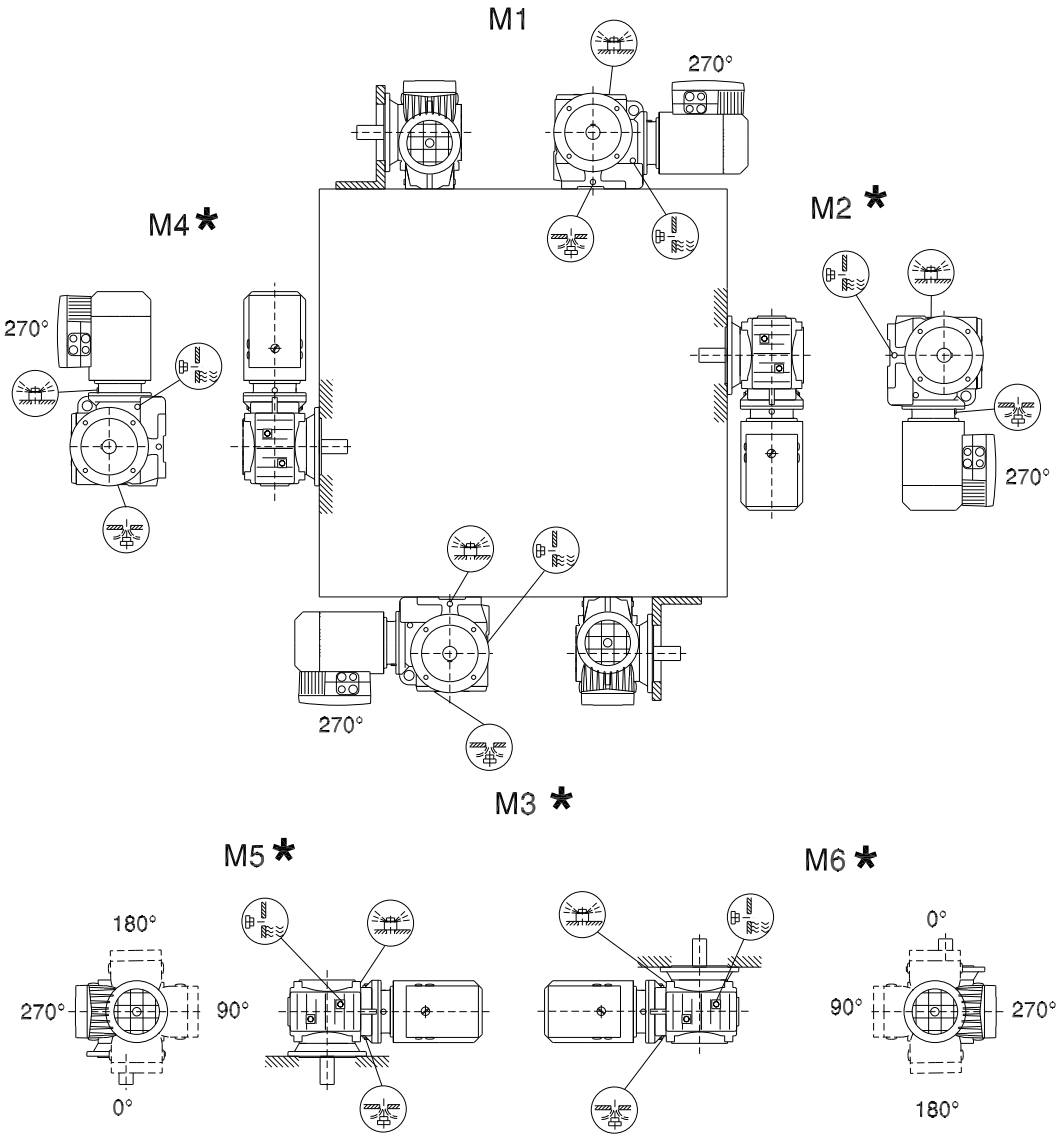




* → (page 57)

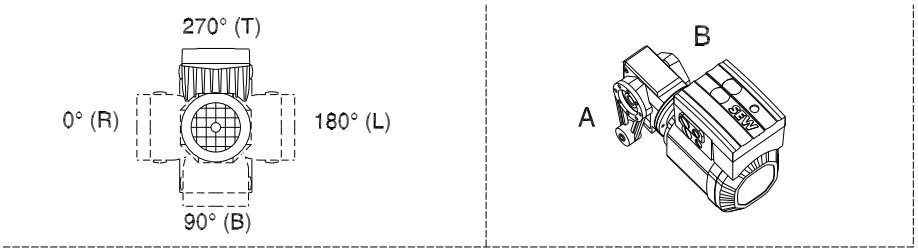
6.7.4 SF / SAF / SHF / SAZ / SHZ47 – 97

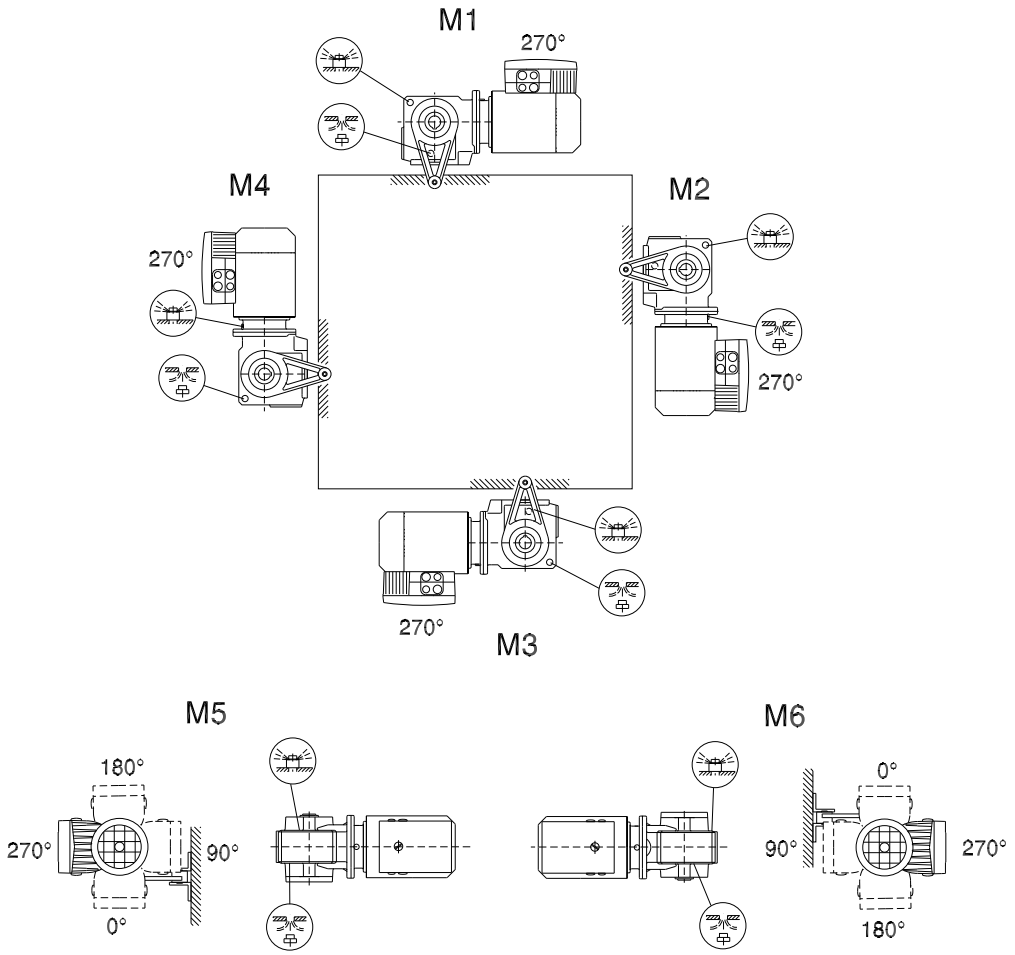




* → (page 57)

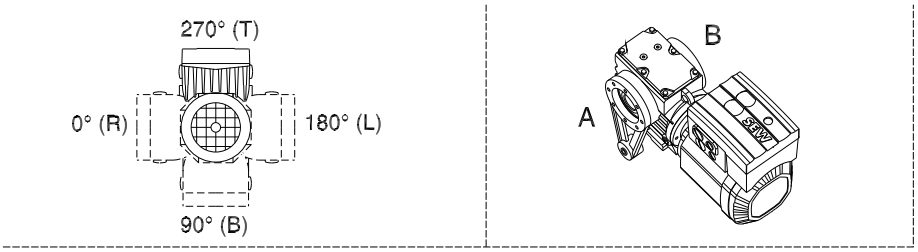
6.7.5 SA / SH / ST37

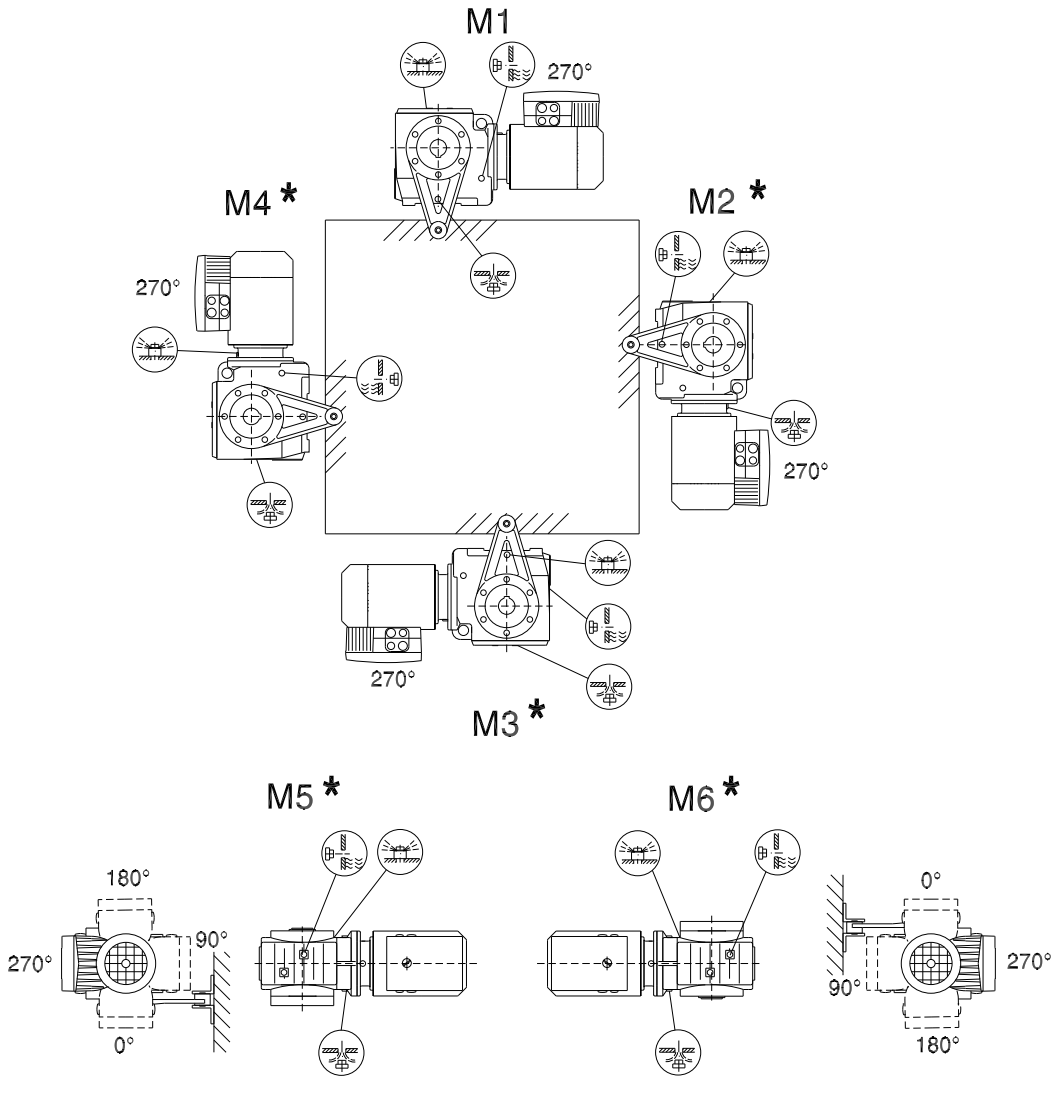




* → (page 57)

6.7.6 SA / SH / ST47 – 97

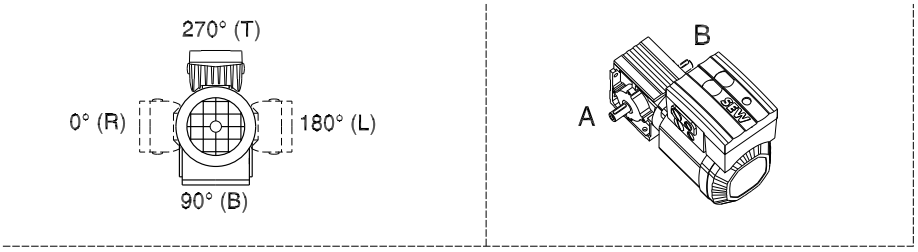


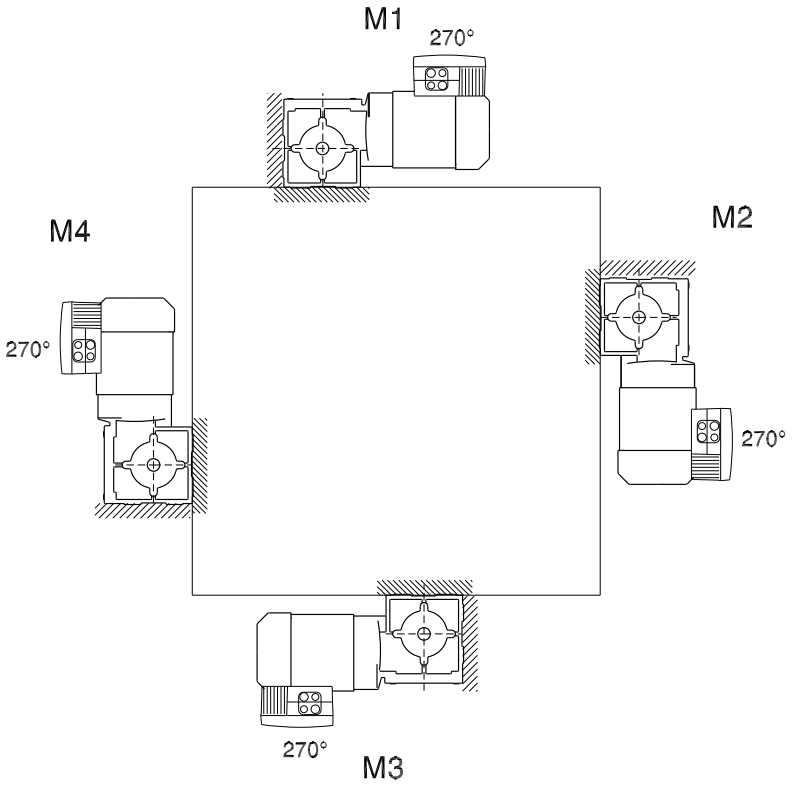


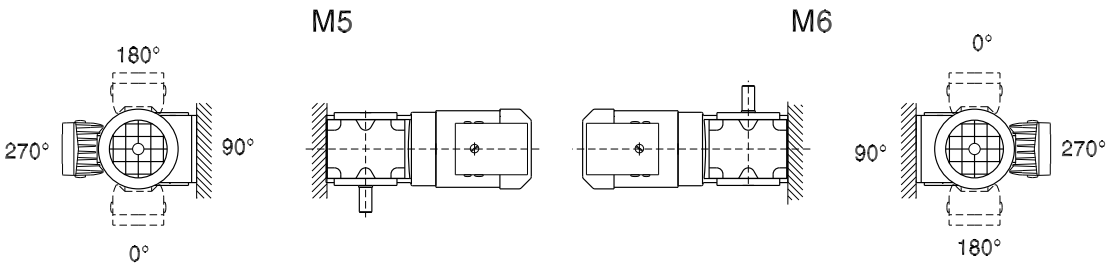
* → (page 57)

6.8 Mounting positions of SPIROPLAN® gearmotors

6.8.1 W10 – 30

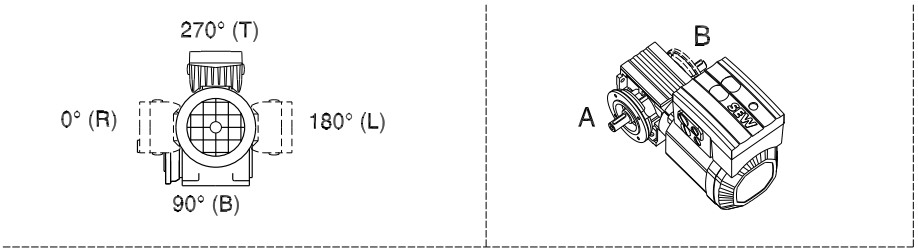


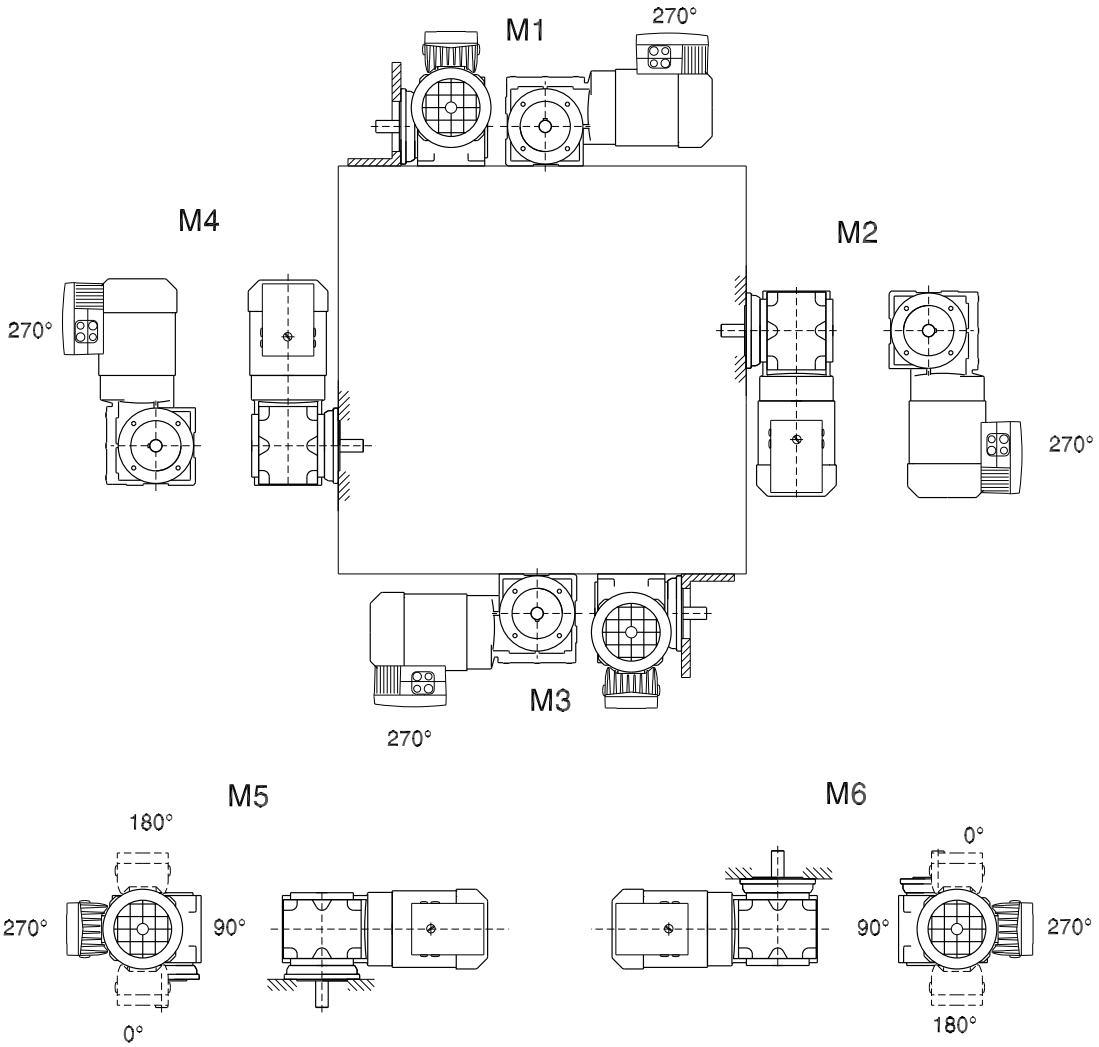




→ (page 57)

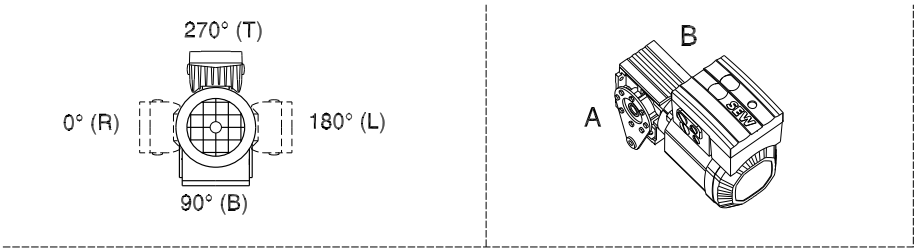
6.8.2 WF10 – 30



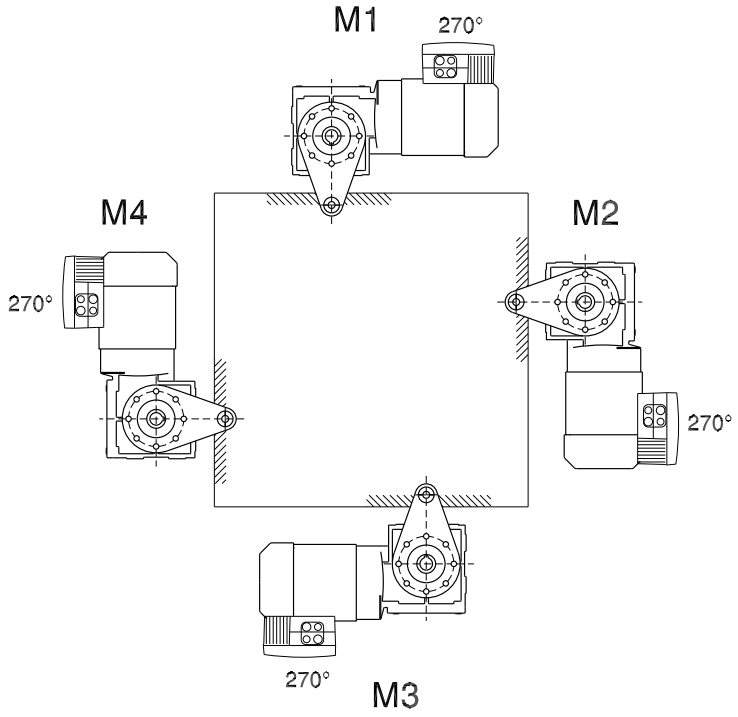


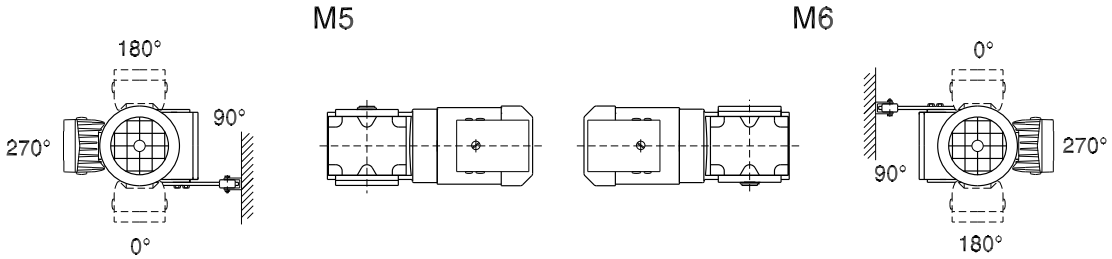
→ (page 57)

6.8.3 WA10 – 30



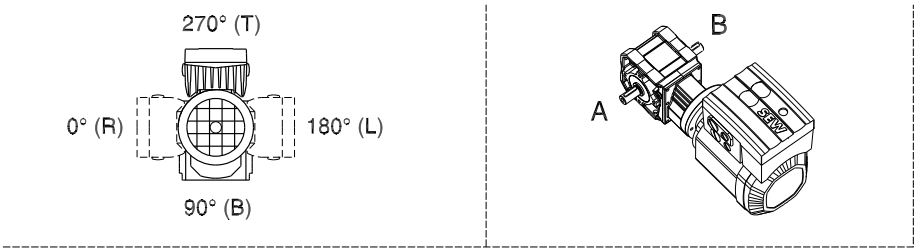
20 012 01 02

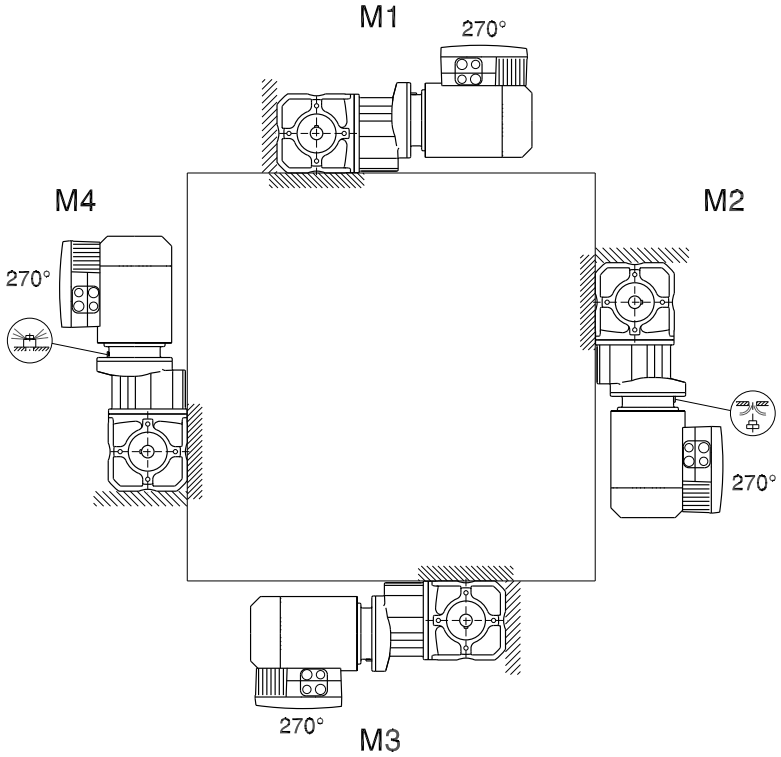


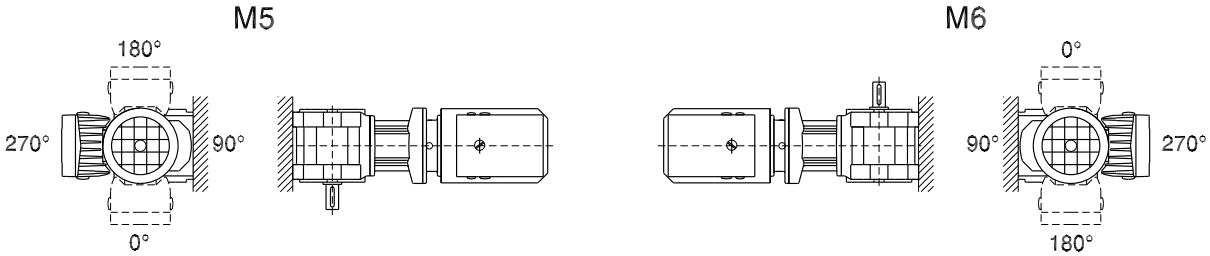


→ (page 57)

6.8.4 W / WA37-47B

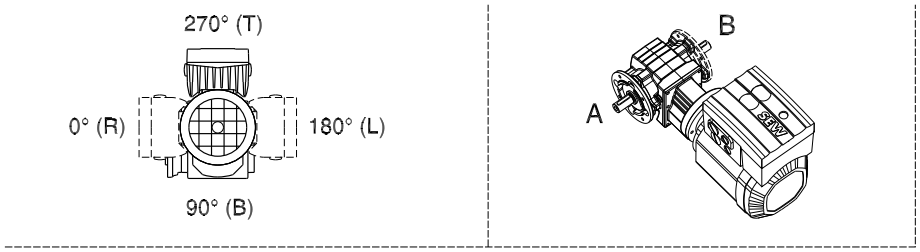


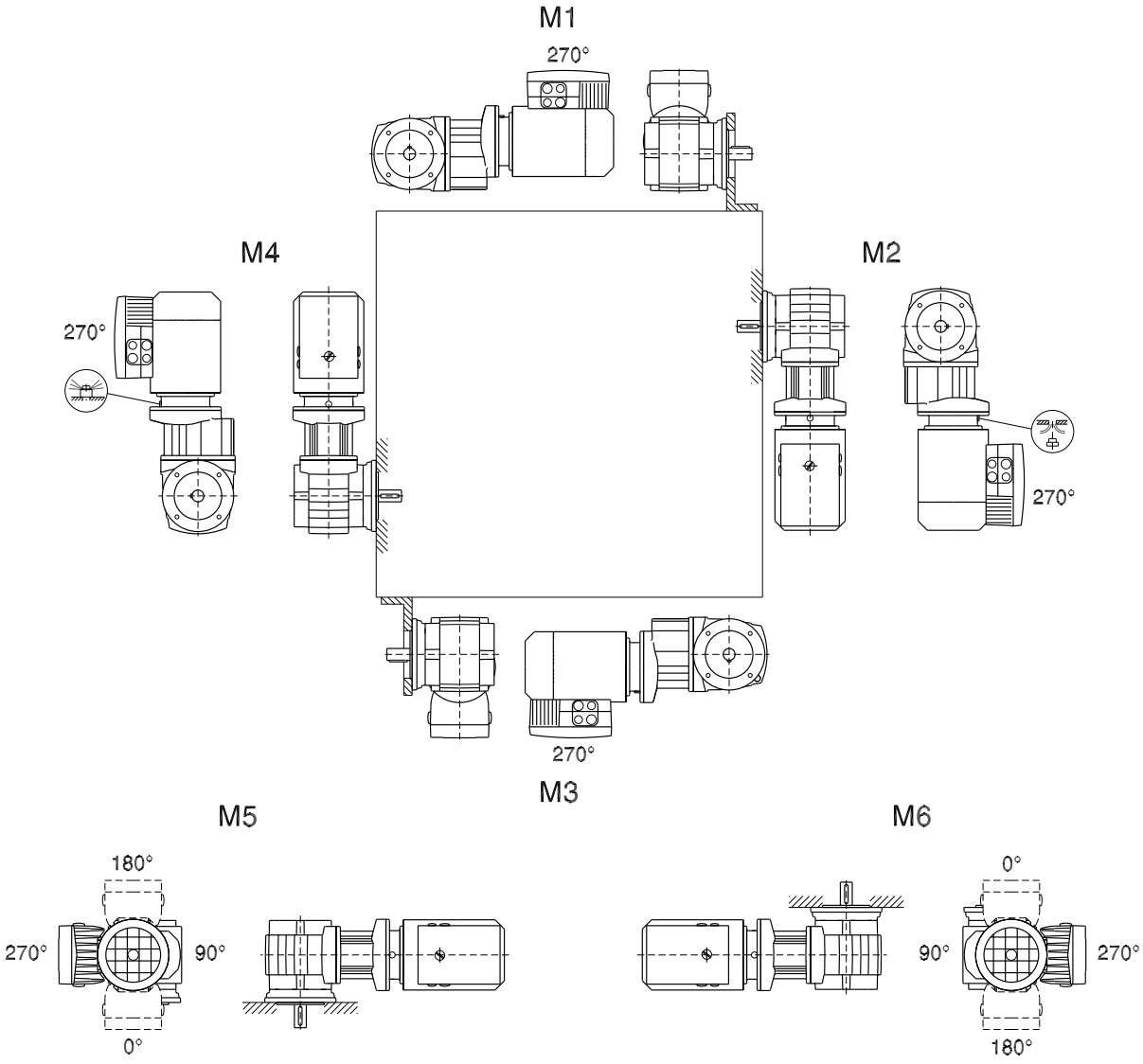




→ (page 57)

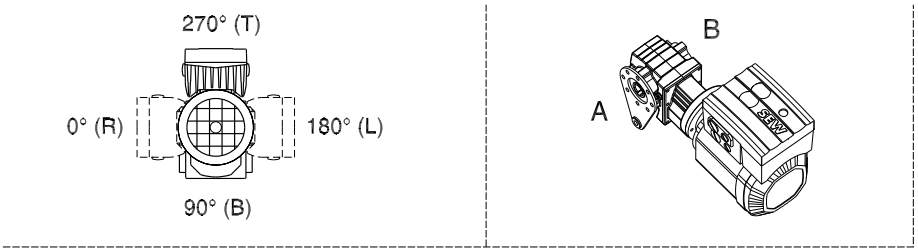
6.8.5 WF / WAF / WHF37-47

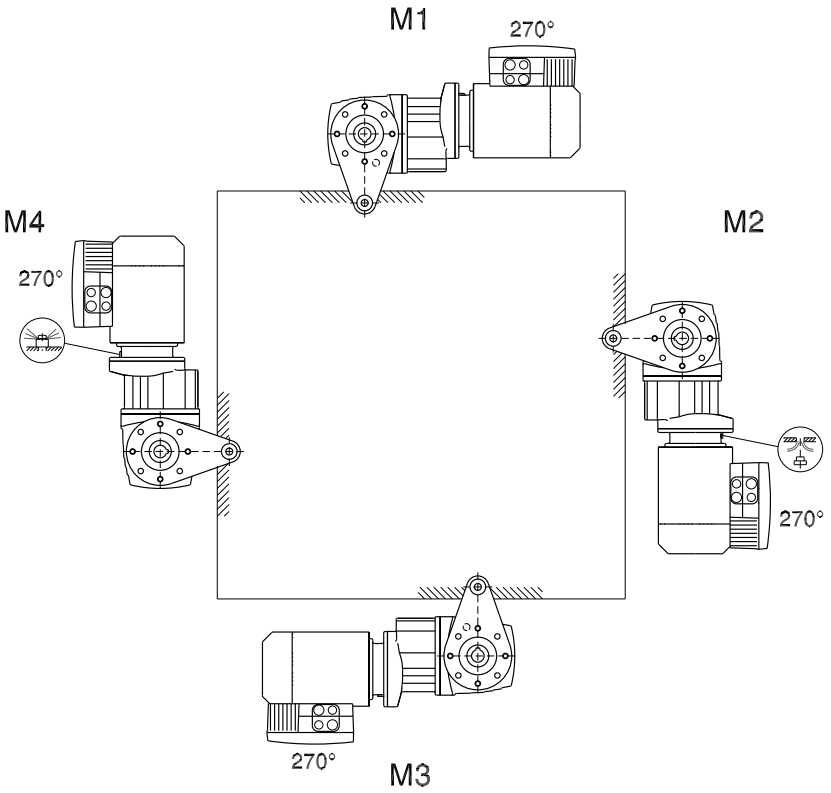


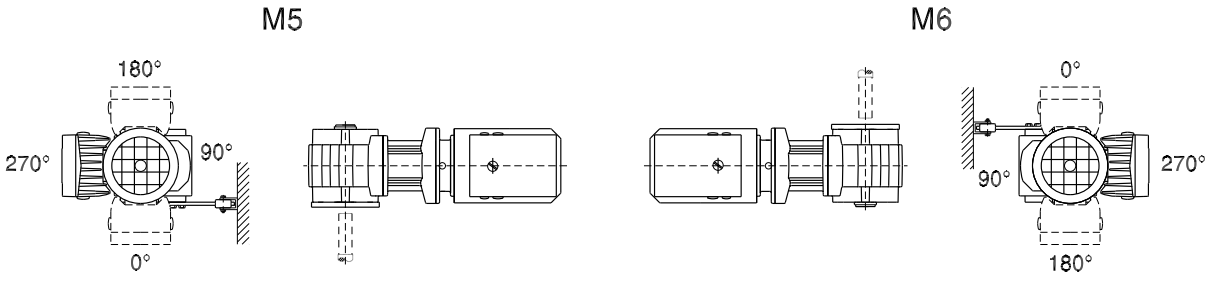


→ (page 57)

6.8.6 WA / WH / WT37-47







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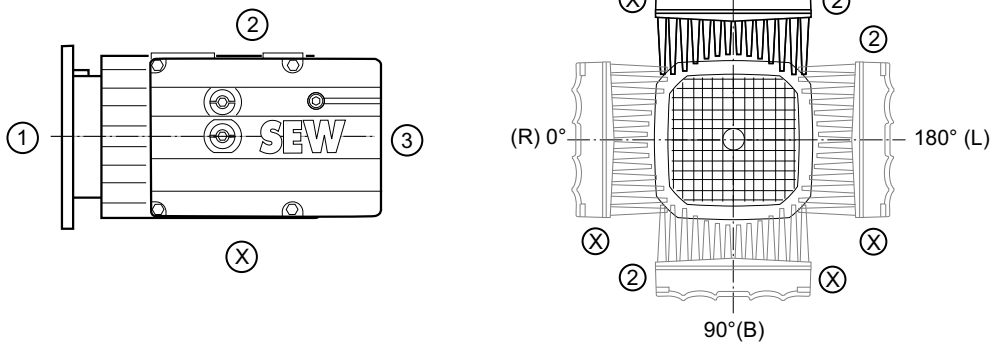
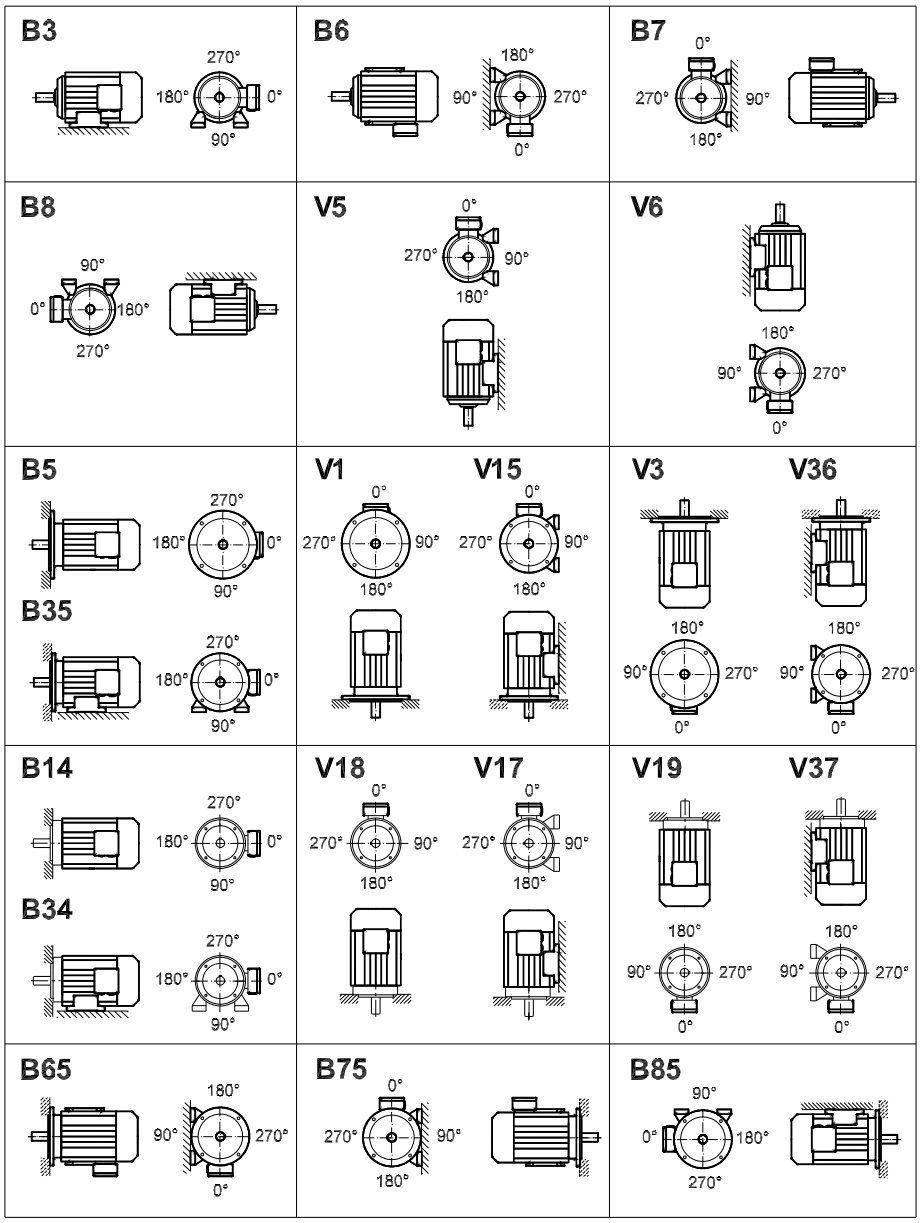
6.9 Mounting positions of AC motors

6.9.1 Position of connection box and cable entry



6.9.2 Mounting positions



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7 Design and Operating Notes

7.1 Lubricants and fill quantities for R, F, K, S, W gear units

7.1.1 General information

Unless a special arrangement is made, SEW-EURODRIVE supplies the drives with a lubricant fill adapted for the specific gear unit and mounting position. The decisive factor is the mounting position (M1 - M6, see chapter "Gear Unit Mounting Positions") specified when ordering the drive. You must adapt the lubricant fill in case of any subsequent changes made to the mounting position (see "Lubricant fill quantities").

INFORMATION

SEW-EURODRIVE fills the gear units with the amount of oil specified for the specific mounting positions. When the mounting position is changed, the amount of oil must be adapted accordingly. Consequently, a **mounting position** may only be **changed** after consultation with SEW-EURODRIVE, otherwise your right to claim under warranty **no longer applies**.

7.1.2 Lubricant table

The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Observe the following key to the lubricant table.

Key to the lubricant table

Abbreviations, meaning of shading and notes:

CLP	= Mineral oil
CLP PG	= Polyglycol (W gear units, conforms to USDA-H1)
CLP HC	= Synthetic hydrocarbons
E	= Ester oil (water hazard classification 1)
HCE	= Synthetic hydrocarbons + ester oil (USDA - H1 certification)
HLP	= Hydraulic oil
	= Synthetic lubricant (= synthetic-based roller bearing grease)
	= Mineral lubricant (= mineral-based rolling bearing grease)

1)	Helical-worm gear units with PG oil: please consult SEW-EURODRIVE
2)	Special lubricant for SPIROPLAN® gear units only
3)	SEW-$f_B \geq 1.2$ required
4)	Observe the critical starting behavior at low temperatures.
5)	Low-viscosity grease
6)	Ambient temperature
	Lubricant for the food industry (food grade oil)
	Biodegradable oil (lubricant for agriculture, forestry, and water management)

Lubricant table

The following table shows the assignment of lubricants to gear units:

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Gear unit		6) °C (-50 … +100)	DIN (ISO)	ISO,NLGI	Mobil®	Shell	Klüber	Aral	bp	Texaco	Castrol Tribol	Castrol Optimol	Fuchs	Total
R...		Standard -15 … +40	CLP(CC)	VG 220	Mobilgear 600 XP 220	Shell Omala 220	Klüberoil GEM 1-220 N	Aral Degol BG 220	BP Energol GR-XP 220	Meropa 220	Tribol 1100/220	Optigear BM 220	Renolin CLP 220	Carter EP 220
		-20 … +80	CLP PG	VG 220	Mobil Glygoyle 220	Shell Tivela S 220	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP 220	Synlube CLP 220	Tribol 800/220	Optiflex A 220	Renolin PG 220	Carter SY 220
K...(HK...)	4)	-20 … +60	CLP HC	VG 220	Mobil SHC 630	Shell Omala HD 220	Klübersynth GEM 4-220 N	Aral Degol PAS 220		Pinnacle EP 220	Tribol 1510/220	Optigear Synthetic X 220	Renolin Unisyn CLP 220	
	4)	-40 … +40	CLP HC	VG 150	Mobil SHC 629	Shell Omala HD 150	Klübersynth GEM 4-150 N			Pinnacle EP 150		Optigear Synthetic X 150	Renolin Unisyn CLP 150	Carter SH 150
		-20 … +25	CLP (CC)	VG 150 VG 100	Mobilgear 600 XP 100	Shell Omala 100	Klüberoil GEM 1-150 N	Aral Degol BG 100	BP Energol GR-XP 100	Meropa 150	Tribol 1100/100	Optigear BM 100	Renolin CLP 150	Carter EP 100
		-30 … +10	HLP (HM)	VG 68-46 VG 32	Mobil DTE 10 Excel 32	Shell Tellus T 32	Klüberoil GEM 1-68 N	Aral Degol BG 46		Rando EP Ashless 46	Tribol 1100/68	Optigear 32	Renolin B 46 HVI	Equivis ZS 46
F...	4)	-40 … +20	CLP HC	VG 68	Mobil SHC 626	Shell Omala HD 68							Renolin Unisyn CLP 68	
	4)	-40 … + 0	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32			Cetus PAO 46		Optileb HY 32	Renolin Unisyn OL 32	Dacnis SH 32
	4)	-40 … -20	HLP (HM)	VG 22 VG 15	Mobil DTE 10 Excel 15	Shell Tellus T 15	Isoflex MT 30 ROT		BP Energol HLP-HM 15	Rando HDZ 15		Hyspin AWS 22	Renolin MR 310	Equivis ZS 15
S...(HS...)		Standard 0 … +40	CLP (CC)	VG 680	Mobilgear 600 XP 680	Shell Omala 680	Klüberoil GEM 1-680 N	Aral Degol BG 680	BP Energol GR-XP 680	Meropa 680	Tribol 1100/680	Optigear BM 680	Renolin SEW 680	Carter EP 680
		-20 … +80	CLP PG	VG 680 1)	Mobil Glygoyle 680	Shell Tivela S 680	Klübersynth GH 6-680		BP Enersyn SG-XP 680	Synlube CLP 680	Tribol 800/680	Optiflex A 680	Renolin PG 680	
	4)	-20 … +60	CLP HC	VG 460	Mobil SHC 634	Shell Omala HD 460	Klübersynth GEM 4-460 N			Pinnacle EP 460		Optigear Synthetic X 460	Renolin Unisyn CLP 460	
	4)	-40 … +30	CLP HC	VG 150	Mobil SHC 629	Shell Omala HD 150	Klübersynth GEM 4-150 N			Pinnacle EP 150		Optigear Synthetic X 150	Renolin Unisyn CLP 150	Carter SH 150
		-20 … +10	CLP (CC)	VG 150 VG 100	Mobilgear 600 XP 100	Shell Omala 100	Klüberoil GEM 1-150 N	Aral Degol BG 100	BP Energol GR-XP 100	Meropa 150	Tribol 1100/100	Optigear BM 100	Renolin CLP 150	Carter EP 100
		-20 … +40	CLP PG	VG 220 1)	Mobil Glygoyle 220	Shell Tivela S 220	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP 220	Synlube CLP 220	Tribol 800/220	Optiflex A 220	Renolin PG 220	Carter SY 220
	4)	-40 … +20	CLP HC	VG 68	Mobil SHC 626	Shell Omala HD 68							Renolin Unisyn CLP 68	
	4)	-40 … 0	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32			Cetus PAO 46		Alphasyn T32	Renolin Unisyn OL 32	Dacnis SH 32
R...,K...(HK...), F...,S...(HS...)	4)	-10 … +40	CLPHC NSF H1	VG 460		Shell Cassida Fluid GL 460	Klüberoil 4UH1-460 N					Optileb GT 460	Geralyn SF 460	
		-20 … +30		VG 220		Shell Cassida Fluid GL 220	Klüberoil 4UH1-220 N					Optileb GT 220		
		-40 … 0		VG 68		Shell Cassida Fluid HF 68	Klüberoil 4UH1-68 N					Optileb HY 68		
		-20 … +40	E	VG 460			Klüberbio CA2-460				Tribol Bio Top 1418/460		Plantogear 460 S	
W...(HW...)		Standard -20 … +40	CLP PG 460 -SEW	VG 460 2)			Klüber SEW HT-460-5							
	4)	-40 … +10	API GL5	SAE 75W90 (~VG 100)	Mobil Synthetic Gear Oil 75 W90									
		-20 … +60	H1 PG	VG 460 2) 3)			Klübersynth UH1 6-460							
PS.F..		Standard -20 … +40	CLP PG	VG 220			Klübersynth GH 6-220							
		-20 … +60	H1 PG	VG 460 2) 3)			Klübersynth UH1 6-460							
		-40 … 0	CLP HC	VG 32	Mobil SHC 624									
PS.C..		Standard -10 … +40	CLP (CC)	VG 220	Mobilgear 600 XP 220									
		-20 … +40	DIN 51 818	00 5)	Mobillux EP 004									
		-20 … +40	DIN 51 818	1 7)			Klübersynth UH1 14-151							
		-40 … 0	CLP HC	VG 32	Mobil SHC 624									
BS.F..		Standard -40 … +40	API GL5	SAE 75W90 (~VG 100)	Mobil Synth Gear Oil 75 W90									
		-20 … +60	H1 PG	VG 460 2) 3)			Klübersynth UH1 6-460							

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7.1.3 Lubricant fill quantities

The specified fill quantities are **guide values**. The exact values vary depending on the number of gear stages and reduction ratio. When filling, it is essential to check the **oil level plug since it indicates the precise oil volume**.

The following tables show guide values for lubricant fill quantities in relation to the mounting position M1 – M6.

Helical (R) gear units

RX..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RX57	0.60	0.80	1.30	1.30	0.90	0.90
RX67	0.80	0.80	1.70	1.90	1.10	1.10
RX77	1.10	1.50	2.60	2.70	1.60	1.60
RX87	1.70	2.50	4.80	4.80	2.90	2.90
RX97	2.10	3.40	7.4	7.0	4.80	4.80
RX107	3.90	5.6	11.6	11.9	7.7	7.7

RXF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RXF57	0.50	0.80	1.10	1.10	0.70	0.70
RXF67	0.70	0.80	1.50	1.40	1.00	1.00
RXF77	0.90	1.30	2.40	2.00	1.60	1.60
RXF87	1.60	1.95	4.90	3.95	2.90	2.90
RXF97	2.10	3.70	7.1	6.3	4.80	4.80
RXF107	3.10	5.7	11.2	9.3	7.2	7.2

R.., R..F

Gear unit	Fill quantity in liters					
	M1[1)]	M2	M3	M4	M5	M6
R07	0.12	0.20	0.20	0.20	0.20	0.20
R17	0.25	0.55	0.35	0.55	0.35	0.40
R27	0.25/0.40	0.70	0.50	0.70	0.50	0.50
R37	0.30/0.95	0.85	0.95	1.05	0.75	0.95
R47	0.70/1.50	1.60	1.50	1.65	1.50	1.50
R57	0.80/1.70	1.90	1.70	2.10	1.70	1.70
R67	1.10/2.30	2.40	2.80	2.90	1.80	2.00
R77	1.20/3.00	3.30	3.60	3.80	2.50	3.40
R87	2.30/6.0	6.4	7.2	7.2	6.3	6.5
R97	4.60/9.8	11.7	11.7	13.4	11.3	11.7
R107	6.0/13.7	16.3	16.9	19.2	13.2	15.9
R137	10.0/25.0	28.0	29.5	31.5	25.0	25.0
R147	15.4/40.0	46.5	48.0	52.0	39.5	41.0
R167	27.0/70.0	82.0	78.0	88.0	66.0	69.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

RF..

Gear unit	Fill quantity in liters					
	M1[1)]	M2	M3	M4	M5	M6
RF07	0.12	0.20	0.20	0.20	0.20	0.20
RF17	0.25	0.55	0.35	0.55	0.35	0.40
RF27	0.25/0.40	0.70	0.50	0.70	0.50	0.50
RF37	0.35/0.95	0.90	0.95	1.05	0.75	0.95
RF47	0.65/1.50	1.60	1.50	1.65	1.50	1.50
RF57	0.80/1.70	1.80	1.70	2.00	1.70	1.70
RF67	1.20/2.50	2.50	2.70	2.80	1.90	2.10
RF77	1.20/2.60	3.10	3.30	3.60	2.40	3.00
RF87	2.40/6.0	6.4	7.1	7.2	6.3	6.4
RF97	5.1/10.2	11.9	11.2	14.0	11.2	11.8
RF107	6.3/14.9	15.9	17.0	19.2	13.1	15.9
RF137	9.5/25.0	27.0	29.0	32.5	25.0	25.0
RF147	16.4/42.0	47.0	48.0	52.0	42.0	42.0
RF167	26.0/70.0	82.0	78.0	88.0	65.0	71.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

Parallel-shaft helical (F) gear units

F.., FA..B, FH..B, FV..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.60	3.50	2.10	3.50	2.80	2.90
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	40.5	54.5	34.0	61.0	46.3	47.0
F..157	69.0	104.0	63.0	105.0	86.0	78.0

FF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
FF27	0.60	0.80	0.65	0.70	0.60	0.60
FF37	1.00	1.25	0.70	1.30	1.00	1.10
FF47	1.60	1.85	1.10	1.90	1.50	1.70
FF57	2.80	3.50	2.10	3.70	2.90	3.00
FF67	2.70	3.80	1.90	3.80	2.90	3.20
FF77	5.9	7.3	4.30	8.1	6.0	6.3
FF87	10.8	13.2	7.8	14.1	11.0	11.2
FF97	19.0	22.5	12.6	25.6	18.9	20.5
FF107	25.5	32.0	19.5	38.5	27.5	28.0
FF127	41.5	55.5	34.0	63.0	46.3	49.0
FF157	72.0	105.0	64.0	106.0	87.0	79.0

FA.., FH.., FV.., FAF.., FAZ.., FHF.., FHZ.., FVF.., FVZ.., FT..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.70	3.50	2.10	3.40	2.90	3.00
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	39.0	54.5	34.0	61.0	45.0	46.5
F..157	68.0	103.0	62.0	104.0	85.0	77.0

Helical-bevel (K) gear units

K.., KA..B, KH..B, KV..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.25	0.95	0.95
K..47	0.80	1.30	1.50	2.00	1.60	1.60
K..57	1.10	2.20	2.20	2.80	2.30	2.10
K..67	1.10	2.40	2.60	3.45	2.60	2.60
K..77	2.20	4.10	4.40	5.8	4.20	4.40
K..87	3.70	8.0	8.7	10.9	8.0	8.0
K..97	7.0	14.0	15.7	20.0	15.7	15.5
K..107	10.0	21.0	25.5	33.5	24.0	24.0
K..127	21.0	41.5	44.0	54.0	40.0	41.0
K..157	31.0	62.0	65.0	90.0	58.0	62.0
K..167	33.0	95.0	105.0	123.0	85.0	84.0
K..187	53.0	152.0	167.0	200	143.0	143.0

KF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
KF37	0.50	1.10	1.10	1.50	1.00	1.00
KF47	0.80	1.30	1.70	2.20	1.60	1.60
KF57	1.20	2.20	2.40	3.15	2.50	2.30
KF67	1.10	2.40	2.80	3.70	2.70	2.70
KF77	2.10	4.10	4.40	5.9	4.50	4.50
KF87	3.70	8.2	9.0	11.9	8.4	8.4
KF97	7.0	14.7	17.3	21.5	15.7	16.5
KF107	10.0	21.8	25.8	35.1	25.2	25.2
KF127	21.0	41.5	46.0	55.0	41.0	41.0
KF157	31.0	66.0	69.0	92.0	62.0	62.0

KA.., KH.., KV.., KAF.., KHF.., KVF.., KAZ.., KHZ.., KVZ.., KT..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.40	1.00	1.00
K..47	0.80	1.30	1.60	2.15	1.60	1.60
K..57	1.20	2.20	2.40	3.15	2.70	2.40
K..67	1.10	2.40	2.70	3.70	2.60	2.60
K..77	2.10	4.10	4.60	5.9	4.40	4.40
K..87	3.70	8.2	8.8	11.1	8.0	8.0
K..97	7.0	14.7	15.7	20.0	15.7	15.7
K..107	10.0	20.5	24.0	32.4	24.0	24.0
K..127	21.0	41.5	43.0	52.0	40.0	40.0
K..157	31.0	66.0	67.0	87.0	62.0	62.0

Helical-worm (S) gear units

S

Gear unit	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S..37	0.25	0.40	0.50	0.55	0.40	0.40
S..47	0.35	0.80	0.70/0.90	1.00	0.80	0.80
S..57	0.50	1.20	1.00/1.20	1.45	1.30	1.30
S..67	1.00	2.00	2.20/3.10	3.10	2.60	2.60
S..77	1.90	4.20	3.70/5.4	5.9	4.40	4.40
S..87	3.30	8.1	6.9/10.4	11.3	8.4	8.4
S..97	6.8	15.0	13.4/18.0	21.8	17.0	17.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SF..

Gear unit	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
SF37	0.25	0.40	0.50	0.55	0.40	0.40
SF47	0.40	0.90	0.90/1.05	1.05	1.00	1.00
SF57	0.50	1.20	1.00/1.50	1.55	1.40	1.40
SF67	1.00	2.20	2.30/3.00	3.20	2.70	2.70
SF77	1.90	4.10	3.90/5.8	6.5	4.90	4.90
SF87	3.80	8.0	7.1/10.1	12.0	9.1	9.1
SF97	7.4	15.0	13.8/18.8	22.6	18.0	18.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SA.., SH.., SAF.., SHZ.., SAZ.., SHF.., ST..

Gear unit	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S..37	0.25	0.40	0.50	0.50	0.40	0.40
S..47	0.40	0.80	0.70/0.90	1.00	0.80	0.80
S..57	0.50	1.10	1.00/1.50	1.50	1.20	1.20
S..67	1.00	2.00	1.80/2.60	2.90	2.50	2.50
S..77	1.80	3.90	3.60/5.0	5.8	4.50	4.50
S..87	3.80	7.4	6.0/8.7	10.8	8.0	8.0
S..97	7.0	14.0	11.4/16.0	20.5	15.7	15.7

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SPIROPLAN® (W) gear units

The fill quantity of SPIROPLAN® gear units W..10 to W..30 does not vary, irrespective of their mounting position. Only the fill quantity of SPIROPLAN® gear units W..37 and W..47 in mounting position M4 is different from that of other mounting positions.

W.., WF.., WA..B, WH..B

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
W..10	0.16					
W..20	0.24					
W..30	0.40					
W..37	0.50			0.70	0.50	
W..47	0.90			1.40	0.90	

WA.., WAF.., WT.., WH.., WHF..

Gear unit	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
W..10	0.16					
W..20	0.24					
W..30	0.40					
W..37	0.50			0.70	0.50	
W..47	0.80			1.25	0.80	

7.1.4 Bearing greases

The rolling bearings in gear units and motors are given a factory-fill with the greases listed below. SEW-EURODRIVE recommends regreasing rolling bearings with a grease fill at the same time as changing the oil and replacing the rolling bearings.

	Ambient temperature	Manufacturer	Type
Gear unit rolling bearings	-40 °C – +80 °C	Fuchs	Renolit CX-TOM15[1)]
Motor rolling bearings[2)]	-20 °C – +80 °C	Esso	Polyrex EM
	+20 °C – +100 °C	Klüber	Barrierta L55/2
	-40 °C – +60 °C	Kyodo Yushi	Multemp SRL[3)]
Special greases for gear unit rolling bearings:			
	-30 °C – +40 °C	Aral	Aral Eural Grease EP 2
	-20 °C – +40 °C	Aral	Aral Aralube BAB EP2

1) Rolling bearing grease based on semi-synthetic base oil.

2) The motor rolling bearings are covered on both sides and cannot be regreased.

3) Recommended for continuous operation at ambient temperatures below 0 °C, for example in a cold storage.

INFORMATION

The following grease quantities are required:

- For fast-running bearings (gear unit input end): Fill the cavities between the rolling elements one-third full with grease.
- For slow-running bearings (in gear units and at gear unit output end): Fill the cavities between the rolling elements two-thirds full with grease.

7.2 Reduced backlash gear unit types

Helical, parallel-shaft helical and helical-bevel gear units with reduced backlash are available as of gear unit size 37. The circumferential backlash of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. The circumferential backlash is specified in angular minutes ['] in the technical data. The circumferential backlash for the output shaft is specified without load (max. 1% of the rated output torque); the gear unit input end is blocked.

The reduced backlash variant is available for the following gear units:

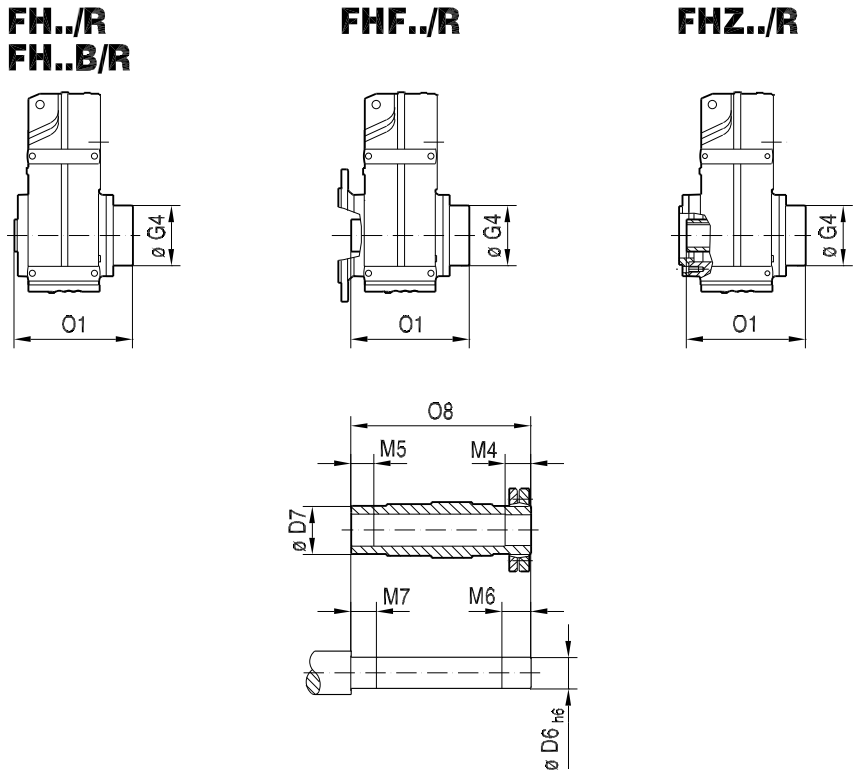
- Helical gear units (R), sizes 37 to 167
- Parallel-shaft helical gear units (F), sizes 37 to 157
- Helical-bevel gear units (K), sizes 37 to 187

Multi-stage gear units are not available with reduced backlash.

The dimensions of the reduced backlash variants correspond to the dimensions of the standard designs, except for parallel-shaft gear units FH.87 and FH.97 with reduced backlash.

The following figure shows the dimensions of the FH.87 and FH.97 gear units with reduced backlash:

42 020 00 09



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Type	D6	D7	G4	M4	M5	M6	M7	O1	O8
FH.87/R	Ø 65 $_{h6}$	Ø 85	Ø 163	41	40	46	45	312.5	299.5
FH.97/R	Ø 75 $_{h6}$	Ø 95	Ø 184	55	50	60	55	382.5	367

7.3 Installation/removal of gear units with hollow shaft and key

INFORMATION

- Always use the supplied NOCO® fluid for installation. The fluid prevents contact corrosion and facilitates subsequent disassembly.
- The key dimension X is specified by the customers, but X > DK must apply, see following figure.

7.3.1 Installation

SEW-EURODRIVE recommends 2 variants for installing gear units with hollow shaft and key onto the input shaft of the driven machine (= customer shaft):

1. Use the provided fastening parts for installation.
2. Use the optional installation/removal kit for installation.

1. Supplied fastening parts

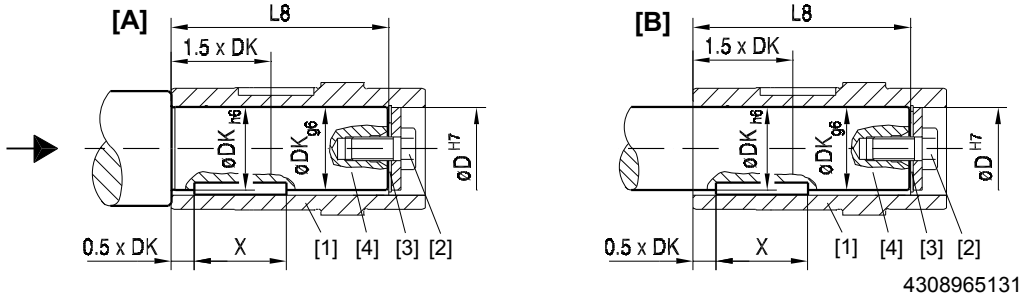
The following fastening parts are provided as standard:

- Retaining screw with washer (2)
- Retaining ring (3)

Note the following points concerning the customer shaft:

- The installation length of the customer shaft with contact shoulder (A) must be L8 - 1 mm.
- The installation length of the customer shaft without contact shoulder (B) must equal L8.

The following figure shows the customer shaft with contact shoulder (A) and without contact shoulder (B).



[1] Hollow shaft
[2] Retaining screw with washer
[3] Retaining ring
[4] Customer shaft

7

Dimensions and tightening torque:

The retaining screw (2) must be tightened to the tightening torque MS given in the following table:

Gear unit type	D^{H7} in mm	DK in mm	L8 in mm	MS in Nm
WA..10	16	16	69	8
WA..20	18	18	84	
WA..20	20	20	84	
FA..27	25	25	88	20
WA..30, WA..37	20	20	105	8
SA..37, BSAF202			104	
FA..37, KA..37, SA..47	30	30	105	20
BSAF302	25	25	118	
SA..47, WA..37			105	
SAF402	30	30	138	
FA..47, KA..47, SA..57	35	35	132	
WA..47	30	30	122	
SA..57			132	
FA..57, KA..57	40	40	142	40
BSAF502			158	
FA..67, KA..67			156	
SA..67			144	
SA..67	45	45	144	
BSAF602	55	55	179	80
FA..77, KA..77, SA..77	50	50	183	40
SA..77	60	60	180	80
FA..87, KA..87			210	
SA..87			220	
SA..87	70	70	220	
BSAF802	60	60	222	
FA..97, KA..97	70	70	270	
SA..97			260	
FA..107, KA..107	80	80	313	
SA..97	90	90	255	200
FA..107, KA..107	90	90	313	
FA..127, KA..127	100	100	373	
FA..157, KA..157	120	120	460	

2. Installation/removal kit

You can use the optional installation/removal kit for installation. You order the kit for the specific gear unit type(s) by quoting the part numbers in the table below. The delivery includes:

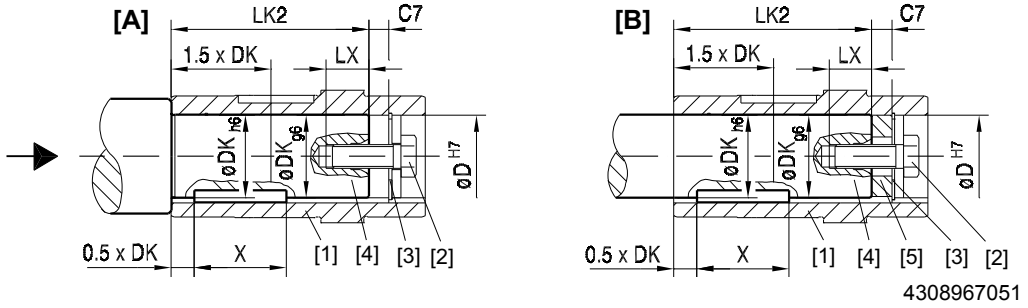
- Spacer tube for installation without contact shoulder (5)
- Retaining screw for installation (2)
- Forcing washer for removal (7)
- Locked nut for removal (8)

The short retaining screw delivered as standard is not required.

Note the following points concerning the customer shaft:

- The installation length of the customer shaft must be LK2. Do not use the spacer if the customer shaft **has a contact shoulder (A)**.
- The installation length of the customer shaft must be LK2. Use the spacer tube if the customer shaft **has no contact shoulder (B)**.

The following figure shows the customer shaft with contact shoulder (A) and without contact shoulder (B).



[1] Hollow shaft
[2] Retaining screw with washer
[3] Retaining ring
[4] Customer shaft
[5] Spacer tube

7

Dimensions, tightening torques and part numbers:

The retaining screw (2) must be tightened to the tightening torque MS given in the following table:

Type	D^{H7} mm	DK mm	LK2 mm	LX^{+2} mm	C7 mm	MS Nm	Part number of installation/removal set
WA..10	16	16	57	12.5	11	8	643 712 5
WA..20	18	18	72	16	12		643 682 X
WA..20, WA..30, WA..37	20	20	72, 93				643 683 8
SA..37	20	20	92	16	12	8	643 683 8
FA..27	25	25	72	22	16	20	643 684 6
SA..47			89				
WA..47	30	30	106				643 685 4
FA..37, KA..37			89				643 685 4
SA..47			89				
SA..57			116				
FA..47, KA..47, SA..57	35	35	114	28	18		643 686 2
FA..57, KA..57	40	40	124	36		40	643 687 0
FA..67			138				
KA..67			138				
SA..67			126				
SA..67	45	45	126				643 688 9
FA..77, KA..77, SA..77	50	50	165				643 689 7
FA..87, KA..87	60	60	188	42	22	80	643 690 0
SA..77			158				
SA..87			198				
FA..97, KA..97	70	70	248				643 691 9
SA..87			198				
SA..97			238				
FA..107, KA..107	80	80	287	42	26	80	106 821 12
FA..107, KA..107	90	90	287	50	26	200	643 692 7
SA..97			229				
FA..127, KA..127	100	100	347				643 693 5
FA..157, KA..157	120	120	434				643 694 3

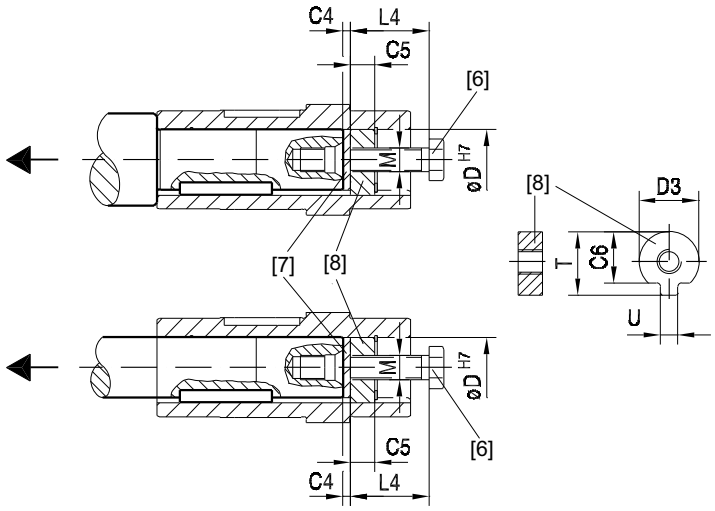
Removal

Applies only if installation/removal kit was previously used for installation.

Proceed as follows for removal:

1. Loosen the retaining screw (6).
2. Remove the circlip (3) and, if used, the spacer tube (5).
3. Insert the forcing disk (7) and the fixed nut (8) between the customer's shaft (4) and circlip (3) according to the following figure.
4. Re-install the circlip (3).
5. Re-install the retaining screw (6). Now you can force the gear unit off the shaft.

The following figures shows the removal of a gear unit with hollow shaft and key.



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[6] Retaining screw
[7] Forcing washer
[8] Locked nut for removal

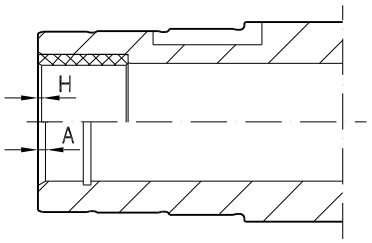
Dimensions and part numbers:

Type	D^{H7} mm	M	C4 mm	C5 mm	C6 mm	$U^{-0.5}$ mm	$T^{-0.5}$ mm	$D3^{-0.5}$ mm	L4 mm	Part number of installation/removal kit
WA..10	16	M5	5	5	12	4.5	18	15.7	50	643 712 5
WA..20	18	M6		6	13.5	5.5	20.5	17.7	25	643 682 X
WA..20, WA..30, WA..37, SA..37	20				15.5	5.5	22.5	19.7		643 683 8
FA27.., SA..47	25	M10		10	20	7.5	28	24.7	35	643 684 6
FA..37, KA..37, SA..47, SA..57, WA..47	30				25	7.5	33	29.7		643 685 4
FA..47, KA..47, SA..57	35	M12		12	29	9.5	38	34.7	45	643 686 2
FA..57, KA..57, FA..67, KA..67, SA..67	40	M16			34	11.5	41.9	39.7	50	643 687 0
SA..67	45				38.5	13.5	48.5	44.7		643 688 9
FA..77, KA..77, SA..77	50				43.5	13.5	53.5	49.7		643 689 7
FA..87, KA..87, SA..77, SA..87	60	M20		16	56	17.5	64	59.7	60	643 690 0
FA..97, KA..97, SA..87, SA..97	70				65.5	19.5	74.5	69.7		643 691 9
FA..107, KA..107	80	M20		20	75.7	21.5	85.4	79.7	70	106 821 12
FA..107, KA..107, SA..97	90	M24			80	24.5	95	89.7	70	643 692 7
FA..127, KA..127	100				89	27.5	106	99.7		643 693 5
FA..157, KA..157	120				107	31	127	119.7		643 694 3

7.4 Gear units with hollow shaft

7.4.1 Chamfers on hollow shafts

The following illustration shows the chamfers on parallel-shaft helical, helical-bevel, helical-worm and SPIROPLAN® gear units with hollow shaft:



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Gear unit	Variant	
	with hollow shaft (A)	with hollow shaft and shrink disk (H)
W..10 - W..30	2 × 30°	-
F..27	2 × 30°	0.5 × 45°
F../K../S../W..37	2 × 30°	0.5 × 45°
F../K../S../W..47	2 × 30°	0.5 × 45°
S..57	2 × 30°	0.5 × 45°
F../K..57	2 × 30°	0.5 × 45°
F../K../S..67	2 × 30°	0.5 × 45°
F../K../S..77	2 × 30°	0.5 × 45°
F../K../S..87	3 × 30°	0.5 × 45°
F../K../S..97	3 × 30°	0.5 × 45°
F../K..107	3 × 30°	0.5 × 45°
F../K..127	5 × 30°	0.5 × 45°
F../K..157	5 × 30°	0.5 × 45°
KH167	-	0.5 × 45°
KH187	-	0.5 × 45°

7.4.2 Special motor/gear unit combinations

Please note for parallel-shaft helical gearmotors with hollow shaft (FA..B, FV..B, FH..B, FAF, FVF, FHF, FA, FV, FH, FT, FAZ, FVZ, FHZ):

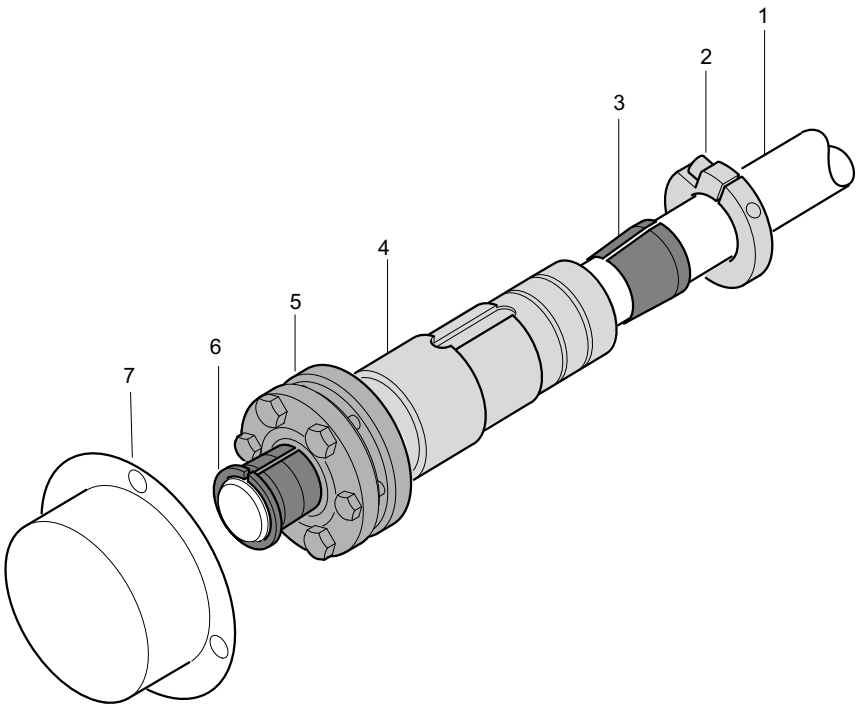
- If you are using a customer shaft pushed through on the motor end, there may be a collision when a "small gear unit" is used in combination with a "large motor."
- Check the motor dimension AC to decide whether there will be a collision with a pushed-through customer shaft.

7.5 TorqLOC® mounting system for hollow shaft gear units

7.5.1 Description of TorqLOC®

The TorqLOC® hollow shaft mounting system is used for achieving a non-positive connection between customer shaft and the hollow shaft in the gear unit. As a result, the TorqLOC® hollow shaft mounting system is an alternative to the hollow shaft with shrink disk, the hollow shaft with key and the splined hollow shaft that have been used so far.

The TorqLOC® hollow shaft mounting system consists of the following components:



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[1]	Customer shaft	[5]	Shrink disk
[2]	Clamping ring	[6]	Conical steel bushing
[3]	Conical bronze bushing	[7]	Fixed cover
[4]	Hollow shaft in gear unit		

7.5.2 Advantages of TorqLOC®

The TorqLOC® hollow shaft mounting system is characterized by the following advantages:

- Cost saving as the customer shaft can be made from drawn material up to quality h11.
- Cost saving as different customer shaft diameters can be realized with one hollow shaft diameter and different bushings.
- Simple installation as there is no need to accommodate any shaft connections.
- Simple removal even after many hours of operation as the formation of contact corrosion has been reduced and the conical connections can easily be released.

7.5.3 Technical data

The TorqLOC® hollow shaft mounting system is approved for input torques of 92 Nm to 18000 Nm.

The following gear units are available with TorqLOC® hollow shaft mounting system:

- Parallel-shaft helical gear units in gear unit sizes 37 to 157 (FT37 – FT157)
- Helical-bevel gear units in gear unit sizes 37 to 157 (KT37 – KT157)
- Helical-worm gear units in gear unit sizes 37 to 97 (ST37 – ST97)
- SPIROPLAN® gear unit sizes 37 and 47 (WT.7)

Available options

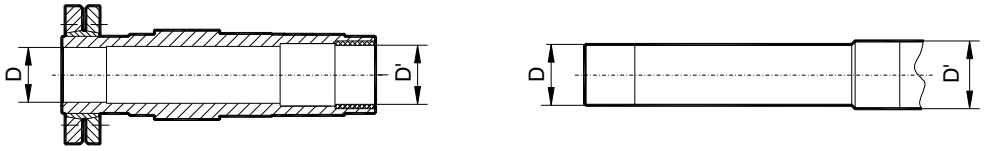
The following options are available for gear units with TorqLOC® hollow shaft mounting system:

- Helical-bevel, helical-worm and SPIROPLAN® gear units with TorqLOC® (KT.., ST.., WT.7..): The "torque arm" (../T) option is available.
- Parallel-shaft helical gear units with TorqLOC® (FT..): The "rubber buffer" (../G) option is available.

7.6 Shouldered hollow shaft option with shrink disk

As an option, gear units with hollow shaft and shrink disk (parallel-shaft helical gear units FH/FHF/FHZ37 – 157, helical-bevel gear units KH/KHF/KHZ37 – 157 and helical-worm gear units SH/SHF47 – 97) can be supplied with a larger bore diameter D'.

As standard, D' = D.



Gear unit	Bore diameter D / optionally D' mm
FH/FHF/FHZ37, KH/KHF/KHZ37, SH/SHF/SHZ47	30 / 32
FH/FHF/FHZ47, KH/KHF/KHZ47, SH/SHF/SHZ57	35 / 36
FH/FHF/FHZ57, KH/KHF/KHZ57	40 / 42
FH/FHF/FHZ67, KH/KHF/KHZ67, SH/SHF/SHZ67	40 / 42
FH/FHF/FHZ77, KH/KHF/KHZ77, SH/SHF/SHZ77	50 / 52
FH/FHF/FHZ87, KH/KHF/KHZ87, SH/SHF/SHZ87	65 / 66
FH/FHF/FHZ97, KH/KHF/KHZ97, SH/SHF/SHZ97	75 / 76
FH/FHF/FHZ107, KH/KHF/KHZ107	95 / 96
FH/FHF/FHZ127, KH/KHF/KHZ127	105 / 106
FH/FHF/FHZ157, KH/KHF/KHZ157	125 / 126

Diameter D/D' must be specified when ordering gear units with a shouldered hollow shaft (optional bore diameter D').

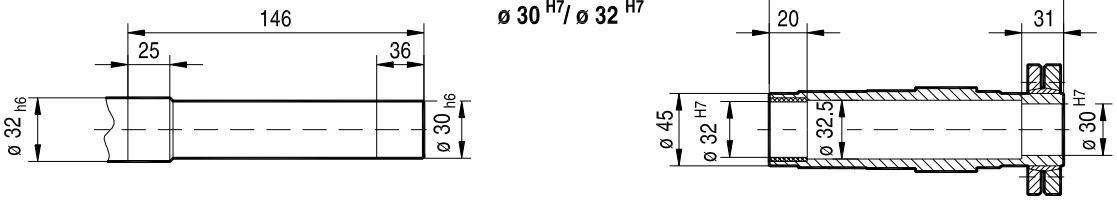
7.6.1 Sample order

FH37 DRS80M4 with hollow shaft 30/32 mm

7.6.2 Parallel-shaft helical gear units with shouldered hollow shaft (dimensions in mm):

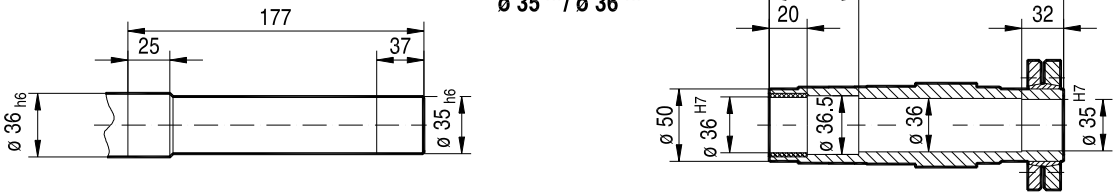
FH / FHF / FHZ37

ø 30 H7 / ø 32 H7



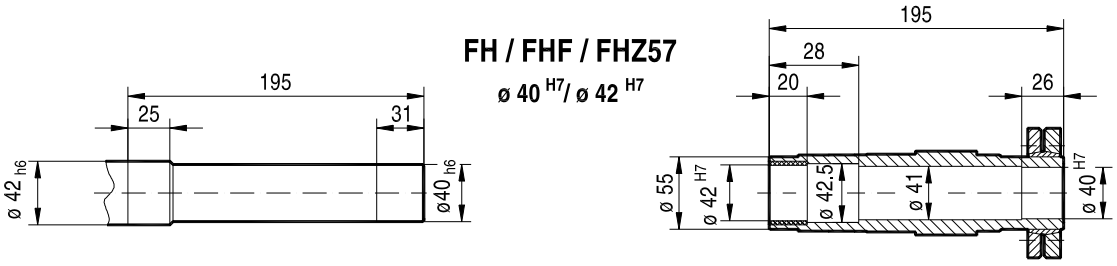
FH / FHF / FHZ47

ø 35 H7 / ø 36 H7



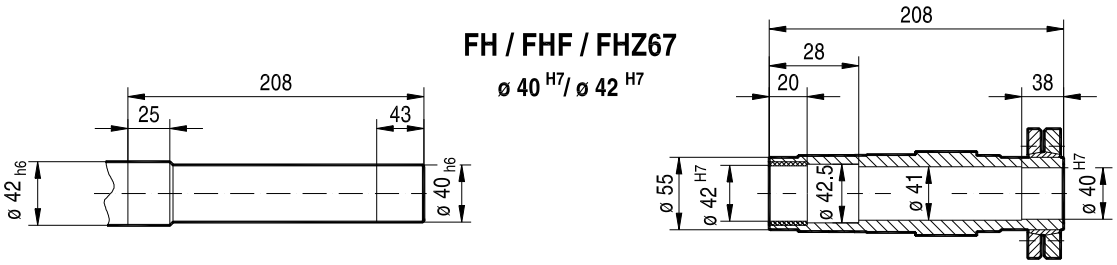
FH / FHF / FHZ57

ø 40 H7 / ø 42 H7



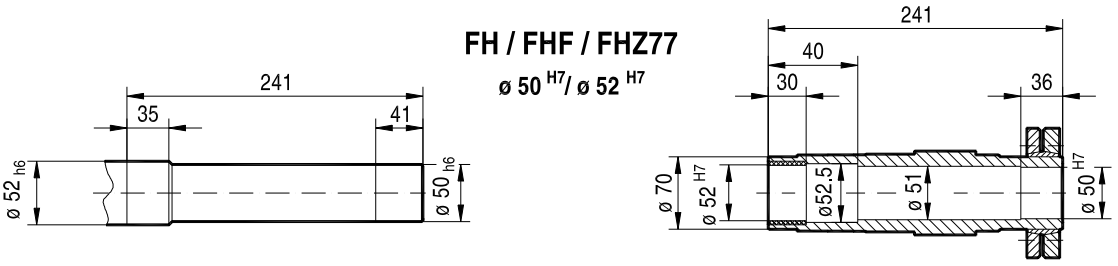
FH / FHF / FHZ67

ø 40 H7 / ø 42 H7



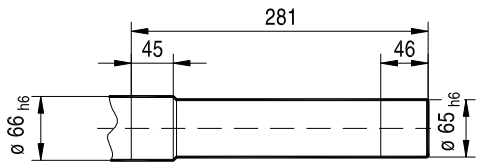
FH / FHF / FHZ77

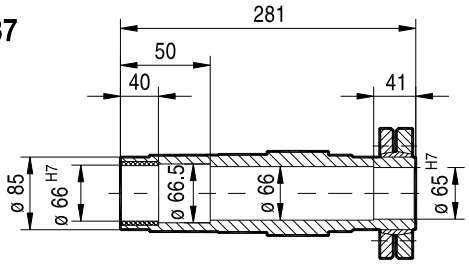
ø 50 H7 / ø 52 H7



FH / FHF / FHZ87

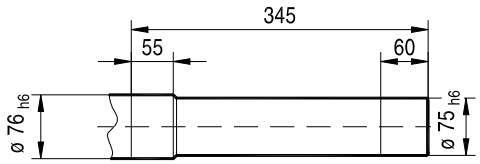
ø 65 H7/ ø 66 H7

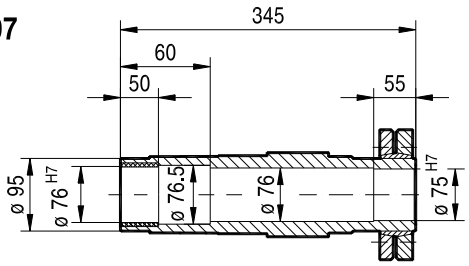




FH / FHF / FHZ97

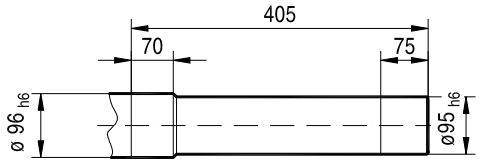
ø 75 H7/ ø 76 H7

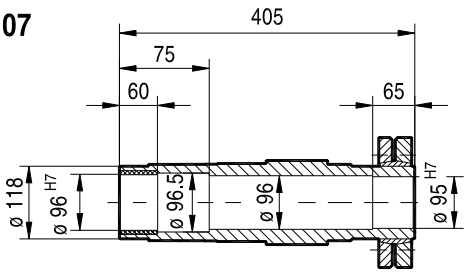




FH / FHF / FHZ107

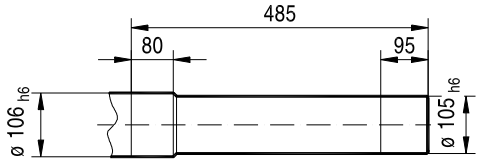
ø 95 H7/ ø 96 H7

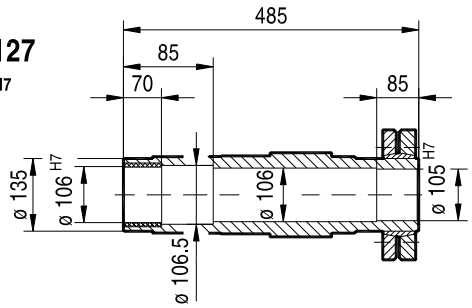




FH / FHF / FHZ127

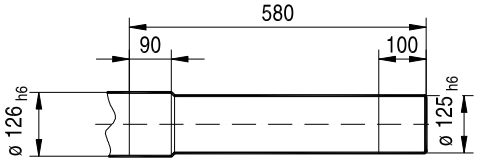
ø 105 H7/ ø 106 H7

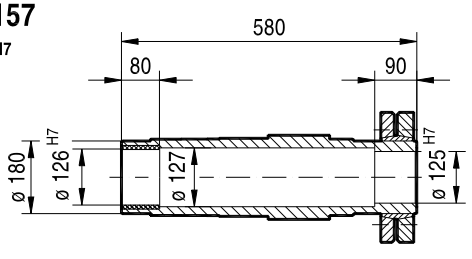




FH / FHF / FHZ157

ø 125 H7/ ø 126 H7

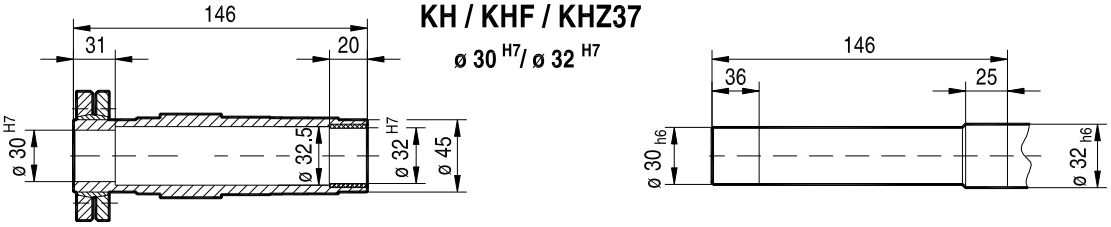




7.6.3 Helical-bevel gear unit with shouldered hollow shaft (dimensions in mm):

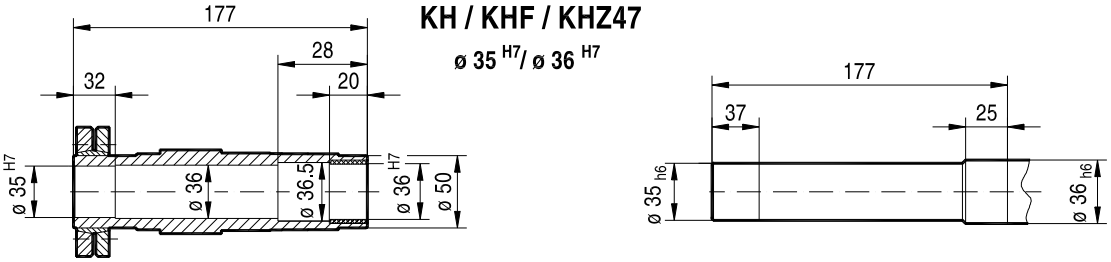
KH / KHF / KHZ37

ø 30 H7 / ø 32 H7



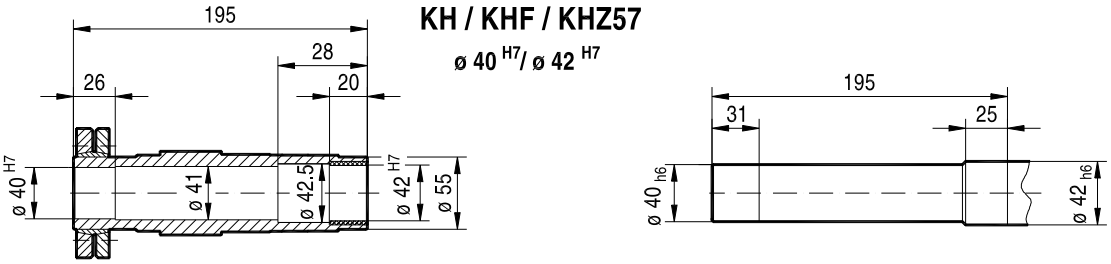
KH / KHF / KHZ47

ø 35 H7 / ø 36 H7



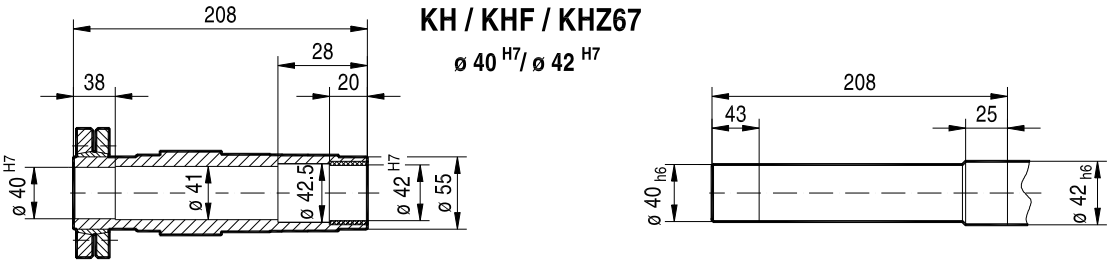
KH / KHF / KHZ57

ø 40 H7 / ø 42 H7



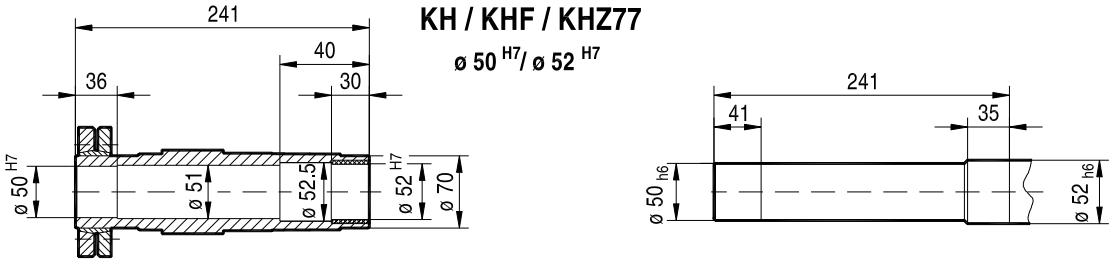
KH / KHF / KHZ67

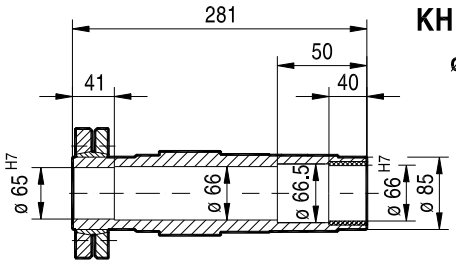
ø 40 H7 / ø 42 H7



KH / KHF / KHZ77

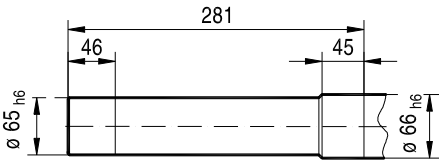
ø 50 H7 / ø 52 H7

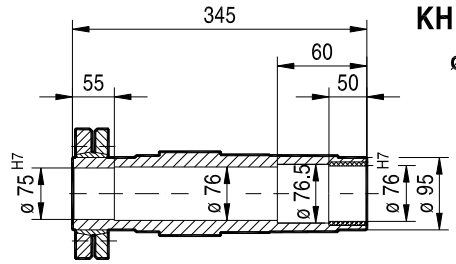




KH / KHF / KHZ87

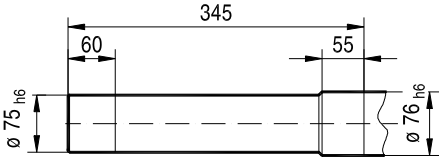
ø 65 H7/ ø 66 H7

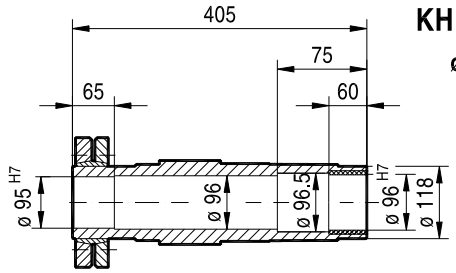




KH / KHF / KHZ97

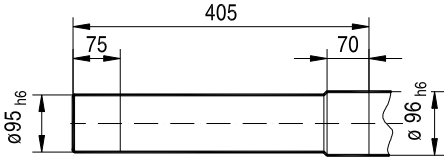
ø 75 H7/ ø 76 H7

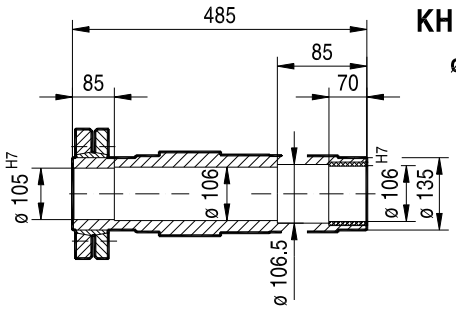




KH / KHF / KHZ107

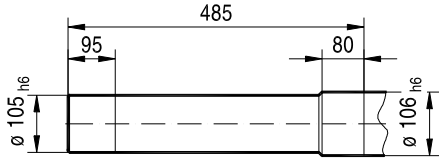
ø 95 H7/ ø 96 H7

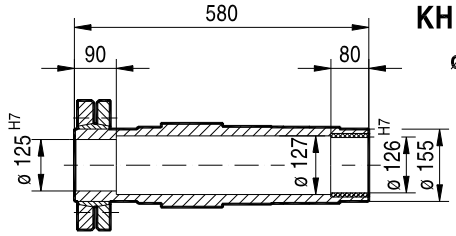




KH / KHF / KHZ127

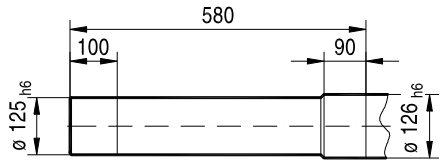
ø 105 H7/ ø 106 H7





KH / KHF / KHZ157

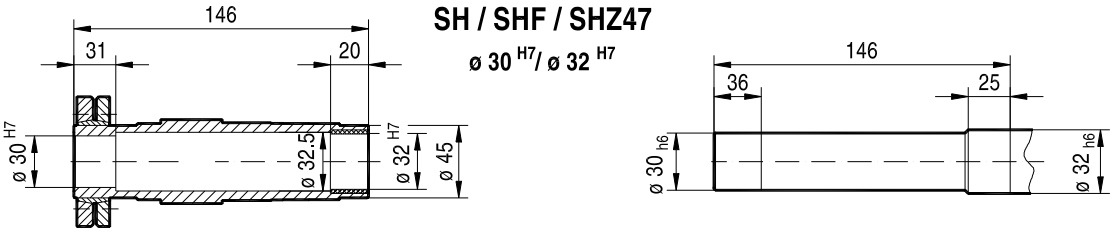
ø 125 H7/ ø 126 H7



7.6.4 Helical-worm gear units with shouldered hollow shaft (dimensions in mm):

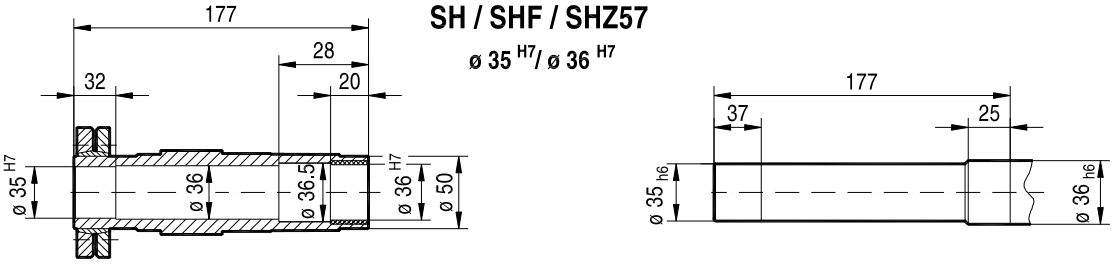
SH / SHF / SHZ47

ø 30 H7 / ø 32 H7



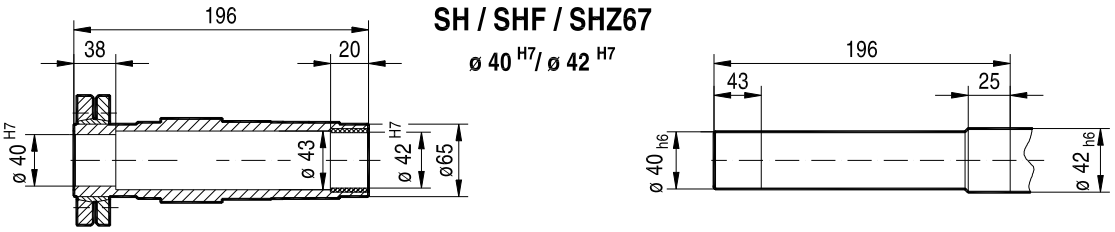
SH / SHF / SHZ57

ø 35 H7 / ø 36 H7



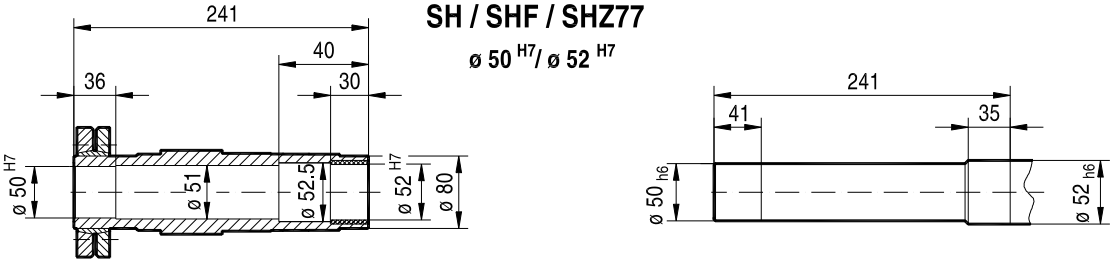
SH / SHF / SHZ67

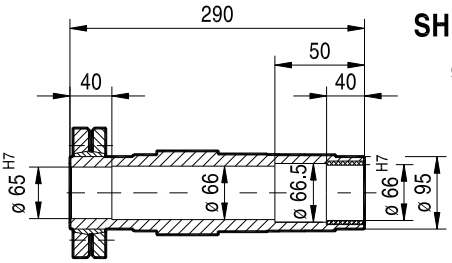
ø 40 H7 / ø 42 H7



SH / SHF / SHZ77

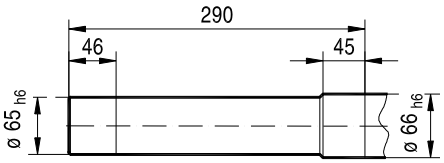
ø 50 H7 / ø 52 H7

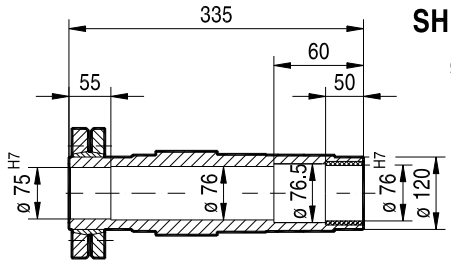




SH / SHF / SHZ87

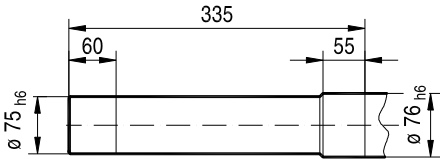
ø 65 H7/ ø 66 H7





SH / SHF / SHZ97

ø 75 H7/ ø 76 H7



7.7 Gear unit mounting

Use bolts of quality 8.8 to fasten gear units and gearmotors.

7.7.1 Exception

In case of the following flange-mounted helical gearmotors (RF../RZ..) and foot/flange-mounted helical gearmotors (R..F), use bolts of **quality 10.9** to fasten the customer flange to transmit the rated torque.

- RF37, R37F with flange Ø = 120 mm
- RF47, R47F with flange Ø = 140 mm
- RF57, R57F with flange Ø = 160 mm
- RZ37 – RZ87

7.8 Torque arms

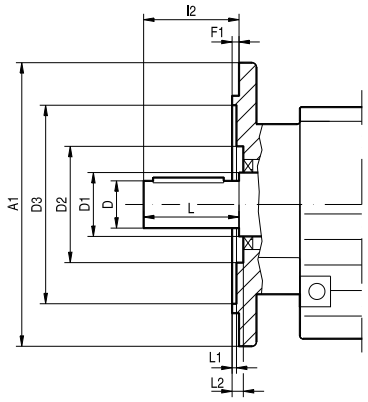
7.8.1 Available torque arms

Gear unit	Size					
	27	37	47	57	67	77
KA, KH, KV, KT	-	643 425 8	643 428 2	643 431 2	643 431 2	643 434 7
SA, SH, ST	-	126 994 1	644 237 4	644 240 4	644 243 9	644 246 3
FA, FH, FV, FT Rubber buffer (2 pieces)	013 348 5	013 348 5	013 348 5	013 348 5	013 348 5	013 349 3

Gear unit	Size				
	87	97	107	127	157
KA, KH, KV, KT	643 437 1	643 440 1	643 443 6	643 294 8	-
SA, SH, ST	644 249 8	644 252 8	-	-	-
FA, FH, FV, FT Rubber buffer (2 pieces)	013 349 3	013 350 7	013 350 7	013 351 5	013 347 7

Gear unit	Size				
	10	20	30	37	
WA	1 061 021 9	1 68 073 0	1 68 011 0	1 061 129 0	

7.9 Flange contours of RF.. and R..F gear units



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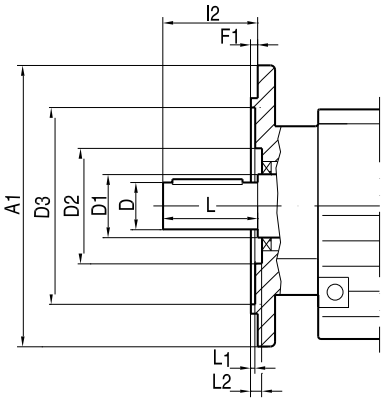
Check dimensions L1 and L2 for selection and installation of output elements.

Type	Dimensions in mm											
	A1	D	D1	D2		D3	F1	I2	L	L1		L2
				RF	R..F					RF	R..F	
RF07, R07F	120	20	22	38	38	72	3	40	40	2	2	6
	140[1)]				-	85	3			2	-	6
	160[1)]				-	100	3.5			2.5	-	6.5
RF17, R17F	120	20	25	46	46	65	3	40	40	1	1	5
	140				-	78	3			1	-	5
	160[1)]				-	95	3.5			1	-	6
RF27, R27F	120	25	30	54	54	66	3	50	50	1	1	6
	140				-	79	3			3	-	7
	160				-	92	3.5			3	-	7
RF37, R37F	120	25	35	60	63	70	3	50	50	5	4	7
	160				-	96	3.5			1	-	7.5
	200[1)]				-	119	3.5			1	-	7.5
RF47, R47F	140	30	35	72	64	82	3	60	60	4	1	6
	160				-	96	3.5			0.5	-	6.5
	200				-	116	3.5			0.5	-	6.5
RF57, R57F	160	35	40	76	75	96	3.5	70	70	4	2.5	5
	200				-	116	3.5			0	-	5
	250[1)]				-	160	4			0.5	-	5.5
RF67, R67F	200	35	50	90	90	118	3.5	70	70	2	4	7
	250				-	160	4			1	-	7.5
RF77, R77F	250	40	52	112	100	160	4	80	80	0.5	2.5	7
	300[1)]				-	210	4			0.5	-	7
RF87, R87F	300	50	62	123	122	210	4	100	100	0	1.5	8
	350				-	226	5			1	-	9
RF97	350	60	72	136		236	5	120	120	0		9
	450					320						
RF107	350	70	82	157		232	5	140	140	0		11
	450			186		316						
RF137	450	90	108	180		316	5	170	170	0		10
	550					416						
RF147	450	110	125	210		316	5	210	210	0		10
	550					416						
RF167	550	120	145	290		416	5	210	210	1		10
	660					517	6			2		11

1) The flange contour protrudes from under the base surface.

7.10 Flange contours of FF.., KF.., SF.. and WF.. gear units



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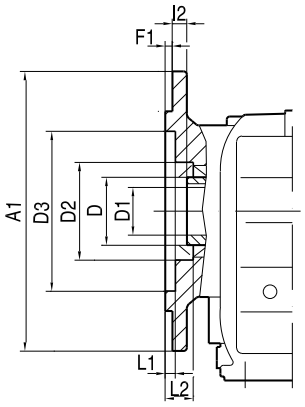
Check dimensions L1 and L2 for selection and installation of output elements.

Type	Dimensions in mm									
	A1	D	D1	D2	D3	F1	l2	L	L1	L2
FF27	160	25	40	66	96	3.5	50	50	3	18.5
FF37	160	25	30	70	94	3.5	50	50	2	6
FF47	200	30	40	72	115	3.5	60	60	3.5	7.5
FF57	250	35	40	84	155	4	70	70	4	9
FF67	250	40	50	84	155	4	80	80	4	9
FF77	300	50	55	82	205	4	100	100	5	9
FF87	350	60	65	115	220	5	120	120	5	9
FF97	450	70	75	112	320	5	140	140	8	10
FF107	450	90	100	159	318	5	170	170	16	9
FF127	550	110	118	-	420	5	210	210	10	-
FF157	660	120	135	190	520	6	210	210	8	14
KF37	160	25	30	70	94	3.5	50	50	2	6
KF47	200	30	40	72	115	3.5	60	60	3.5	7.5
KF57	250	35	40	84	155	4	70	70	4	9
KF67	250	40	50	84	155	4	80	80	4	9
KF77	300	50	55	82	205	4	100	100	5	9
KF87	350	60	65	115	220	5	120	120	5	9
KF97	450	70	75	112	320	5	140	140	8	10
KF107	450	90	100	159	318	5	170	170	16	9
KF127	550	110	118	-	420	5	210	210	10	-
KF157	660	120	135	190	520	6	210	210	8	14
SF37	120	20	25	-	68	3	40	40	6	-
SF37	160	20	25	-	96	3.5	40	40	5.5	-
SF47	160	25	30	70	94	3.5	50	50	2	6
SF57	200	30	40	72	115	3.5	60	60	3.5	7.5
SF67	200	35	45	-	115	3.5	70	70	8.5	-
SF77	250	45	55	108	160	4	90	90	8	9
SF87	350	60	65	130	220	5	120	120	6	10
SF97	450	70	75	150	320	5	140	140	8.5	10
WF10	80	16	25	-	39	2.5	40	40	30	-
WF10	120	16	25	39	74	3	40	40	5	30
WF20	110	20	30	44	53	-4	40	40	27	35
WF20	120	20	30	-	45	2.5	40	40	37.5	-
WF30	120	20	30	48	63	2.5	40	40	18	27
WF30	160	20	30	48	63	2.5	40	40	33	42
WF37	120	20	30	-	70	2.5	40	40	-	10.5
WF37	160	20	30	-	70	2.5	40	40	-	25.5
WF47	160	30	35	-	92	3.5	10	60	6	-

7.11 Flange contours of FAF.., KAF.., SAF.. and WAF.. gear units



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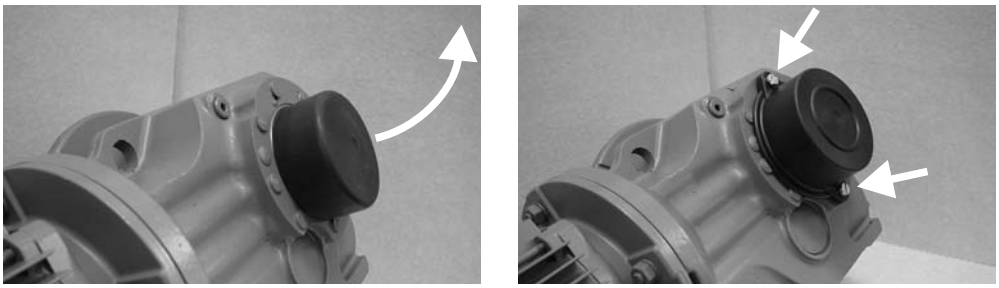
Check dimensions L1 and L2 for selection and installation of output elements.

Type	Dimensions in mm								
	A1	D	D1	D2	D3	F1	I2	L1	L2
FAF27	160	40	25	66	96	3.5	20	3	18.5
FAF37	160	45	30	62	94	3.5	24	2	30
FAF47	200	50	35	70	115	3.5	25	3.5	31.5
FAF57	250	55	40	76	155	4	23.5	4	31
FAF67	250	55	40	76	155	4	23	4	31
FAF77	300	70	50	95	205	4	37	5	45
FAF87	350	85	60	120	220	5	30	5	39
FAF97	450	95	70	135	320	5	41.5	5.5	51
FAF107	450	118	90	224	320	5	41	16	52
FAF127	550	135	100	185	420	5	51	6	63
FAF157	660	155	120	200	520	6	60	10	74
KAF37	160	45	30	62	94	3.5	24	2	30
KAF47	200	50	35	70	115	3.5	25	3.5	8.5
KAF57	250	55	40	76	155	4	23.5	4	31
KAF67	250	55	40	76	155	4	23	4	31
KAF77	300	70	50	95	205	4	37	5	45
KAF87	350	85	60	120	220	5	30	5	39
KAF97	450	95	70	135	320	5	41.5	5.5	51
KAF107	450	118	90	224	320	5	41	16	52
KAF127	550	135	100	185	420	5	51	6	63
KAF157	660	155	120	200	520	6	60	10	74
SAF37	120	35	20	-	68	3	15	6	-
SAF37	160	35	20	-	96	3.5	15	5.5	-
SAF47	160	45	30 / 25	62	94	3.5	24	2	30
SAF57	200	50	35 / 30	70	115	3.5	25	3.5	31.5
SAF67	200	65	45 / 40	91	115	3.5	42.5	4	48.5
SAF77	250	80	60 / 50	112	164	4	45.5	5	53.5
SAF87	350	95	70 / 60	131	220	5	52.5	6	62.5
SAF97	450	120	90 / 70	160	320	5	60	6.5	69
WAF10	80	25	16	-	39	2.5	23	30	-
WAF10	120	25	16	39	74	3	23	5	30
WAF20	110	30	18 / 20	44	53	-4	30	27	35
WAF20	120	30	18 / 20	-	45	2.5	30	37.5	-
WAF30	120	30	20	48	63	2.5	19.5	18	27
WAF30	160	30	20	48	63	2.5	34.5	33	42
WAF37	120	35	20 / 25	54	70	2.5	19.5	10.5	27
WAF37	160	35	20 / 25	54	70	2.5	34.5	25.5	42
WAF47	160	45	25 / 30	72	92	3.5	10	6	45

7.12 Fixed covers

Parallel shaft helical gear units, helical-bevel gear units, helical-worm and SPIROPLAN® gear units with hollow shafts and shrink disks of size 37 up to size 97 come equipped with a rotating cover as standard. If, for safety reasons, fixed covers are required for these gear units, you can order them for the respective gear unit types by quoting the part numbers in the following tables. As standard, parallel shaft helical gear units and helical-bevel gear units with hollow shafts and shrink disks of size 107 and larger such as parallel shaft helical gear units of size 27 come equipped with a fixed cover.

The following figure shows how to replace the rotating cover with a fixed cover.



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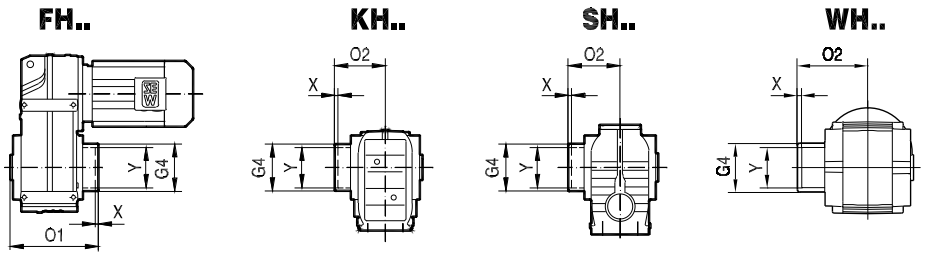
1. Pull off the rotating cover
2. Install and fasten fixed cover

7.12.1 Part numbers and dimensions

The following figure shows the different gear unit variants:



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Parallel-shaft helical gearmotors	FH..37	FH..47	FH..57	FH..67	FH..77	FH..87	FH..97
Part number	643 513 0	643 514 9	643 515 7	643 515 7	643 516 5	643 517 3	643 518 1
G4	78	88	100	100	121	164	185
O1	157	188.5	207.5	221.5	255	295	363.5
X	2	4.5	7.5	6	6	4	6.5
Y	75	83	83	93	114	159	174

Helical-bevel gearmotors[1)]	KH..37	KH..47	KH..57	KH..67	KH..77	KH..87	KH..97
Part number	643 513 0	643 514 9	643 515 7	643 515 7	643 516 5	643 517 3	643 518 1
G4 in mm	78	88	100	100	121	164	185
O2 in mm	95	111.5	122.5	129	147	172	210.5
X in mm	0	1.5	5.5	3	1	2	4.5
Y in mm	75	83	83	93	114	159	174

1) Not possible in foot-mounted helical-bevel gear units with hollow shafts and shrink disk (KH..B).

Helical-worm gearmotors	SH..37	SH..47	SH..57	SH..67	SH..77	SH..87	SH..97
Part number	643 512 2	643 513 0	643 514 9	643 515 7	643 516 5	643 517 3	643 518 1
G4 in mm	59	78	88	100	121	164	185
O2 in mm	88	95	111.5	123	147	176	204.5
X in mm	1	0	1.5	3	1	0	0.5
Y in mm	53	75	83	93	114	159	174

SPIROPLAN® gearmotors	WH..37	WH..47
Part number	1 061 136 3	1 061 194 0
G4 in mm	68	80.5
O2 in mm	95.5	109.5
X in mm	11	12.5
Y in mm	50	72

7.13 Condition monitoring: Oil aging and vibration sensor

7.13.1 Technical data of oil aging sensor

DUO10A diagnostic unit

DUO10A	Technical data		
Preset oil grades	OIL1	CLP mineral oil.	T_{max} = 100°C
		Bio oil	T_{max} = 100°C
	OIL2	CLP HC synthetic oil:	T_{max} = 130 °C
		CLP PAO oil	T_{max} = 130 °C
	OIL3	CLP PG polyglycol	T_{max} = 130 °C
	OIL4	Food grade oil	T_{max} = 100°C
Switch outputs	1: Early warning (time to next oil change can be set to between 2 and 100 days) 2: Main alarm (time to oil change 0 days) 3: Exceeded temperature T_{max} 4: DUO10A is ready for operation		
Permitted oil temperature	-40 °C to +130 °C		
Permitted temperature sensor	PT1000		
EMC	IEC1000-4-2/3/4/6		
Ambient temperature	-25 °C to +70 °C		
Operating voltage	DC 18 – 28 V		
Current consumption for DC 24 V	< 90 mA		
Protection class	III		
Degree of protection	IP67 (optionally IP69K)		
Housing materials	Evaluation unit: V2A, EPDM/X, PBT, FPM Temperature sensor: V4A		
Electrical connection	Evaluation unit: M12 plug connector PT1000 temperature sensor: M12 plug connector		

Designations and part numbers

Designation	Description	Part number
DUO10A 	Evaluation unit (basic unit)	1 343 875 1
DUO10A-PUR-M12-5m	5 m PUR cable with 1 connector	1 343 877 8
DUO10A-PVC-M12-5m	5 m PVC cable with 1 connector	1 343 878 6
DUO10A	Mounting bracket	1 343 880 8
DUO10A D = 34	Mounting clamp	1 343 879 4

Designation	Description	Part number
W4843 PT1000 	PT1000 temperature sensor	1 343 881 6
W4843_4x0.34-2m-PUR	2 m PUR cable for PT1000[1)]	1 343 882 4
W4843_4x0.34-2m-PVC	2 m PVC cable for PT1000[2)]	1 343 883 2
DUO10A 	Protection cap (for aseptic design, IP69K)	1 343 902 2

1) PUR cables are particularly suited for use in oil-contaminated environments.

2) PVC cables are particularly suited for use in moist environments.

Mounting to standard gear units (R, F, K,S)

Adapter for mounting the PT1000 temperature sensor in screw plug holes:

Complete adapter for PT1000 sensor	Part number
M10 × 1	1 343 903 0
M12 × 1.5	1 343 904 9
M22 × 1.5	1 343 905 7
M33 × 2	1 343 906 5
M42 × 2	1 343 907 3

Mounting base for installing the diagnostic unit at the gear unit with an angle bracket:

Mounting base with sealing ring	Part number
M10 × 1	1 343 441 1
M12 × 1.5	1 343 827 1
M22 × 1.5	1 343 829 8
M33 × 2	1 343 830 1
M42 × 2	1 343 832 8

7.13.2 Technical data of vibration sensor

DUV10A and DUV30A vibration sensors are suited for early detection of gearmotor damage, which can be detected using vibration diagnostics, such as bearing damage or imbalance. The highest load of the drives at constant speed must be present to being able to use the full functionality of the diagnostic unit. Drives in which the maximum load is present during acceleration are suitable for monitoring using vibration sensors to a limited degree only.

DUV10A/DUV30A diagnostic unit

	Technical data	
	DUV10A	**DUV30A**
Measuring range	± 20 g	± 20 g
Frequency range	0.125 to 500 Hz	0.125 to 500 Hz / 0.125 to 5000 Hz /
Spectral resolution	0.125 Hz	0.125 Hz / 1.25 Hz
Diagnostic methods	FFT, envelope-FFT, trend analysis	
Minimum measuring period	8.0 s	8.0 s / 0.8 s
Speed range	12 to 3500 rpm	12 to 3500 rpm / 120 to 12000 rpm
Switch outputs	1: Early warning 2: Main alarm	
Operating voltage	DC 10-32 V	
Current consumption for DC 24 V	100 mA	
Protection class	III	
EMC	IEC1000-4-2/3/4/6	
Overload capacity	100 g	
Ambient temperature	-30 °C to +60 °C	-30 °C to +70 °C
Degree of protection	IP67	
Housing materials	Zinc die-casting, coating based on epoxy finish, polyester membrane keypad	
Electrical connection for supply and switching output	M12 plug connector	
Electrical connection RS232 for communication	M8 plug connector	
Certificates and standards	CE, UL	

Designations and part numbers

Designation	Description	Part number
DUV10A / DUV30A 	Diagnostic unit (basic unit)	DUV10A: 1 406 629 7 DUV30A: 1 328 969 1
DUV.0A-S	Parameter setting software	1 406 630 0
DUV.0A-K-RS232-M8	Communication cable	1 406 631 9
DUV.0A-N24DC	DC 24 V power supply unit	1 406 632 7
DUV.0A-I	Pulse tester	1 406 633 5
DUV.0A-K-M12-2m PUR	2 m PUR cable with 1 connector[1)]	1 406 634 3
DUV.0A-K-M12-5m PUR	5 m PUR cable with 1 connector[1)]	1 406 635 1
DUV.0A-K-M12-2m PVC	2 m PVC cable with 1 connector[2)]	1 326 620 9
DUV.0A-K-M12-5m PVC	5 m PVC cable with 1 connector[2)]	1 326 621 7

1) PUR cables are particularly suited for use in oil-contaminated environments.

2) PVC cables are particularly suited for use in moist environments.

Mounting to standard gear units (R, F, K,S)

Mounting base for installing the diagnostic unit:

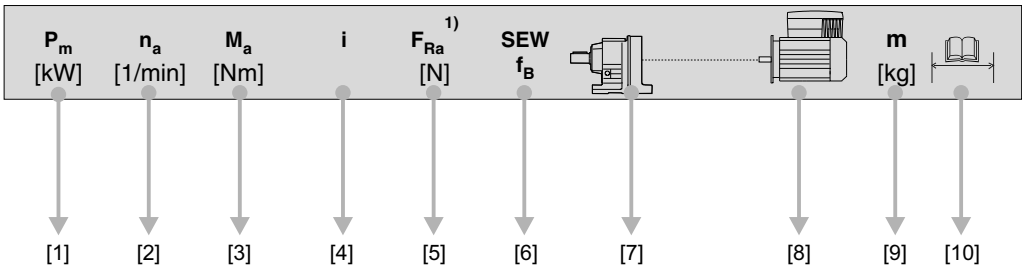
Mounting base with sealing ring for gear unit	Part number
M10 × 1	1 343 441 1
M12 × 1.5	1 343 827 1
M22 × 1.5	1 343 829 8
M33 × 2	1 343 830 1
M42 × 2	1 343 832 8
G ¾	1 343 833 6
G 1	1 343 834 4
G 1 ¼	1 343 835 2
G 1 ½	1 343 836 0
Mounting base for motors	**Part number**
M 8	1 362 261 7
M 12	1 343 842 5
M 16	1 343 844 1
M 20	1 362 262 5

8 Important Information, Tables and Dimension Sheets

8.1 Selection tables for gearmotors

8.1.1 Structure of the selection tables

The selection tables for gearmotors are structured as shown below. The data is sorted according to the nominal power P_m [kW] of the driving motor.



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[1] Nominal power of driving motor
[2] Output speed
[3] Output torque
[4] Gear unit reduction ratio
[5] Permitted overhung load on output end
[6] Service factor
[7] Gear unit type
[8] Motor type
[9] Weight
[10] Dimension sheet page number

* Finite gear unit reduction ratio
1) Overhung load for foot-mounted gear units with solid shaft; overhung loads for other gear unit types upon request

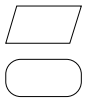
INFORMATION

Only for SPIROPLAN® gearmotors (W gearmotors):

- If a lubricant is used for the food industry (food grade), a service factor of SEW $f_B \geq 1.2$ is required.

8.2 Dimension sheet information

8.2.1 Scope of delivery



= Standard parts supplied by SEW-EURODRIVE.

= Standard parts not supplied by SEW-EURODRIVE.

8.2.2 Tolerances

Shaft heights

The following tolerances apply to the indicated dimensions:

h	≤ 250 mm	→ -0.5 mm
h	> 250 mm	→ -1 mm

Foot-mounted gear units: Check the mounted motor because it may project below the mounting surface.

Shaft ends

Diameter tolerance:

Ø	≤ 50 mm	→ ISO k6
Ø	> 50 mm	→ ISO m6

Center bores according to DIN 332, shape DR:

Ø	= 7 – 10 mm	→ M3	Ø	> 30 – 38 mm	→ M12
Ø	> 10 – 13 mm	→ M4	Ø	> 38 – 50 mm	→ M16
Ø	> 13 – 16 mm	→ M5	Ø	> 50 – 85 mm	→ M20
Ø	> 16 – 21 mm	→ M6	Ø	> 85 – 130 mm	→ M24
Ø	> 21 – 24 mm	→ M8	Ø	> 130 mm	→ M30
Ø	> 24 – 30 mm	→ M10			

Keys: according to DIN 6885 (domed type)

Hollow shafts

Diameter tolerance:

Ø → ISO H7 measured with plug gauge

Keys: according to DIN 6885 (domed type)

Exception: Key for WA37 with shaft Ø 25 mm according to DIN 6885-3 (low form)

Multiple-spline shafts

D_m = Measuring roller diameter
M_e = Check size

Flanges

Centering shoulder tolerance:

Ø	≤ 230 mm (flange sizes A120 – A300)	→ ISO j6
Ø	> 230 mm (flange sizes A350 – A660)	→ ISO h6

Up to 3 different flange dimensions are available for each size of helical gear units, SPIROPLAN® gear units, AC (brake) motors and explosion-proof AC (brake) motors. The respective dimension drawings will show the flanges approved for each size.

8.2.3 Breather valves

The gear unit dimension drawings always show the screw plugs. The corresponding screw plug is replaced by an activated breather valve at the factory depending on the ordered mounting position M1 – M6. The result may be slightly altered contour dimensions.

8.2.4 Shrink disk connection

Hollow shaft gear unit with shrink disk connection: If required, please request a detailed data sheet on shrink disks, data sheet no. 33 753 nn 95.

8.2.5 Splined hollow shaft

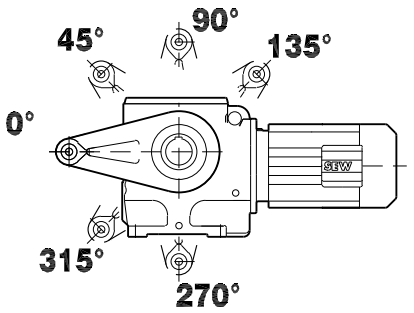
FV.. hollow shaft gear unit sizes 27 to 107, and KV.. sizes 37 to 107 are supplied with splining according to standard 5480.

8.2.6 Rubber buffer for FA/FH/FV/FT

Preload rubber buffer by the indicated value mL. The characteristic curve of spring for the rubber buffers is available at SEW-EURODRIVE on request.

8.2.7 Torque arm position

The following illustration shows the possible torque arm positions for helical-worm gear units and SPIROPLAN® gear units (135° position not possible with SPIROPLAN® gear units) as well as the respective angles:



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8.3 Gearmotor dimensions

8.3.1 Motor options

The motor dimensions may change when installing motor options. Refer to the dimension drawings of the motor options.

8.3.2 EN 50347

European standard EN 50347 became effective in August 2001. This standard adopts the dimension designations for three-phase AC motors for sizes 56 to 315M and flange sizes 65 to 740 from the IEC 72-1 standard.

The new dimension designations given in EN 50347 / IEC 72-1 are used for the dimensions in question in the dimension tables of the dimensions sheets.