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 in a multitude of applications – worldwide. 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, both in terms of functionality and investment.

Not only are we represented in all the main industries of our time, but we are also found all over the world: with 15 manufacturing plants and 76 Drive Technology Centers worldwide as well as 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 all applications, each based on the required speed and torque range, available space, and ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to meet your drive requirements.

The modular DR.. motor series includes the energy-efficient motor types IE1 to IE4 and was designed and constructed with all worldwide requirements for energy efficiency classes in mind. The DR.. motor easily met the requirements for approval and certification in all relevant countries. The energy-efficient drives achieve the highest efficiency in combination with SEW-EURODRIVE gear units.

The gearmotors are electronically enhanced 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 is the case with the mechanical systems, all development, production, and assembly is carried out entirely 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 inverters ensure precision and dynamics. From single-axis or multi-axis applications to synchronized process sequences, servo drive systems from SEW-EURODRIVE enable flexible and customized implementation of your applications.

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 has developed hybrid cables to provide cost-effective functional solutions, irrespective of the system philosophy or scope. The latest developments from SEW-EURODRIVE: DRC.. electronic motor, MOVIGEAR® mechatronic drive system, MOVIFIT® decentralized drive controller, MOVIPRO® decentralized drive, positioning, and application controller, as well as MOVITRANS® system components for contactless energy transfer.

Power, quality, and robustness combined in a single standard product: with SEW-EURODRIVE, powerful movements are delivered by industrial gear units with high torques. The modular concept once again ensures optimum adaptation of industrial gear units to meet a wide range of different applications.

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1.2 Products and systems from SEW-EURODRIVE

The products and systems of SEW-EURODRIVE are divided into four product groups:

- Gearmotors and frequency inverters
- Servo drive systems
- Decentralized drive systems
- VARIOLUTION® and MAXOLUTION®
- 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:

Gearmotors and frequency inverters		
Gear units / gearmotors	**Motors**	**Frequency inverters**
• 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 • Drives for electrified monorail systems • Geared torque motors • Pole-changing gearmotors • Variable speed gear units / variable speed gearmotors • Aseptic gearmotors • Explosion-proof gear units / gearmotors • Explosion-proof variable-speed gear units / variable-speed gearmotors	• 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 • MOVI4R-U® frequency inverters • MOVIDRIVE® drive inverters • Control, technology, and communication options for inverters

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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 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 brake motors • Explosion-proof servomotors / servo brakemotors • Synchronous linear motors	• MOVIDRIVE® servo drive inverters • MOVIAXIS® multi-axis servo inverters • Control, technology, and communication options for servo drive inverters and servo inverters

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 functions • MOVI-SWITCH® motors / brakemotors with integrated switching and protection functions • 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 switch – MOVIFIT® FC with integrated frequency inverter • MOVIPRO® product range – MOVIPRO® SDC decentralized drive and positioning control	• MOVITRANS® system – Stationary components for energy supply – Mobile components for energy absorption – Line cables and installation material

VARIOLUTION® and MAXOLUTION®
• VARIOLUTION® packages for high technical solution expertise in plants and machines • MAXOLUTION® systems for customer-specific system solutions and plants

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

Products and systems covering several product groups
• Operator panels • MOVI-PLC® drive-based control system • Components of the type "functional safety" • Diagnostic units

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

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

Visit our home page:

→ **www.sew-eurodrive.com**

The website offers a great deal of information and services.

1.3 Documentation

1.3.1 Content of this publication

This "DRN.. gearmotors (IE3)" catalog describes the following product groups from SEW-EURODRIVE in detail:

- DRN.. helical gearmotors
- DRN.. parallel-shaft helical gearmotors
- DRN.. helical-bevel gearmotors
- DRN.. helical-worm gearmotors
- DRN.. SPIROPLAN® gearmotors

1.3.2 Additional documentation

In addition to this "DRN.. Gearmotors (IE3)" catalog, you can order or download other documents from the SEW-EURODRIVE homepage. The complete range of technical documentation is available in various languages for download from the web at **www.sew-eurodrive.com**.

Catalogs

- Gear units
- Servo gear units
- AC motors
- DRS.. gearmotors (IE1)

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- DRE.. gearmotors (IE2)
- Synchronous servomotors
- Synchronous servo gearmotors
- Asynchronous servo gearmotors
- DRC.. gearmotors
- Gearmotors with single-phase motor
- Variable-speed gearmotors
- Pole-changing gearmotors
- Geared torque motors
- Explosion-proof drives
- Explosion-proof AC motors

Drive Engineering – Practical Implementation

You find detailed documentation about the entire topic of electrical drive engineering in the publications of the "Drive Engineering - Practical Implementation" series:

- Project planning for drives
- EMC in Drive Engineering – Basic Theoretical Principles and EMC-Compliant Installation in Practice
- Efficient Plant Automation with Mechatronic Drive Solutions
- SEW encoder systems
- Servo technology
- Explosion-Proof Drives to EU Directive 94/9/EC

1.4 Product names and trademarks

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

1.5 Copyright

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2 Product description

2.1 Product features

2.1.1 Operating temperatures

Gear units and gearmotors from SEW-EURODRIVE can be operated in a wide ambient temperature range.

Gear units

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
K..19, K..29	CLP(PG) VG460	–20°C to +60°C
K..37 – K..187 **RX.57 – RX.107** **R.07 – R.167** **F..27 – F..157**	CLP(CC) VG220	-15°C to +40°C
S..37 – S..97	CLP(CC) VG680	0°C to +40°C
W..10 – W..30 **W..37, W..47**	CLP(SEW-PG) VG460	-20°C to +40°C

The nominal data of the gear units and gearmotors specified in the catalog refers to an ambient temperature of +25°C.

SEW-EURODRIVE gear units can be operated outside the standard temperature range if project planning is adapted to ambient temperatures from as low as -40°C in the intensive cooling range and 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.

Motors

The motors of the DR.. series are designed for use in a temperature range between -20°C and +40°C.

This expands the standardized temperature range required by IEC 60034.

Using the motors outside the above mentioned temperature range is possible with some special adjustments. Please consult with SEW-EURODRIVE to find out which options are available.

INFORMATION

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

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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 asl 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 Speeds

The quoted output speeds of the gearmotors are recommended values. You can calculate the rated output speed based on the rated motor speed and the gear unit reduction ratio. Please note that the actual output speed depends on the motor load and the supply system conditions.

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

The gear units, motors and gearmotors from SEW-EURODRIVE are coated as follows:

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

Exception: SPIROPLAN® W..10DT56 gearmotors have an aluminum housing and are supplied unpainted as standard.

Special coatings are available on request.

2.1.7 Surface and anti-corrosion protection

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

2.1.8 Heat dissipation and accessibility

When fitting gearmotors/geared brakemotors to the driven machine, ensure that there is enough space in axial and radial direction. This space is required for air circulation and heat dissipation as well as to maintain the brake and, if applicable, the MOVIMOT® inverter.

Please also refer to the notes in the motor dimension sheets contained in the "AC Motors" catalog.

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2.1.9 Weights

Please note that all weight specifications in the catalogs apply to gear units and gearmotors without lubricant. The weights vary 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. Guide values for lubricant fill quantities based on the mounting position are provided in the chapter "Lubricant fill quantities" (→ 🗎 97). The exact weight is given in the order confirmation.

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 rotational clearance of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. The rotational clearance is specified in angular minutes in the chapters entitled "Geometrically possible combinations." 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. For further information, refer to chapter "Reduced backlash gear units" (→ 🗎 103).

2.1.11 Multi-stage gearmotors

You can achieve particularly low output speeds by using multi-stage gear units or multi-stage gearmotors. This involves mounting a helical gear unit on the input end as a second gear unit.

It may be necessary to limit the motor power to match the maximum permitted output torque of the gear unit.

2.1.12 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 gear units in the chapter "Project planning for RM gear units" (→ 🗎 51).

2.1.13 SPIROPLAN® gearmotors

SPIROPLAN® gearmotors are robust, single- and two-stage right-angle gearmotors with SPIROPLAN® gearing. They have three main differences from the helical-worm gear units: the material combination of the steel-on-steel gearing, the special tooth meshing relationships and the aluminum housing. As a result, SPIROPLAN® right-angle gearmotors are wear-free and lightweight.

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

The wear-free gearing and the life-long lubrication facilitate long periods of maintenance-free operation. The identical hole spacing and axle height of the foot and face allows for a number of mounting options.

Two different flange diameters are available. On request, SPIROPLAN® gearmotors can be equipped with a torque arm.

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2.1.14 Brakemotors

On request, motors and gearmotors 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 comes with either a hand lever with automatic reset or an adjustable setscrew. The brake is controlled with a brake control that is either installed in the motor wiring space or the control cabinet.

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

2.1.15 International markets

USA and Canada

On request, SEW-EURODRIVE supplies UL registered motors or CSA certified motors with connection conditions according to CSA and NEMA standard.

Eurasian Economic Union / Customs Union between Russia, Belarus, and Kazakhstan.

Motors marketed in Russia, Belarus or Kazakhstan as of March 15, 2015 must bear the EAC mark (Eurasian Conformity), similar to the European CE mark.

As in the case of the CE mark, the EAC mark is used by manufacturers and suppliers to confirm that a product has undergone a conformity process and meets the specified technical requirements. Conformity is issued by an authorized certifying body. The technical requirements for the conformity evaluation procedure are set forth in the technical regulations of the Customs Union (TR CU). These regulations refer to standards that must be applied for a manufacturer to meet the requirements. SEW motors comply with the technical regulations of the Customs Union for low-voltage systems. Contact your sales representative to assist you in such cases.

2.1.16 Components on the input side

The following components on the input side are available for the gear units from SEW-EURODRIVE:

- **Input covers with input shaft extension,** optionally with
  - Centering shoulder
  - Backstop
  - Motor platform
- **Adapter**
  - for mounting IEC or NEMA motors with the option of a backstop
  - for mounting servomotors with a square flange
  - with torque limiting safety couplings and speed or slip monitor
  - with hydraulic centrifugal coupling, also with disc brake or backstop

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2.1.17 Swing base

A swing base is a drive unit consisting of helical-bevel gear unit, hydraulic centrifugal coupling and electric motor. The complete arrangement is mounted to a rigid mounting rail.

Motor swings are available with the following optional accessories:

- Torque arm
- Mechanical thermal monitoring unit
- Contactlaess thermal monitoring unit

2.2 Corrosion and surface protection

2.2.1 General information

SEW-EURODRIVE offers various optional protective measures for operating motors and gearmotors under special ambient conditions.

These preventive measures comprise two groups:

- Corrosion protection KS for motors
- Surface protection OS for motors and gear units

For motors, optimum protection is offered by a combination of corrosion protection KS and surface protection OS.

Special optional protective measures for the output shafts are also available.

2.2.2 KS corrosion protection

KS corrosion protection for motors comprises the following measures:

- All retaining screws that are loosened during operation are made of stainless steel.
- The nameplates are made of stainless steel.
- Various motor parts are coated with a finishing varnish.
- The flange contact surfaces and shaft ends are treated with a temporary rust preventive.
- Additional measures are performed for brakemotors.

A sticker labeled "KORROSIONSSCHUTZ" (corrosion protection) on the fan guard indicates special treatment has been applied.

INFORMATION

The following motor options are not available with KS corrosion protection:

- /V forced cooling fan
- Shaft-centered encoders /ES, /ES7, /EG, /EG7, /EV7, /AS, /AS7, /AG, /AG7, /AV7

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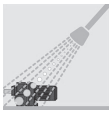
2.2.3 OS surface protection

In addition to standard surface protection, motors and gear units are also available with surface protection OS1 to OS4. The special measure "Z" is also available. Special measure "Z" means that large contour recesses are filled with rubber before painting.

Surface protection[1) 2)]		Ambient conditions	Sample applications
Standard		Suitable for machines and systems within buildings and interior rooms with neutral atmospheres. Similar to corrosivity category[3)]: • C1 (negligible)	• Machines and systems in the automotive industry • Transport systems in logistics • Conveyor belts at airports
OS1		Suitable for environments prone to condensation and atmospheres with low humidity or contamination, such as applications outdoors under roof or with protection. Similar to corrosivity category[3)]: • C2 (low)	• Systems in saw mills • Hall gates • Agitators and mixers
OS2		Suited for environments with high humidity or moderate atmospheric contamination, such as applications outdoors subject to direct weathering. Similar to corrosivity category[3)]: • C3 (moderate)	• Applications in amusement parks • Aerial tramways and chair-lifts • Applications in gravel plants • Systems in nuclear power plants
OS3		Suitable for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasionally acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt load. Similar to corrosivity category[3)]: • C4 (high)	• Sewage treatment plants • Port cranes • Mining applications
OS4		Suitable for environments with permanent humidity and severe atmospheric or chemical contamination. Regular acidic and caustic wet cleaning, also with chemical cleaning agents. Similar to corrosivity category[3)]: • C5-1 (very high)	• Drives in malting plants • Wet areas in the beverage industry • Conveyor belts in the food industry

1) IP56 and IP66 motors/brakemotors are only available with OS2, OS3, or OS4 surface protection.

2) Gearmotors with OS2 - OS4 surface protection are only available in combination with KS corrosion protection for motors.

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

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2.2.4 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:
FKM oil seal	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 FKM oil seal
Stainless steel output shaft	Surface protection due to high-quality material	Particularly demanding applications in terms of surface protection

2.2.5 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, including parts of shaft ends or flanges. You can also order larger quantities of NOCO® fluid from SEW-EURODRIVE.

Container quantity	Packaging type	Part number
5.5 g	Sachet	0 910 781 9
100 g	Tube	0 325 314 7
1 kg	Tub	0 910 782 7

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

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2.3 Extended storage

2.3.1 Variant

INFORMATION

"Extended storage" gear units must remain tightly sealed until startup to prevent the VCI anti-corrosion agent from evaporating.

The gear units come with the oil fill according to the specified mounting position (M1 – M6). Check the oil level before you start operating the gear unit for the first time.

You can also order gear units designed for "extended storage". SEW-EURODRIVE recommends the "extended storage" type for storage periods longer than 9 months. A VCI anti-corrosion agent (**v**olatile **c**orrosion **i**nhibitor) is added to the lubricant in these gear units. 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. You can order OS2, OS3 or OS4 instead of OS1.

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	• Roofed • Protected against rain and snow • Shock-free	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 variations • Controlled ventilation with filter (free from dust and dirt) • No aggressive vapors • No shocks	2 years or more with regular inspections • Check for cleanness and mechanical damage during the inspection • Check corrosion protection

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Climate zone	Packaging[1)]	Storage[2)]	Storage duration
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	• Roofed • Protected against rain and snow • Shock-free	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 variations • 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 cleanness and mechanical damage during the 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 sensor

2.4.1 DUO10A diagnostic unit

The DUO10A diagnostic unit consists of a temperature sensor and the actual evaluation unit. The service life curves of the oil grades common in SEW gear units are stored in the evaluation unit. SEW-EURODRIVE can customize any oil grade in the diagnostic unit. Standard parameterization is performed directly on the evaluation unit. During operation, the evaluation unit uses the oil temperature to continuously calculate the remaining service life in days until the next oil change. The remaining service life is displayed directly on the evaluation unit. When the service life has expired, this can be transferred to a higher level system via a binary signal and evaluated or visualized there.

Using the DUO10A diagnostic unit, 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.

2.5 Oil expansion tank

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

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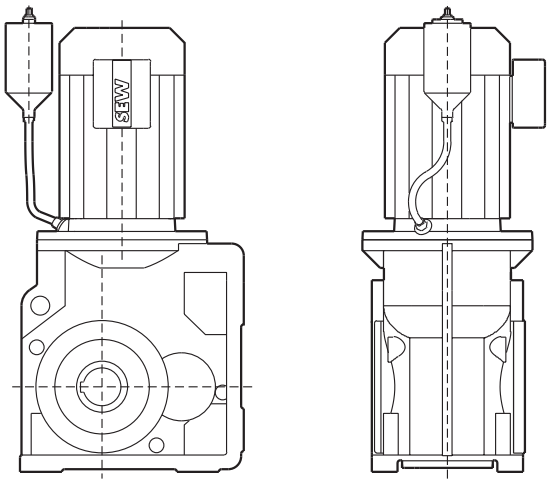
SEW-EURODRIVE recommends to use oil expansion tanks for gear units and gearmotors in M4 mounting position and for input speeds > 2000 rpm.

The following figure shows the oil expansion tank.



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The oil compensator is suppled as assembly kit. It is intended for mounting onto the gearmotor. However, if installation space is limited or if the compensator 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.

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3 Overview of types and type designations

3.1 Designs 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 units

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

3.1.2 Parallel-shaft helical gear units

Designation	
F..	Foot-mounted design
FA..B	Foot-mounted design and hollow shaft
FH..B	Foot-mounted design and hollow shaft with shrink disk
FV..B	Foot-mounted design and hollow shaft with splined hollow shaft to DIN 5480
FF..	B5 flange-mounted design
FAF..	B5 flange-mounted design and hollow shaft
FHF..	B5 flange-mounted design and hollow shaft with shrink disk
FVF..	B5 flange-mounted design 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..	Splined hollow shaft according DIN 5480
FZ..[1)]	B14 flange-mounted design
FAZ..	B14 flange-mounted design and hollow shaft
FHZ..	B14 flange-mounted design and hollow shaft with shrink disk
FVZ..	B14 flange-mounted design and hollow shaft with splined hollow shaft to DIN 5480

1) The gear unit design FZ.. is not considered in the gearmotor dimension sheets (chapter 9.5). Contact SEW-EURODRIVE if required.

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3.1.3 Helical-bevel gear units

Designation	
K..	Foot-mounted design
KA..B	Foot-mounted design and hollow shaft
KAF.B	B5 flange-mounted design, hollow shaft and foot-mounted design
KF..B	Foot-mounted design, B5 flange-mounted design
KH..B	Foot-mounted design and hollow shaft with shrink disk
KHF.B	B5 flange-mounted design and hollow shaft with shrink disk and flange-mounted design
KV..B	Foot-mounted design and hollow shaft with splined hollow shaft to DIN 5480
KF..	B5 flange-mounted design
KAF..	B5 flange-mounted design and hollow shaft
KHF..	B5 flange-mounted design and hollow shaft with shrink disk
KVF..	B5 flange-mounted design 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..	Splined hollow shaft according DIN 5480
KZ..[1)]	B14 flange-mounted design
KAZ..	B14 flange-mounted design and hollow shaft
KHZ..	B14 flange-mounted design and hollow shaft with shrink disk
KVZ..	B14 flange-mounted design and hollow shaft with splined hollow shaft to DIN 5480

1) The gear unit design KZ.. is not considered in the gearmotor dimension sheets (chapter 10.5). Contact SEW-EURODRIVE if required.

3.1.4 Helical-worm gear units

Designation	
S..	Foot-mounted design
SF..	B5 flange-mounted design
SAF..	B5 flange-mounted and hollow shaft
SHF..	B5 flange-mounted design 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 design and hollow shaft
SHZ..	B14 flange-mounted and hollow shaft with shrink disk

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3.1.5 SPIROPLAN® gear units

Designation	
W..	Foot-mounted design
WF..	Flange-mounted design
WAF..	Flange-mounted version and hollow shaft
WA..	Hollow shaft
WA..B	Foot-mounted version and hollow shaft
WH..B	Foot-mounted version and hollow shaft with shrink disk
WHF..	Flange-mounted and 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

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3.2 Designs and options for the DRN.. motor series

3.2.1 Designation of the motors

Design	Description
DRN..	Energy efficient motors of energy efficiency class IE3
80 – 315	Sizes: 80 / 90 / 100 / 112 / 132 / 160 / 180 / 200 / 225 / 250 / 280 / 315
S, M, ME, LS, L, H	Lengths: S = Short; M = Medium; L = Long; H = Extra-long design ME = longer variant of length M LS = Length S with shorter package
4	Number of poles 4

3.2.2 Output variants

Designation	Option	Size DRN..
/FI	IEC foot-mounted motor	80M – 315H
/F.A, /F.B	Universal foot version	80M – 132S, 225S – 315H
/FG	7-series integral motor, as stand-alone motor	80M – 315H
/FF	IEC flange-mounted motor with bore	80M – 315H
/FT	IEC flange-mounted motor with threads	80M – 100L
/FL	Flange mounted motor (deviating from IEC)	80M – 315H
/FM	7-series integral motor with IEC feet	80M – 315H
/FE	IEC flange-mounted motor with bore and IEC feet	80M – 315H
/FY	IEC flange-mounted motor with threads and IEC feet	80M – 100L
/FK	Flange-mounted motor (deviating from IEC) with feet	80M – 280M[1)]
/FC	C-face flange-mounted motor, dimensions in inch	80M – 160L[1)]

1) In preparation

3.2.3 Mechanical attachments

Designation	Option	Size
/BE..	Spring-loaded brake with specification of size	80M – 315H
HR	Manual brake release of the brake, automatic disengaging function	80M – 315H
HF	Manual brake release, lockable	80M – 315H
/RS	Backstop	80M – 315H
/MSW	MOVI-SWITCH®	80M – 100L
/MI	Motor identification module for MOVIMOT®	80M – 112M
/MM03 – MM40	MOVIMOT®	80M – 112M

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Designation	Option	Size
/MO	MOVIMOT® option(s)	80M – 112M

3.2.4 Connection alternatives

Designation	Option	Size
/IS	Integrated plug connector	80M – 132S
/ASE.	HAN 10ES plug connector on terminal box with single locking latch (cage clamp contacts on the motor side)	80M – 132S
/ASB.	HAN 10ES plug connector on terminal box with double locking latch (cage clamp contacts on the motor side)	80M – 132S
/ACE.	HAN 10E plug connector on terminal box with single locking latch (crimp contacts on the motor side)	80M – 132S
/ACB.	HAN 10E plug connector on terminal box with double locking latch (crimp contacts on the motor side)	80M – 132S
/AME.	HAN Modular 10B plug connector on terminal box with single locking latch (crimp contacts on the motor side)	80M – 132S
/ABE.		80M – 225M
/ADE.		80M – 225M
/AKE.		132M – 225M
/AMB.	HAN Modular 10B plug connector on terminal box with double locking latch (crimp contacts on the motor side)	80M – 132S
/ABB.		80M – 225M
/ADB.		80M – 225M
/AKB.		132M – 225M
/AND.	Harting Han® Q8/0, single locking latch	80M – 132S
/AFQ.	Round plug connector Molex/ Amphenol, 4-pole power 1 3/8" (AFQ8 housing Al), 3-pole brake connection 7/8", 3 fixed ends, max. 25 A, BG/BGE/BSR/BUR brake	80M – 132S
/AFL.	Round plug connector Molex/ Amphenol, 4-pole power 7/8" (AFL8 housing Al), 3-pole brake connection 7/8", 3 ends, max. 25 A, BG/BGE/BSR/BUR brake	80M – 100L
/KCC	6 or 10-pole terminal strip with cage clamp contacts	80M – 132S
/KC1	C1-profile-compliant connection of the electric monorail system drive (VDI guideline 3643) (for DR71, 80). Alternatively for DR.90 – 132 for a more compact connection range	80M – 132S
/IV	Other industrial plug connectors according to customer specifications	80M – 225M

3.2.5 Temperature sensor / temperature detection

Designation	Option	Size
/TF	Temperature sensor (PTC thermistor or PTC resistor)	80M – 315H
/TH	Thermostat (bimetallic switch)	80M – 315H
/KY	1 KTY84 – 130 sensor	80M – 315H

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Designation	Option	Size
/PT	1 / 3 PT100 sensor(s)	80M – 315H

3.2.6 Encoders

Designation	Option	Size
/ES7S[1)]	Mounted speed sensor with sin/cos interface	80M – 132S
/EG7S[1)]		132M – 280M
/EV7S		80M – 280M
/EH7S		315S – 315H
/ES7R	Mounted speed sensor with TTL (RS-422) interface, V = 9 – 26 V	80M – 132S
/EG7R		132M – 280M
/EV7R		80M – 280M
/EH7R		315S – 315H
/EI7C[1)]	Built-in incremental encoder with HTL interface, 24 periods	80M – 132S
/EI76	Built-in incremental encoder with HTL interface and 6 / 2 / 1 period(s)	80M – 132S
/EI72		80M – 132S
/EI71		80M – 132S
/AS7W[1)]	Mount-on absolute encoder, RS-485 interface (multi-turn)	80M – 132S
/AG7W[1)]		132M – 280M
/AV7W		80M – 280M
/AS7Y[1)]	Mount-on absolute encoder, SSI interface (multi-turn)	80M – 132S
/AG7Y[1)]		132M – 280M
/AV7Y		80M – 280M
/AH7Y		315S – 315H
/ES7A	Mounting adapter for speed sensors from the SEW-EURODRIVE portfolio	80M – 132S
/EG7A		132M – 280M
/EV7A		80M – 280M
/EH7A		315S – 315H
/ES7C	Mount-on speed sensor with HTL interface	80M – 132S
/EG7C		132M – 280M
/EV7C		80M – 280M
/EH7C		315S – 315H
/EH7T	Mount-on speed sensor TTL (RS-422) interface	315S – 315H
/XV.A	Mounting adapter for non-SEW speed sensors	80M – 280M
/XH1.	Mounted non-SEW speed sensor	80M – 132S[2)]
/XV..		80M – 280M

1) Also available in a safety-rated design

2) In preparation

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3.2.7 Ventilation

Designation	Option	Size
/V	Forced cooling fan	80M – 315H
/Z	Additional inertia (flywheel fan)	80M – 132L
/AL	Metal fan	80M – 315H
/U	Non-ventilated (without fan)	80M – 315H
/OL	Non-ventilated (closed B-side)	80M – 132S[1)]
/C	Protection canopy for fan guard	80M – 315H

1) In preparation

3.2.8 Bearings

Designation	Option	Size
/NS	Lubrication device	250M – 315H
/ERF	Reinforced bearings on A-side with roller bearing	250M – 315H
/NIB	Insulated bearing B-side	250M – 315H

3.2.9 Condition monitoring

Designation	Option	Size
/DUE	Diagnostic Unit Eddy Current = function/wear monitoring for brakes BE1 – BE122	80M – 315H[1)]

1) In preparation

3.2.10 Other additional features

Designation	Option	Size
/DH	Condensation drain hole	80M – 315H
/RI	Reinforced winding insulation	80M – 315H
/RI2	Reinforced winding insulation with increased resistance against partial discharge	80M – 315H[1)]
/2W	Second shaft end on the motor/brakemotor	80M – 315H

1) In preparation

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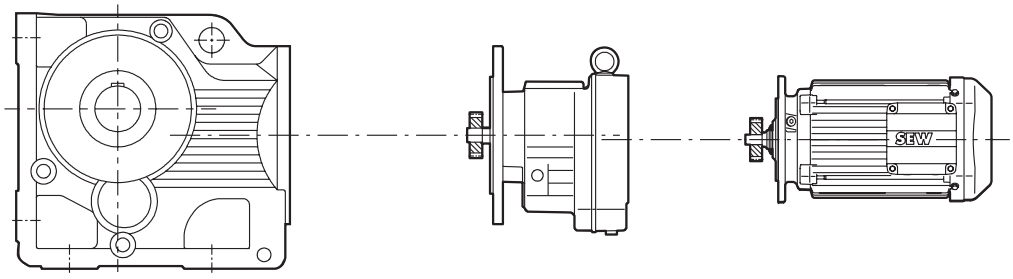
3.3 Example type designation of a DRN.. gearmotor

The type designation of the gearmotor starts from the component on the output end.

For instance, a multi-stage helical-bevel gearmotor with temperature sensor in the motor winding has the following type designation:

Example: K107R77DRN100M4 /TF		
Gear unit type	K	1. Gear unit
Gear unit size	107	
Gear unit series	R	2. Gear unit
Gear unit size	77	
Motor series	DRN..	Motor
Motor size	100	
Length	M	
Number of poles	4	
Motor option temperature sensor	/TF	Option

Example: DRN.. gearmotor

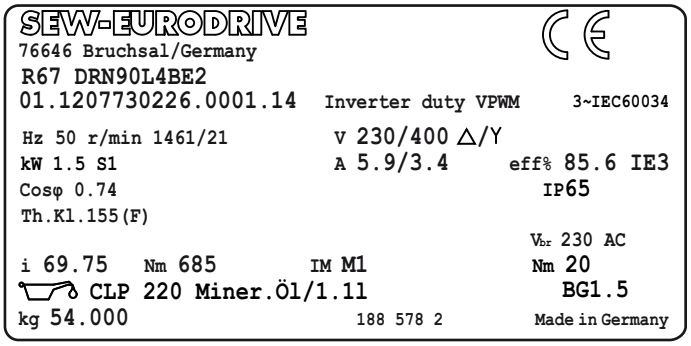


K107 R77 DRN100M4/TF

13368182539

3.4 DRN.. gearmotor nameplate

The following figure shows an example of the nameplate of a DRN.. gearmotor.



13373073675

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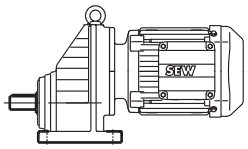
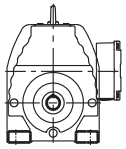
3.5 Gearmotor types

INFORMATION

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

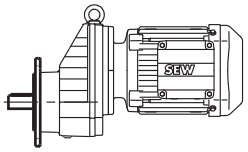
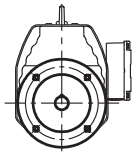
3.5.1 Helical gearmotors

The following types of helical gearmotors are available:

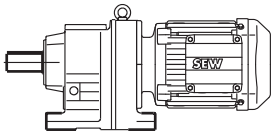
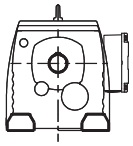
RX..DR..

Single-stage helical gearmotor in foot-mounted design

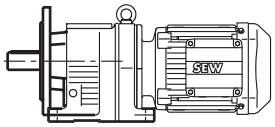
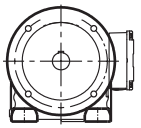
RXF..DR..

Single-stage helical gearmotor in B5 flange-mounted design

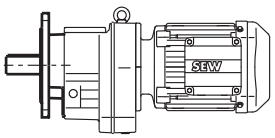
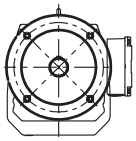
R..DR..

Foot-mounted helical gearmotor

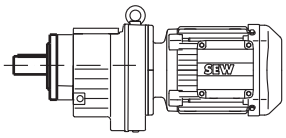
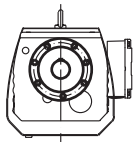
R..F DR..

Foot and B5 flange-mounted helical gearmotor

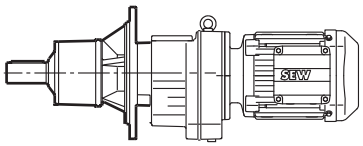
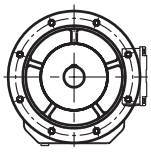
RF..DR..

Helical gearmotor in B5 flange-mounted design

RZ..DR..

B14 flange-mounted helical gearmotor

RM..DR..

B5 flange-mounted helical gearmotor with extended bearing hub

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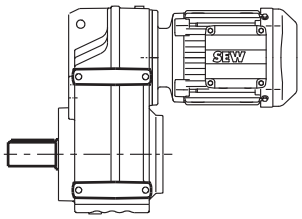
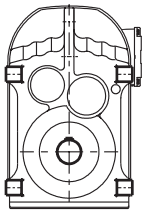
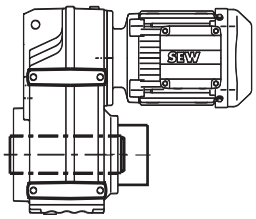
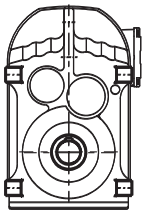
3.5.2 Parallel-shaft helical gearmotors

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

F..DR..

Parallel-shaft helical gearmotor in foot-mounted design

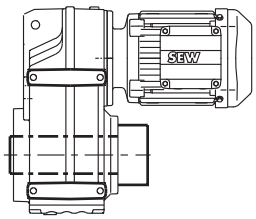
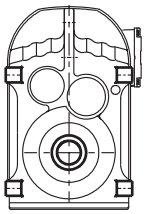



FA..B DR..

Parallel-shaft helical gearmotor in foot-mounted design with hollow shaft

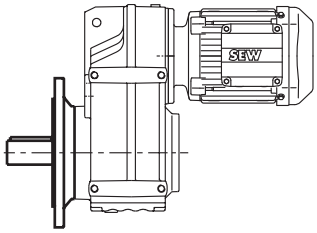
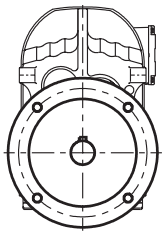
FV..B DR..

Parallel-shaft helical gearmotor in foot-mounted design with hollow shaft and splining to DIN 5480

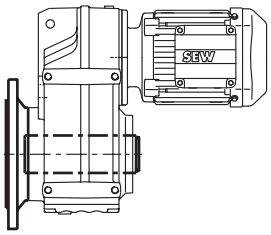
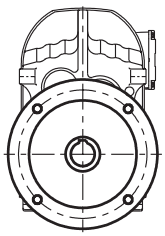
FH..B DR..

Parallel-shaft helical gearmotor in foot-mounted design with hollow shaft and shrink disk

FF..DR..

Parallel-shaft helical gearmotor in B5 flange-mounted design

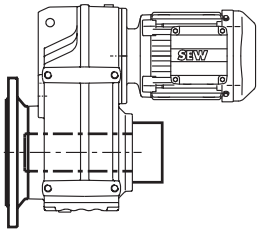
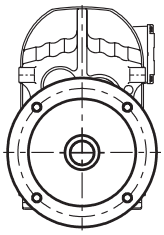



FAF..DR..

Parallel-shaft helical gearmotor in B5 flange-mounted design with hollow shaft

FVF..DR..

Parallel-shaft helical gearmotor in B5 flange-mounted design with hollow shaft and splining to DIN 5480

FHF..DR..

Parallel-shaft helical gearmotor in B5 flange-mounted design with hollow shaft and shrink disk

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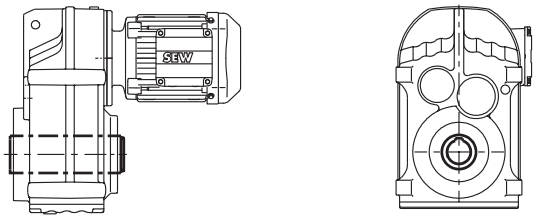
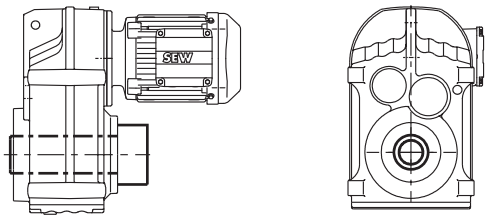


FA..DR..

Parallel-shaft helical gearmotor with hollow shaft

FV..DR..

Parallel-shaft helical gearmotor with hollow shaft and splining to DIN 5480

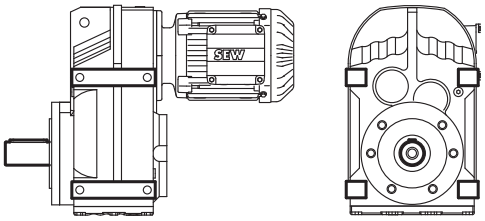


FH..DR..

Parallel-shaft helical gearmotor with hollow shaft and shrink disk

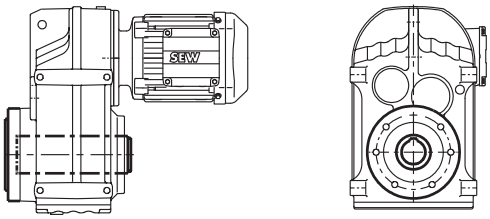
FT..DR..

Parallel-shaft helical gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system



FZ..DR..[1)]

Parallel-shaft helical gearmotor in B14 flange-mounted design.

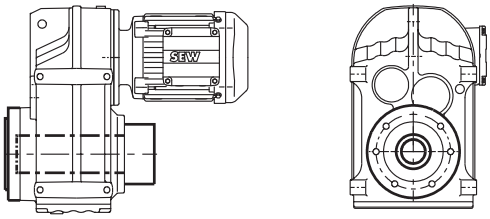


FAZ..DR..

Parallel-shaft helical gearmotor in B14 flange-mounted design with hollow shaft

FVZ..DR..

Parallel-shaft helical gearmotor in B14 flange-mounted design with hollow shaft and splining to DIN 5480



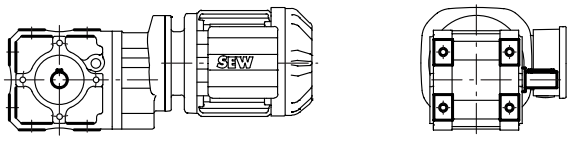
FHZ..DR..

Parallel-shaft helical gearmotor in B14 flange-mounted design with hollow shaft and shrink disk

1) The gear unit design FZ.. is not considered in the gearmotor dimension sheets (chapter 9.5). Contact SEW-EURODRIVE, if required.

3.5.3 Helical-bevel gearmotors, gear unit sizes K..9

The following types of helical-bevel gearmotors with gear units of size K..9 are available:



K.9DR..

Foot-mounted helical-bevel gearmotor

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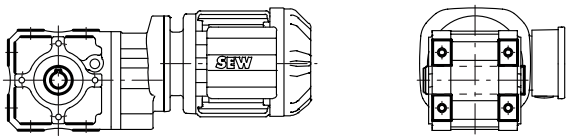
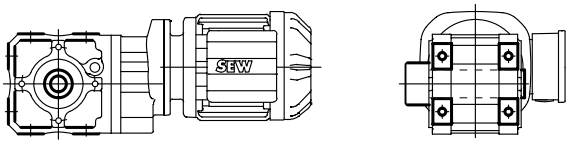


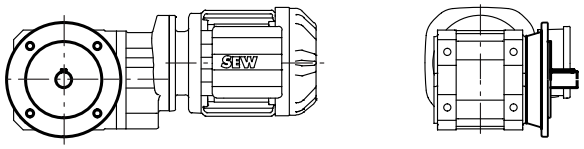
KA.9B..DR..

Foot-mounted helical-bevel gearmotor with hollow shaft



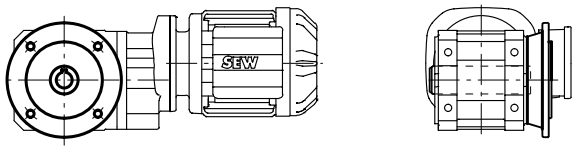
KH.9B..DR..

Foot-mounted helical-bevel gearmotor with hollow shaft and shrink disk



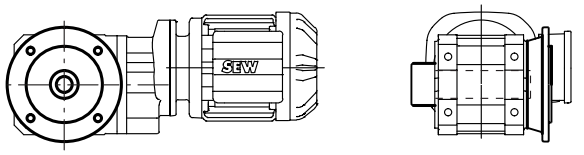
KF.9B..DR..

Foot-mounted helical-bevel gearmotor with B5 flange



KAF.9B..DR..

Foot-mounted helical-bevel gearmotor with B5 flange and hollow shaft

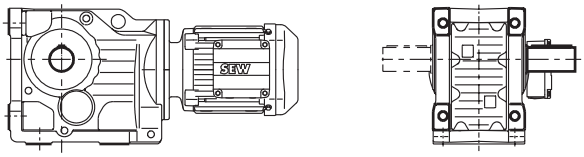


KHF.9B..DR..

Foot-mounted helical-bevel gearmotor with B5 flange, hollow shaft and shrink disk

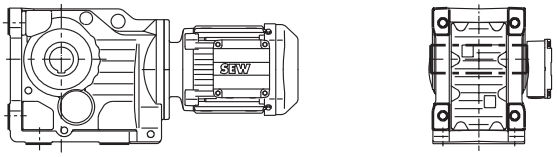
3.5.4 Helical-bevel gearmotors, gear unit sizes K..7

The following types of helical-bevel gearmotors with gear units of size K..7 are available:



K..7..DR..

Helical-bevel gearmotor in foot-mounted design

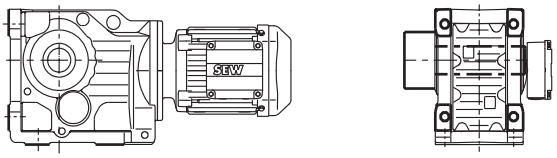


KA..7B..DR..

Helical-bevel gearmotor in foot-mounted design with hollow shaft

KV..7B..DR..

Helical-bevel gearmotor in foot-mounted design with hollow shaft and splining acc. to DIN 5480



KH..7B..DR..

Helical-bevel gearmotor in foot-mounted design with hollow shaft and shrink disk

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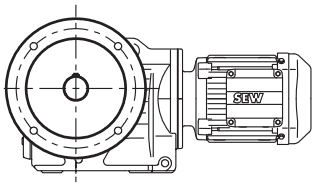
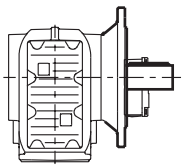
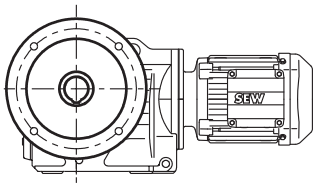
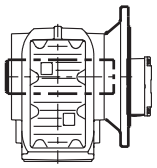



KF..7..DR..

Helical-bevel gearmotor in B5 flange-mounted design

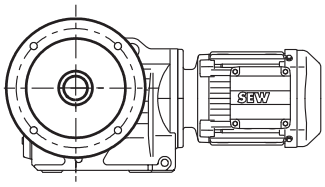
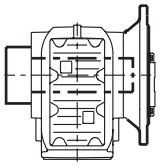



KAF..7..DR..

Helical-bevel gearmotor in B5 flange-mounted design with hollow shaft

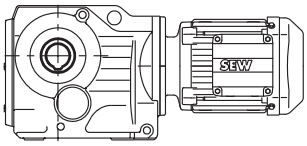
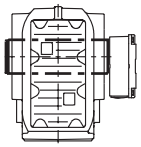
KVF..7..DR..

Helical-bevel gearmotor in B5 flange-mounted design with hollow shaft and splining acc. to DIN 5480

KHF..7..DR..

Helical-bevel gearmotor in B5 flange-mounted design with hollow shaft and shrink disk

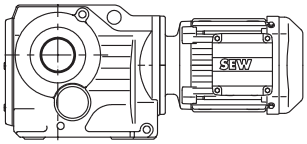
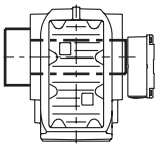



KA..7..DR..

Helical-bevel gearmotor with hollow shaft

KV..7..DR..

Helical-bevel gearmotor with hollow shaft and splining to DIN 5480

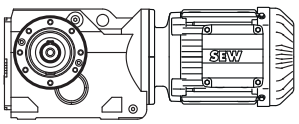
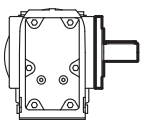



KH..7..DR..

Helical-bevel gearmotor with hollow shaft and shrink disk

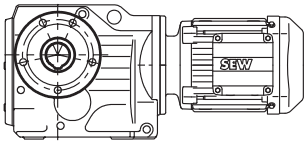
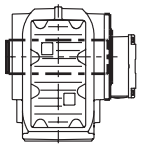
KT..7..DR..

Helical-bevel gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system

KZ..7..DR.. [1)]

Helical-bevel gearmotor in B14 flange-mounted design.

KAZ..7..DR..

Helical-bevel gearmotor in B14 flange-mounted design with hollow shaft

KVZ..7..DR..

Helical-bevel gearmotor in B14 flange-mounted design with hollow shaft and splining acc. to DIN 5480

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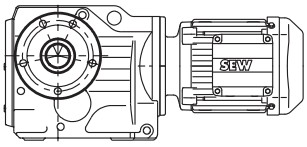
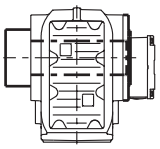



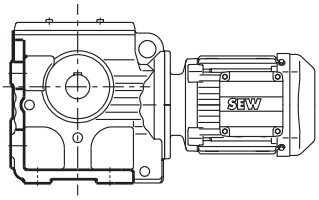
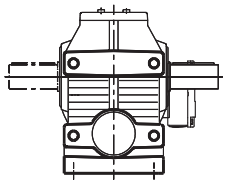
KHZ..7..DR..

Helical-bevel gearmotor in B14 flange-mounted design with hollow shaft and shrink disk

1) The gear unit design KZ.. is not considered in the gearmotor dimension sheets (chapter 10.5). Contact SEW-EURODRIVE, if required.

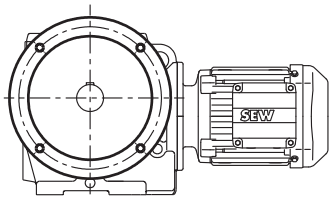
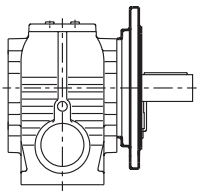
3.5.5 Helical-worm gearmotors

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

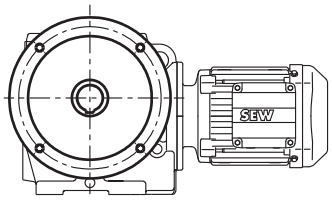
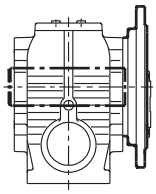
S..DR..

Foot-mounted helical-worm gearmotor

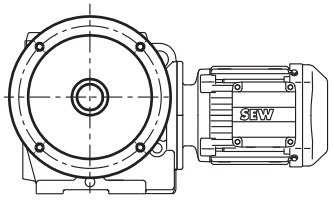
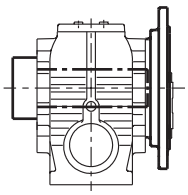
SF..DR..

Helical-worm gearmotor in B5 flange-mounted version

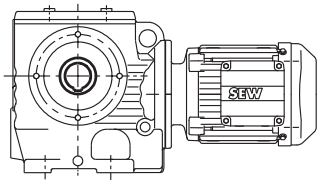
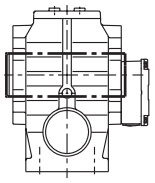
SAF..DR..

Helical-worm gearmotor in B5 flange-mounted version with hollow shaft

SHF..DR..

Helical-worm gearmotor in B5 flange-mounted version with hollow shaft and shrink disk

SA..DR..

Helical-worm gearmotor with hollow shaft

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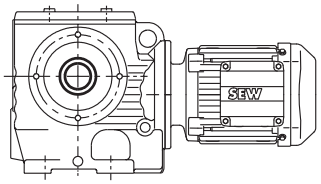
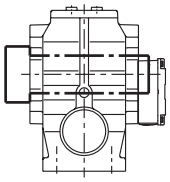
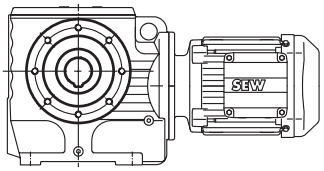
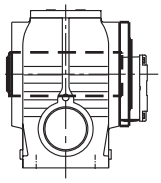



SH..DR..

Helical-worm gearmotor with hollow shaft and shrink disk

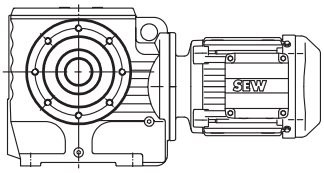
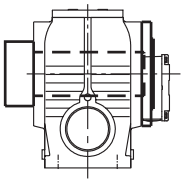
ST..DR..

Helical-worm gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system

SAZ..DR..

B14 flange-mounted helical-worm gearmotor with hollow shaft

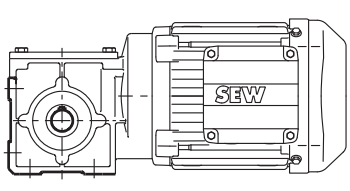
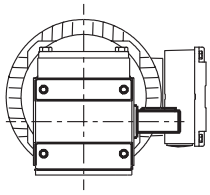



SHZ..DR..

B14 flange-mounted helical-worm gearmotor with hollow shaft and shrink disk

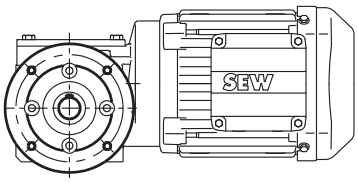
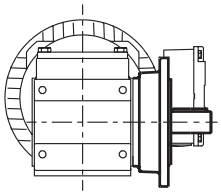
3.5.6 SPIROPLAN® gearmotors, gear unit sizes W..10, W..20, W..30

The following types of SPIROPLAN® gearmotors with gear units of sizes W..10, W..20 and W..30 are available:

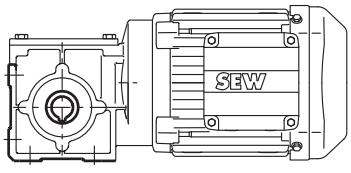
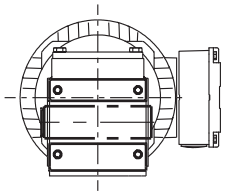
W10..DR.., W20..DR.., W30..DR..,

Foot-mounted SPIROPLAN® gearmotor

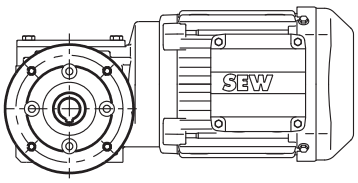
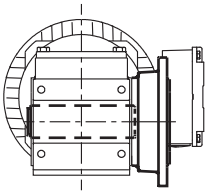
WF10..DR.., WF20..DR.., WF30..DR..

Flange-mounted SPIROPLAN® gearmotor

WA10..DR.., WA20..DR.., WA30..DR..

SPIROPLAN® gearmotor with hollow shaft

WAF10..DR.., WAF20..DR.., WAF30..DR..

Flange-mounted SPIROPLAN® gearmotor with hollow shaft

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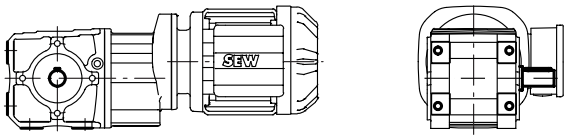
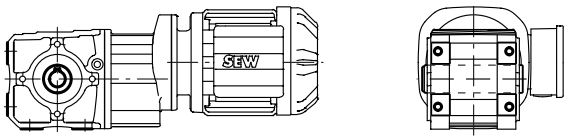
3.5.7 SPIROPLAN® gearmotors, gear unit sizes W..37 and W..47

The following types of SPIROPLAN® gearmotors with gear units of sizes W..37 and W..47 are available:



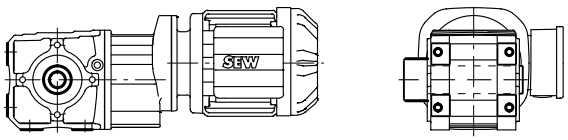
W37..DR.., W47..DR..

Foot-mounted SPIROPLAN® gearmotor



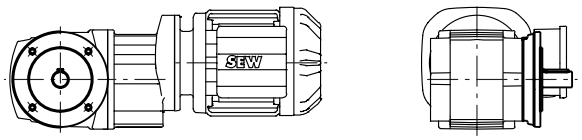
WA37..B DR.., WA47..B DR..

Foot-mounted SPIROPLAN® gearmotor with hollow shaft



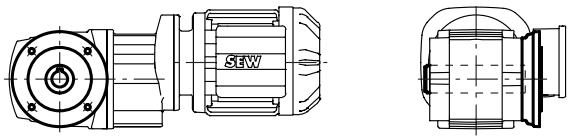
WH37..B DR.., WH47..B DR..

Foot-mounted SPIROPLAN® gearmotor with hollow shaft and shrink disk



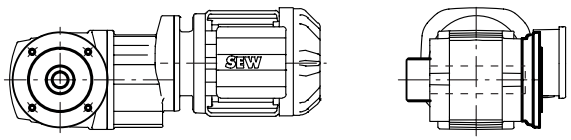
WF37..DR.., WF47..DR..

B5 flange-mounted SPIROPLAN® gearmotor



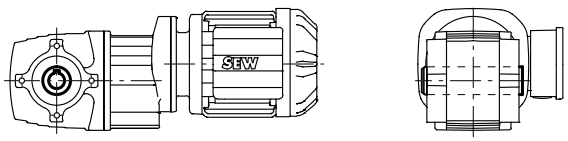
WAF37..DR.., WAF47..DR..

B5 flange-mounted SPIROPLAN® gearmotor with hollow shaft



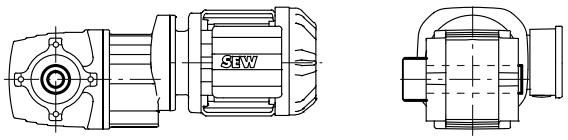
WHF37..DR.., WHF47..DR..

B5 flange-mounted SPIROPLAN® gearmotor with hollow shaft and shrink disk



WA37..DR.., WA47..DR..

SPIROPLAN® gearmotor with hollow shaft



WH37..DR.., WH47..DR..

SPIROPLAN® gearmotor with hollow shaft and shrink disk

WT37..DR.., WT47..DR..

SPIROPLAN® gearmotor with hollow shaft and TorqLOC® hollow shaft mounting system

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4 Project planning for drives

4.1 Additional publications

For more details on the subject of project planning for drives, visit the SEW-EURODRIVE website where you can order or download the following publications of the "Drive Engineering – Practical Implementation" series:

- Project Planning for Drives
- EMC in Drive Engineering – Basic Theoretical Principles and EMC-Compliant Installation in Practice
- Efficient Plant Automation with Mechatronic Drive Solutions
- SEW encoder systems
- Servo Technology
- Drive Engineering - Practical Implementation: Explosion-Proof Drives to EU Directive 94/9/EC

4.2 Drive and gear unit selection data

Certain data of the application have to be provided to being able to precisely define the components for your drive.

Designation	Meaning	Unit
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_A	Axial load (tension and compression) on the output shaft	N
F_R	Overhung load on output shaft	N
J_{load}	Mass moment of inertia to be driven	10^{-4} kgm^2
R, F, K, S, W M1 - M6	Mounting position and required gear unit type; see also the chapters "Mounting position of gear units" (→ 🗎 54) and "Project planning notes for R, F, K, S, W gear units" (→ 🗎 40)	-
IP..	Required degree of protection	-
ϑ_{amb}	Ambient temperature	°C
H	Installation altitude	m above sea level SL
S.., ..% cdf	Duty type and cyclic duration factor (cdf); alternatively, exact load cycle can be entered.	-
Z	Starting frequency; alternatively, 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: required control type and setting range		

Determining the motor data

It is first necessary to have data on the machine to be driven (mass, speed, setting range, etc.) to design the drive correctly. 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.

Selecting the correct drive

The appropriate drive can be selected once the power and speed of the drive have been calculated and with regard to other mechanical requirements.

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4.3 Project planning procedure – DR.. motors

4.3.1 Drive selection – non-controlled operation

The following flow diagram illustrates the project planning procedure for a non-controlled drive. The drive consists of a gearmotor operated on the grid.

Necessary information on the machine to be driven

- Technical data and environmental conditions
- Stopping accuracy
- Output speed
- Start-up acceleration and deceleration
- Cyclic duration factor and starting frequency

↓

Calculation of the relevant application data

- Static and dynamic power
- Speeds
- Torques, powers
- Travel diagram, if required
- Determine the necessary service factor f_B

↓

Motor selection

- Torque/power/speed (number of poles)
- Acceleration torque/starting torque
- Starting frequency
- Determine the energy efficiency class IE
- Mechanical brake (braking work, braking torque, brake service life)
- Motor equipment (brake, plug connector, thermal motor protedction, etc.)

↓

Gear unit selection

- Define gear unit type, gear unit size, gear unit ratio and gear unit version
- Check the positioning accuracy
- Check the service factor f_B

↓

Make sure that all requirements have been met.

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4.3.2 Drive selection – controlled operation

The following flow diagram illustrates the project planning procedure for a positioning drive. The drive consists of a gearmotor that is powered by an inverter.

Necessary information on the machine to be driven

- Technical data and environmental conditions
- Positioning accuracy
- Speed setting range
- Calculate the travel cycle

↓

Calculation of the relevant application data

- Travel diagram
- Speeds
- Static, dynamic torques
- Regenerative power

↓

Gear unit selection

- Define gear unit type, gear unit size, gear unit ratio and gear unit version
- Check the positioning accuracy
- Check the gear unit utilization ($M_{a\,max} \geq M_a$)
- Check the input speed (churning losses)

↓

Motor selection

- Maximum torque
- With dynamic drives: effective torque at medium speed
- Maximum speed
- Determine the energy efficiency class IE
- Observe dynamic and thermal torque curves
- Selection of the correct encoder
- Motor equipment (brake, plug connector, TF selection, etc.)

↓

Inverter selection

- Motor/inverter assignment
- Continuous current and peak current for current-controlled inverters/axes

↓

Selecting the braking resistor

- Based on the calculated regenerative power, cdf and peak braking power

↓

Options
- EMC measures
- Operation/communication
- Additional functions

↓

Make sure that all requirements have been met.

4.4 Project planning information – R, F, K, S, W gear units

4.4.1 Efficiency of gear units

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 applies in particular to helical-worm and SPIROPLAN® right-angle gear units.

R, F, K gear units

Depending on the number of gear stages, the gearing efficiency of helical, parallel-shaft and helical-bevel gear units is up to 96% (3-stage), 97% (2-stage) and 98% (1-stage).

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 thus be less efficient.

Other factors influencing efficiency:

- 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 gear stage has a very high gear ratio.

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 also dynamically self-locking. Contact SEW-EURODRIVE if you want to make technical use of the braking effect of self-locking characteristics.

INFORMATION

Note that the self-locking effect of helical-worm and SPIROPLAN® gear units is not permitted as the sole safety function for hoists.

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Run-in phase

The tooth flanks of new helical-worm and SPIROPLAN® gear units are not yet completely smooth. That fact makes for a greater friction angle and less efficiency than during later operation. This effect intensifies with increasing gear ratio.

During the run-in phase, the nominal efficiency of the gear unit is reduced by the relevant value from the following tables.

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

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

The run-in phase usually lasts 48 hours. The following conditions must be met for helical-worm and SPIROPLAN® gear units to achieve their nominal efficiency ratings:

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

Churning losses

In specific gear unit mounting positions (see also chapter "Gear unit mounting positions and order information" (→ 🗎 54)), the first gearing stage is completely immersed in the lubricant. With larger gear unit sizes and high circumferential velocities of the input stage, this gives rise to churning losses constituting a factor which cannot be ignored. Contact SEW-EURODRIVE if you wish to use gear units of this type.

To reduce churning losses to a minimum, use gear units in the M1 mounting position.

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4.5 Service factor

4.5.1 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 determine the service factor applicable to your application in the following figure. The service factor determined must be smaller than or equal to the service factor specified in the selection tables.

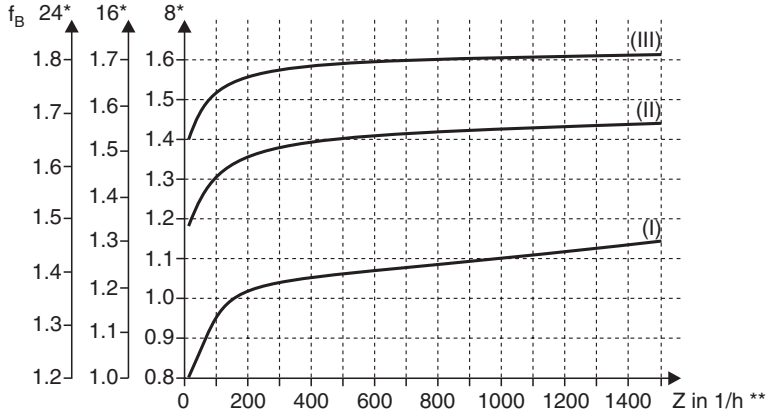
Condition for service factor

$$M_a \times f_B \leq M_{amax}$$

M_a Output torque in Nm

f_B SEW service factor

M_{amax} Maximum output torque in Nm



* 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) Non-uniform, permitted mass acceleration factor ≤ 10

Mass acceleration factor

The mass acceleration factor is calculated as follows:

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

"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:

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Scaling down the mass moment of inertia on the motor shaft

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

J_X Reduced mass moment of inertia on 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 a case.

4.5.2 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 = 1.5, 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 1.5 or greater.

4.5.3 Helical-worm gear unit

In the case of helical-worm gear units, two further service factors have to be taken into account in addition to the service factor f_B shown the above diagram. They are:

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

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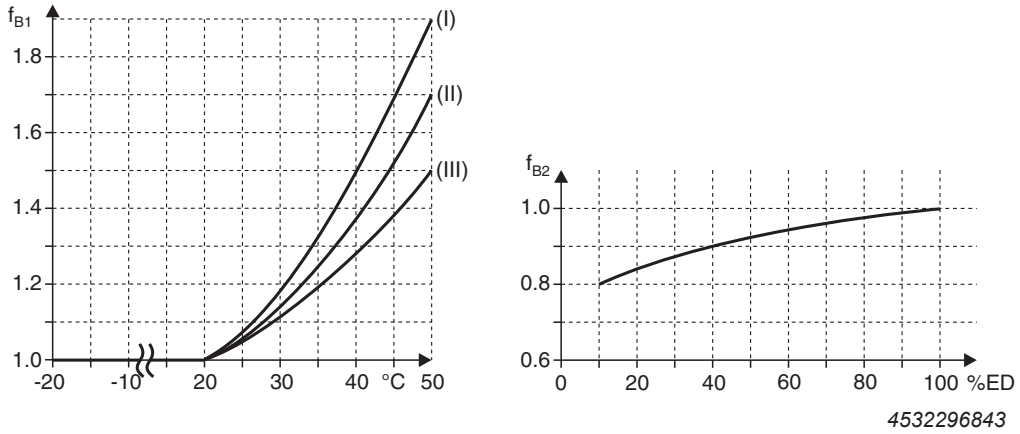
The additional service factors f_{B1} and f_{B2} can be determined by referring to the diagram below. For f_{B1}, the load classification is taken into account in the same way as for f_B. The following diagram shows the additional service factors f_{B1} and f_{B2}:



Cyclic duration factor

$$CDF = \frac{Time\ under\ load\ in\ min\ /\ h}{60} \times 100$$

CDF Cyclic duration factor in %

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

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

Total service factor

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

f_{Btot} Total service factor

f_B SEW service factor

f_{B1} Service factor from ambient temperature

f_{B2} Service factor from cyclic duration factor

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.

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4.6 Overhung and axial loads

4.6.1 Determining the overhung load

When determining the resulting overhung load, the type of transmission element mounted on the shaft end must be considered. The following transmission element factors f_Z have to be considered for various transmission elements.

Transmission element	Transmission element factor f_Z	Comments
Gears	1.15	< 17 teeth
Sprockets	1.40	< 13 teeth
Sprockets	1.25	< 20 teeth
Narrow V-belt pulleys	1.75	Influence of the pre-tensioning force
Flat belt pulleys	2.50	Influence of the pre-tensioning force
Toothed belt pulleys	1.50	Influence of the pre-tensioning force
Gear rack pinion, pre-tensioned	2.00	Influence of the pre-tensioning force

The overhung force load exerted on the motor or gear unit shaft is then 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

4.6.2 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. For other versions, contact SEW-EURODRIVE.

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INFORMATION

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

- For K and S gear units, 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.
- Helical-bevel gearmotors K167 and K187 in mounting positions M1 to M4: A maximum of 50% of the overhung load F_{Ra} specified in the selection tables is permitted in the case of gear unit mountings other than those shown in the mounting position sheets.
- Foot and flange-mounted helical gearmotors (R..F): A maximum of 50% of the overhung load F_{Ra} specified in the selection tables is permitted in the case of torque transmission via the flange mounting.

4.6.3 Higher permitted overhung loads

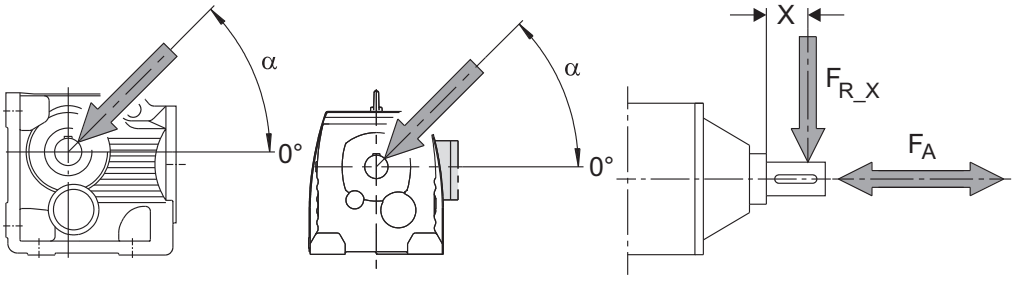
Exactly considering the force application angle α and the direction of rotation makes it possible to achieve a higher overhung load than listed in the selection tables.

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.

4.6.4 Definition of the force application

Force application is defined according to the following figure:



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F_{R_X} Permitted overhung load at point x in N

F_A Permitted axial load in N

α Force application angle

4.6.5 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

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INFORMATION

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

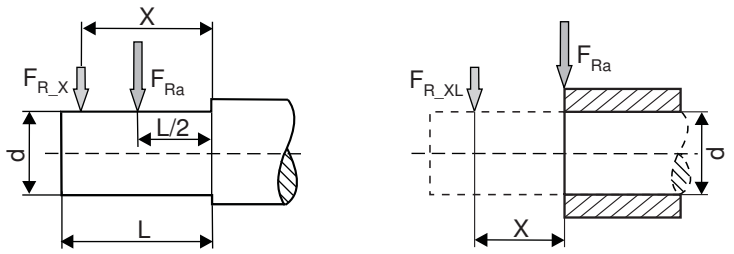
4.6.6 Input end: Overhung load conversion for off-center force application

INFORMATION

Contact SEW-EURODRIVE with regard to the project planning of gear units with input shaft assemblies and off-center force application.

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

The permitted overhung loads must be calculated according the selection tables using the following formulae in the event that force is not applied at the center of the shaft end. The smaller of the two values F_{R_XL} (according to bearing life) and F_{R_XW} (according to shaft strength) is the permitted value for the overhung load at point x. Note that the calculations apply to $M_{a\ max}$.



Overhung load F_{R_X} for off-center force application

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F_{R_XL} based on bearing service life

$$F_{R\_XL} = F_{Ra} \times \frac{a}{b + X}$$

F_{R_XW} based on shaft strength

$$F_{R\_XW} = \frac{c}{f + X}$$

F_{Ra}	Permitted overhung load (X = L/2) based on M_{amax} in N for foot-mounted gear units according to the selection tables
X	Distance from the shaft shoulder to the force application point in mm
a, b, f	Gear unit constants for overhung load conversion in mm
c	Gear unit constant for overhung load conversion in Nmm

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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	6.527×10^4	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
K19	103.7	83.7	8.66×10^4	0	20	40
K29	124.5	99.5	1.26×10^5	0	25	50
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.

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4.7 Multi-stage gearmotors

4.7.1 General information

You can achieve particularly low output speeds by using double gear units or multi-stage gearmotors. This means an additional second gear unit, usually a helical gear unit, is installed in front of the gear unit or between gear unit and motor.

The resulting total reduction ratio may necessitate gear unit protection.

4.7.2 Limiting the motor power

Reduce the maximum output motor power according to the maximum permitted output torque on the gear unit ($M_{a\ max}$). For this purpose you first have to determine the maximum permitted motor torque ($M_{N\ perm}$).

You can calculate the maximum permitted motor torque as follows:

Maximum permitted motor torque

$$M_{N\,perm} = \frac{M_{a\ max}}{i_{tot} \times \eta_{tot}}$$

$M_{n\ perm}$	Maximum permitted motor torque in Nm
$M_{a\ max}$	Maximum permitted output torque in Nm
i_{tot}	Total gear unit ratio
η_{tot}	Overall efficiency

Use this maximum permitted motor torque $M_{N\ perm}$ and the load diagram of the motor to determine the associated value for the motor current.

Take appropriate measures to prevent the continuous current consumption of the motor from exceeding the pre-determined value for the motor torque $M_{N\ perm}$. An appropriate measure would be to set the trip current of the motor protection switch to this maximum current value. A motor circuit breaker offers the option to compensate for a brief overload, for example during the startup phase of the motor. A suitable measure for inverter drives is to limit the output current of the inverter according to the determined motor current.

4.7.3 Checking brake torques

When using a multi-stage brakemotor, you have to limit the braking torque (M_B) according to the maximum permitted motor torque $M_{N\ perm}$. The maximum permitted braking torque is 200% $M_{N\ perm}$.

Maximum braking torque

$$M_{B\ max} \leq 200\%\ M_{N\ perm}$$

$M_{B\ max}$	Maximum braking torque in Nm
$M_{N\ perm}$	Maximum permitted motor torque in Nm

If you have questions regarding the permitted starting frequency of multi-stage brake motors, please consult SEW-EURODRIVE.

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4.7.4 Preventing blocking

Blockage on the output side of the multi-stage gear unit or multi-stage gearmotor is not permitted. The reason is that indeterminable torques and uncontrolled overhung and axial loads may occur. The gear units may suffer irreparable damage as a result.

INFORMATION

Consult SEW-EURODRIVE if blockages of the double gear unit or multi-stage gearmotor cannot be avoided due to the application.

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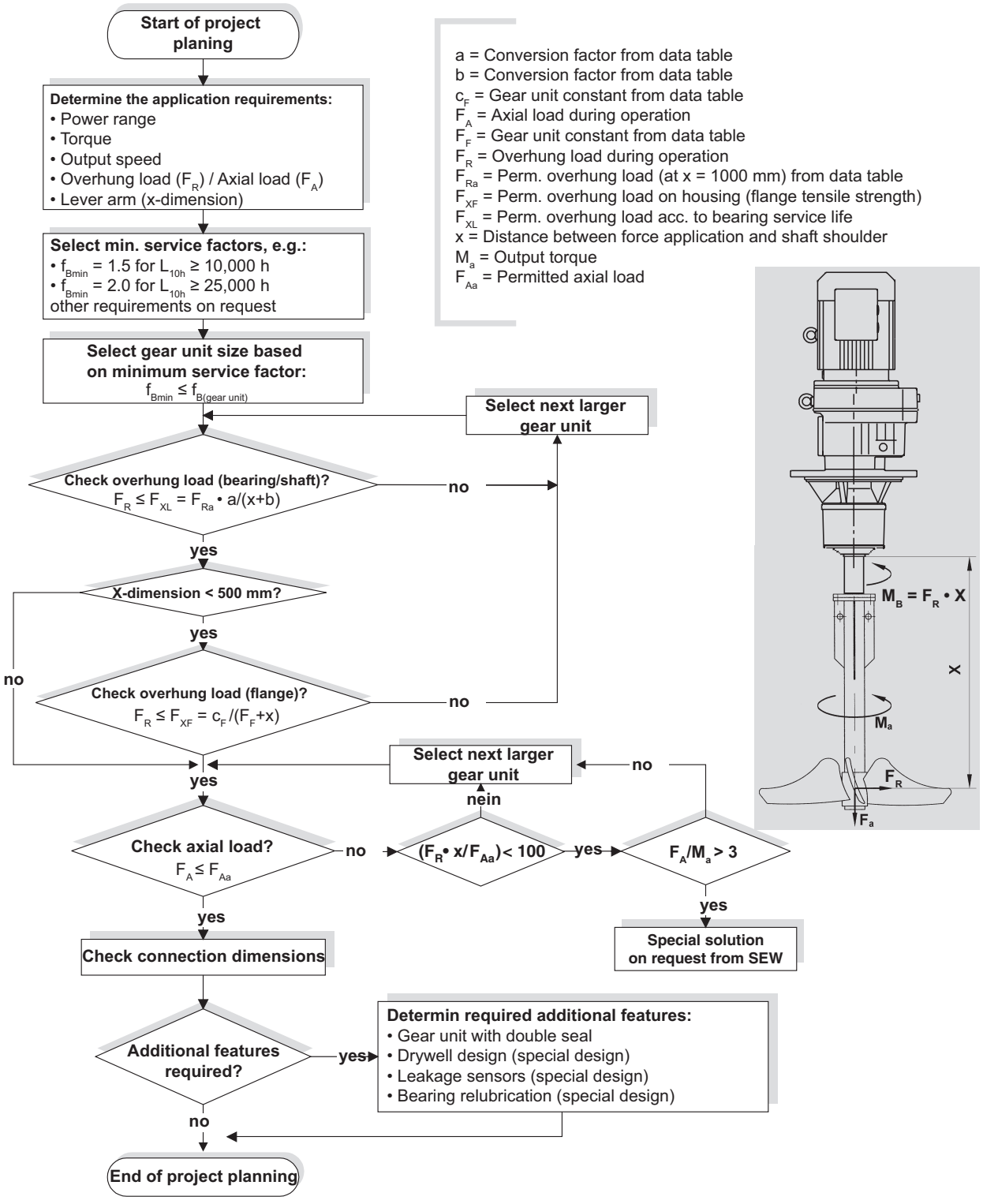
4.8 Project planning for RM gear units

4.8.1 Project planning procedure

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



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4.8.2 Permitted overhung loads and axial forces

The following table shows the permitted overhung loads F_{Ra} and axial loads F_{Aa} for various service factors f_B and nominal bearing service life L_{10h}.

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

		n_a in rpm							
		< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra} in N	400	400	400	400	400	405	410	415
	F_{Aa} in N	18800	15000	11500	9700	7100	5650	4450	3800
RM67	F_{Ra} in N	575	575	575	580	575	585	590	600
	F_{Aa} in N	19000	18900	15300	11900	9210	7470	5870	5050
RM77	F_{Ra} in N	1200	1200	1200	1200	1200	1210	1210	1220
	F_{Aa} in N	22000	22000	19400	15100	11400	9220	7200	6710
RM87	F_{Ra} in N	1970	1970	1970	1970	1980	1990	2000	2010
	F_{Aa} in N	30000	30000	23600	18000	14300	11000	8940	8030
RM97	F_{Ra} in N	2980	2980	2980	2990	3010	3050	3060	3080
	F_{Aa} in N	40000	36100	27300	20300	15900	12600	9640	7810
RM107	F_{Ra} in N	4230	4230	4230	4230	4230	4230	3580	3830
	F_{Aa} in N	48000	41000	30300	23000	18000	13100	9550	9030
RM137	F_{Ra} in N	8710	8710	8710	8710	7220	5060	3980	6750
	F_{Aa} in N	70000	70000	70000	57600	46900	44000	35600	32400
RM147	F_{Ra} in N	11100	11100	11100	11100	11100	10600	8640	10800
	F_{Aa} in N	70000	70000	69700	58400	45600	38000	32800	30800
RM167	F_{Ra} in N	14600	14600	14600	14600	14600	14700	–	–
	F_{Aa} in N	70000	70000	70000	60300	45300	36900	–	–

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

		n_a in rpm							
		< 16	16-25	26-40	41-60	61-100	101-160	161-250	251-400
RM57	F_{Ra} in N	410	410	410	410	410	415	415	420
	F_{Aa} in N	12100	9600	7350	6050	4300	3350	2600	2200
RM67	F_{Ra} in N	590	590	590	595	590	595	600	605
	F_{Aa} in N	15800	12000	9580	7330	5580	4460	3460	2930
RM77	F_{Ra} in N	1210	1210	1210	1210	1210	1220	1220	1220
	F_{Aa} in N	20000	15400	11900	9070	6670	5280	4010	3700
RM87	F_{Ra} in N	2000	2000	2000	2000	2000	1720	1690	1710
	F_{Aa} in N	24600	19200	14300	10600	8190	6100	5490	4860
RM97	F_{Ra} in N	3040	3040	3040	3050	3070	3080	2540	2430
	F_{Aa} in N	28400	22000	16200	11600	8850	6840	5830	4760
RM107	F_{Ra} in N	4330	4330	4330	4330	4330	3350	2810	2990
	F_{Aa} in N	32300	24800	17800	13000	9780	8170	5950	5620
RM137	F_{Ra} in N	8850	8850	8850	8830	5660	4020	3200	5240
	F_{Aa} in N	70000	59900	48000	37900	33800	31700	25600	23300
RM147	F_{Ra} in N	11400	11400	11400	11400	11400	8320	6850	8440
	F_{Aa} in N	70000	60600	45900	39900	33500	27900	24100	22600
RM167	F_{Ra} in N	15100	15100	15100	15100	15100	13100	–	–
	F_{Aa} in N	70000	63500	51600	37800	26800	23600	–	–

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4.8.3 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
RM137	1088	88	25291700	25993600	650
RM147	1091	91	30038700	31173900	756
RM167	1089.5	89.5	42096100	43654300	869

4.8.4 Additional weight of RM gear units

Type	Additional weight compared to RF with reference to the smallest RF flange Δm in kg
RM57	12.0
RM67	15.8
RM77	25.0
RM87	29.7
RM97	51.3
RM107	88.0
RM137	111.1
RM147	167.4
RM167	195.4

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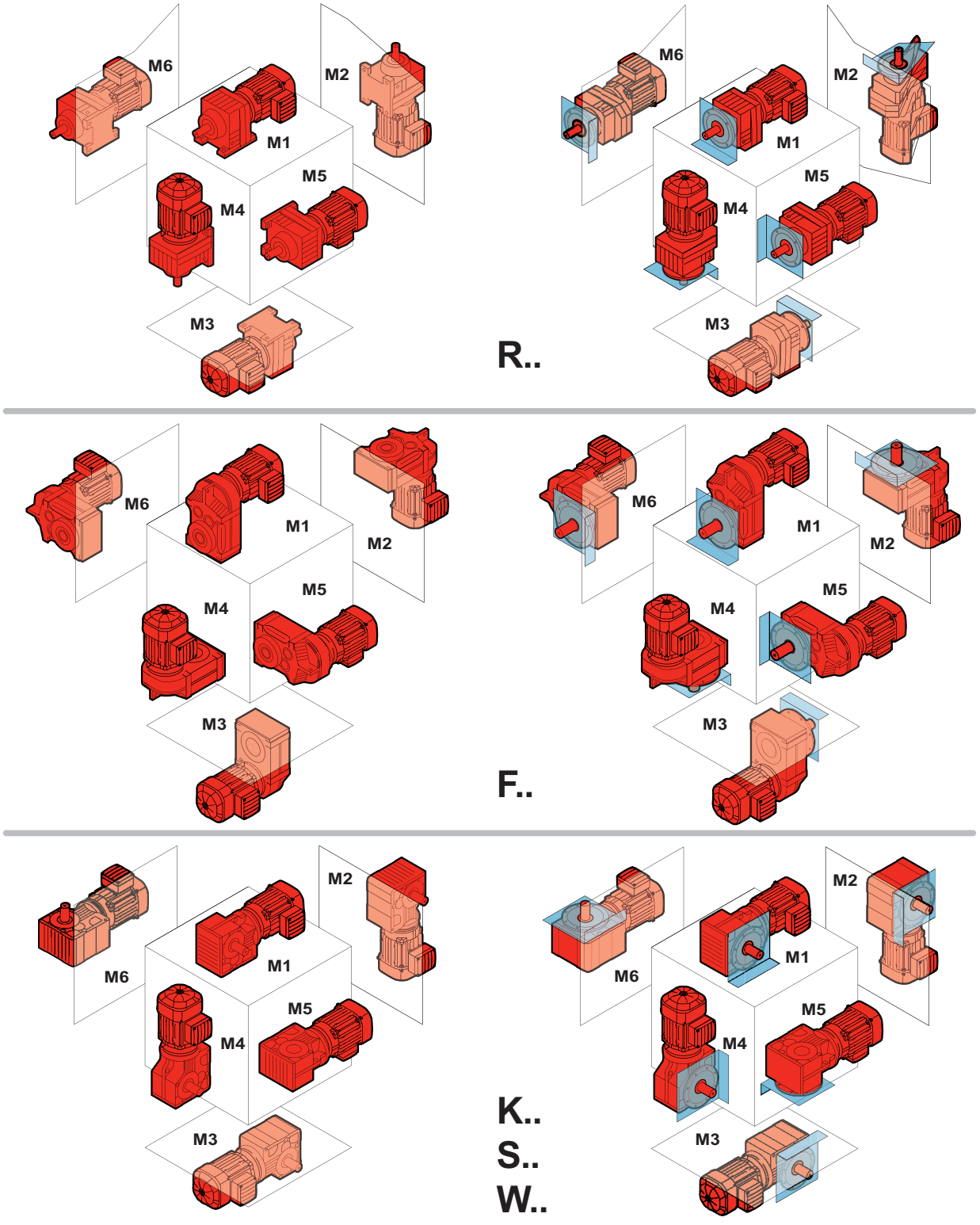
5 Gear unit mounting positions and order information

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

The following figure shows the SEW mounting positions M1 – M6 of the gear units:



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5.2 Order information

INFORMATION

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

This information is also required for gearmotors that do not depend on a particular mounting position.

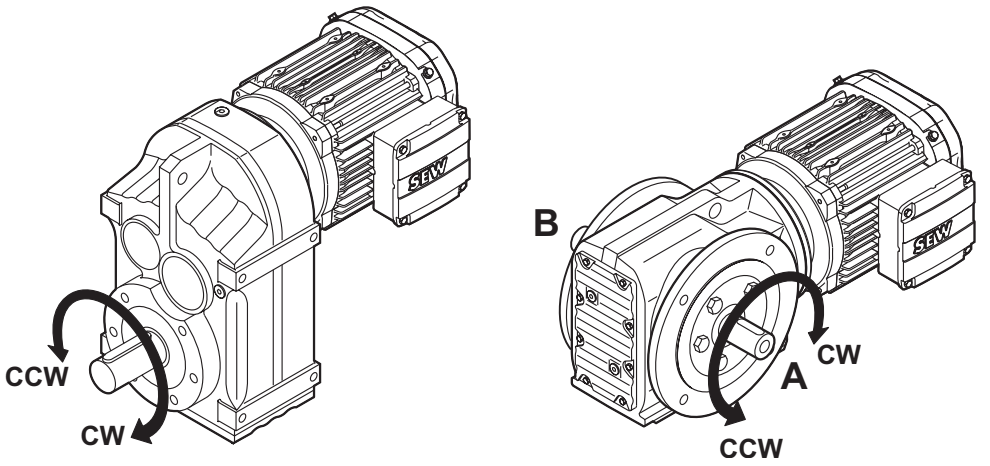
5.2.1 Order information for all gear units and gearmotors

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

Output direction of rotation with backstop

If the drive has a backstop RS, 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-side.

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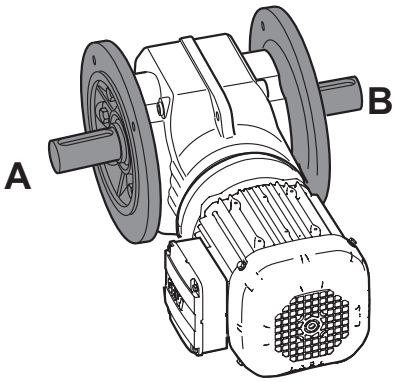
Position of the output shaft and the output flange

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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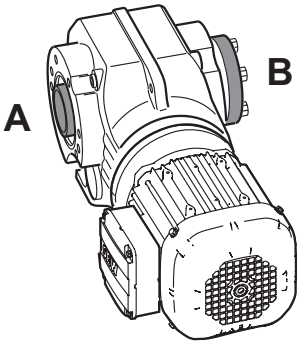
Position of the output end in right-angle gear units

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

In the case of shaft-mounted right-angle gear units, the designation "output end" is equivalent to the "shaft position" of right-angle gear units with a 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.

5.2.2 Position of motor terminal box and cable entry

The position of the motor terminal box was previously specified as 0°, 90°, 180° or 270° as viewed onto the fan guard (= B-side); see the following figure. A change in the product standard EN 60034 stipulates that the following designations have to be used for the terminal box positions of foot-mounted motors in the future:

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

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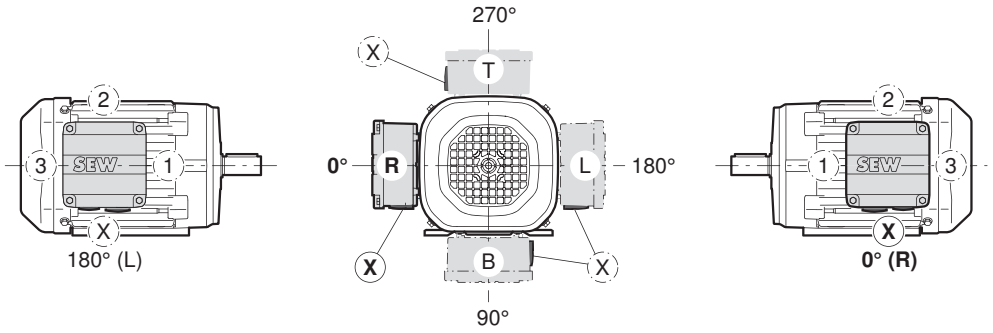
This new designation applies to foot-mounted motors without a gear unit in mounting position B3 (= M1). The previous designation is retained for gearmotors. The following figure shows both designations. Where the mounting position of the motor changes, R, B, L and T are rotated accordingly. In motor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

The position of the cable entry can be selected as well. "X" (= normal position), "1", "2" or "3" are possible, as shown in the following figure.



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Unless indicated otherwise, you will receive the terminal box type 0° with "X" cable entry. For mounting position M3, we recommend that you select cable entry "2".

INFORMATION

Only cable entries "X" and "2" are possible with the DR63 motor. Exception: This limitation does not apply with IS plug connectors.

INFORMATION

When the **terminal box is in the 90° (B) position**, check whether the gearmotor has to be supported.

Software support

Not all cable entry positions X, 1, 2, 3 and terminal box positions 0°(R), 90°(B), 180°(L), 270°(T) are possible in all cases. Some additional features for the motor require a connection inside the terminal box, which means this terminal box is larger than the standard terminal box due to the normative air gaps and creepage distances. The dimension sheets only depict the standard terminal box.

Dimensions not listed in the dimension sheets can be determined via the relevant CAD data on the SEW-EURODRIVE website.

5.2.3 Sample orders

Type (examples)	Mounting position	Shaft position	Flange position	Terminal box position	Position of cable entry	Direction of rotation of output
K47DRK71M4/RS	M2	A	–	0°	"X"	CW
SF77DRS90L4	M6	AB	AB	90°	"3"	-
KA97DRE132M4	M4	B	–	270°	"2"	-
KH107DRN160M4	M1	A	–	180°	"3"	-
KAF67A	M3	A	B	–	–	–

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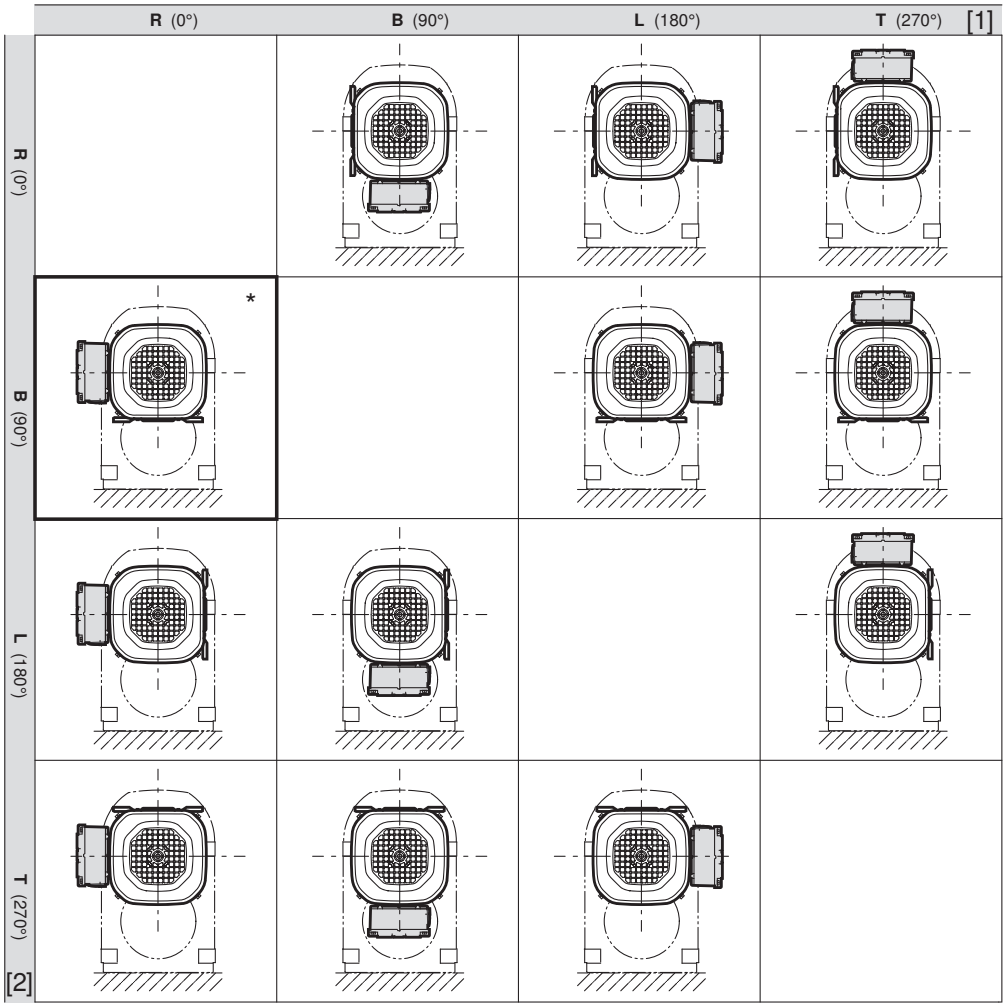
5.2.4 Position motor terminal box and foot for gearmotors with motor option /FM

With gearmotors, the motor is designed as flange-mounted motor for gear unit mounting. It is also possible to provide the motor with feet that can be used for customer components. The load values of the feet are available from SEW-EURODRIVE on request. The position of the foot must be specified in the order.

The following figure shows the possible positions of the terminal box and the feet for gearmotors with motor option /FM.



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[1] Terminal box positions [2] Foot positions

*) If not specified otherwise in the order, the gearmotor is delivered with foot position B (90°) and terminal box position R (0°).

INFORMATION

The foot on the motor is not suited to attach a complete gearmotor.

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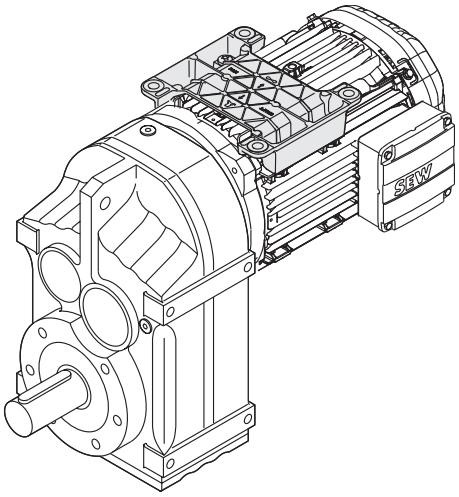
Example: F87DRN100L4/FM:



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Order information on mounting position of the complete drive, foot positions, terminal box and cable entry:

Mounting position complete drive:	M1
Terminal box position:	R (0°)
Cable entry:	X
Foot position:	T (270°)

5.2.5 Change of 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: If you wish to switch to mounting position M5 or M6, regardless of the original mounting position, please consult SEW-EURODRIVE
- For helical-worm gearmotors: Contact SEW-EURODRIVE when changing to mounting position M2 or M3.

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5.3 Key to the mounting position sheets

INFORMATION

The positions of the breather valve, oil level plug and oil drain plug specified in the mounting position sheets are binding and correspond to the assembly specifications.

INFORMATION

SPIROPLAN® are position-independent, with the exception of 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.

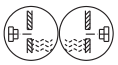
INFORMATION

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.

5.3.1 Symbols used

The following table shows the symbols used in the mounting position sheets and what they mean:

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

1) Does not apply to the 1st gear unit (large gear unit) of multi-stage drives.

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5.3.2 Churning losses

*(→ 🗎 XY)

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

Mounting position	Gear unit type	Gear unit size	Input speed rpm
M2, M4	R	97 ... 107	> 2500
		> 107	>1500
M2, M3, M4, M5, M6	F	97 ... 107	> 2500
		> 107	> 1500
	K	77 ... 107	> 2500
		> 107	> 1500
	S	77 ... 97	> 2500

5.3.3 Displayed shaft

Observe the following information regarding the display of shafts on the mounting position sheets:

INFORMATION

For gear units with solid shaft: The displayed shaft is always on the A-side.

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-side.

5.3.4 Position of breather valve/oil drain plug in motor flange

As shown in the mounting position sheets in chapter "Helical gearmotors mounting positions" (→ 🗎 65) and the following, the position of the breather valve and oil drain plug depend on the gearmotor mounting position.

The following table shows the position of the breather valve and the oil drain plug depending on the mounting position:

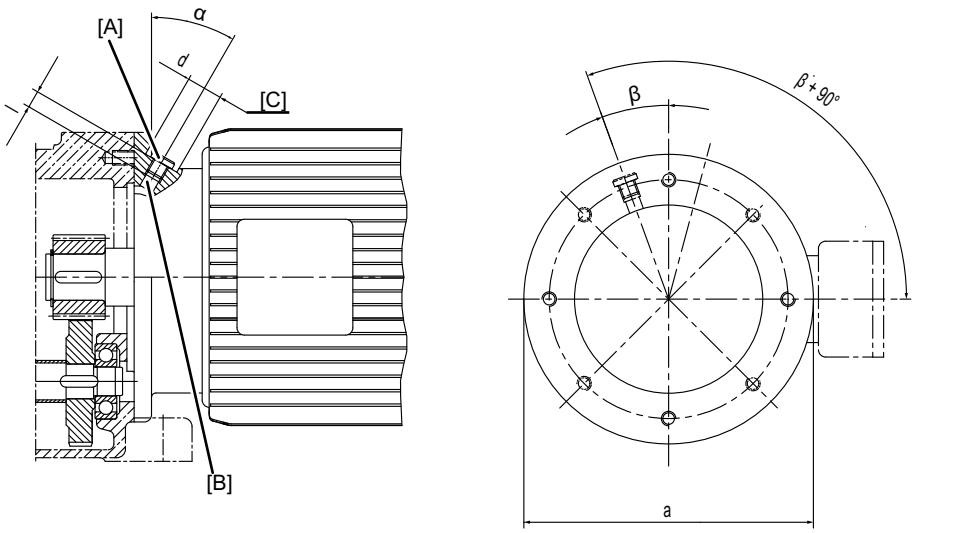
Mounting position	Breather valve position	Oil drain plug position
M1, M3, M5, M6	In the gear unit housing	In the gear unit housing
M4	**In the motor flange**	In the gear unit housing
M2	In the gear unit housing	**In the motor flange**

If the breather valve (M4 mounting position) or the oil drain plug (M2 mounting position) is positioned in the motor flange, the position depends on the terminal box position.

INFORMATION

The positions of the breather valve/oil drain plug in the mounting position sheets in chapter "Helical gearmotors mounting positions" (→ 🗎 65) and the following chapters always refers to the standard terminal box position 0°. Note that the position of the breather valve / oil drain plug is changed depending on the possible terminal box positions (90°, 180°, 270°).

The following illustration shows the exact position of the breather valve / oil drain plug in the motor flange.



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[A] Position of breather valve / oil drain plug
[B] Continuous core drilling
[C] Counterbored bore
[α] Drill angle
[d] Diameter of the countersinking
[l] Thread length
[a] Flange diameter
[β] Position angle

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Dimension tables

The following tables contain the dimensions regarding the position of the breather valve and the oil drain plug depending on the motor size.

DR.. motor type	a in mm	α in °	β in °	Thread designation	Ø d in mm	l in mm
DR63	120	30	45	M10x1	15	10
	160		22.5			
	200			M12×1.5	18	12
DR..71	120	0	45	M10×1.5	15	10
	160	30	22.5			
	200			M12×1.5	18	12
	250					
	300	90		M22×1.5	28	14

DRN80 – 132 motor type	a in mm	α in °	β in °	Thread designation	Ø d in mm	l in mm
DRN80	120	30	22.5	M10×1.5	15	10
	160					
	200			M12×1.5	18	12
	250					
	300	90		M22×1.5	28	14
DRN90	120	30	22.5	M10×1.5	15	12
	160					
	200			M12×1.5	15	16
	250				18	12
	300			M22×1.5	28	
DRN100	120	30	22.5	M10×1.5	15	10
	160					12
	200			M12×1.5	18	
	250					
	300			M22×1.5	28	14
	350					
DRN112M DRN132S	160	30	22.5	M10×1.5	15	10
	200			M12×1.5	18	12
	250					
	300			M22×1.5	28	14
	350					
	400	45				10
	450			M33x2	40	16
DRN132M/L	160	30	22.5	M10×1.5	15	10
	200	15		M12×1.5	18	14
	250	30				
	300			M22×1.5	28	12
	350					14
	400					13
	450	75		M33x2	40	16
	550	90		M42x2	50	18

DRN160 – 315 motor type	a in mm	α in °	β in °	Thread designation	Ø d in mm	l in mm
DRN160	200	30	22.5	M10×1.5	15	17
	250			M12×1.5	18	15
	300			M22×1.5	28	12
	350					
	400					16
	450			M33x2	40	
	550	90		M42x2	50	

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DRN160 – 315 motor type	a in mm	α in °	β in °	Thread designation	Ø d in mm	l in mm
DRN180	250	30	22.5	M12×1.5	18	15
	300			M22×1.5	28	
	350					
	400					16
	450			M33x2	40	
	550	90		M42x2	50	17
DRN200	250	30	22.5	M12×1.5	18	15
	300			M22×1.5	28	
	350					14
	400					16
	450			M33x2	40	
	550			M42x2	50	19
DRN225	300	30	22.5	M22×1.5	28	15
	350					14
	400					16
	450			M33x2	40	17
	550			M42x2	50	29
DRN250 DRN280	350	15	22.5	M22×1.5	28	14
	400		21			
	450		22.5	M33x2	40	16
	550			M42x2	50	
DRN315	450	30	22.5	M33x2	40	30
	550		11.25	M42x2	50	20

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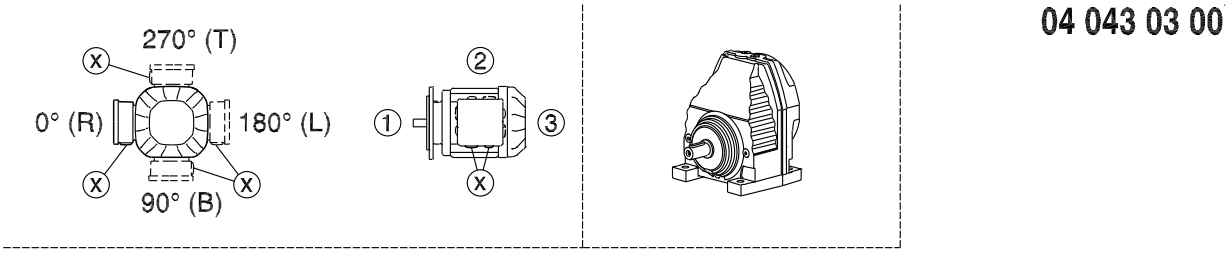
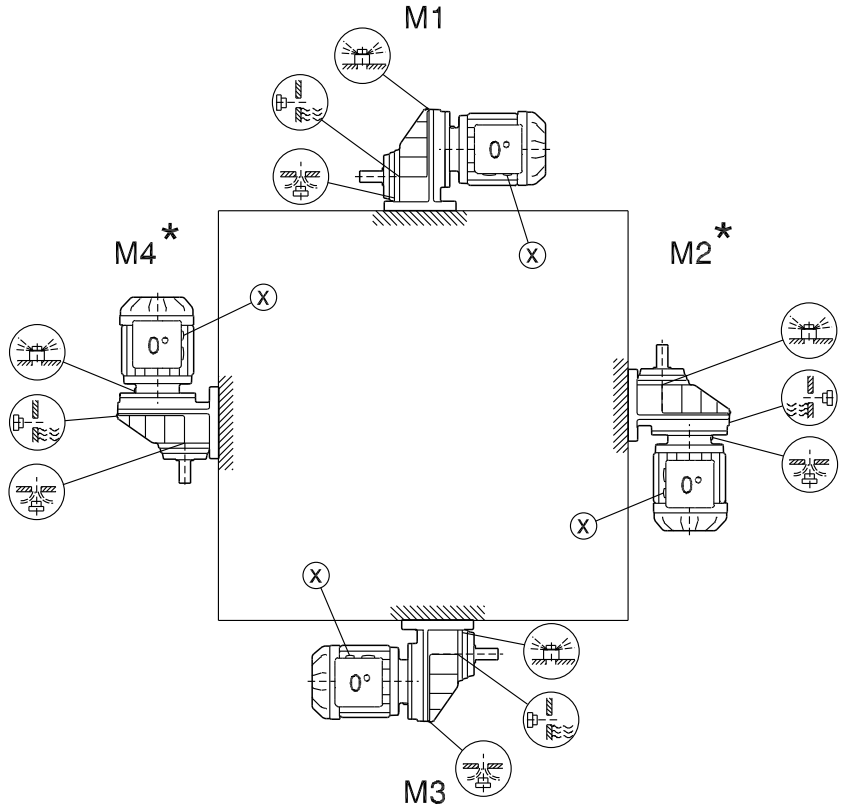
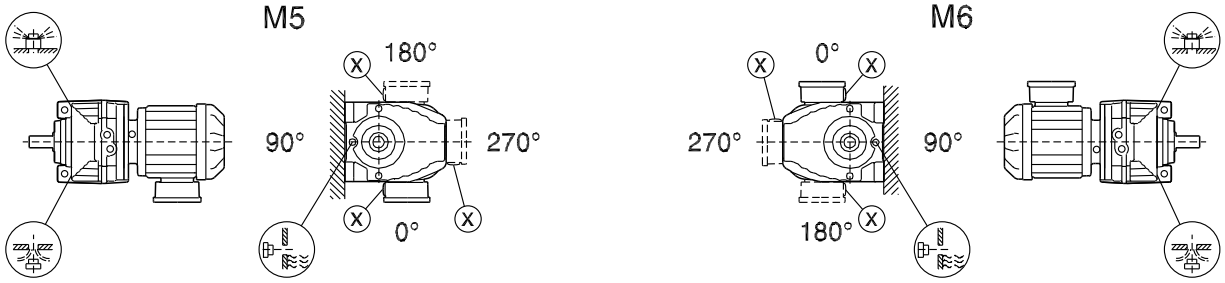
5.4 Mounting positions of helical gearmotors

5.4.1 RX57-RX107

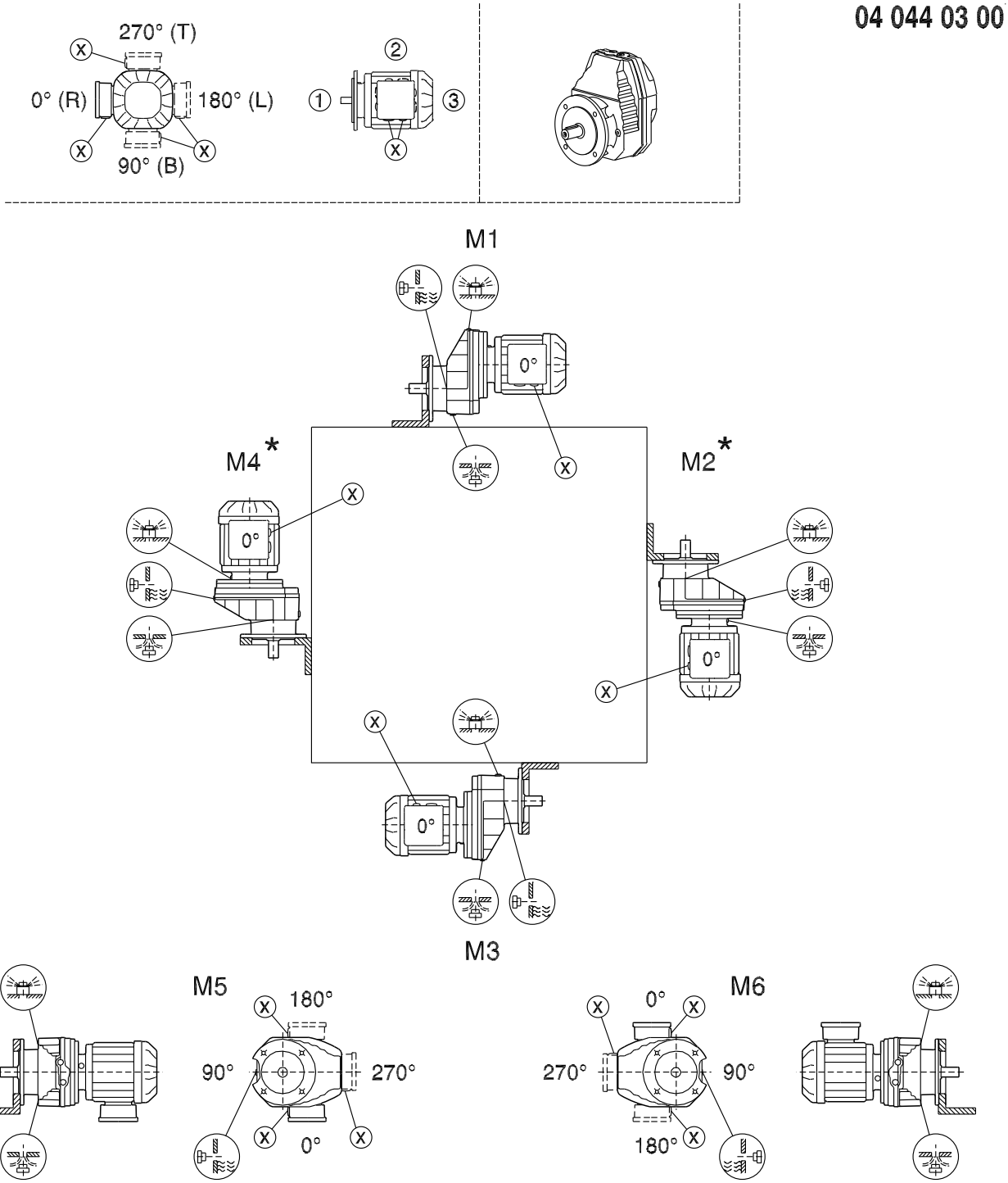






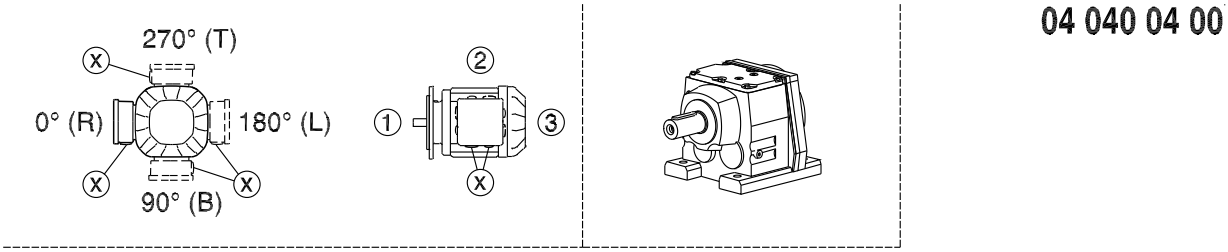
* (→ 61)

5.4.2 RXF57-RXF107



* (→ 🗎 61)

5.4.3 R07-R167



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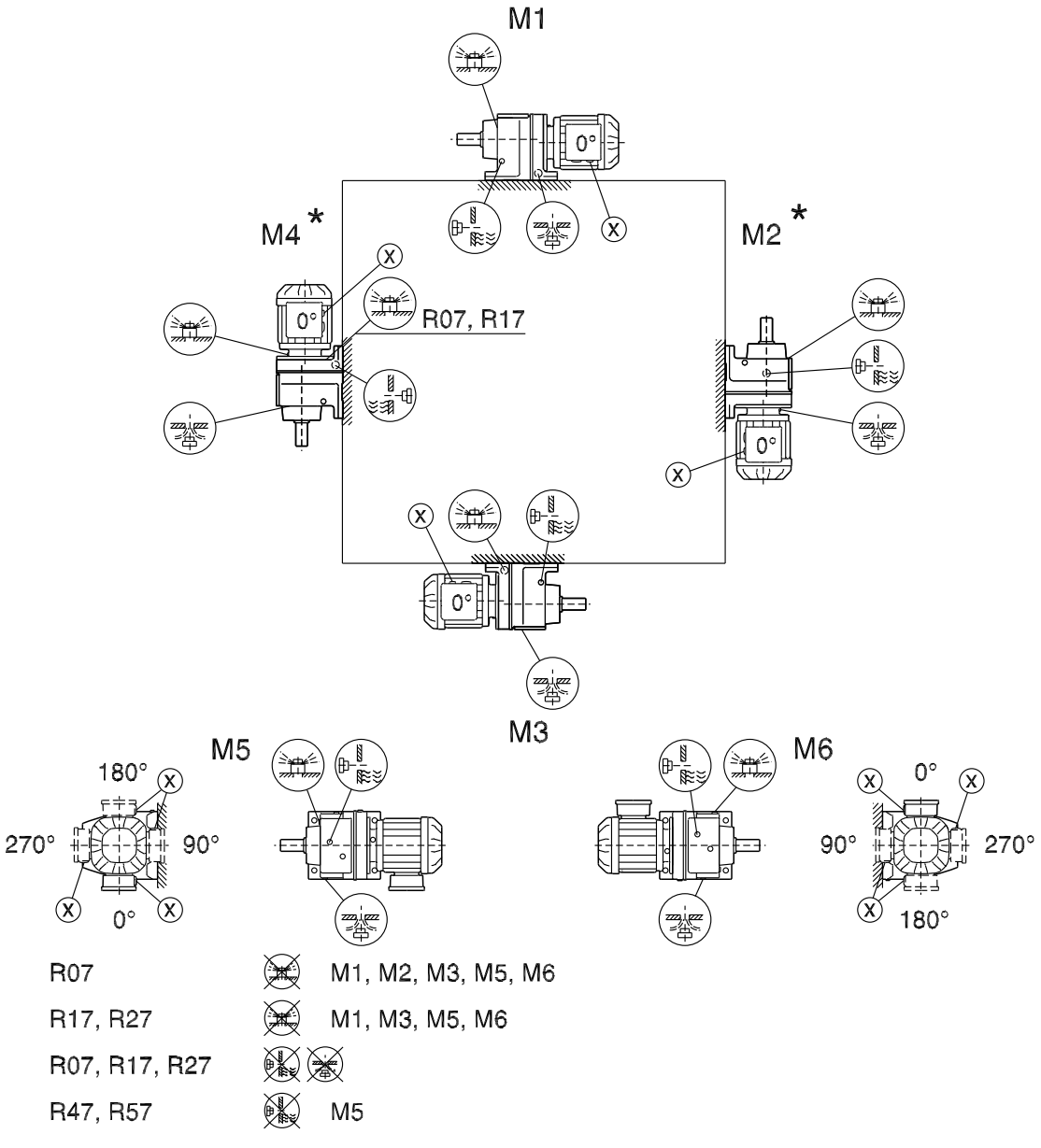
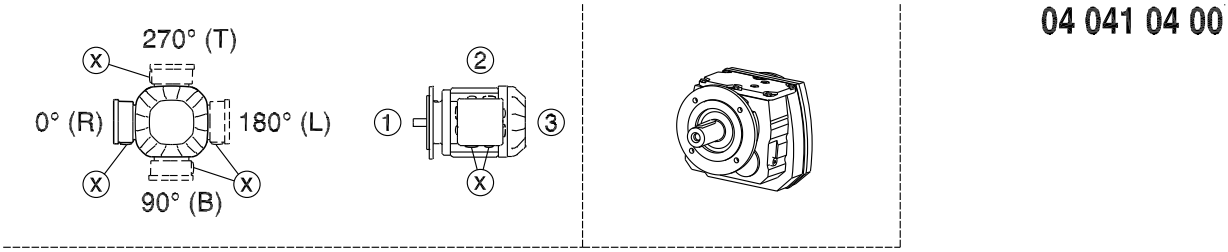
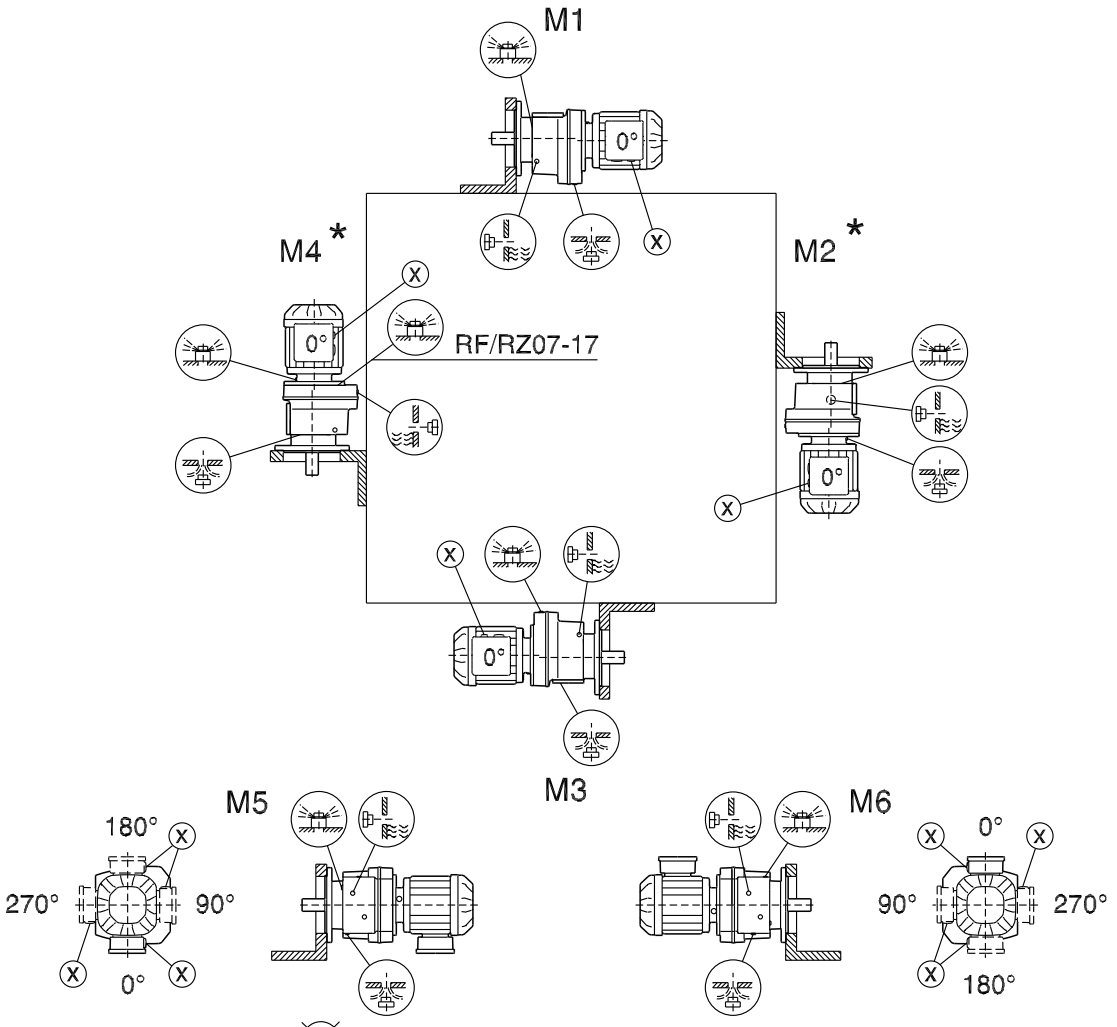


R07	⊗	M1, M2, M3, M5, M6
R17, R27	⊗	M1, M3, M5, M6
R07, R17, R27	⊗ ⊗	
R47, R57	⊗	M5

* (→ 🗎 61)

5.4.4 RF07-RF167, RZ07-RZ87





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

* (→ 61)

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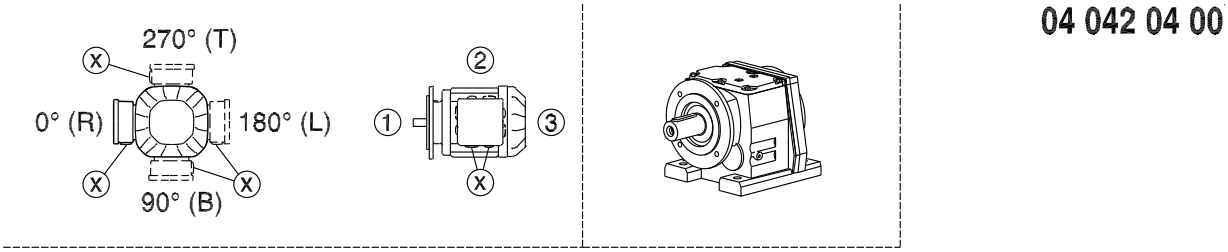
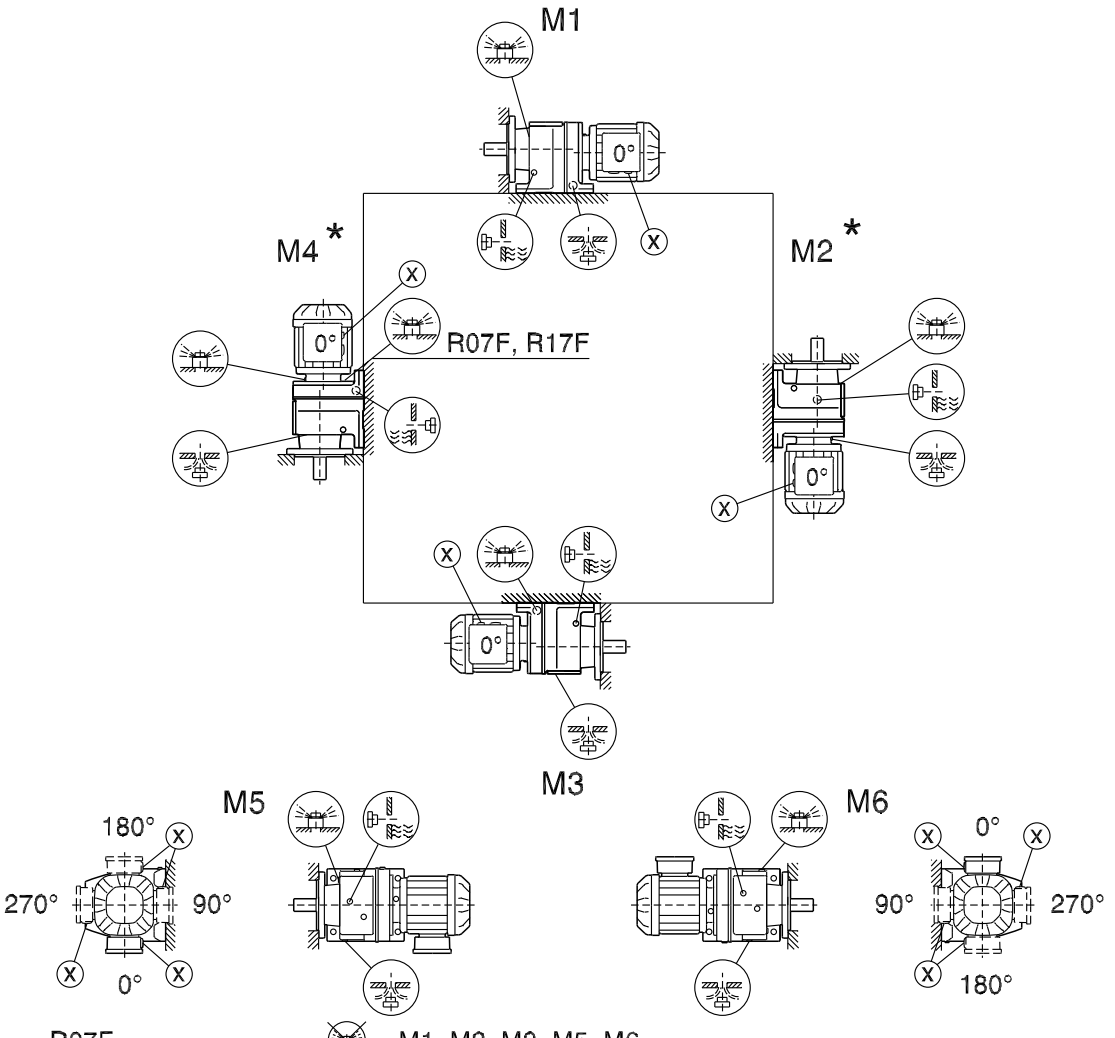
5.4.5 R07F-R87F





R07F	⊗	M1, M2, M3, M5, M6
R17F, R27F	⊗	M1, M3, M5, M6
R07F, R17F, R27F	⊗ ⊗	
R47F, R57F	⊗	M5

* (→ 🗎 61)

Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

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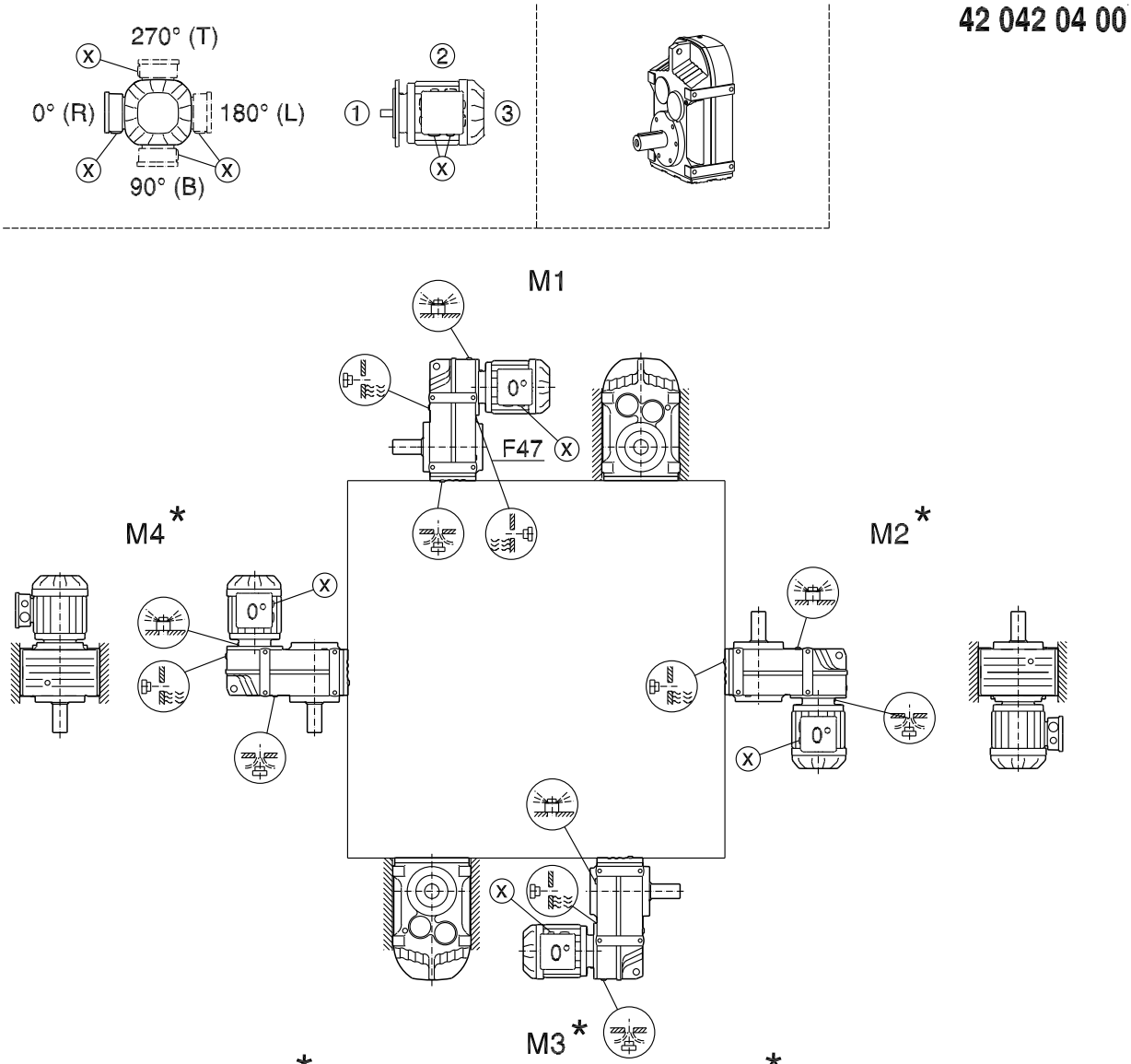
5.5 Mounting positions of parallel-shaft helical gearmotors

5.5.1 F/FA..B/FH27B-157B, FV27B-107B

42 042 04 00



F..27	⊗	M1, M3, M5, M6
F..27	⊗	M1 - M6
F..27	⊗	M1, M3, M5, M6

* (→ 🗎 61)

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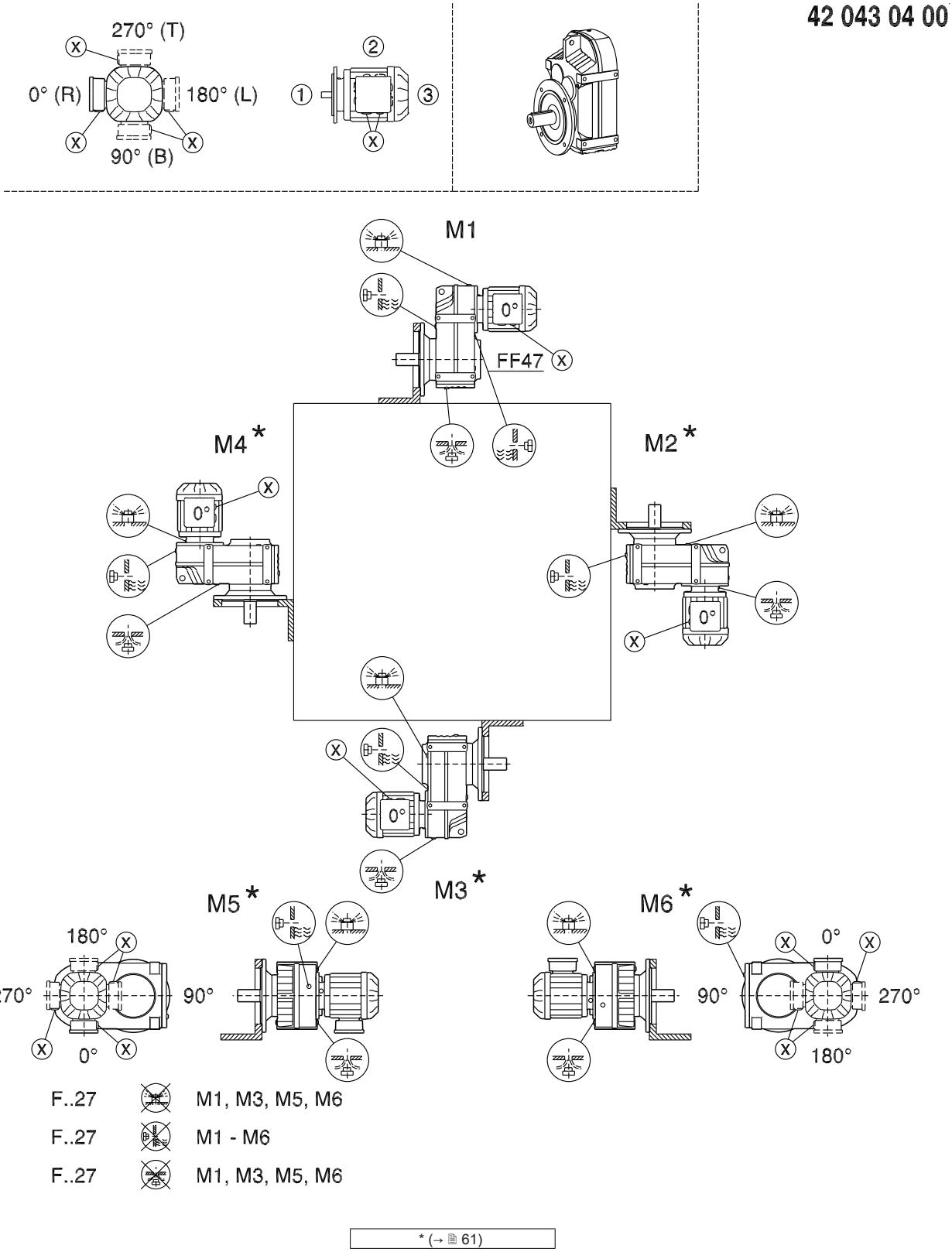
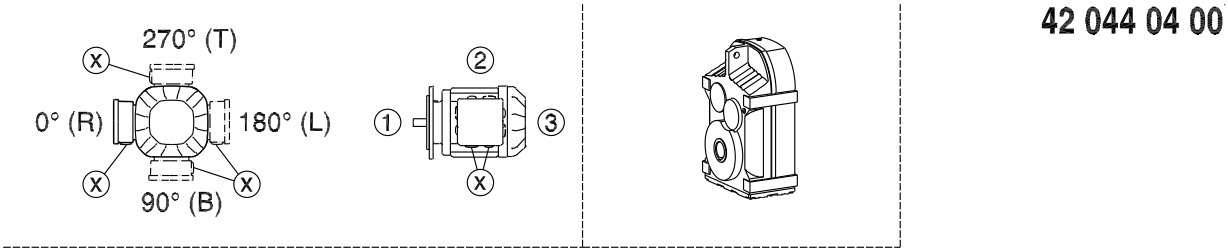
5.5.2 FF/FAF/FHF/FZ/FAZ/FHZ27-157, FVF/FVZ27-107



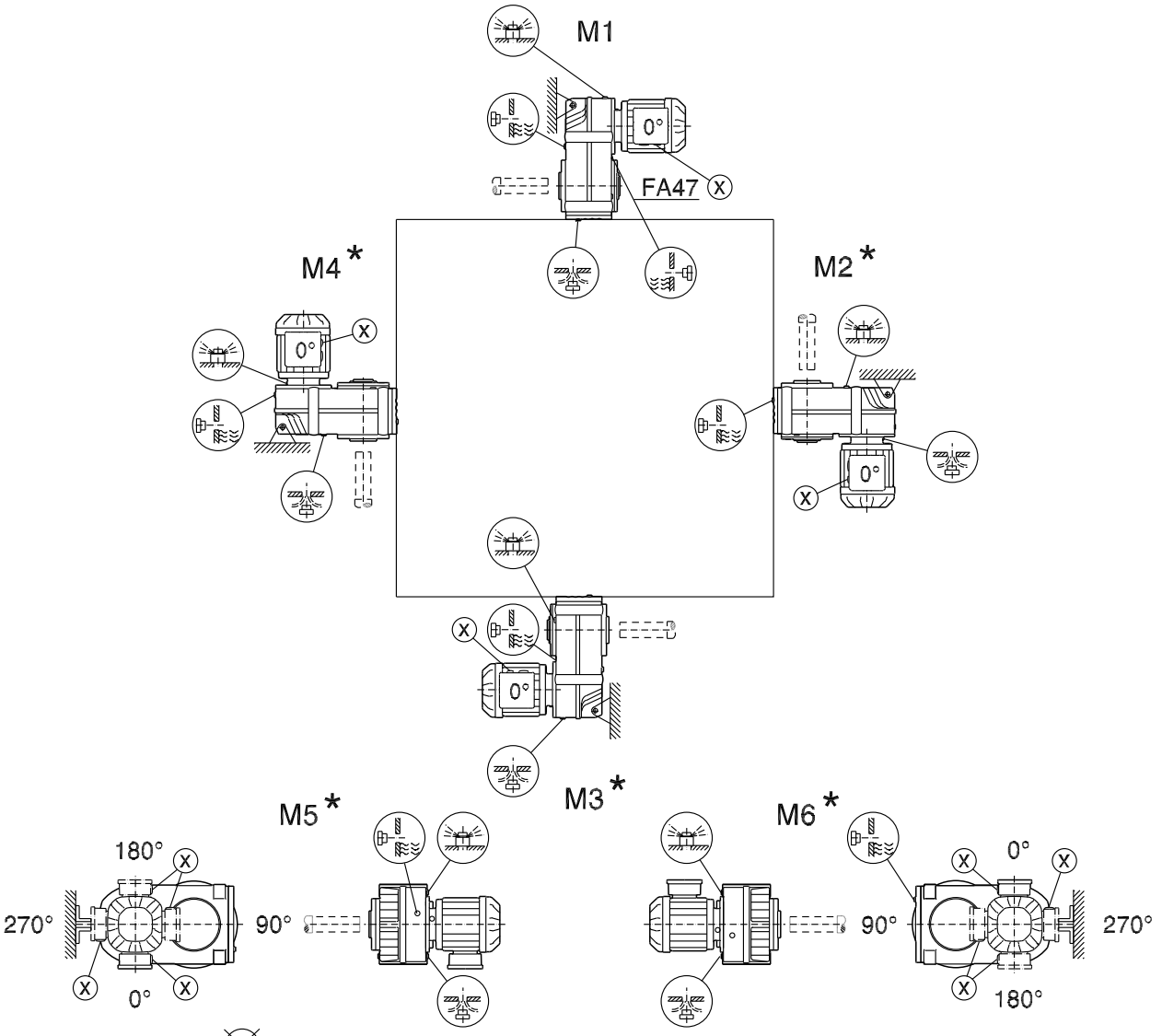
F..27		M1, M3, M5, M6
F..27		M1 - M6
F..27		M1, M3, M5, M6

* (→ 61)

5.5.3 FA/FH27-157, FV27-107, FT37-97



42 044 04 00



F..27		M1, M3, M5, M6
F..27		M1 - M6
F..27		M1, M3, M5, M6

* (→ 61)

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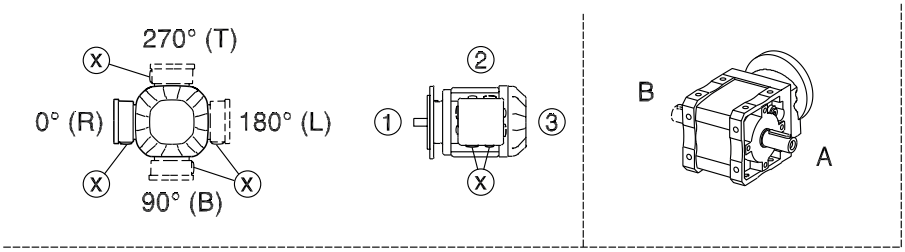
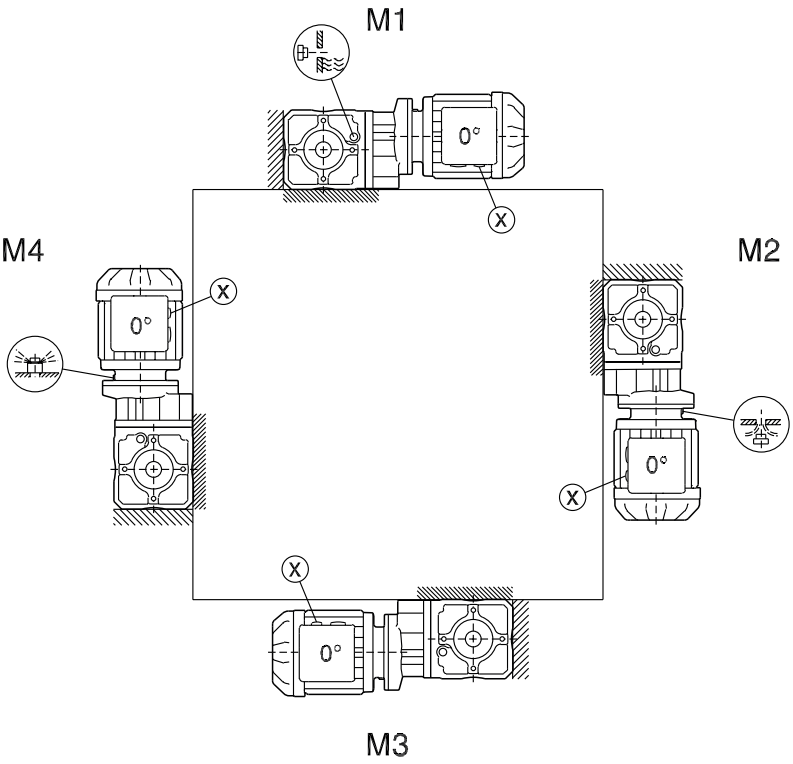
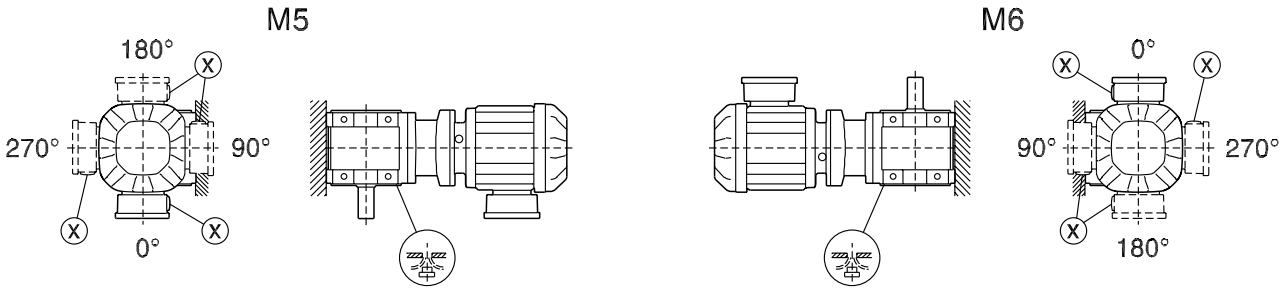
5.6 Mounting positions of helical-bevel gearmotors

5.6.1 K/KA..B/KH19B-29B

33 010 00 13

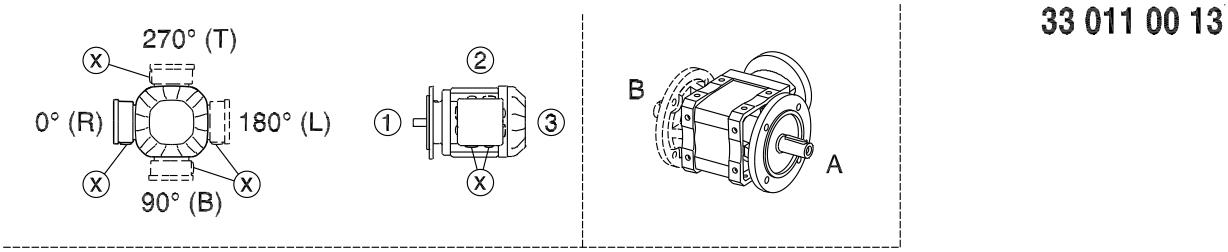


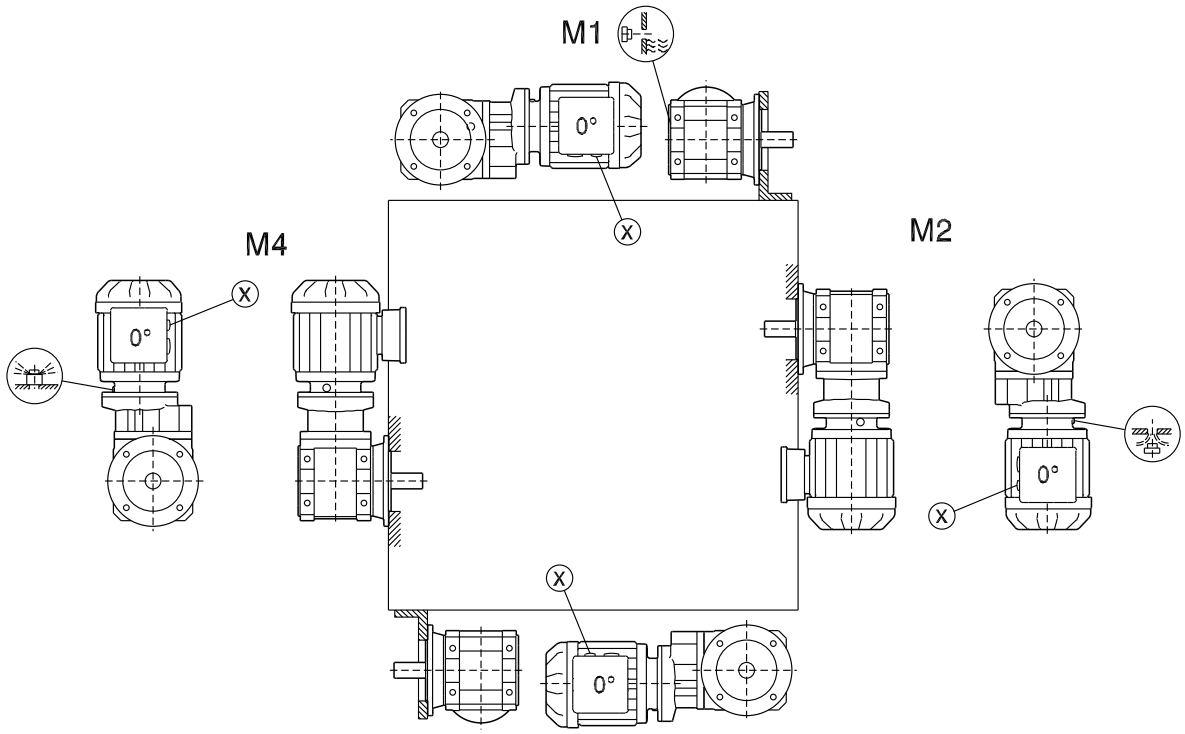


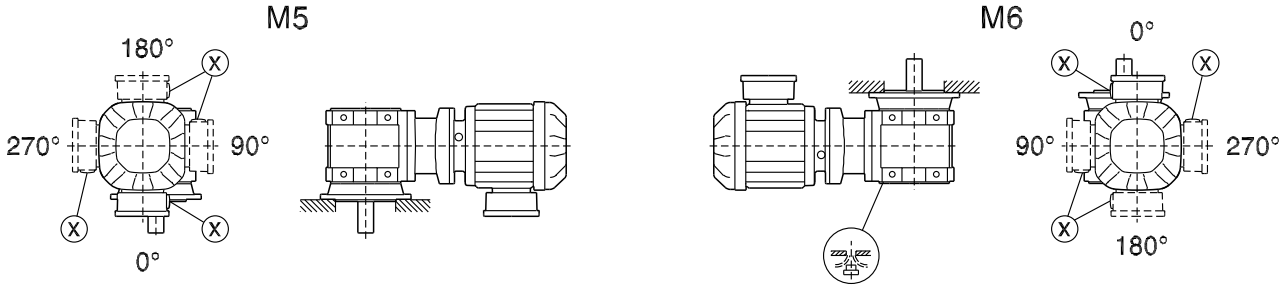


Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

5.6.2 KF..B/KAF..B/KHF19B-29B







Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

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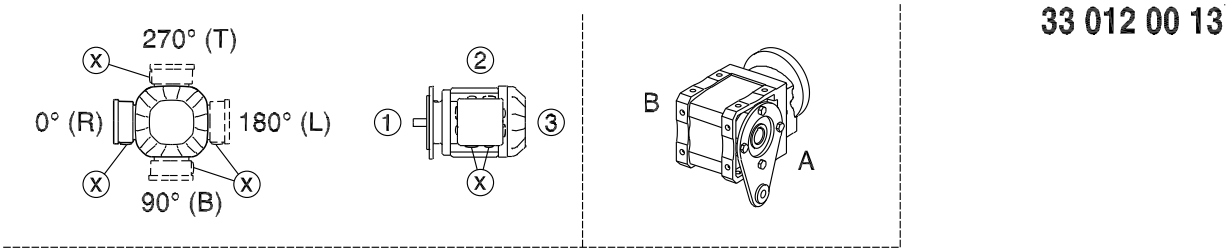
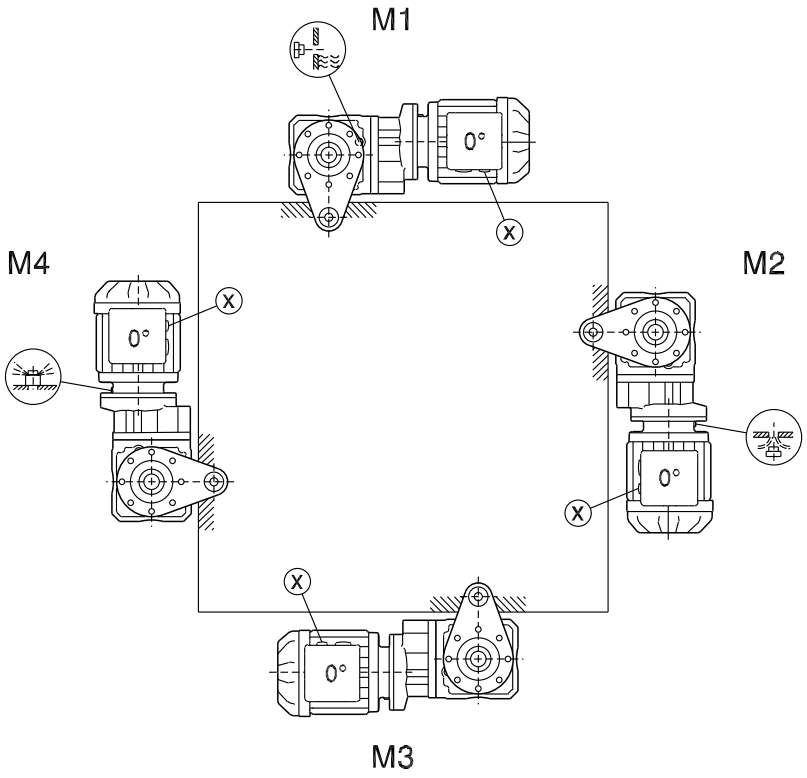
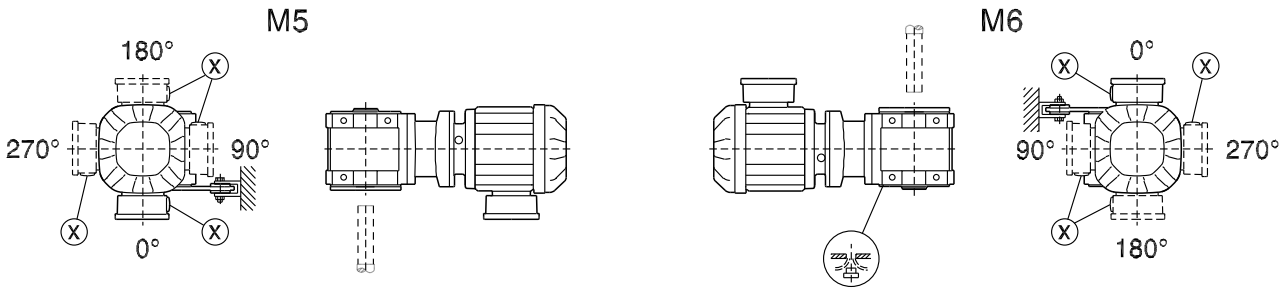
5.6.3 KA..B/KH19B-29B



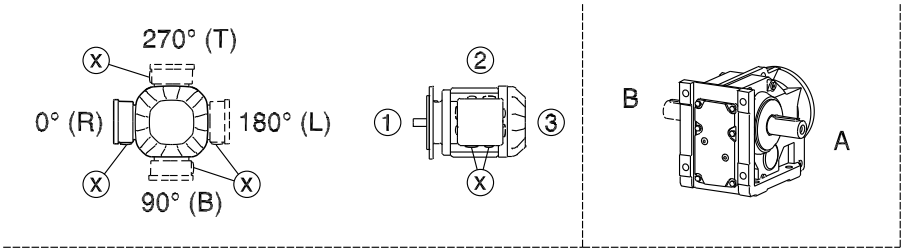


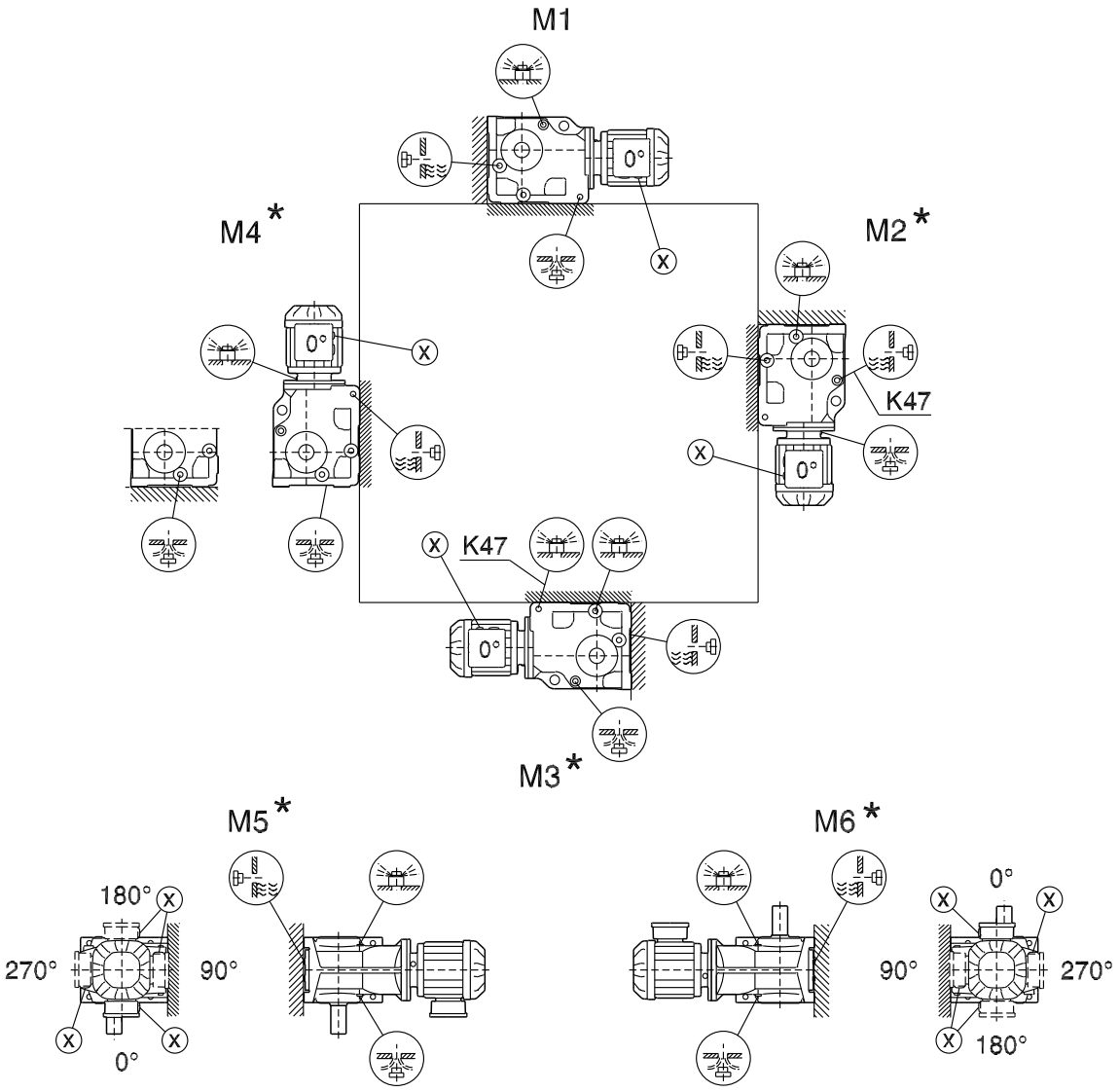


Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

5.6.4 K/KA..B/KH37B-157B, KV37B-107B

34 025 04 00





* (→ 🗎 61)

Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

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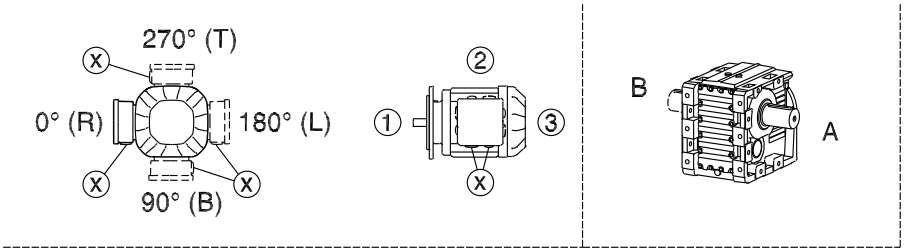
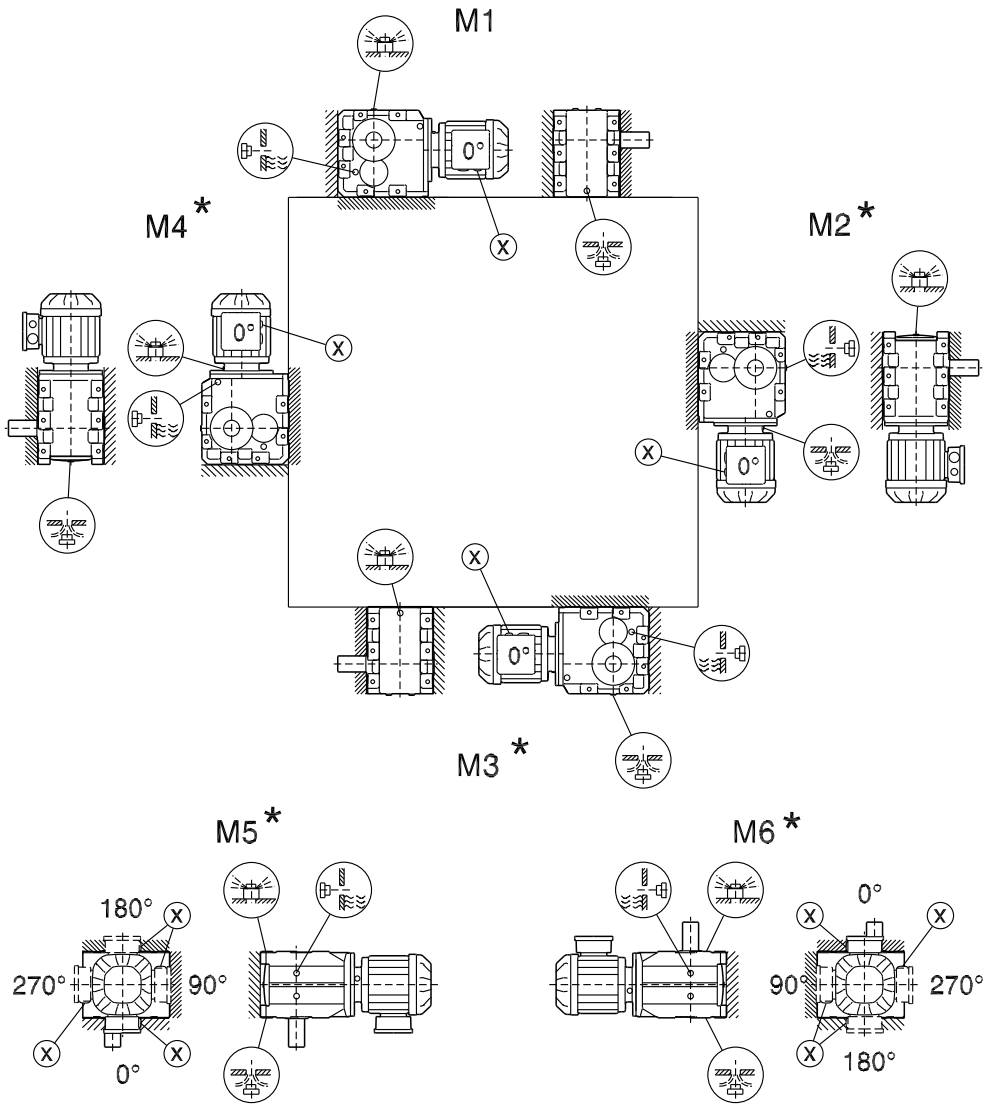
5.6.5 K167-187, KH167B-187B

34 026 04 00



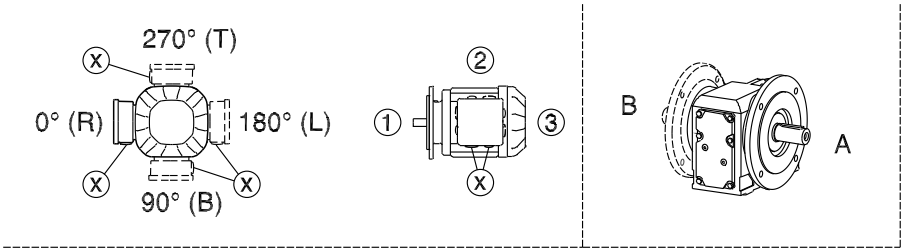


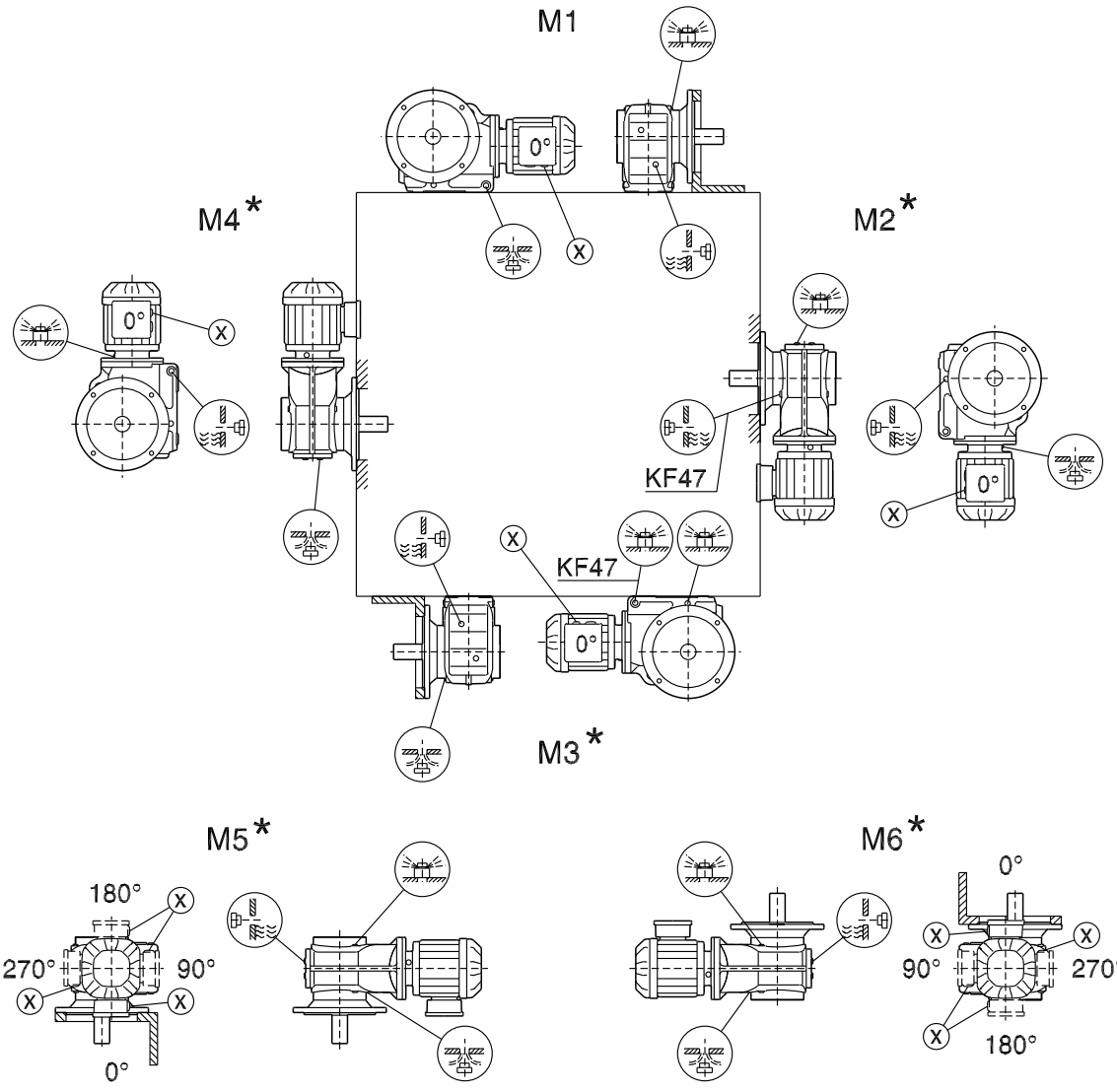
* (→ 🗎 61)

Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

5.6.6 KF/KAF/KHF/KZ/KAZ/KHZ37-157, KVF/KVZ37-107

34 027 04 00





* (→ 61)

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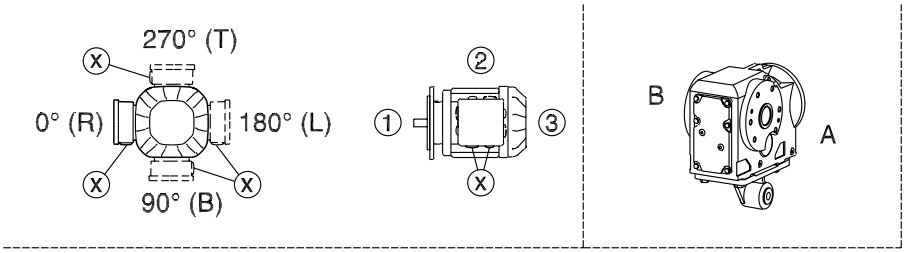
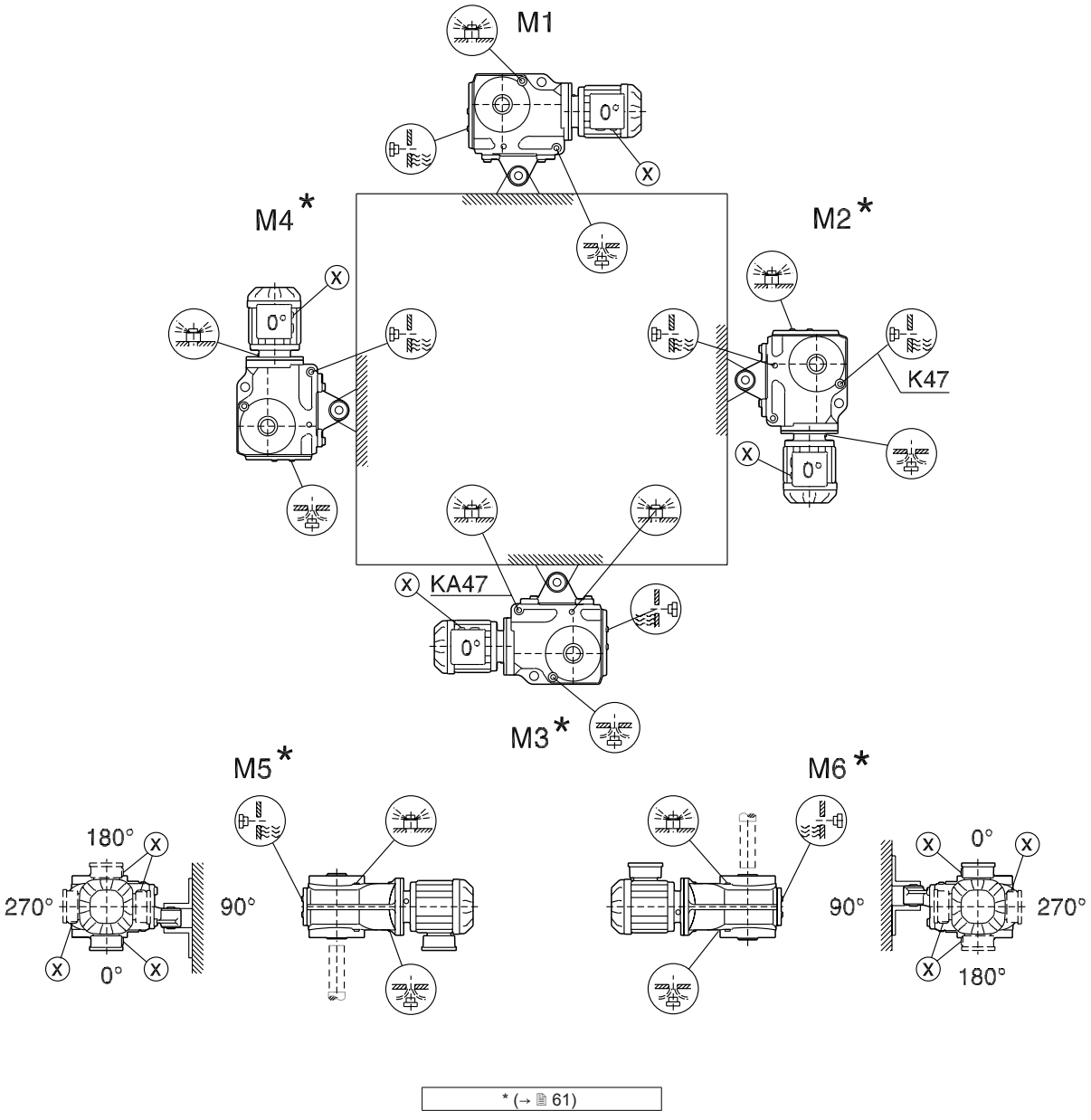
5.6.7 KA/KH37-157, KV37-107, KT37-97

39 025 05 00

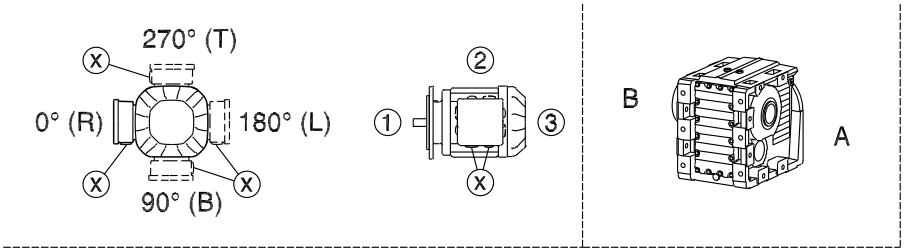


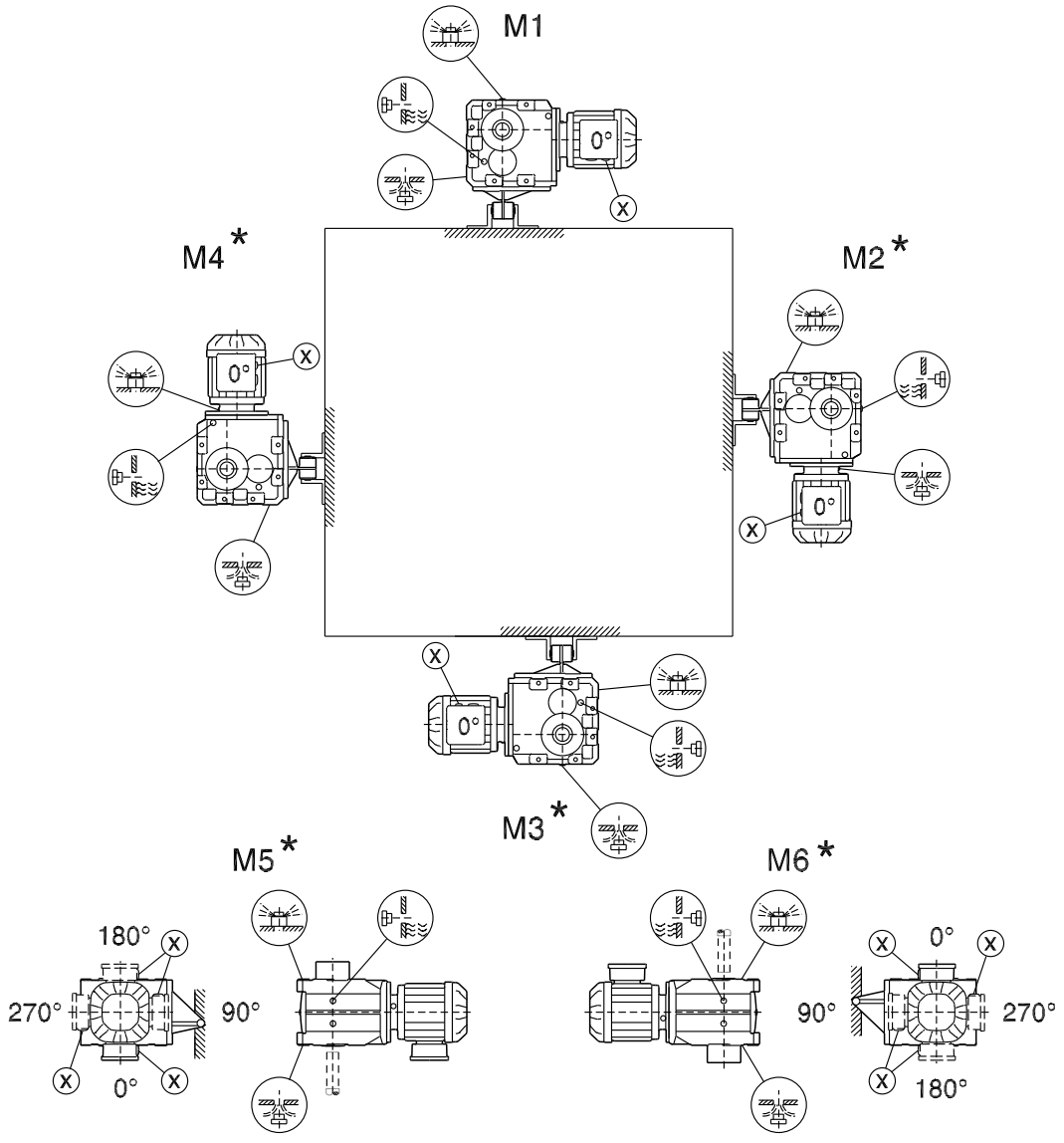


* (→ 🗎 61)

5.6.8 KH167-187

39 026 05 00





* (→ 🗎 61)

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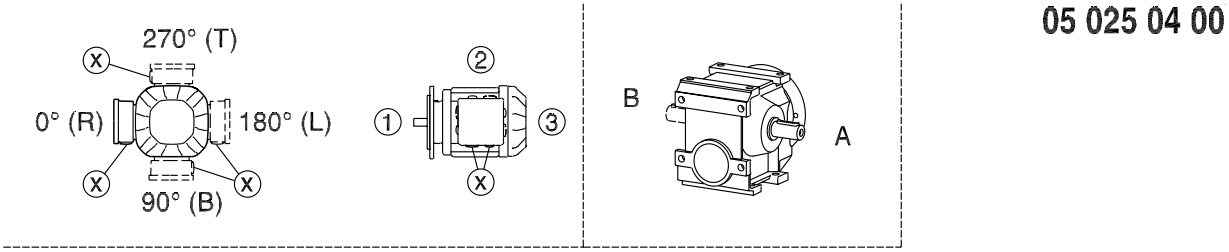
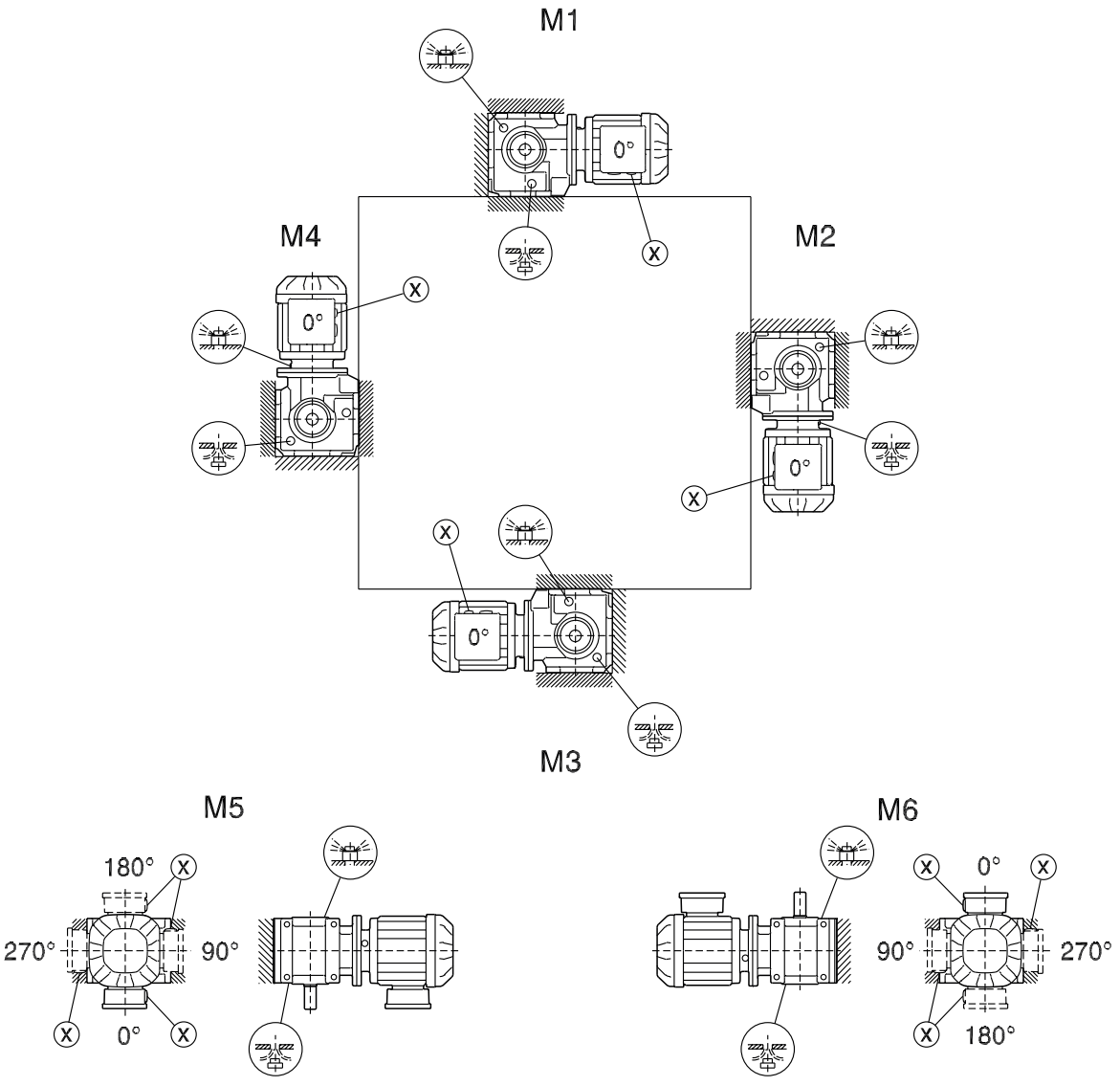
5.7 Mounting positions of helical-worm gearmotors

5.7.1 S37

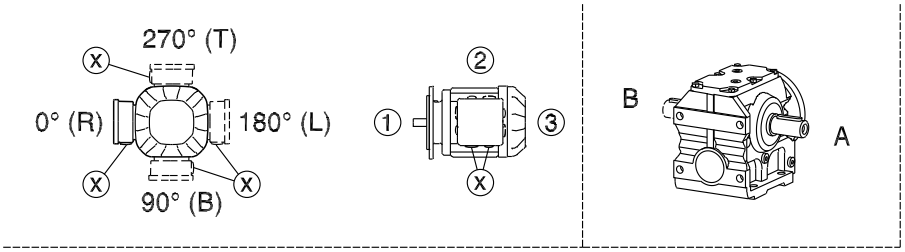


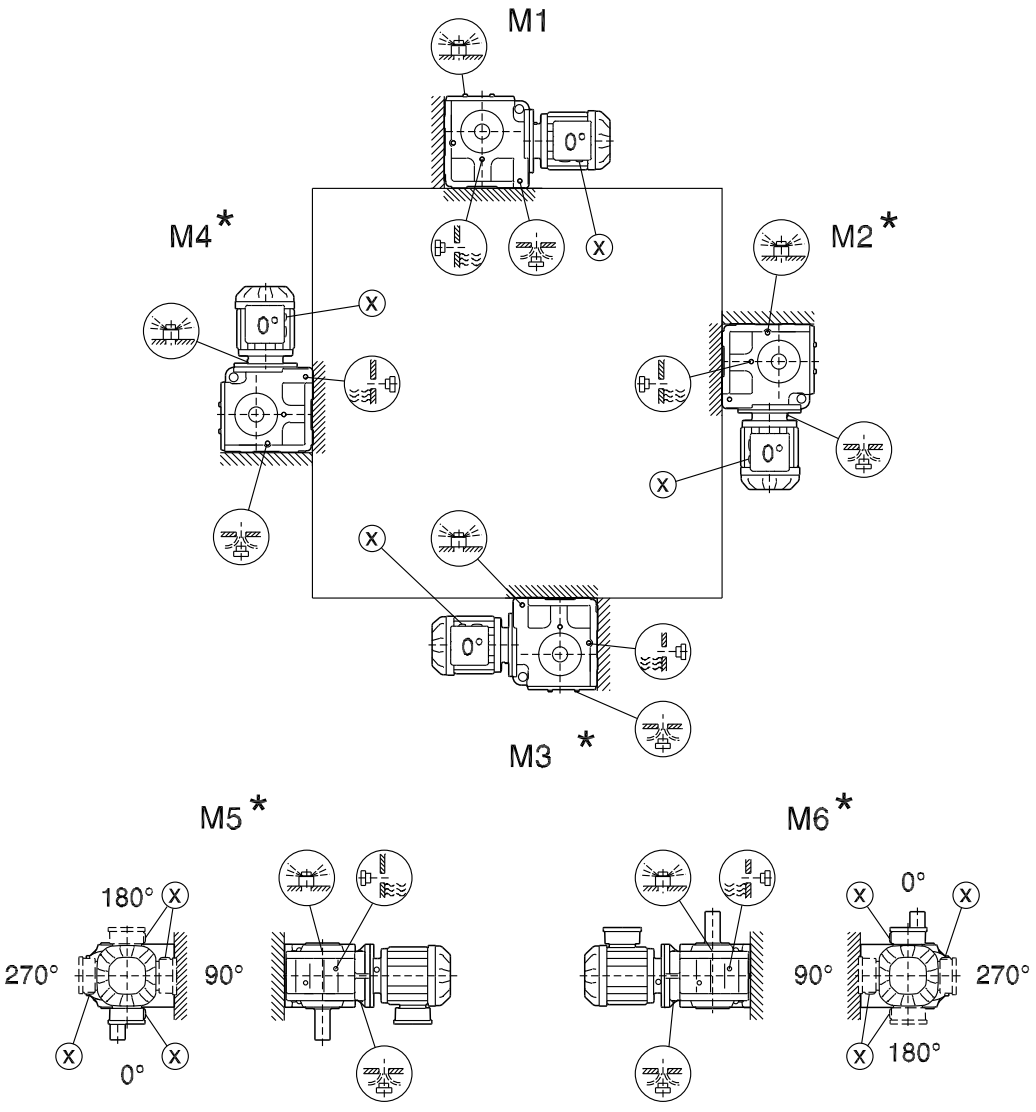


Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

5.7.2 S47-S97

05 026 04 00





* (→ 🗎 61)

Observe the notes in chapter "Project planning for gear units" / "Overhung and axial loads" (→ 🗎 45).

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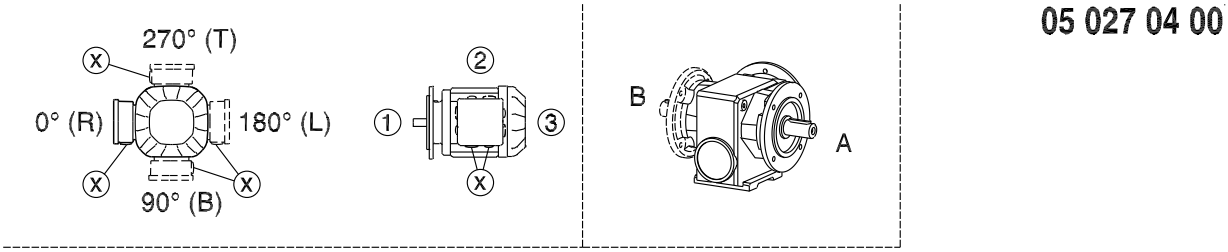
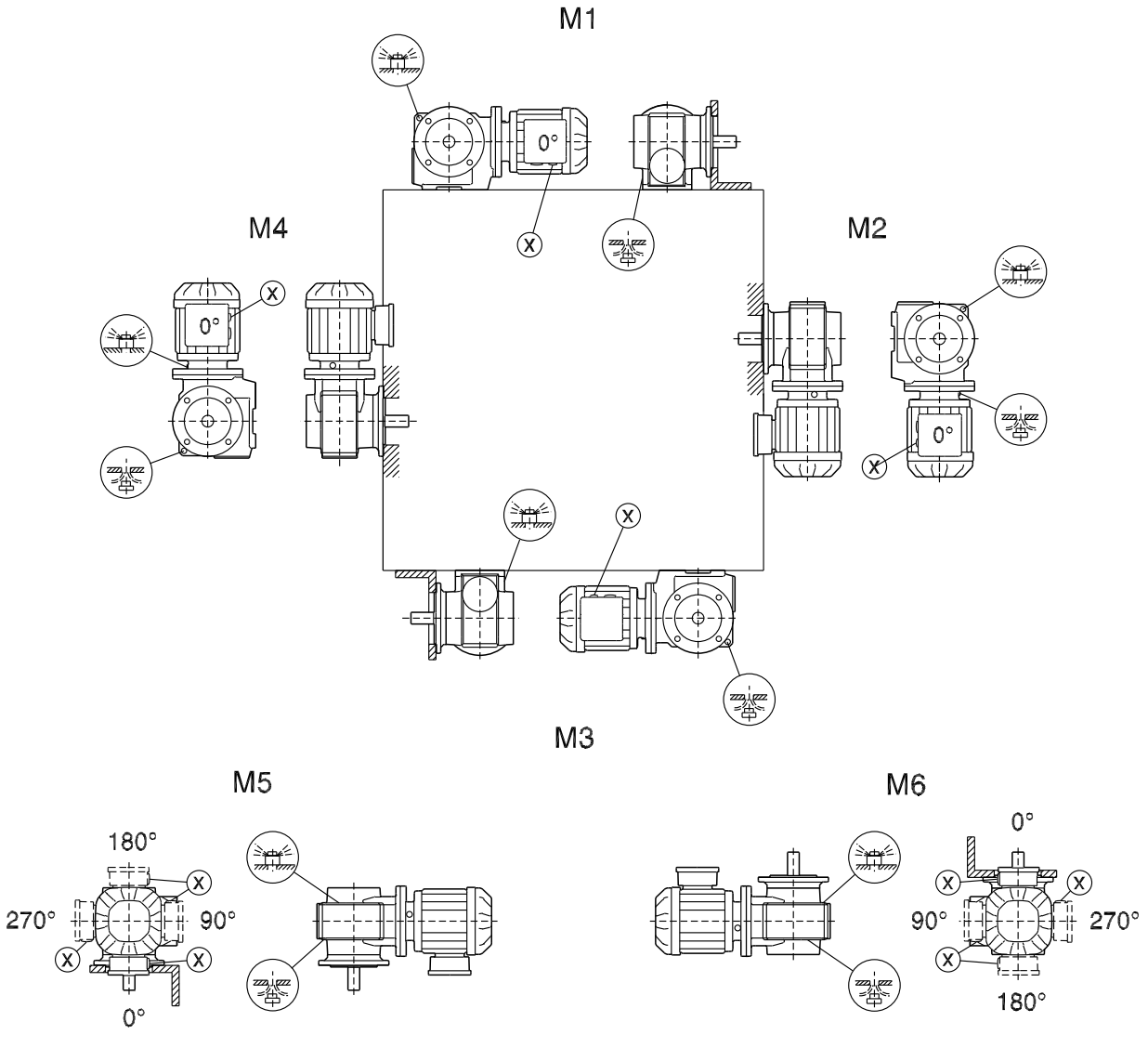
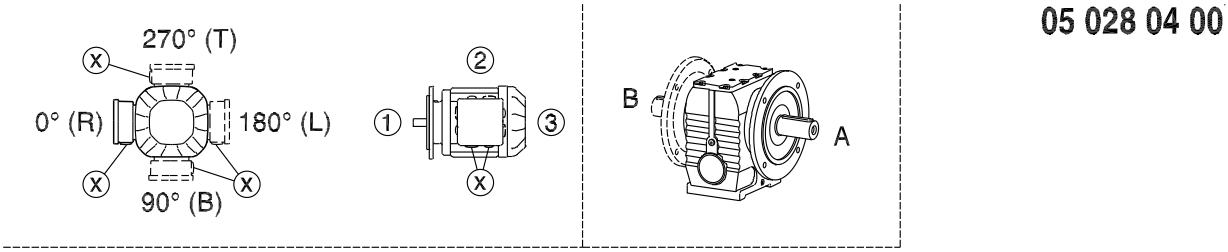
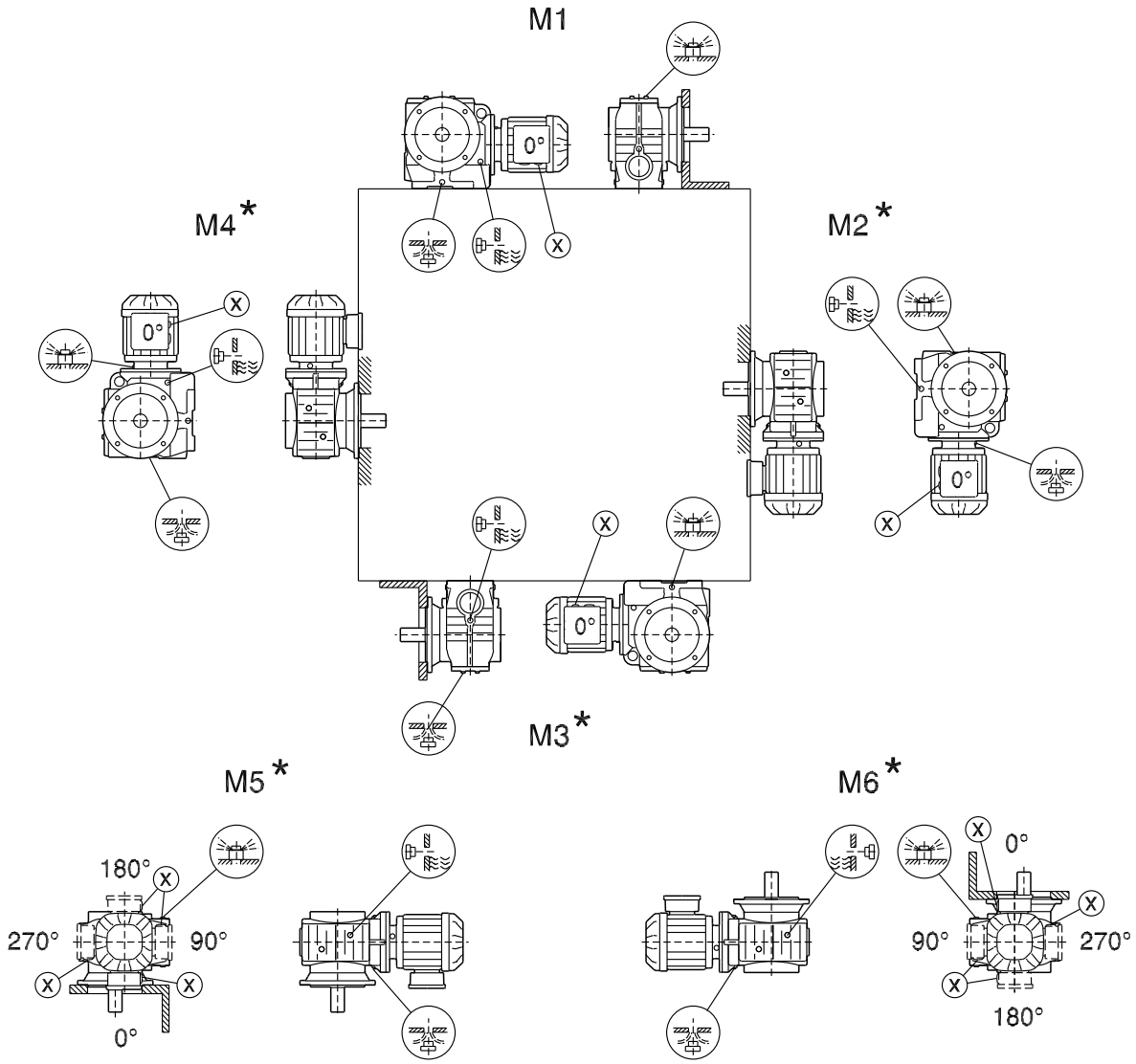
5.7.3 SF/SAF/SHF37





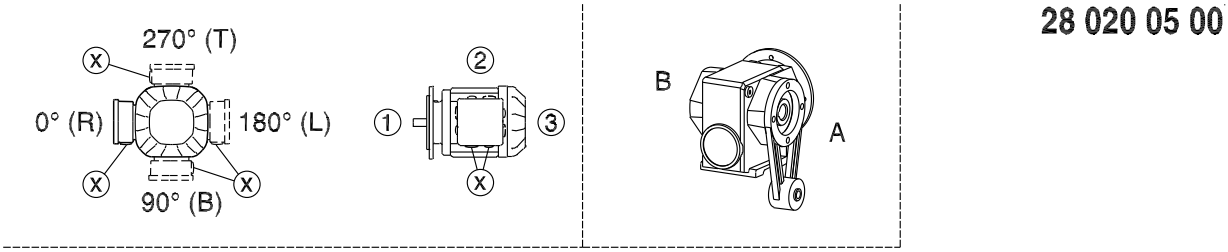
5.7.4 SF/SAF/SHF/SAZ/SHZ47-97

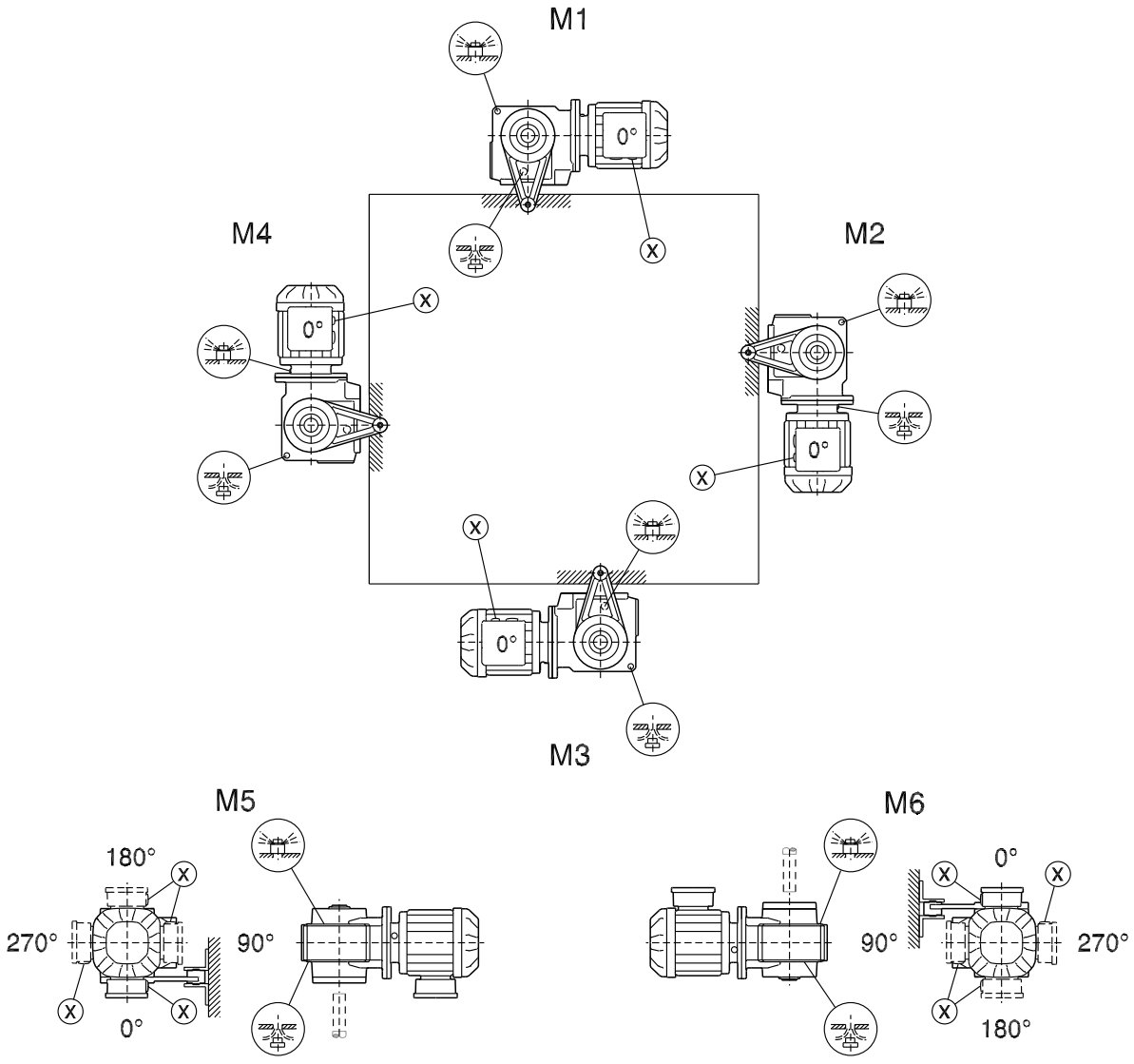




* (→ 🗎 61)

5.7.5 SA/SH/ST37





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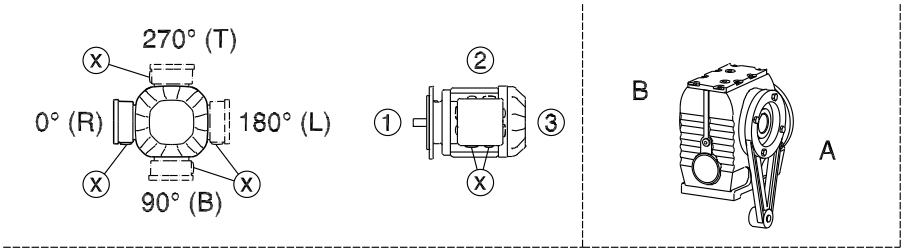
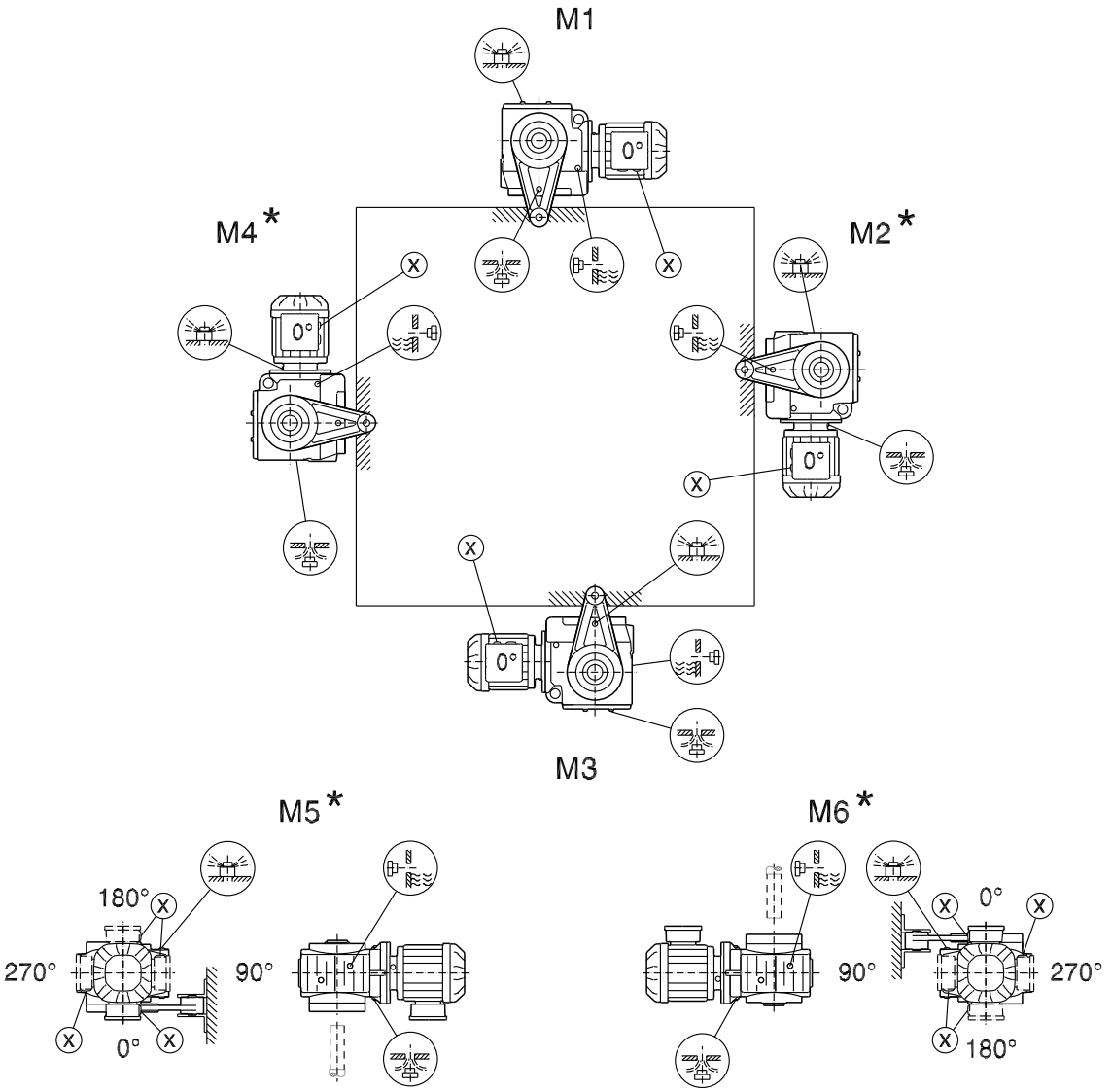
5.7.6 SA/SH/ST47-97

28 021 04 00

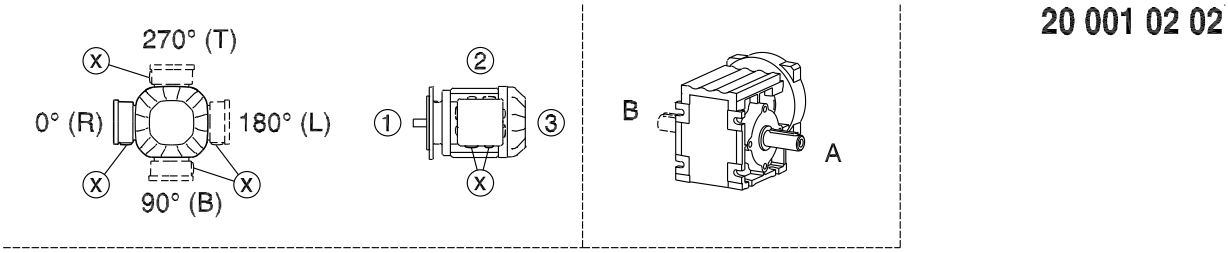




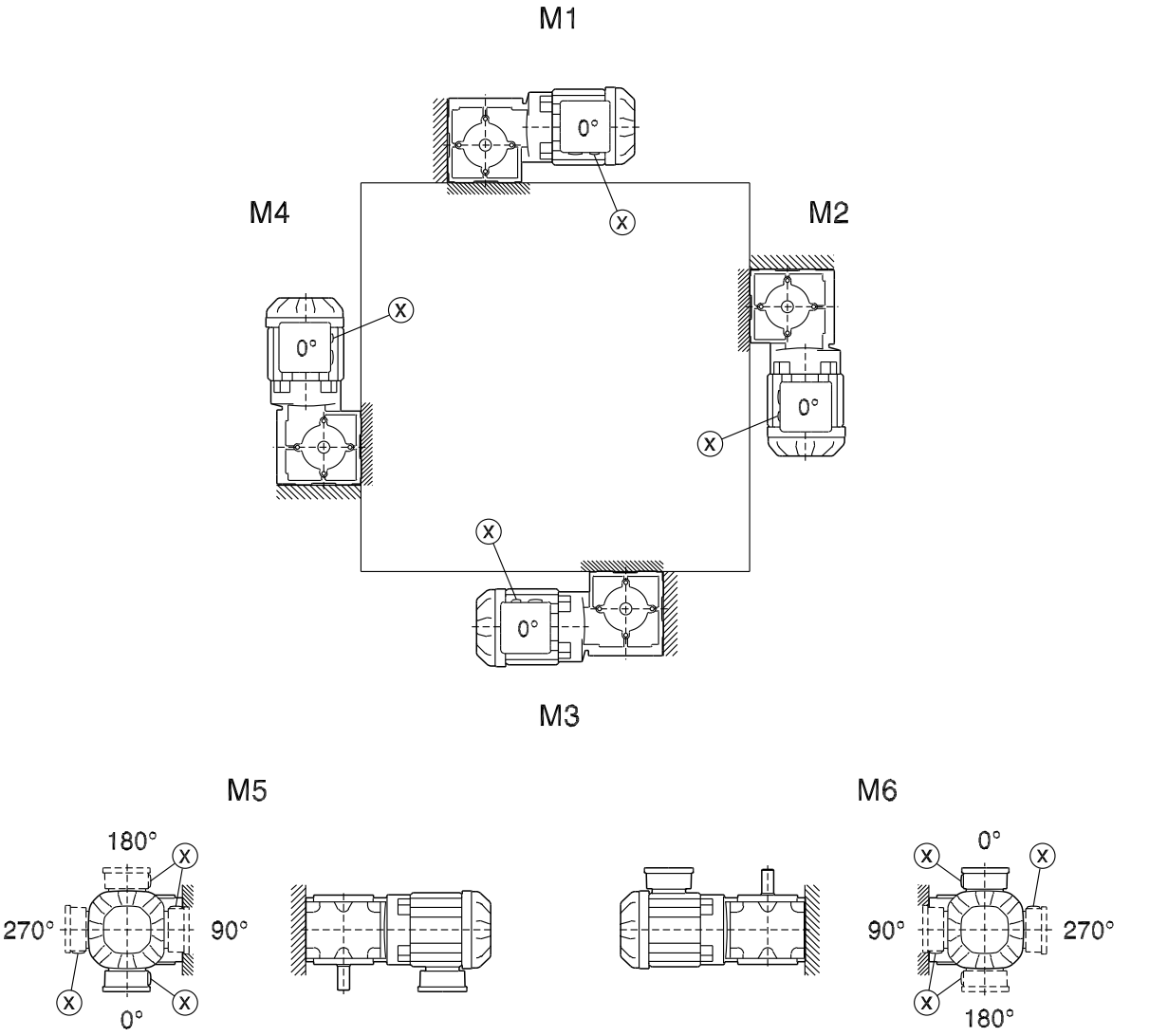
* (→ 61)

5.8 Mounting positions of SPIROPLAN® gearmotors

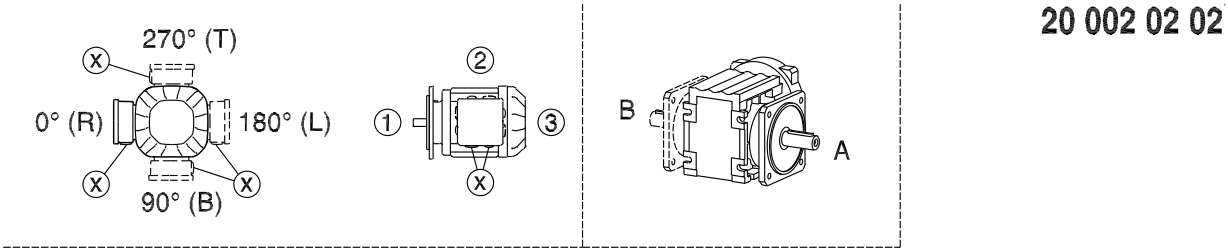
5.8.1 W10-30



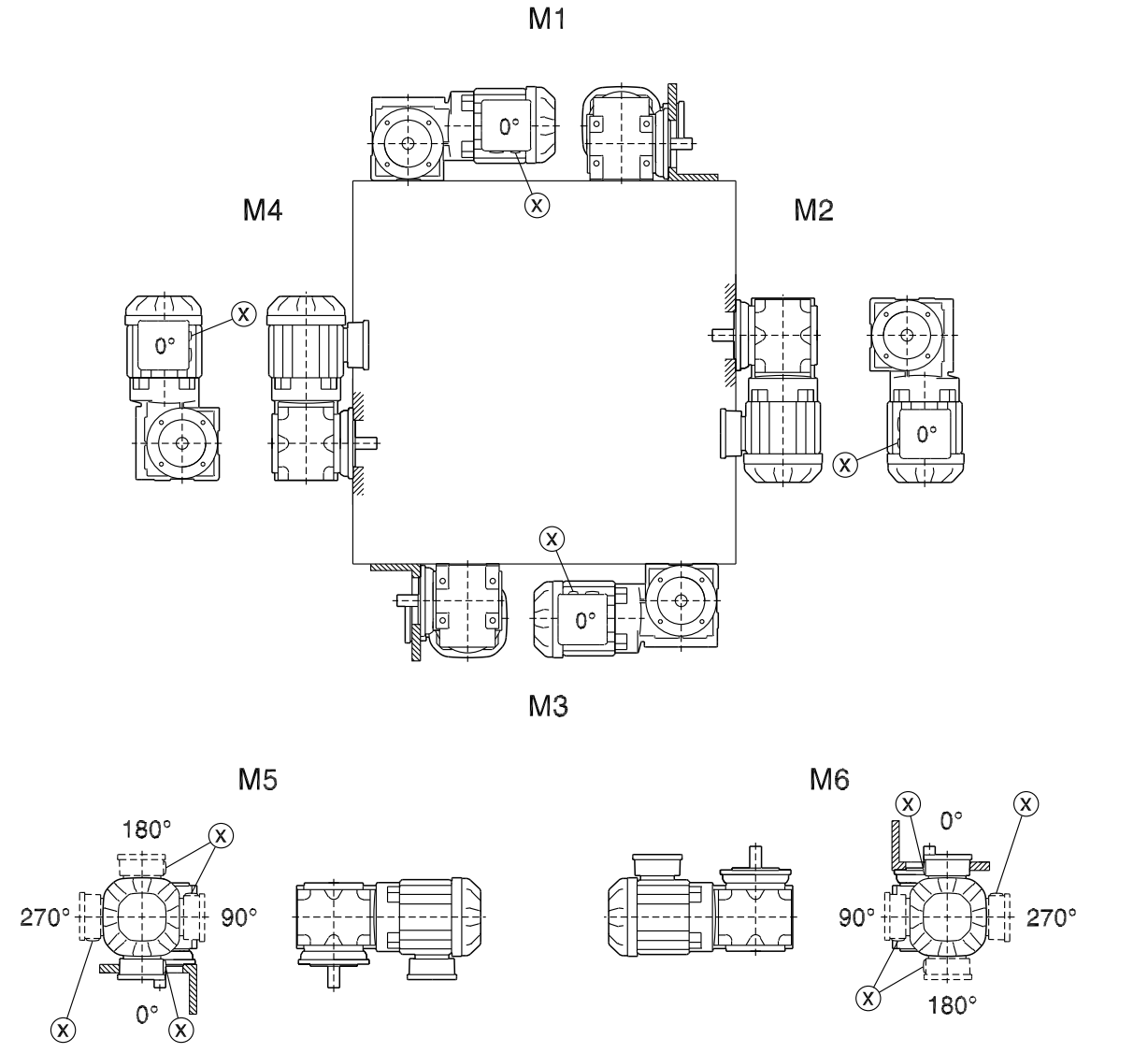
20 001 02 02



5.8.2 WF10-30



20 002 02 02



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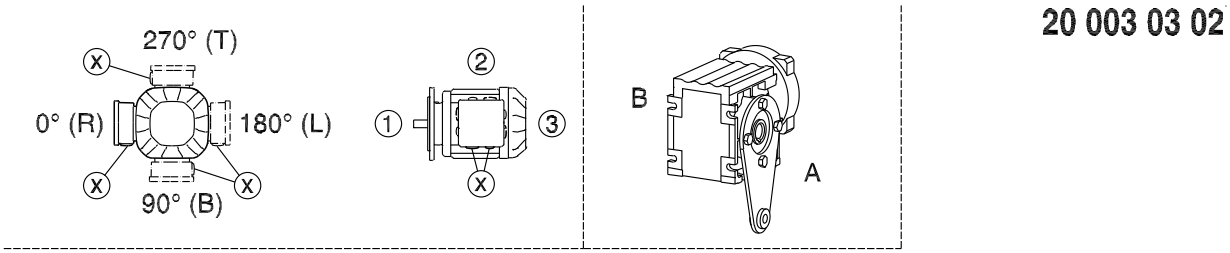
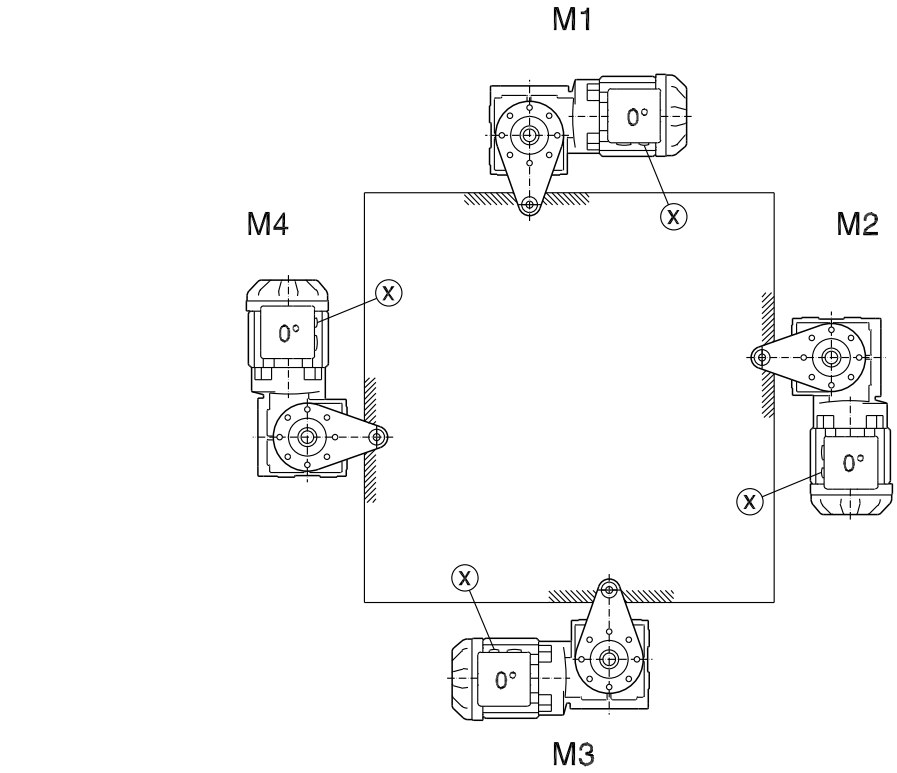
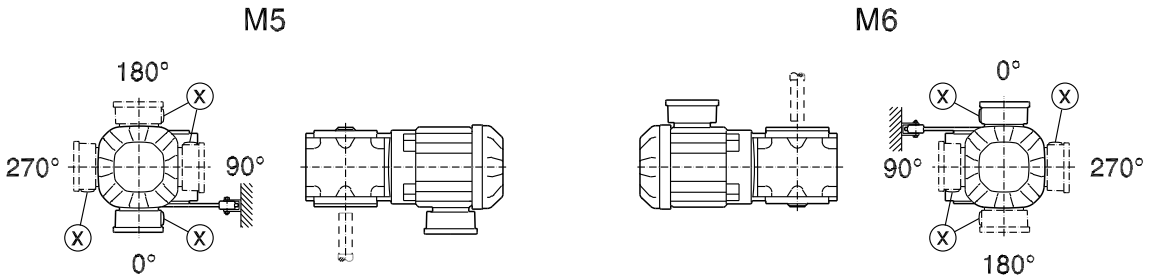
5.8.3 WA10-30



20 003 03 02





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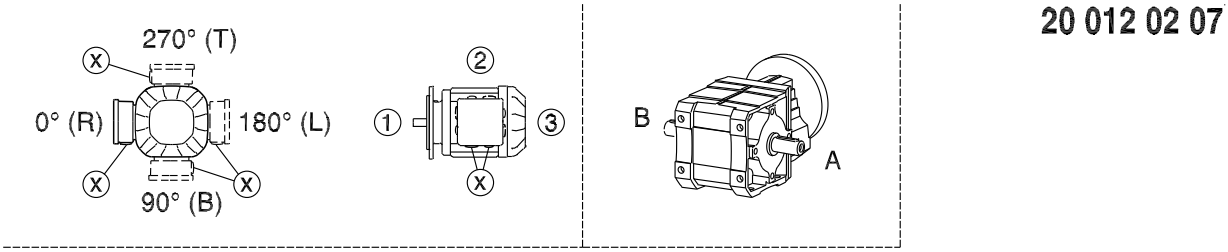
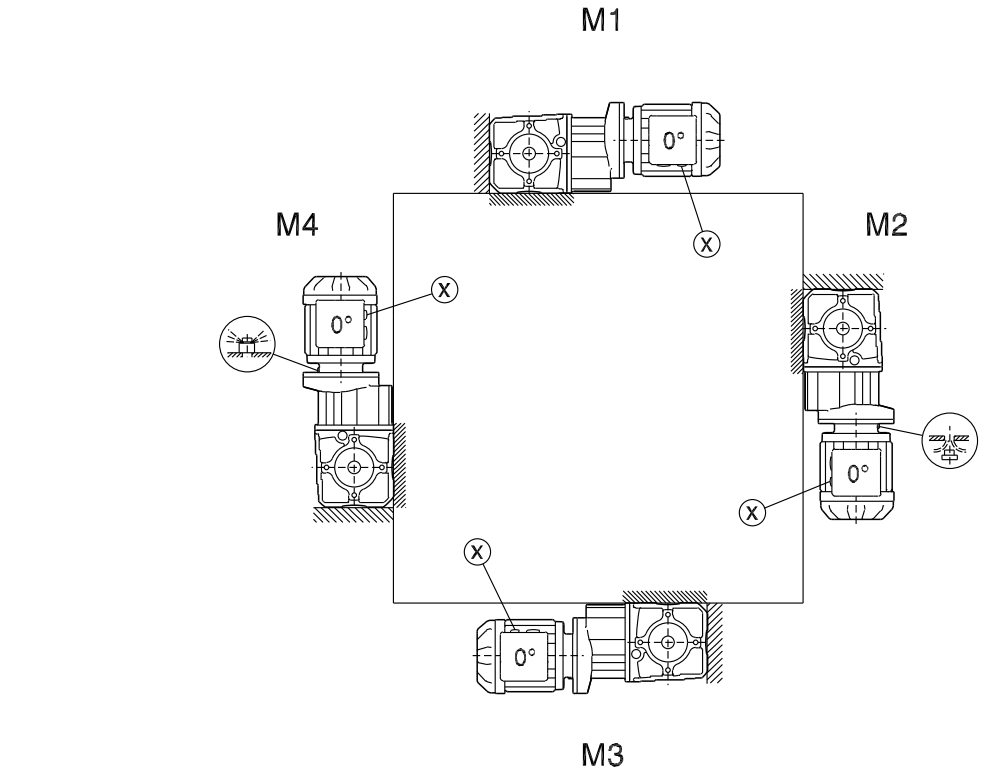
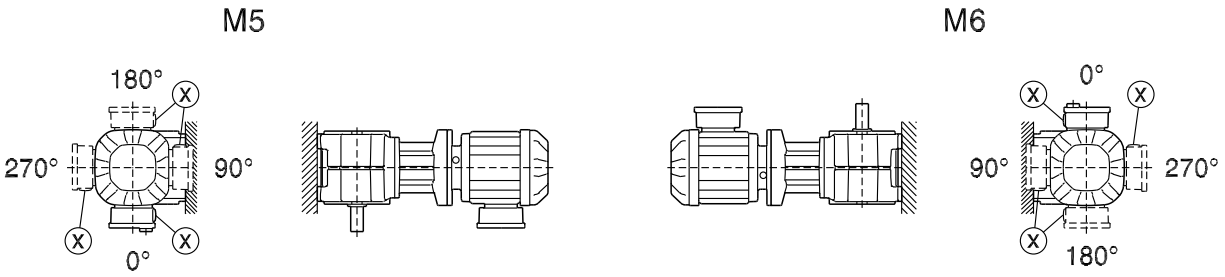
5.8.4 W/WA..B/WH37B-47B







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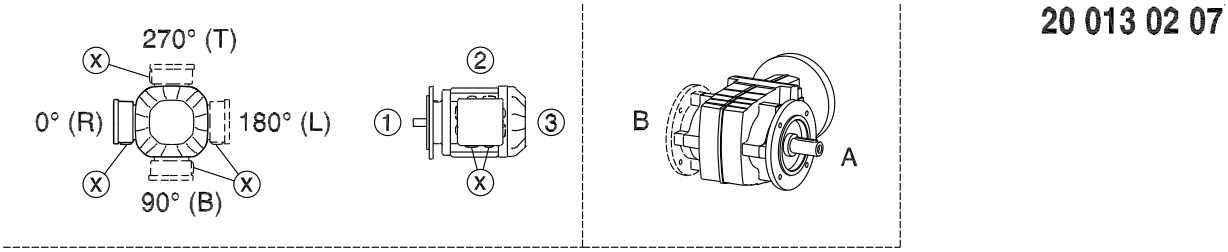
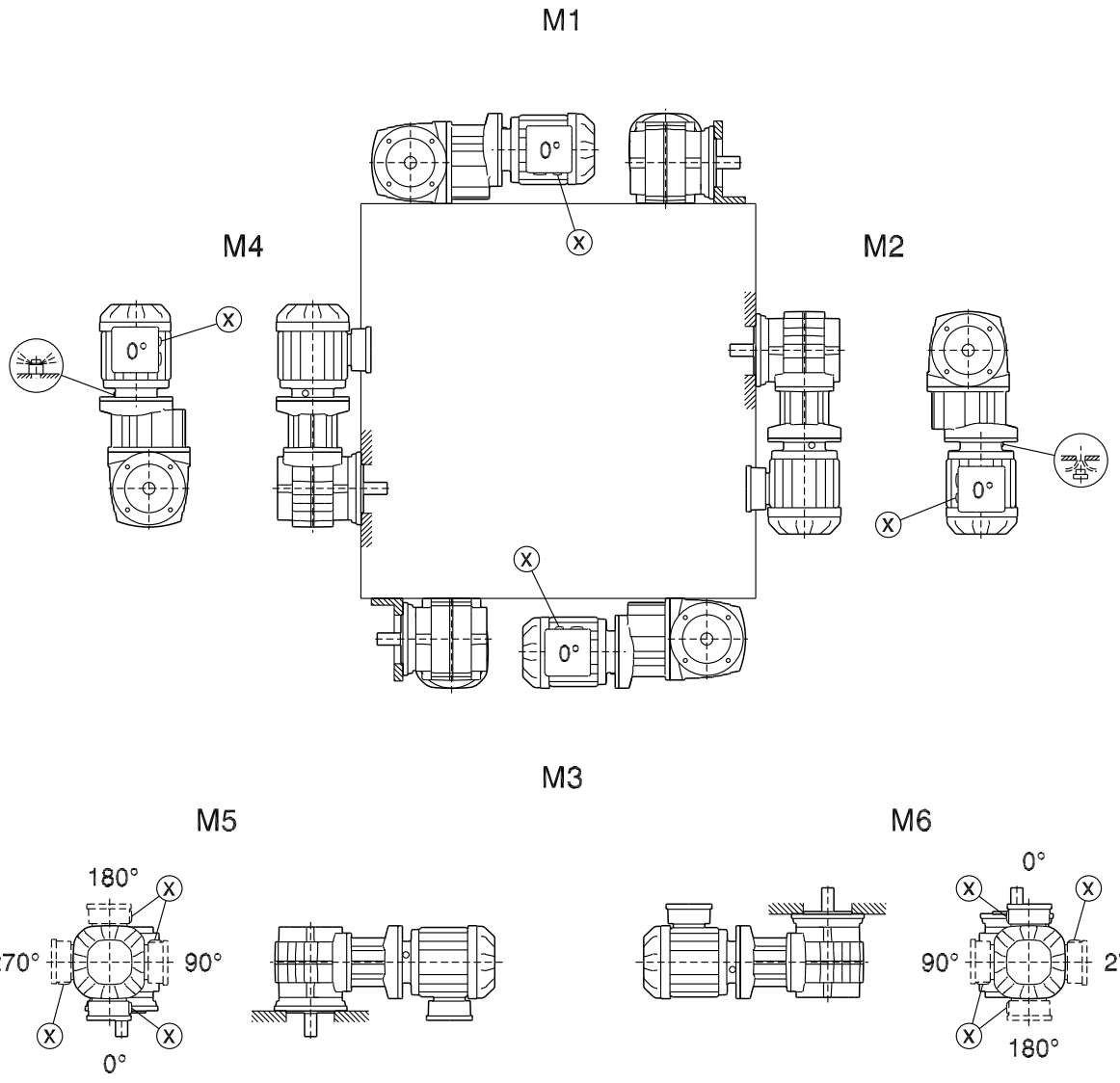
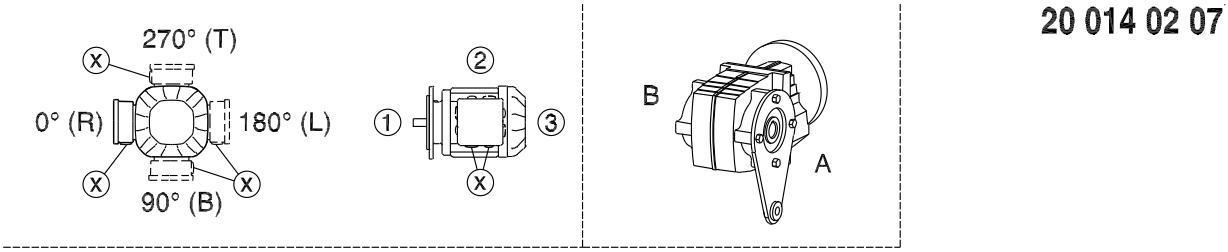
5.8.5 WF/WAF/WHF37-47

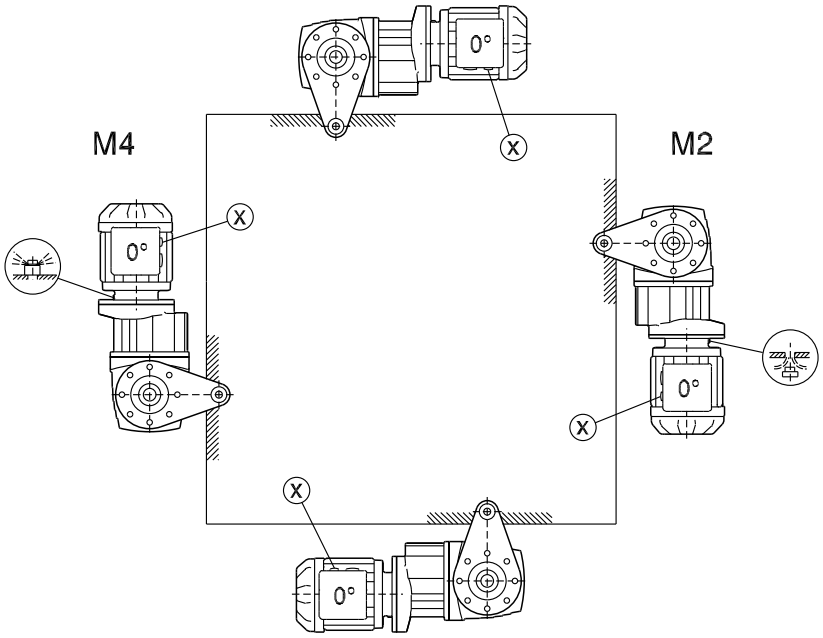




5.8.6 WA/WH/WT37-47



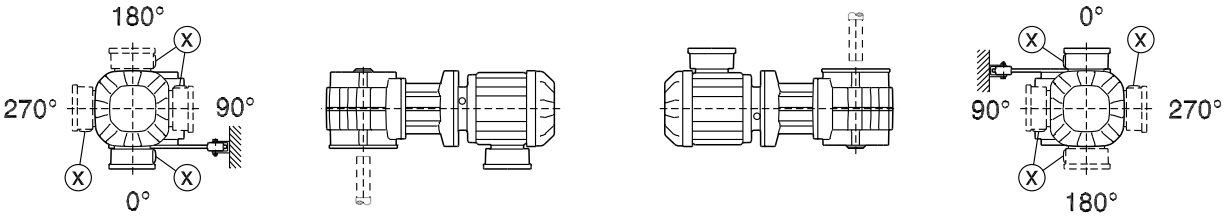
M1



M4 M2

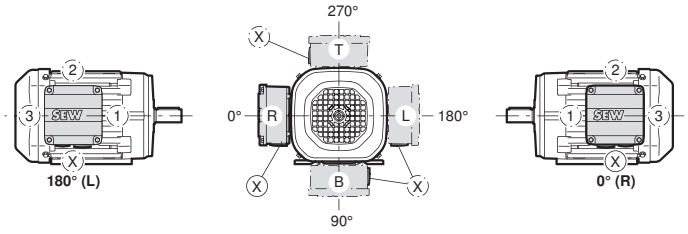
M3

M5 M6



5.9 Mounting positions of AC motors

5.9.1 Motor terminal box position and cable entry



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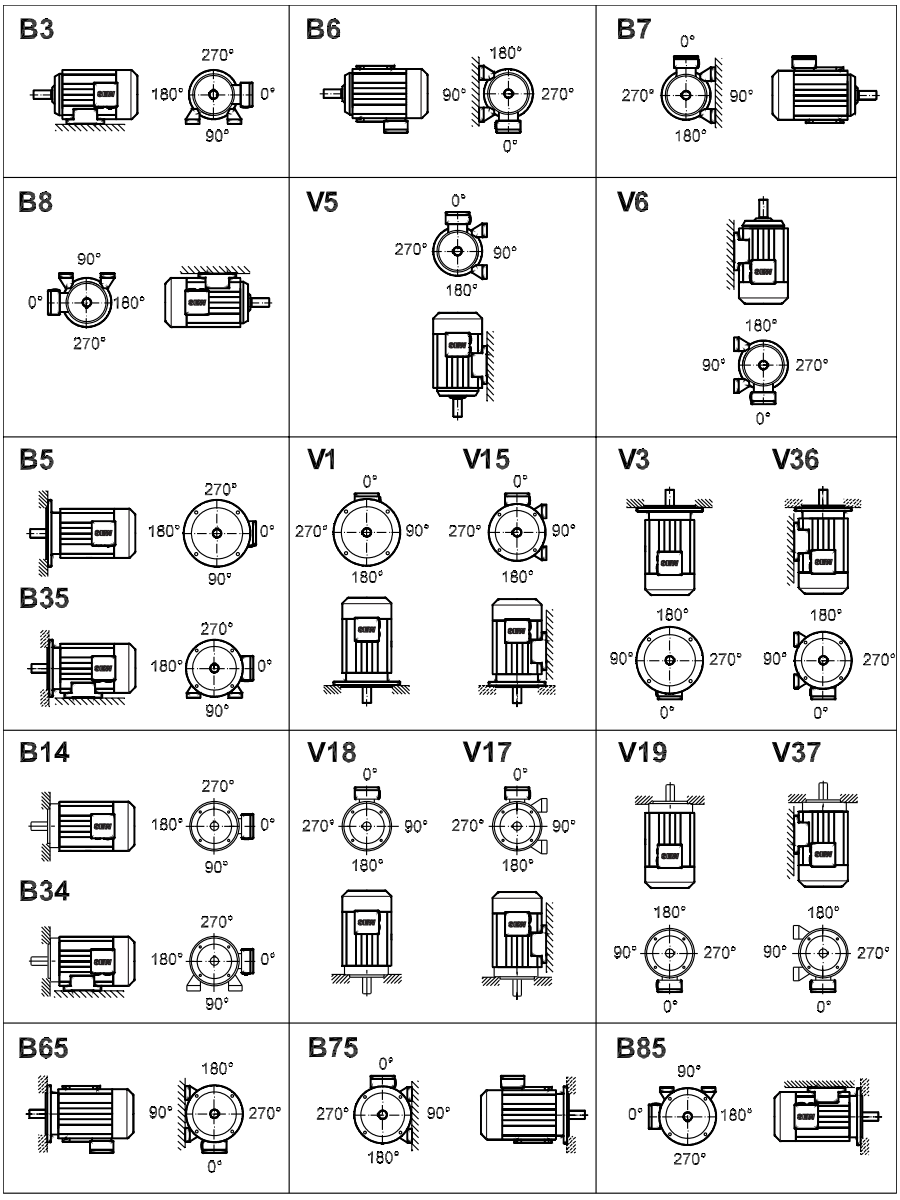
5.9.2 Mounting positions



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6 Design and operating notes

6.1 Lubricants

6.1.1 General information

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. This is based on the specification of the mounting position (see chapter "Gear unit mounting positions and order information" (→ 🗎 54)) in the drive order.

If the mounting position is changed, the lubricant fill quantity must be adapted accordingly (see chapter "Lubricant fill quantities" (→ 🗎 97)). Consequently, a **change to the mounting position** can only occur following consultation with SEW-EURODRIVE, otherwise your **right to claim under warranty no longer applies**.

6.1.2 Bearing greases

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

	Ambient temperature	Manufacturer	Type
Gear unit roller bearings	-40°C to +80°C	Fuchs	Renolit CX-TOM 15[1)]
	-40°C to +80°C	Klüber	Petamo GHY 133 N
	-40°C to +40°C	Castrol	Obeen FS 2
	–20°C to +40°C	Fuchs	Plantogel 2S

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

INFORMATION

The following grease quantities are required:

- **For fast-running bearings (gear unit input side):** Fill the cavities between the rolling elements one-third full with grease.
- **For slow-running bearings (gear unit output side):** Fill the cavities between the rolling elements two-thirds full with grease.

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6.1.3 Lubricant table

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

Key to lubricant table

CLP PG	= Polyglycol (W gear units, conforms to USDA-H1)
CLP HC	= Synthetic hydrocarbons
E	= Ester oil (water hazard class 1 (German regulation – "WKG")
HCE	= Synthetic hydrocarbons + ester oil (USDA - H1 certification)
HLP	= Hydraulic oil
	= Synthetic lubricant (= synthetic roller bearing grease)
1)	Helical-worm gear units with PG oil: please consult SEW-EURODRIVE
2)	Special lubricant for SPIROPLAN® gear units only
3)	Use SEW $f_B \geq 1.2$
4)	Pay attention to critical starting behavior at low temperatures.
5)	Low-viscosity grease
6	Ambient temperature
7)	Bold
	Lubricant for the food industry (food grade oil)
	Biodegradable oil (lubricant for agriculture, forestry, and fisheries)

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Lubricant table

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Gear unit		6) °C	DIN (ISO)	ISO,NLGI	Mobil	Shell	bp	Klüber	Texaco	Castrol Tribol	Castrol Optimol	Fuchs	Total
R... K37-187 (HK...) F...		Standard -15 … +40	CLP (CC)	VG 220	Mobilgear 600 XP 220	Shell Omala S2 G 220	BP Energol GR-XP 220	Klüberoil GEM 1-220 N	Meropa 220	Tribol 1100/220	Optigear BM 220	Renolin CLP 220	Carter EP 220
		-20 … +80	CLP PG	VG 220	Mobil Glygoyle 220	Shell Omala S4 WE 220	BP Enersyn SG-XP 220	Klübersynth GH 6-220	Synlube CLP 220	Tribol 800/220	Optiflex A 220	Renolin PG 220	Carter SY 220
		-20 … +60	CLP HC	VG 220	Mobil SHC 630	Shell Omala S4 GX 220		Klübersynth GEM 4-220 N	Pinnacle EP 220	Tribol 1510/220	Optigear Synthetic X 220	Renolin Unisyn CLP 220	Carter SH 220
	4)	-40 … +40	CLP HC	VG 150	Mobil SHC 629	Shell Omala S4 GX 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	Mobilgear 600 XP 150	Shell Omala S2 G 150	BP Energol GR-XP 150	Klüberoil GEM 1-150 N	Meropa 150	Tribol 1100/150	Optigear BM 100	Renolin CLP 150	Carter EP 150
		-40 … +20	CLP HC	VG 68	Mobil SHC 626	Shell Omala S4 GX 68						Renolin Unisyn CLP 68	
		-40 … + 0	CLP HC	VG 32	Mobil SHC 624			Klüber-Summit HySyn FG-32	Cetus PAO 46		Optilieb HY 32	Renolin Unisyn OL 32	Dacnis SH 32
K..19 - K..29	4)	Standard -20 … +60	CLP PG	VG 460				Klübersynth GH 6-460					
	4)	-20 … +60	H1 PG	VG 460				Klübersynth UH1 6-460					
S...(HS...)		Standard 0 … +40	CLP (CC)	VG 680	Mobilgear 600 XP 680	Shell Omala S2 G 680	BP Energol GR-XP 680	Klüberoil GEM 1-680 N	Meropa 680	Tribol 1100/680	Optigear BM 680	Renolin SEW 680	Carter EP 680
	1)	-20 … +80	CLP PG	VG 680	Mobil Glygoyle 680	Shell Omala S4 WE 680	BP Enersyn SG-XP 680	Klübersynth GH 6-680	Synlube CLP 680	Tribol 800/680	Optiflex A 680	Renolin PG 680	
		-20 … +60	CLP HC	VG 460	Mobil SHC 634	Shell Omala S4 GX 460		Klübersynth GEM 4-460 N	Pinnacle EP 460		Optigear Synthetic X 460	Renolin Unisyn CLP 460	Carter SH 460
	4)	-40 … +30	CLP HC	VG 150	Mobil SHC 629	Shell Omala S4 GX 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	Mobilgear 600 XP 150	Shell Omala S2 G 150	BP Energol GR-XP 150	Klüberoil GEM 1-150 N	Meropa 150	Tribol 1100/150	Optigear BM 150	Renolin CLP 150	Carter EP 150
	1)	-20 … +40	CLP PG	VG 220	Mobil Glygoyle 220	Shell Omala S4 WE 220	BP Enersyn SG-XP 220	Klübersynth GH 6-220	Synlube CLP 220	Tribol 800/220	Optiflex A 220	Renolin PG 220	Carter SY 220
		-40 … +20	CLP HC	VG 68	Mobil SHC 626	Shell Omala S4 GX 68						Renolin Unisyn CLP 68	
		-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.. K37-187 / HK.. F.. S.. / HS..		-10 … +40	CLPHC NSF H1	VG 460				Klüberoil 4UH1-460 N			Optileb GT 460	Cassida Fluid GL 460	
		-20 … +30		VG 220				Klüberoil 4UH1-220 N			Optileb GT 220	Cassida Fluid GL 220	
		-40 … 0		VG 68				Klüberoil 4UH1-68 N			Optileb HY 68	Cassida Fluid HF 68	
		-20 … +40	E	VG 460				Klüberbio CA2-460				Plantogear 460 S	
W...(HW...)	2)	Standard -20 … +40	SEW PG	VG 460				Klüber SEW HT-460-5					
	4)	-40 … +10	API GL5	SAE 75W90 (~VG 100)	Mobil Synth Gear Oil 75 W90								
	3)	-20 … +60	H1 PG	VG 460				Klübersynth UH1 6-460					
PS.F..		Standard -20 … +80	CLP PG	VG 220				Klübersynth GH 6-220					
		-20 … +60	H1 PG	VG 460				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								
	5)	-20 … +40	DIN 51 818	NLGI 00	Mobilux EP 004								
		-20 … +40	DIN 51 818	NLGI 1				Klübersynth UH1 14-151					
		-40 … 0	CLP HC	VG 32	Mobil SHC 624								
BS.F..		Standard -20 … +60	CLP PG	VG 220				Klübersynth GH 6-220					
		-20 … +60	H1 PG	VG 460				Klübersynth UH1 6-460					

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6.1.4 Lubricant fill quantities

INFORMATION

The specified fill quantities are only given as a **guideline**. The precise values vary depending on the number of stages and gear 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

R.., R..F

Gear units	Fill quantity in liters					
	M1[1)]	M2	M3	M4	M5	M6
R07	0.12	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	
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	
R57	0.80/1.70	1.90	1.70	2.10	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		6.3	6.5
R97	4.60/9.8	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	
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) In the case of double gear units, the large gear unit must be filled with the greater oil volume.

RF..

Gear units	Fill quantity in liters					
	M1[1)]	M2	M3	M4	M5	M6
RF07	0.12	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	
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	
RF57	0.80/1.70	1.80	1.70	2.00	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	
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) In the case of double gear units, the large gear unit must be filled with the greater oil volume.

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RX..

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

RXF..

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

Parallel-shaft helical (F) gear units

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

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	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	
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 units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
FF27	0.60	0.80	0.65	0.70	0.60	
FF37	1.00	1.25	0.70	1.30	1.00	
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

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

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	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	
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	79.5

Helical-bevel (K) gear units

INFORMATION

All K..9 gear have a universal mounting position, which means that K..9 gear units of the same design are filled with the same amount of oil independent of the mounting position. An exception to this is the M4 mounting position.

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

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..19	0.35			0.38	0.35	
K..29	0.65			0.8	0.65	
K..37	0.50	1.00		1.25	0.95	
K..47	0.80	1.30	1.50	2.00	1.60	
K..57	1.10	2.20		2.80	2.30	2.10
K..67	1.10	2.40	2.60	3.45	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	
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	
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	

KF..

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
KF19	0.35			0.38	0.35	
KF29	0.75			0.9	0.75	
KF37	0.50	1.10		1.50	1.00	
KF47	0.80	1.30	1.70	2.20	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	
KF77	2.10	4.10	4.40	5.9	4.50	
KF87	3.70	8.2	9.0	11.9	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	
KF127	21.0	41.5	46.0	55.0	41.0	
KF157	31.0	66.0	69.0	92.0	62.0	

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

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..19	0.35			0.38	0.35	
K..29	0.65			0.8	0.65	
K..37	0.50	1.00		1.40	1.00	
K..47	0.80	1.30	1.60	2.15	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	
K..77	2.10	4.10	4.60	5.9	4.40	
K..87	3.70	8.2	8.8	11.1	8.0	
K..97	7.0	14.7	15.7	20.0	15.7	
K..107	10.0	20.5	24.0	32.4	24.0	
K..127	21.0	41.5	43.0	52.0	40.0	
K..157	31.0	66.0	67.0	87.0	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	

Helical-worm (S) gear units

S

Gear units	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S..37	0.25	0.40	0.50	0.55	0.40	
S..47	0.35	0.80	0.70/0.90	1.00	0.80	
S..57	0.50	1.20	1.00/1.20	1.45	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	
S..87	3.30	8.1	6.9/10.4	11.3	8.4	
S..97	6.8	15.0	13.4/18.0	21.8	17.0	

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

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SF..

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

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

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

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

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

SPIROPLAN® (W) gear units

INFORMATION

SPIROPLAN® gear units W..10 to W..30 have a universal mounting position, which means that gear units of the same design are filled with the same amount of oil independent of the mounting position.

The oil fill quantity of SPIROPLAN® gear units W..37 and W..47 in mounting position M4 is different from that of the other mounting positions.

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

Gear units	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	

WF..

Gear units	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
WF10	0.16					
WF20	0.24					
WF30	0.40					
WF37	0.50			0.70	0.50	
WF47	0.90			1.55	0.90	

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

Gear units	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			1.40	0.80	

6.2 Gear unit venting

INFORMATION

The function of breather valves can be impaired by dirt and dust in the environment.

If necessary, contact SEW-EURODRIVE to discuss alternative venting systems.

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6.3 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 rotational clearance of these gear units is considerably less than that of the standard versions so that positioning tasks can be solved with great precision. Rotational clearances are specified in the technical data in angular minutes. 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:

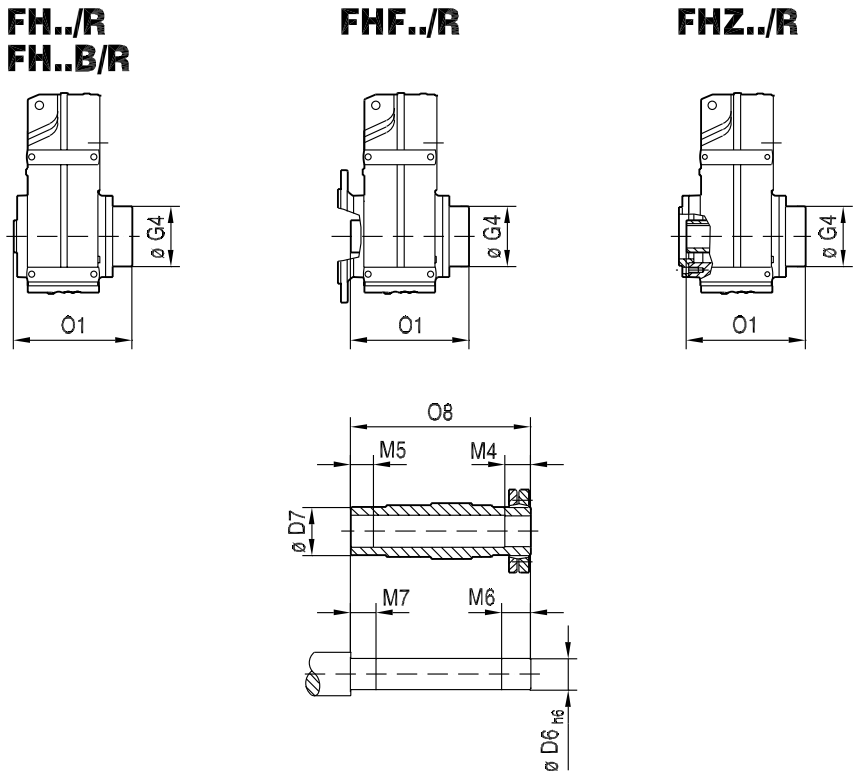
- Helical gear units (R), sizes 37 to 167
- Parallel-shaft helical gear units (F), sizes 37 to 157
- Helical-bevel gear units (K), sizes 37 to 187

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	Dimensions in mm								
	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

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

INFORMATION

Always use the supplied NOCO® fluid during assembly. The fluid prevents contact corrosion and facilitates subsequent removal.

The key dimension X is specified by the customer, though X must be greater than DK (DK = diameter of customer shaft).

See figures for "Customer shaft with and without contact shoulder."

6.4.1 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 fastening parts supplied for installation.
2. Use the optional installation/removal kit for installation.

Supplied fastening parts

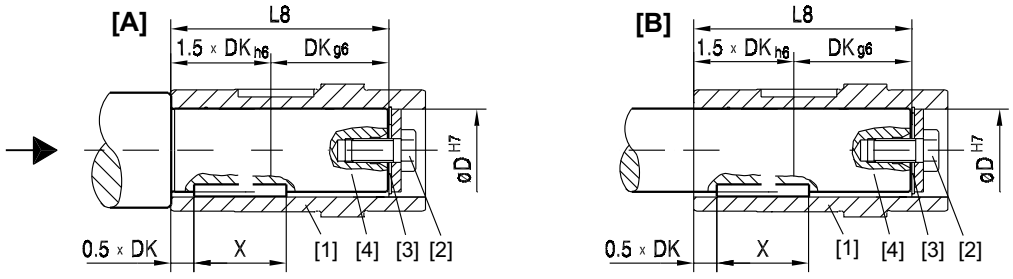
The following fastening parts are supplied as standard:

- Retaining screw with washer [2]
- Circlip [3]

Note the following points concerning the customer shaft:

- The installation length of the customer shaft with contact shoulder [A] must be L8 mm - 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].



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DK	Diameter of customer shaft	[2]	Retaining screw with washer
X	Key	[3]	Retaining ring
[1]	Hollow shaft	[4]	Customer shaft

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Dimensions and tightening torque:

Tightening torques MS for the retaining screw [2]:

Gear unit type	D^{H7} mm	DK mm	L8 mm	MS Nm
WA..10	16		69	8
WA..20	18		84	
WA..20	20			
KA..19			92	
FA..27	25		88	20
KA..29			107	
KA..29	30			
WA..30, WA..37	20		105	8
SA..37, BSAF202			104	
FA..37, KA..37, SA..47	30		105	20
BSAF302	25		118	
SA..47, WA..37			105	
BSAF402	30		138	
FA..47, KA..47, SA..57	35		132	
WA..47	30		122	
SA..57			132	
FA..57, KA..57	40		142	40
BSAF502			158	
FA..67, KA..67			156	
SA..67			144	
SA..67	45			
BSAF602	55		179	80
FA..77, KA..77, SA..77	50		183	40
SA..77	60		180	80
FA..87, KA..87			210	
SA..87			220	
SA..87	70			
BSAF802	60		222	
FA..97, KA..97	70		270	
SA..97			260	
FA..107, KA..107	80		313	
SA..97	90		255	200
FA..107, KA..107			313	
FA..127, KA..127	100		373	
FA..157, KA..157	120		460	

Installation/removal kit

You can use the optional installation/removal kit for installation. This can be ordered for the specific gear unit types by quoting the part numbers in the following table. 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.

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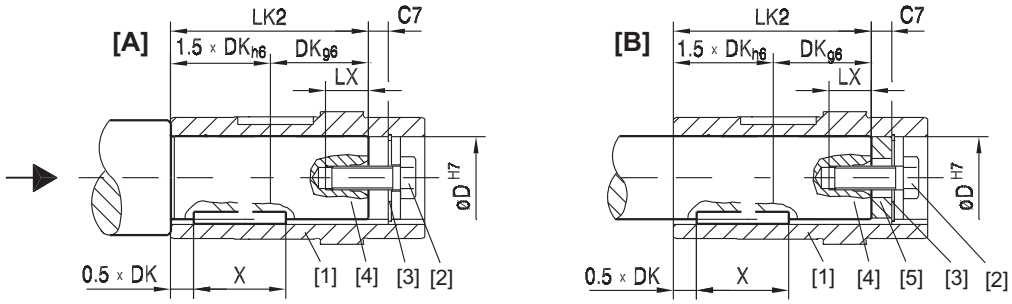
Note the following information concerning the customer shaft:

- The installation length of the customer shaft must be LK2. Do not use the spacer tube 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].



9007203563708043

DK	Diameter of customer shaft	[3]	Retaining ring
X	Key dimension	[4]	Customer shaft
[1]	Hollow shaft	[5]	Spacer tube
[2]	Retaining screw with washer		

Dimensions, tightening torques and part numbers:

Tightening torques MS for the retaining screw [2]:

Type	D^{H7} mm	DK mm	LK2 mm	LX^{+2} mm	C7 mm	MS Nm	Part number of installation/ removal kit
WA..10	16		57	12.5	11	8	643 712 5
WA..20	18		72	16	12		643 682 X
WA..20	20		72				643 683 8
WA..30, WA..37			93				
SA..37			92				
KA..19			80				
KA..29	25		95	22	16	20	643 684 6
FA..27			72				
SA..47			89				
WA..47	30		106				643 685 4
FA..37, KA..37			89				
SA..47			89				
SA..57			116				
KA..29			95				
FA..47, KA..47, SA..57	35		114	28	18		643 686 2
FA..57, KA..57	40		124	36		40	643 687 0
FA..67			138				
KA..67			138				
SA..67			126				
SA..67	45		126				643 688 9
FA..77, KA..77, SA..77	50		165				643 689 7
FA..87, KA..87	60		188	42	22	80	643 690 0
SA..77			158				
SA..87			198				
FA..97, KA..97	70		248				643 691 9
SA..87			198				
SA..97			238				

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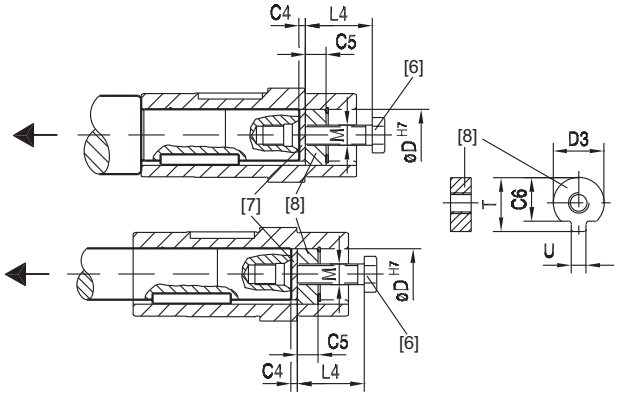
Type	D^{H7} mm	DK mm	LK2 mm	LX^{+2} mm	C7 mm	MS Nm	Part number of installation/ removal kit
FA..107, KA..107	80		287	42	26	80	106 821 12
FA..107, KA..107	90		287	50	26	200	643 692 7
SA..97			229				
FA..127, KA..127	100		347				643 693 5
FA..157, KA..157	120		434				643 694 3

6.4.2 Removal

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

1. Loosen the retaining screw [6].
2. Remove the circlip [3] and, if used, the spacer tube [5].
3. Insert the forcing washer [7] and the locked nut [8] between the customer 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, SA..37, WA..37, KA..19	20				15.5		22.5	19.7		643 683 8
FA..27, SA..47, WA..47, KA..29	25	M10		10	20	7.5	28	24.7	35	643 684 6
FA..37, KA..37, SA..47, SA..57, WA..47, KA..29	30				25		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		53.5	49.7		643 689 7

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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
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			20	75.5	21.5	85	79.7	70	106 8211 2
FA..107, KA..107, SA..97	90	M24			80	24.5	95	89.7		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

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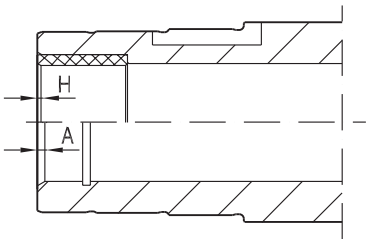
6.5 Gear units with hollow shaft

6.5.1 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:

00 004 002



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Gear units	Design	
	with hollow shaft (A)	with hollow shaft and shrink disc (H)
W..10	1.5 × 30°	-
W..20	2 × 30°	-
W..30		-
F..27		0.5 × 45°
K..19		
K..29		
F../K../S../W..37		
F../K../S../ W..47		
S..57		
F../K..57		
F../K../S..67		
F../K../S..77		
F../K../S..87	3 × 30°	
F../K../S..97		
F../K..107		
F../K..127	5 × 30°	
F../K..157		
KH167	–	
KH187	–	

6.5.2 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.

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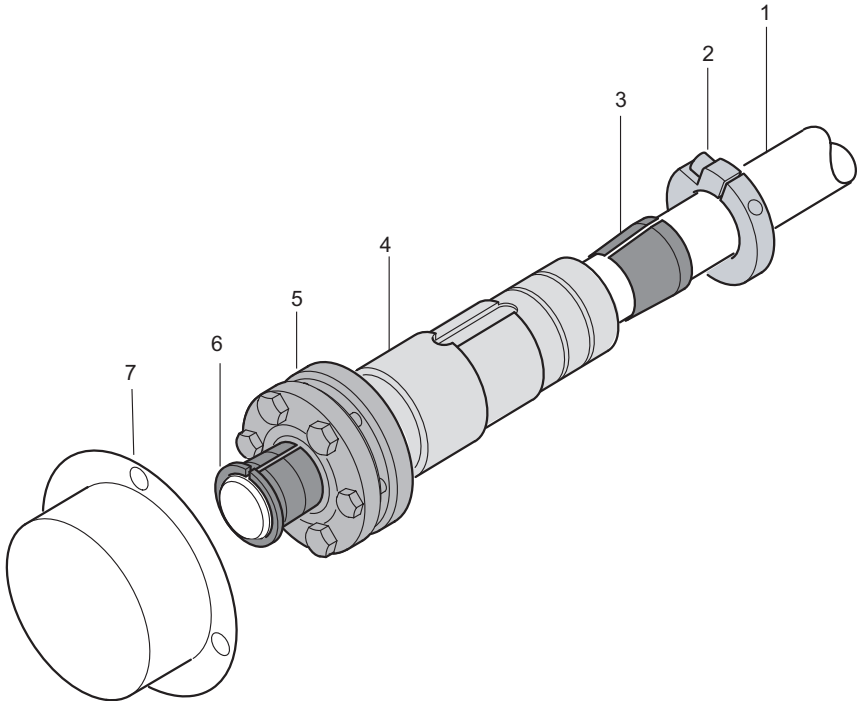
6.6 TorqLOC® mounting system for gear units with hollow shaft

6.6.1 Description of TorqLOC®

The TorqLOC® hollow shaft mounting system is used for achieving a non-positive connection between the customer's shaft and the hollow shaft in the gear unit. 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 hood cover
[4]	Hollow shaft in gear unit		

6.6.2 Benefits of TorqLOC®

The TorqLOC® hollow shaft mounting system provides the following advantages:

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

6.6.3 Technical data

The TorqLOC® hollow shaft mounting system is approved for input torques of 92 Nm to 18,000 Nm.

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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 units in sizes 37 and 47 (WT.7)

Available options

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

- For helical-bevel, helical-worm and SPIROPLAN® gear units (KT.., ST.., WT.7..): "torque arm" option (../T)
- For parallel-shaft helical gear units (FT..): "rubber buffer" option (../G)

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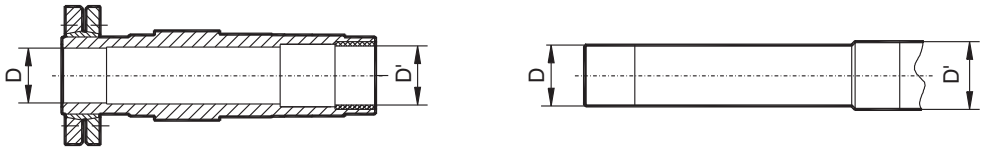
6.7 Shouldered hollow shaft option with shrink disk

The following gear units with a hollow shaft and shrink disk are also available with an optional larger bore diameter D':

- Parallel-shaft helical gear units FH/FHF/FHZ37 – 157
- Helical-bevel gear units KH/KHF/KHZ37 – 157
- Helical-worm gear units SH/SHF47 – 97

D' = D as standard.



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Gear units	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').

6.7.1 Sample order

FH37 DRS80M4 with hollow shaft 30/32 mm

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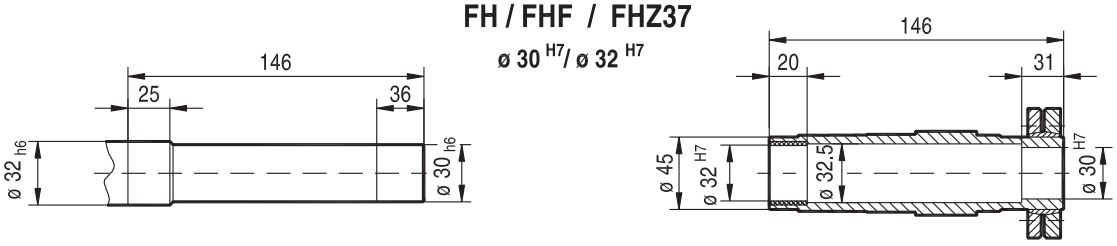
6.7.2 Parallel-shaft helical gear units with shouldered hollow shaft (dimensions in mm):

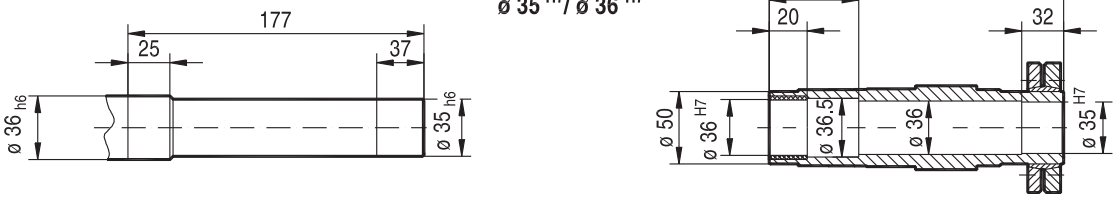
FH / FHF / FHZ37

ø 30 H7 / ø 32 H7



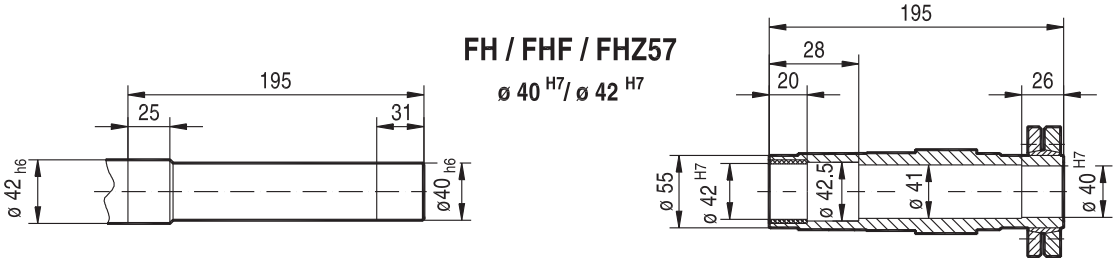
FH / FHF / FHZ47

ø 35 H7 / ø 36 H7



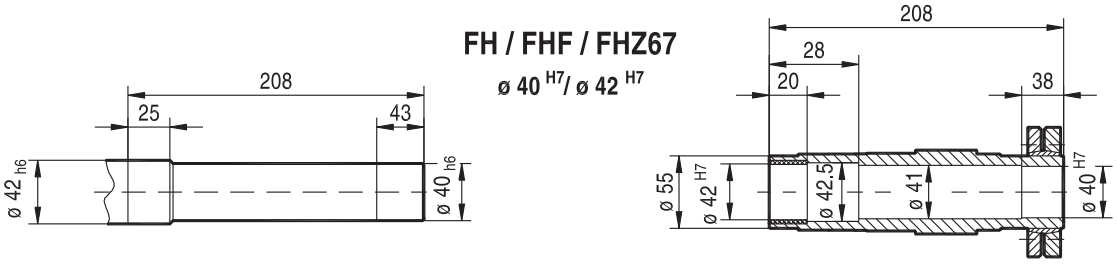
FH / FHF / FHZ57

ø 40 H7 / ø 42 H7



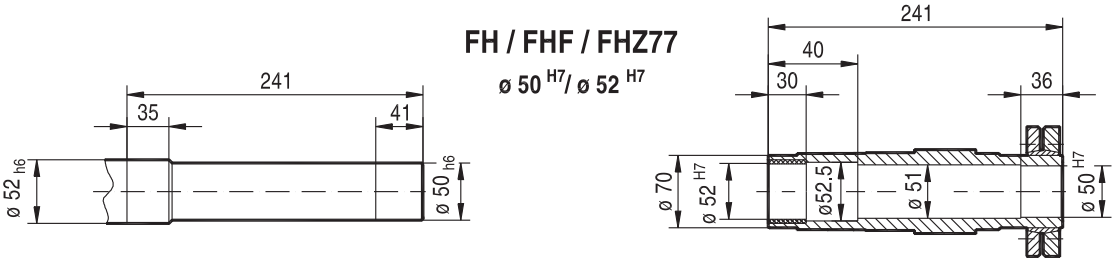
FH / FHF / FHZ67

ø 40 H7 / ø 42 H7



FH / FHF / FHZ77

ø 50 H7 / ø 52 H7



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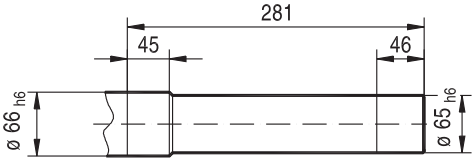
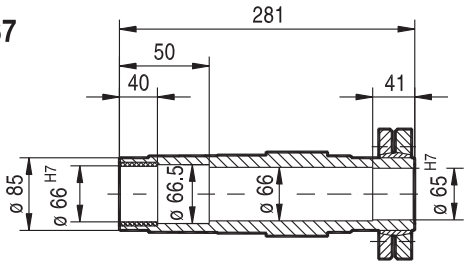
FH / FHF / FHZ87

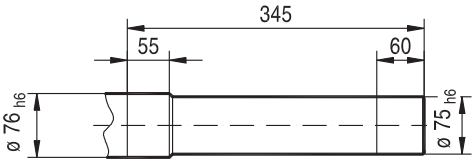
ø 65 H7/ ø 66 H7

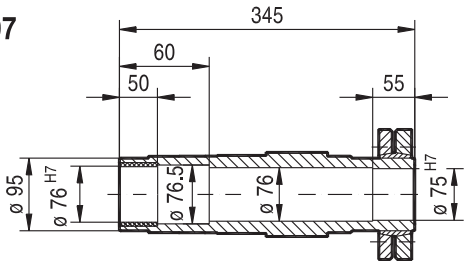




FH / FHF / FHZ97

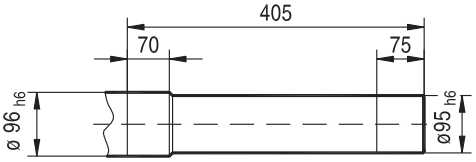
ø 75 H7/ ø 76 H7

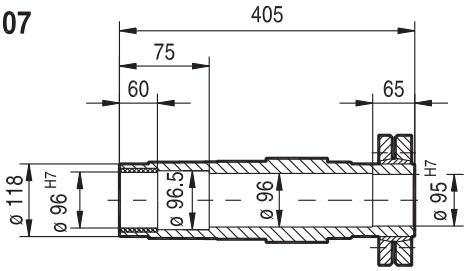




FH / FHF / FHZ107

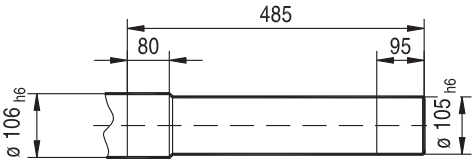
ø 95 H7/ ø 96 H7

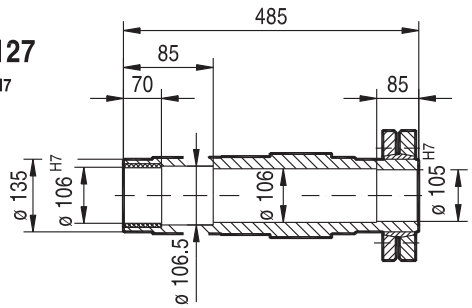




FH / FHF / FHZ127

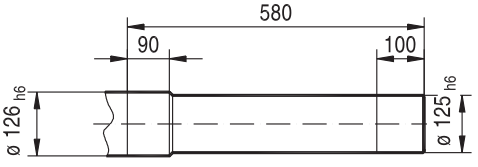
ø 105 H7/ ø 106 H7

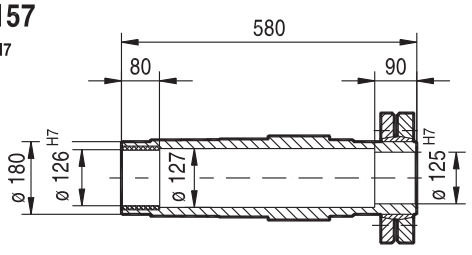




FH / FHF / FHZ157

ø 125 H7/ ø 126 H7





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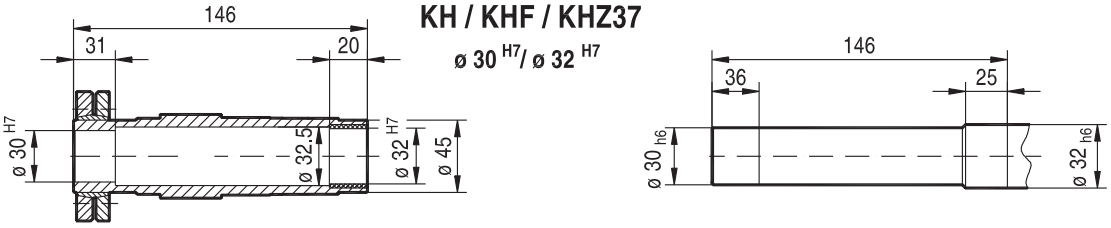
6.7.3 Helical-bevel gear units with shouldered hollow shaft (dimensions in mm):

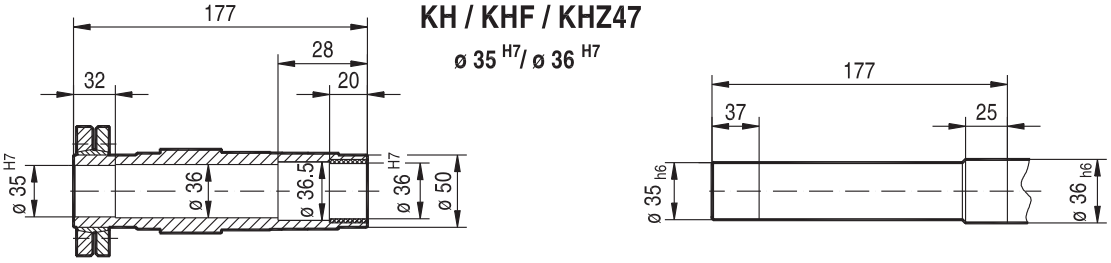
KH / KHF / KHZ37

ø 30 H7/ ø 32 H7



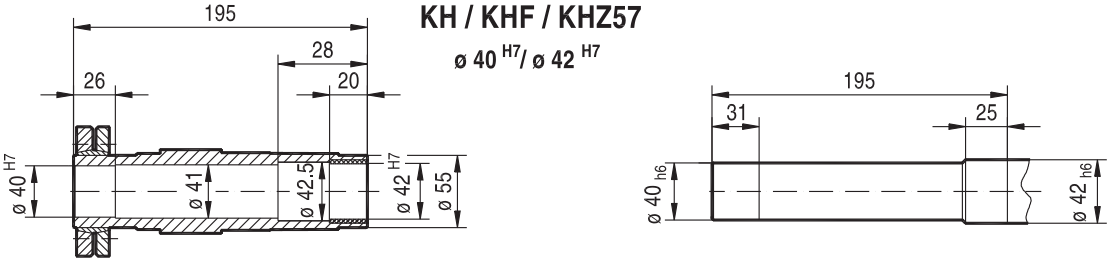
KH / KHF / KHZ47

ø 35 H7/ ø 36 H7



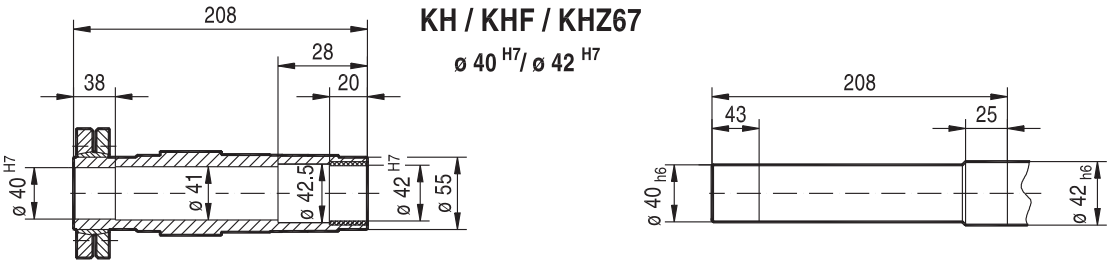
KH / KHF / KHZ57

ø 40 H7/ ø 42 H7



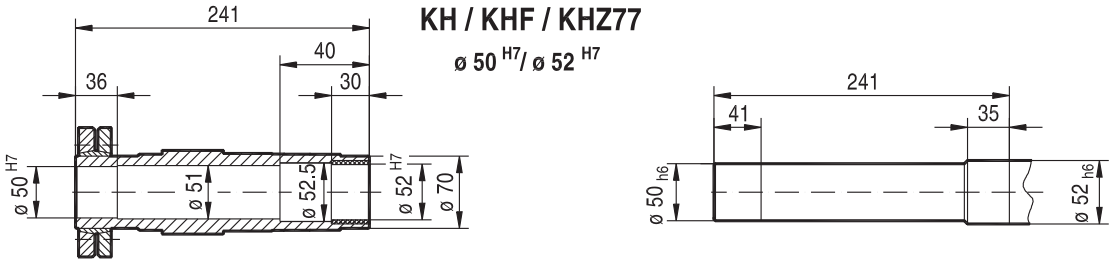
KH / KHF / KHZ67

ø 40 H7/ ø 42 H7

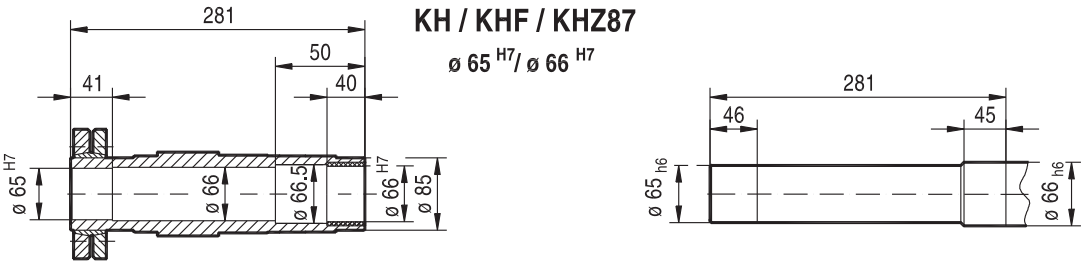


KH / KHF / KHZ77

ø 50 H7/ ø 52 H7

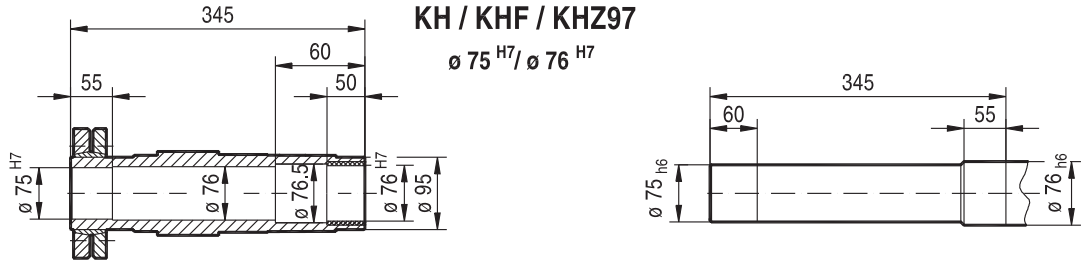


4987063435



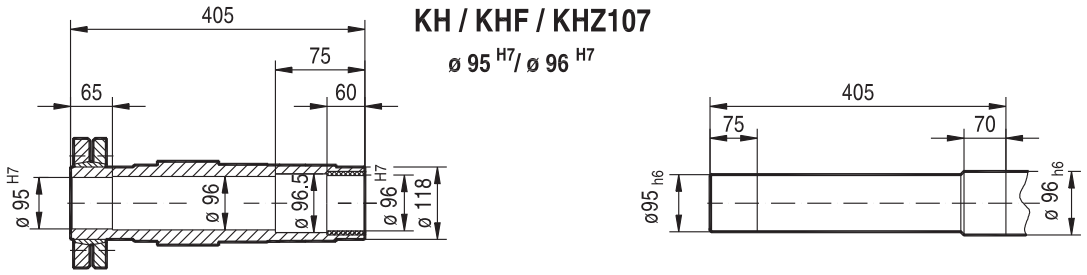
KH / KHF / KHZ87

ø 65 H7/ ø 66 H7



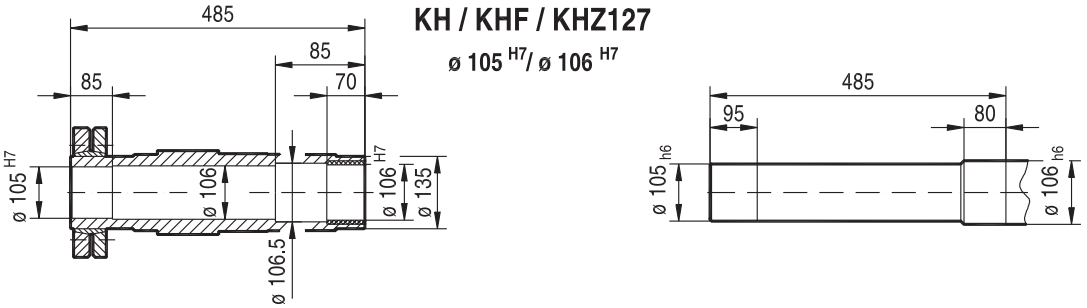
KH / KHF / KHZ97

ø 75 H7/ ø 76 H7



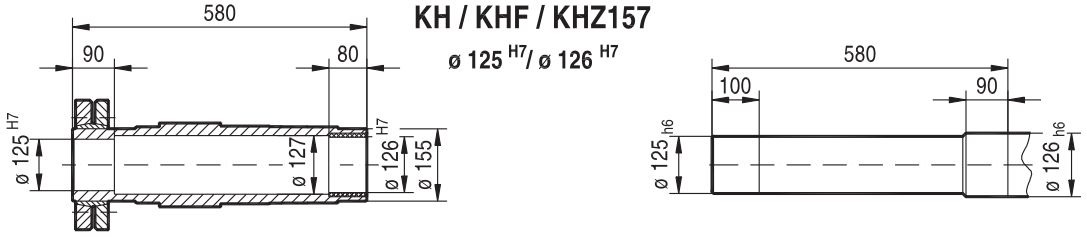
KH / KHF / KHZ107

ø 95 H7/ ø 96 H7



KH / KHF / KHZ127

ø 105 H7/ ø 106 H7



KH / KHF / KHZ157

ø 125 H7/ ø 126 H7

4987065099

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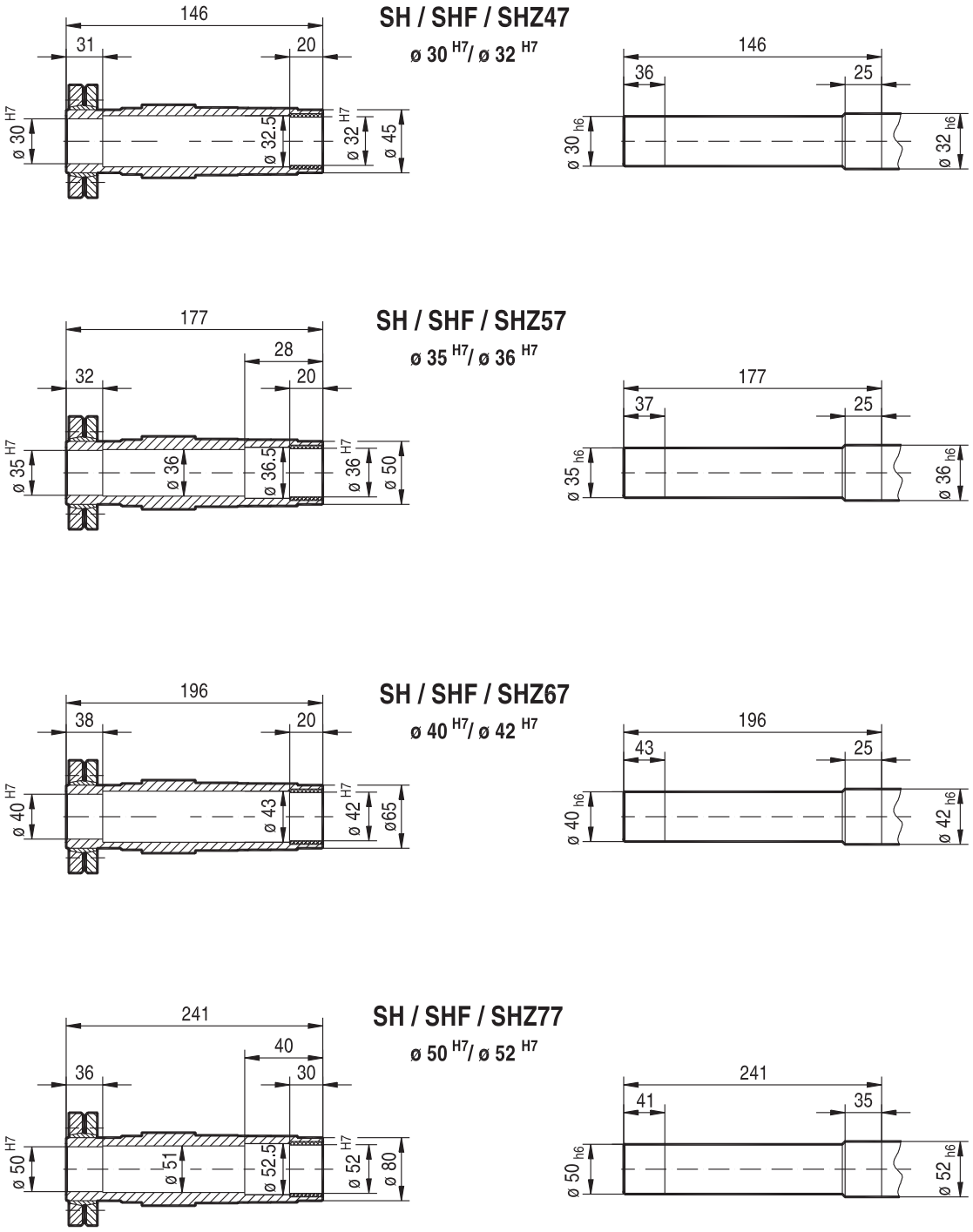
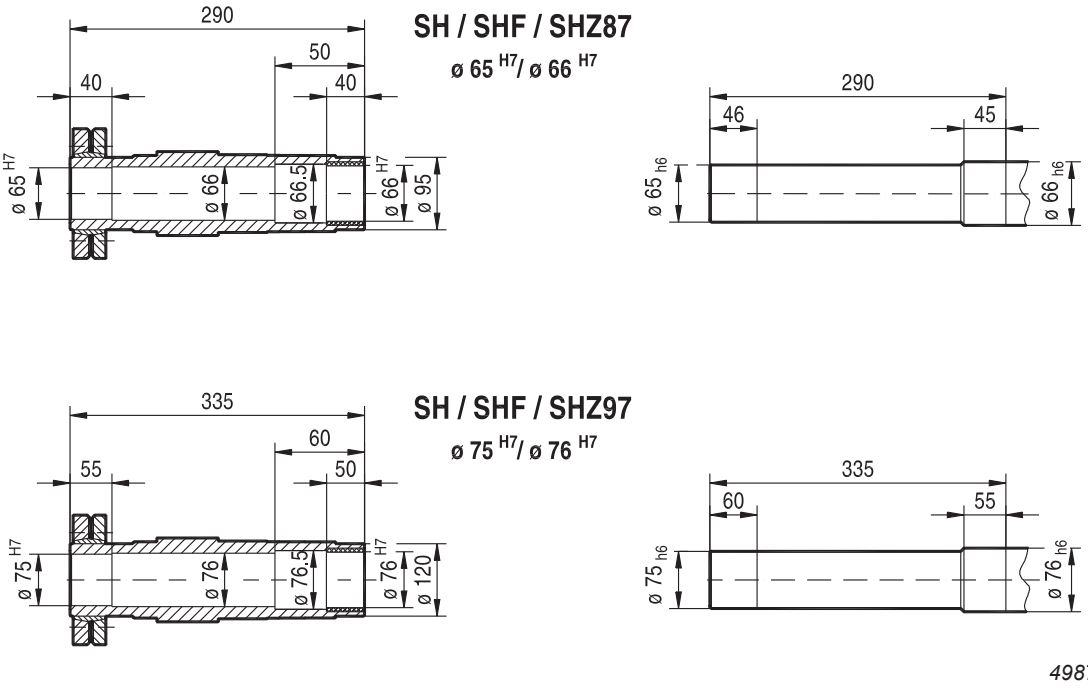
6.7.4 Helical-worm gear units with shouldered hollow shaft (dimensions in mm):



4987067787



4987069451

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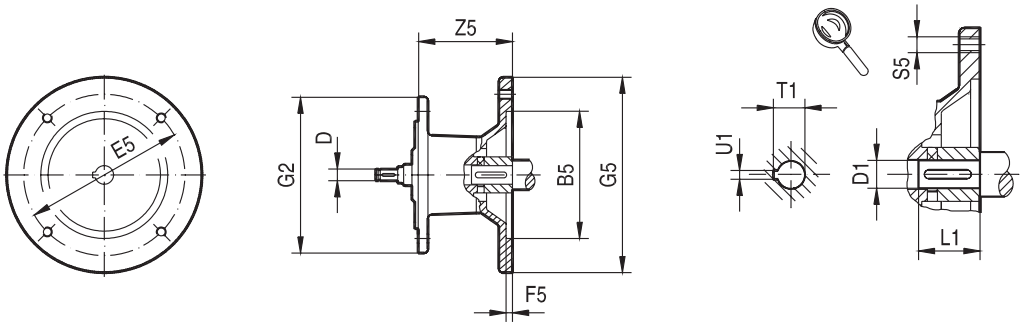
6.8 Adapters for mounting IEC motors

23 002 100



9007204242190859

Gear unit type	Adapter type	Dimensions in mm											
		B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1
R..27, R..37 F..27, F..37, F..47 K..19, K..29, K..37 S..37, S..47, S..57 W..37	AM63	95	10	115	3.5	120	140	M8	72	11	23	12.8	4
	AM71[1]	110		130	4		160			14	30	16.3	5
	AM80[1]	130	12	165	4.5		200	M10	106	19	40	21.8	6
	AM90[1]		14							24	50	27.3	8
R..47[2], R..57, R..67 F..57, F..67 K..47[2], K..57, K..67 S..67 W..47[3]	AM63	95	10	115	3.5	160	140	M8	66	11	23	12.8	4
	AM71	110		130	4		160			14	30	16.3	5
	AM80	130	12	165	4.5		200	M10	99	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100[1]	180	16	215	5		250	M12	134	28	60	31.3	8
	AM112[1]		18										
	AM132S/M[1]	230	22	265			300		191	38	80	41.3	10
R..77 F..77 K..77 S..77	AM63	95	10	115	3.5	200	140	M8	60	11	23	12.8	4
	AM71	110		130	4		160			14	30	16.3	5
	AM80	130	12	165	4.5		200	M10	92	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100[1]	180	16	215	5		250	M12	126	28	60	31.3	8
	AM112[1]		18										
	AM132S/M[1]	230	22	265			300		179	38	80	41.3	10
	AM132ML[1]		28										
R..87 F..87 K..87 S..87[4]	AM80	130	12	165	4.5	250	200	M10	87	19	40	21.8	6
	AM90		14							24	50	27.3	8
	AM100	180	16	215	5		250	M12	121	28	60	31.3	8
	AM112		18										
	AM132S/M	230	22	265			300		174	38	80	41.3	10
	AM132ML		28										
	AM160[1]	250	28	300	6		350	M16	232	42	110	45.3	12
	AM180[1]		32							48		51.8	14

1) Check dimension 1/2 G5 because component may protrude past foot-mounting surface if installed on R, K, S or W foot-mounted gear unit.

2) Max. AM100

3) Max. AM90

4) Not with AM180

23 003 100

Fig.1

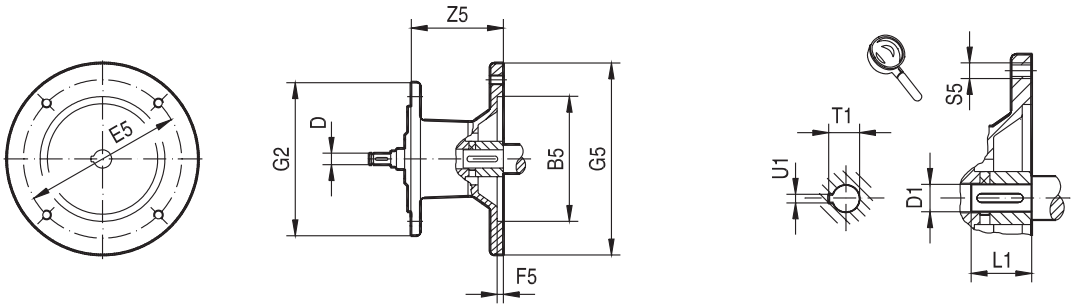
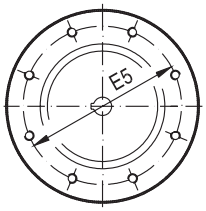


Fig.2



9007204242194571

Gear unit type	Adapter type	Fig.	Dimensions in mm											
			B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1
R..97 F..97 K..97 S..97[1]	AM100	1	180	16	215	5	300	250	M12	116	28	60	31.3	8
	AM112			18										
	AM132S/M		230	22	265			300		169	38	80	41.3	10
	AM132ML			28										
	AM160		250		300	6		350	M16	227	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		268	55		59.3	16
R..107 F..107 K..107	AM100		180	16	215	5	350	250	M12	110	28	60	31.3	8
	AM112			18										
	AM132S/M		230	22	265			300		163	38	80	41.3	10
	AM132ML			28										
	AM160		250		300	6		350	M16	221	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		262	55		59.3	16
	AM225	2	350		400			450		277	60	140	64.4	18
R..137	AM132S/M	1	230	22	265	5	400	300	M12	156	38	80	41.3	10
	AM132ML			28										
	AM160		250		300	6		350	M16	214	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		255	55		59.3	16
	AM225	2	350		400			450		270	60	140	64.4	18

1) Not with AM200

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23 004 100

Fig.1

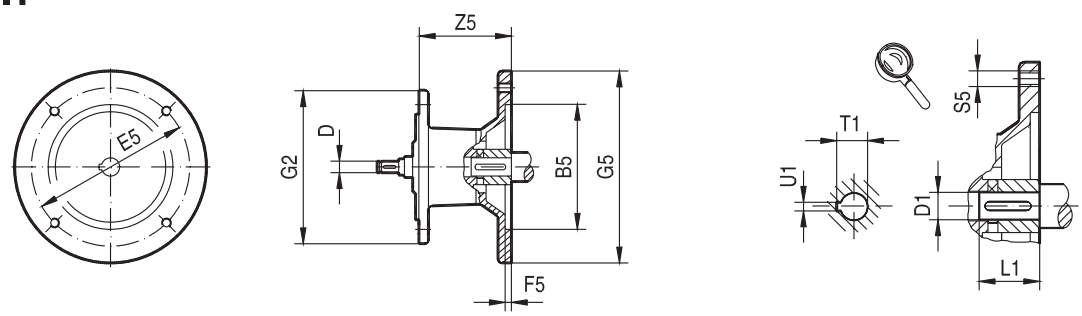
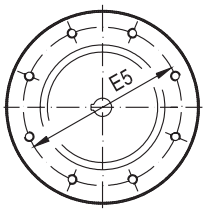


Fig.2



4987456011

Gear unit type	Adapter type	Fig.	Dimensions in mm											
			B5	D	E5	F5	G2	G5	S5	Z5	D1	L1	T1	U1
R..147 F..127 K..127	AM132S/M	1	230	22	265	5	450	300	M12	148	38	80	41.3	10
	AM132ML			28										
	AM160		250	28	300	6		350	M16	206	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		247	55		59.3	16
	AM225	2	350		400			450		262	60	140	64.4	18
	AM250		450	48	500			550		336	65		69.4	
	AM280										75		79.9	20
R..167 F..157 K..157 K..167 K..187	AM160	1	250	28	300	6	550	350		198	42	110	45.3	12
	AM180			32							48		51.8	14
	AM200		300	38	350	7		400		239	55		59.3	16
	AM225	2	350		400			450		254	60	140	64.4	18
	AM250		450	48	500			550		328	65		69.4	
	AM280										75		79.9	20

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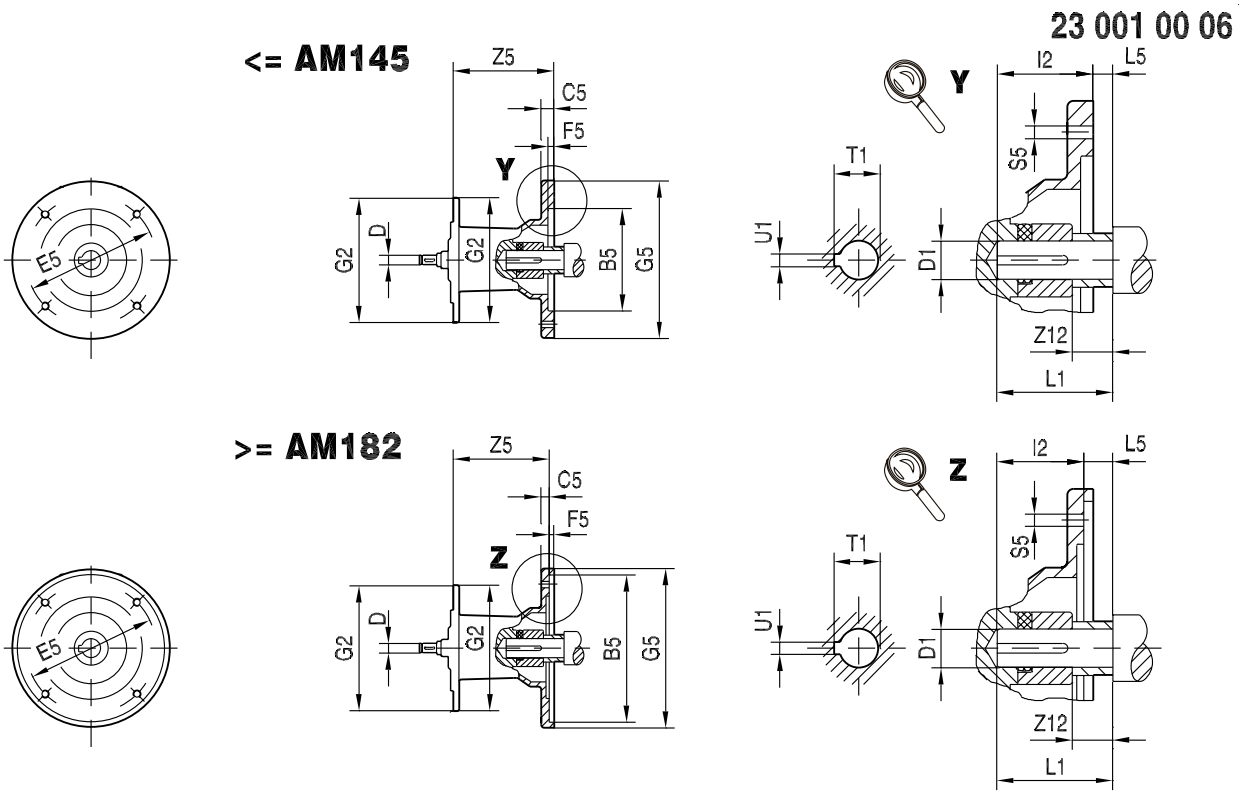
6.9 Adapters for mounting NEMA motors



9007204242131979

Gear unit type	Adapter type	Dimensions in mm															
		B5	C5	D	E5	F5	G2	G5	I2	L5	S5	Z5	Z12	D1	L1	T1	U1
R..27, R..37 F..27, F..37, F..47 K..19, K..29, K..37 S..37, S..47, S..57 W..37	AM56	114.3	11	10	149.2	4.5	120	170	52.55	-4.8	10.5	93.5	16.5	15.875	47	18.1	4.76
	AM143		12	12					54.1	3		117	14.5	22.225	57	24.7	
	AM145			14													
R..47, R..57, R..67 F..57, F..67 K..47, K..57, K..67 S..67 W..47[1)]	AM56		11	10			160		52.55	-4.8		87	16.5	15.875	47	18.1	
	AM143		12	12					54.1	3		110.5	14.5	22.225	57	24.7	
	AM145			14													
	AM182	215.9	10	16	184	5		228	66.85	3	15	147.5	16.5	28.575	69	31.7	6.35
	AM184			18													
	AM213/215		11	22					79.55	6.3		200.5	15.8	34.925	85	38.7	7.94
R..77 F..77 K..77 S..77	AM56	114.3	11	10	149.2	4.5	200	170	52.55	-4.8	10.5	81	16.5	15.875	47	18.1	4.76
	AM143		12	12					54.1	3		103.5	14.5	22.225	57	24.7	
	AM145			14													
	AM182	215.9	10	16	184	5		228	66.85	3	15	139.5	16.5	28.575	69	31.7	6.35
	AM184			18													
	AM213/215		11	22					79.55	6.3		188.5	15.8	34.925	85	38.7	7.94
R..87 F..87 K..87 S..87	AM143	114.3	12	12	149.2	4.5	250	170	54.1	3	10.5	98.5	14.5	22.225	57	24.7	4.76
	AM145			14													
	AM182	215.9	10	16	184	5		228	66.85	3	15	134.5	16.5	28.575	69	31.7	6.35
	AM184			18													
	AM213/215		11	22					79.55	6.3		183.5	15.8	34.925	85	38.7	7.94
	AM254/256		12	28					95.3	6.3		234	8.8	41.275	101	45.8	9.53
	AM284/286	266.7	15	32	228.6			286	111.05	6.3	15	241	15.8	47.625	117	53.4	12.7

1) Max. AM143/AM145

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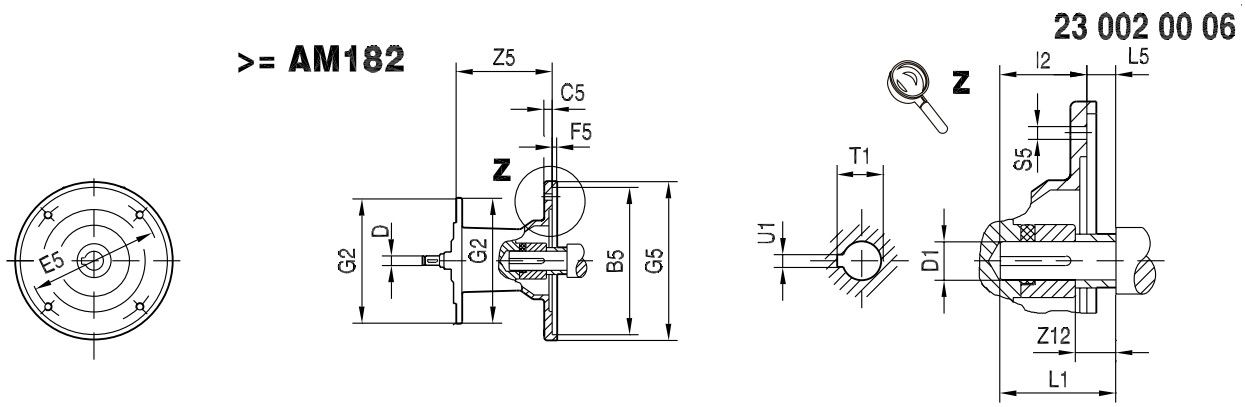

9007204242133899

Gear unit type	Adapter type	Dimensions in mm															
		B5	C5	D	E5	F5	G2	G5	I2	L5	S5	Z5	Z12	D1	L1	T1	U1
R..97 F..97 K..97 S..97	AM182	215.9	10	16	184	5	300	228	66.85	3	15	129.5	16.5	28.575	69	31.7	6.35
	AM184			18													
	AM213/215		11	22					79.55	6.3		178.5	15.8	34.925	85	38.7	7.94
	AM254/256		12	28					95.3			229	8.8	41.275	101	45.8	9.53
	AM284/286	266.7	20	32	228.6			286	111.05			236	15.8	47.625	117	53.4	12.7
	AM324/326	317.5	17	38	279.4			356	127.05		17.5	296	34.8	53.975	133	60	12.7
	AM364/365								143.05					60.325	149	67.6	15.875
R..107 F..107 K..107	AM182	215.9	10	16	184		350	228	66.85	3	15	123.5	16.5	28.575	69.85	31.7	6.35
	AM184			18						6.3							
	AM213/215		11	22					79.55			172.5	15.8	34.925	85.85	38.7	7.94
	AM254/256		12	28					95.3			223	8.8	41.275	101.6	45.8	9.53
	AM284/286	266.7	15	32	228.6			286	111.05			230	15.8	47.625	117.35	53.4	12.7
	AM324/326	317.5	17	38	279.4			356	127.05		17.5	290	34.8	53.975	133.35	60	12.7
	AM364/365								143.05					60.325	149.35	67.6	15.875
R..137	AM213/215	215.9	11	22	184		400	228	79.55		15	165.5	15.8	34.925	85.85	38.7	7.94
	AM254/256		12	28					95.3			216	8.8	41.275	101.6	45.8	9.53
	AM284/286	266.7	15	32	228.6			286	111.05			223	15.8	47.625	117.35	53.4	12.7
	AM324/326	317.5	17	38	279.4			356	127.05		17.5	283	34.8	53.975	133.35	60	12.7
	AM364/365								143.05					60.325	149.35	67.6	15.875
R..147 F..127 K..127	AM213/215	215.9	11	22	184		450	228	79.55		15	157.5	15.8	34.925	85.85	38.7	7.94
	AM254/256		12	28					95.3			208	8.8	41.275	101.6	45.8	9.53
	AM284/286	266.7	15	32	228.6			286	111.05			215	15.8	47.625	117.35	53.4	12.7
	AM324/326	317.5	17	38	279.4			356	127.05		17.5	275	34.8	53.975	133.35	60	12.7
	AM364/365								143.05					60.325	149.35	67.6	15.875
R..167 F..157 K..157 K..167 K..187	AM254/256	215.9	12	28	184		550	228	95.3		15	200	8.8	41.275	101.6	45.8	9.53
	AM284/286	266.7	15	32	228.6			286	111.05			207	15.8	47.625	117.35	53.4	12.7
	AM324/326	317.5	17	38	279.4			356	127.05		17.5	267	34.8	53.975	133.35	60	12.7
	AM364/365								143.05					60.325	149.35	67.6	15.875

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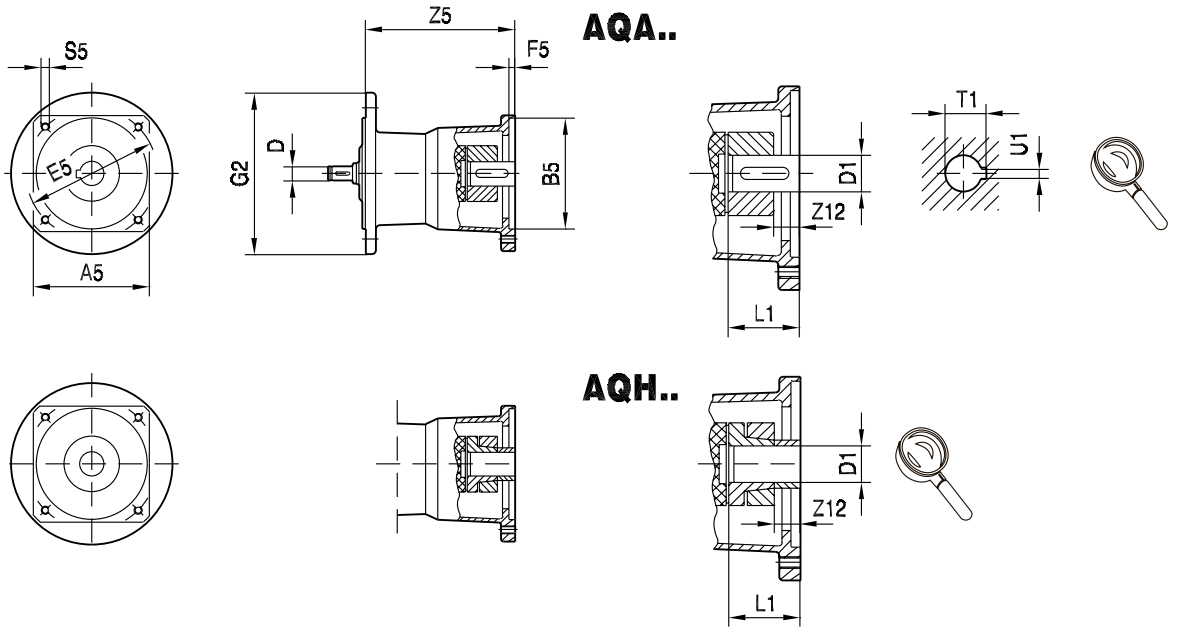
6.10 Adapters for mounting servomotors

23 005 01 00



Gear unit type	Adapter type	Dimensions in mm													
		A5	B5	D	E5	F5	G2	S5	Z5	Z12[1]	Z12[2]	D1	L1	T1[1]	U1[1]
R..27, R..37 F..27, F..37, F..47 K..19, K..29, K..37 S..37, S..47, S..57 W..37	AQ..80/1	82	60	10 12	75	3	120	M5	104.5	5.5	5.5	11	23	12.8	4
	AQ..80/2											14	30	16.3	5
	AQ..80/3		50		95			M6	129.5	-	-				
	AQ..100/1	100	80	10 12 14 16	100	4									5
	AQ..100/2		95		115			M8							
	AQ..100/3		80		100			M6	143.5	2	14	19	40	21.8	6
	AQ..100/4		95		115			M8	152.5	11	23				
	AQ..115/1	115	110		130										
	AQ..115/2														
	AQ..115/3									16	16	24	50	27.3	8
R..47, R..57, R..67 F..57, F..67 K..47[3], K..57, K..67 S..67 W..47	AQ..80/1	82	60	10 12	75	3	160	M5	98	5.5	5.5	11	23	12.8	4
	AQ..80/2											14	30	16.3	5
	AQ..80/3		50		95			M6	122.5	-	-				
	AQ..100/1	100	80	10 12 14 16	100	4									
	AQ..100/2		95		115			M8							
	AQ..100/3		80		100			M6	136.5	2	14	19	40	21.8	6
	AQ..100/4		95		115			M8	145.5	11	23				
	AQ..115/1	115	110		130										
	AQ..115/2														
	AQ..115/3									16	16	24	50	27.3	8
	AQ..140/1	140	130	16 18 22	165	5		M10	175						
	AQ..140/2														
	AQ..140/3								188	22	22	32	60	35.5	10
	AQ..140/4											28		31.3	8
	AQ..160/1	162	155		190							32		35.3	10
	AQ..190/1	190	130	22 28	215			M12	237.5	24	24				
	AQ..190/2		180												
	AQ..190/3								261.5	34	34	38	80	41.3	

1) For variants with keyway (AQA..)

2) For variants with clamping ring hub (AQH..)

3) Not with AQ190

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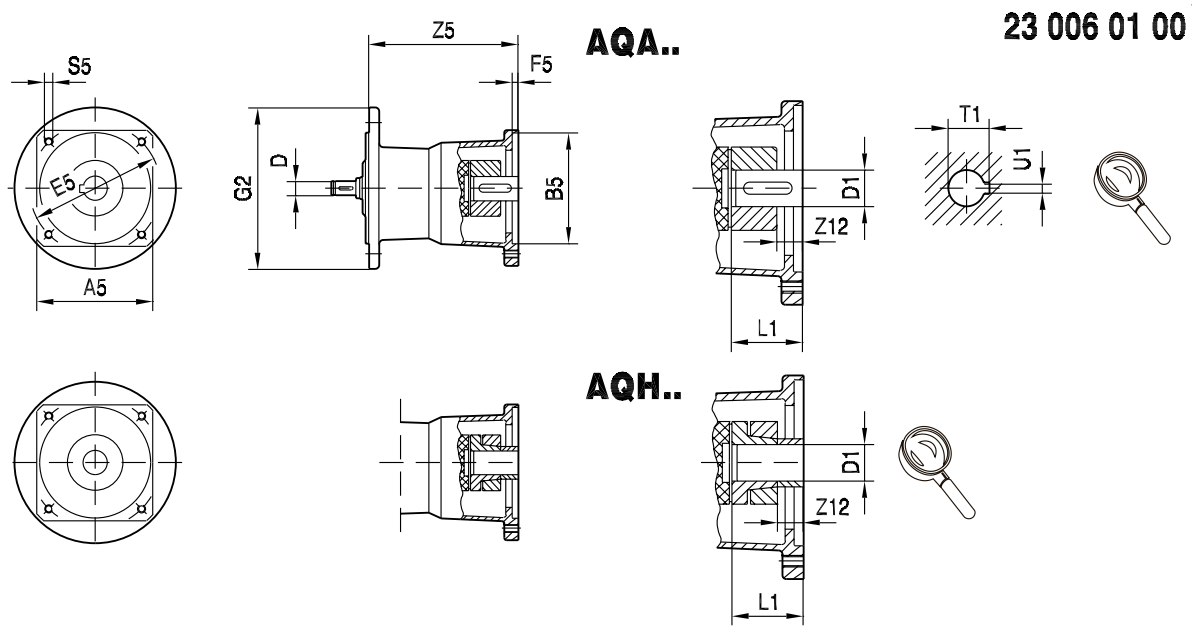

Gear unit type	Adapter type	Dimensions in mm													
		A5	B5	D	E5	F5	G2	S5	Z5	Z12[1]	Z12[2]	D1	L1	T1[1]	U1[1]
R..77 F..77 K..77 S..77	AQ..80/1	82	60	10 12	75	3	200	M5	92	5.5	5.5	11	23	12.8	4
	AQ..80/2											14	30	16.3	5
	AQ..80/3		50		95			M6							
	AQ..100/1	100	80	10 12 14 16	100	4			115.5	-	-				
	AQ..100/2		95		115			M8							
	AQ..100/3		80		100			M6	129.5	2	14	19	40	21.8	6
	AQ..100/4		95		115			M8							
	AQ..115/1	115			130				138.5	11	23				
	AQ..115/2		110												
	AQ..115/3									16	16	24	50	27.3	8
	AQ..140/1	140	130	16 18 22	165	5		M10	167						
	AQ..140/2														
	AQ..140/3								180	22	22	32	60	35.3	10
	AQ..140/4											28		31.3	8
	AQ..160/1	162	155		190							32		35.3	10
	AQ..190/1	190	130	22 28	215			M12	225.5	24	24			35.3	
	AQ..190/2		180												
	AQ..190/3								249.5	34	34	38	80	41.3	
R..87 F..87 K..87 S..87	AQ..100/1	100	80	12 14 16	100	4	250	M6	110.5	-	-	14	30	16.3	5
	AQ..100/2		95		115			M8							
	AQ..100/3		80		100			M6	124.5	2	14	19	40	21.8	6
	AQ..100/4		95		115			M8							
	AQ..115/1	115			130				133.5	11	23				
	AQ..115/2		110												
	AQ..115/3									16	16	24	50	27.3	8
	AQ..140/1	140	130	16 18 22	165	5		M10	162						
	AQ..140/2														
	AQ..140/3								175	22	22	32	60	35.3	10
	AQ..140/4											28		31.3	8
	AQ..160/1	162	155		190							32		35.3	10
	AQ..190/1	190	130	22 28	215			M12	220.5	24	24				
	AQ..190/2		180												
	AQ..190/3								244.5	34	34	38	80	41.3	

1) For variants with keyway (AQA..)

2) For variants with clamping ring hub (AQH..)

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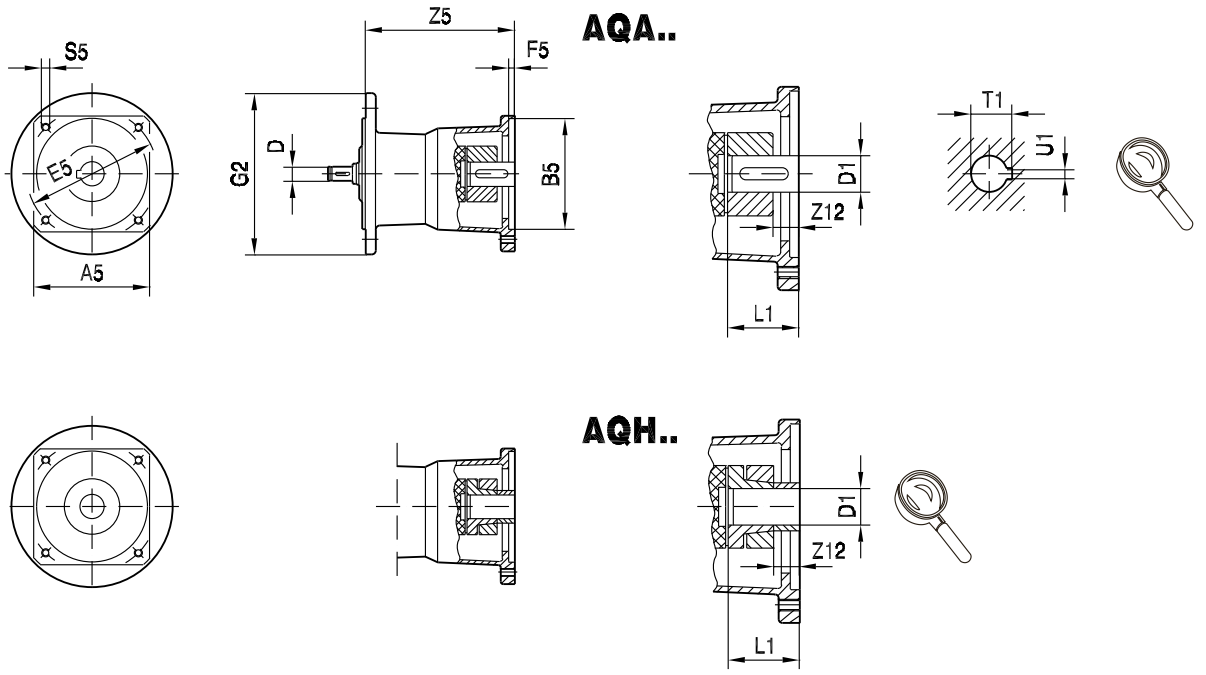

Gear unit type	Adapter type	Dimensions in mm													
		A5	B5	D	E5	F5	G2	S5	Z5	Z12[1]	Z12[2]	D1	L1	T1[1]	U1[1]
R..97 F..97 K..97 S..97	AQ..140/1	140	110	16 18 22	165	5	300	M10	157	16	16	24	50	27.3	8
	AQ..140/2		130						170	22	22	32	60	35.3	10
	AQ..140/3											28		31.3	8
	AQ..140/4											32		35.3	10
	AQ..160/1	162	155		190										
	AQ..190/1	190	130	22 28	215			M12	215.5	24	24				
	AQ..190/2		180												
	AQ..190/3								239.5	34	34	38	80	41.3	
R..107 F..107 K..107	AQ..140/1	140	110	16 18 22	165		350	M10	151	16	16	24	50	27.3	8
	AQ..140/2		130						164	22	22	32	60	35.3	10
	AQ..140/3											28		31.3	8
	AQ..140/4											32		35.3	10
	AQ..160/1	162	155		190										
	AQ..190/1	190	130	22 28	215			M12	209.5	24	24				
	AQ..190/2		180												
	AQ..190/3								233.5	34	34	38	80	41.3	
R..137	AQ..190/1		130				400		202.5	24	24	32	60	35.3	
	AQ..190/2		180												
	AQ..190/3								226.5	34	34	38	80	41.3	
R..147 F..127 K..127	AQ..190/1		130				450		194.5	24	24	32	60	35.3	
	AQ..190/2		180												
	AQ..190/3								218.5	34	34	38	80	41.3	

1) For variants with keyway (AQA..)

2) For variants with clamping ring hub (AQH..)

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6.11 Gear unit mounting

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

Exception

Use bolts of **quality 10.9** for the the customer flange mounting to transmit the nominal torques for the following flange-mounted helical gearmotors (RF../RZ..) and foot/ flange-mounted versions (R..F):

- RF37, R37F with flange Ø 120 mm
- RF47, R47F with flange Ø 140 mm
- RF57, R57F with flange Ø 160 mm
- RF147 with flange ∅ 450 mm
- RF167 with flange ∅ 550 mm
- RZ37 – RZ87

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6.12 Torque arms

6.12.1 Available torque arms

NOTICE

Danger due to static overdetermination if gear units with foot (e.g. KA19/29B, KA127/157B or FA127/157B) are mounted both via the torque arm and via the foot plate.

Risk of injuries and damage to property.

- Especially with the KA.9B/T variant, it is not permitted to use the foot plates and the torque arm at the same time.
- The KA.9B/T variant may only be mounted via torque arms.
- K.9 or KA.9B variants may only be mounted via the foot plate.
- If you want to use foot plates and torque arms for mounting, consult with SEW-EURODRIVE.

Gear units	Size	
	19	29
KA, KH, KV, KT	1 068 411 5	1 068 410 7

Gear units	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 units	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 units	Size				
	10	20	30	37	47
WA	1 061 021 9	1 68 073 0	1 68 011 0	1 061 129 0	1 061 187 8

6.12.2 Torque arms for KH167.., KH187..

As standard, torque arms are not available for gear unit sizes KH167.. and KH187... Consult SEW-EURODRIVE if you need torque arms for these gear units.

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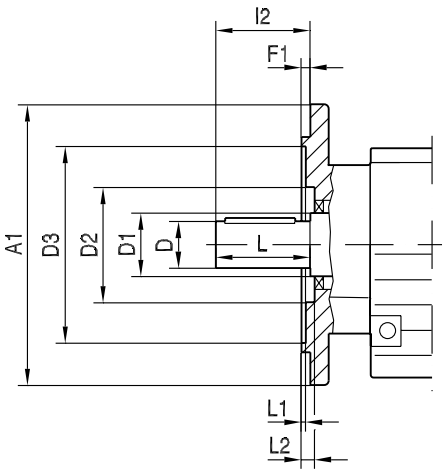
6.13 Flange contours of RF.. and R..F gear units



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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	l2	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					-	
	160[1)]					100	3.5			2.5	–	6.5
RF17, R17F	120		25	46	46	65	3			1	1	5
	140				-	78					–	
	160[1)]					95	3.5					6
RF27, R27F	120	25	30	54	54	66	3	50	50	1	1	6
	140				–	79				3	-	7
	160					92	3.5					
RF37, R37F	120		35	60	63	70	3			5	4	
	160				–	96	3.5			1	-	7.5
	200[1)]					119						
RF47, R47F	140	30		72	64	82	3	60	60	4	1	6
	160				–	96	3.5			0.5	-	6.5
	200					116						
RF57, R57F	160	35	40	76	75	96		70	70	4	2.5	5
	200				–	116				0	-	
	250[1)]					160	4			0.5		5.5
RF67, R67F	200		50	90	90	118	3.5			2	4	7
	250				–	160	4			1	-	7.5
RF77, R77F	250	40	52	112	100	160		80	80	0.5	2.5	7
	300[1)]				-	210					–	
RF87, R87F	300	50	62	123	122	210		100	100	0	1.5	8
	350				-	226	5			1	-	9
RF97		60	72	136		236		120	120	0		9
	450					320						

Table continued on next page.

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

Type	Dimensions in mm											
	A1	D	D1	D2		D3	F1	I2	L	L1		L2
				RF	R..F					RF	R..F	
RF107	350	70	82	157		232	5	140	140	0		11
	450			186		316						
RF137		90	108	180		316		170	170			10
	550					416						
RF147	450	110	125	210		316		210	210			
	550					416						
RF167		120	145	290		416				1,		
	660					517	6			2		11

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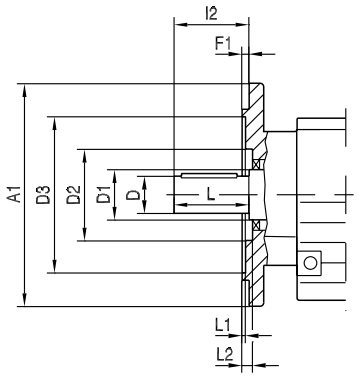
6.14 Flange contours of FF.., KF.., SF.. and WF.. gear units



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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	I2	L	L1	L2
FF27	160	25	40	66	96	3.5	50	50	3	18.5
FF37			30	70	94				2	6
FF47	200	30	40	72	115		60	60	3.5	7.5
FF57	250	35		84	155	4	70	70	4	9
FF67	250	40	50				80	80		
FF77	300	50	55	82	205		100	100	5	
FF87	350	60	65	115	220	5	120	120		
FF97	450	70	75	112	320		140	140	8	10
FF107		90	100	159	318		170	170	16	9
FF127	550	110	118	-	420		210	210	10	-
FF157	660	120	135	190	520	6			8	14
KF19	120	20	25	-	70	2.5	40	40	-	11.5
KF19	160				100					
KF29		25	30		109	3.5	50	50		6.5
KF29	200				115					
KF37	160			70	94				2	6
KF47	200	30	40	72	115		60	60	3.5	7.5
KF57	250	35		84	155	4	70	70	4	9
KF67		40	50				80	80		
KF77	300	50	55	82	205		100	100	5	
KF87	350	60	65	115	220	5	120	120		
KF97	450	70	75	112	320		140	140	8	10
KF107		90	100	159	318		170	170	16	9
KF127	550	110	118	-	420		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		–	96	3.5			5.5	
SF47		25	30	70	94		50	50	2	6
SF57	200	30	40	72	115		60	60	3.5	7.5
SF67		35	45	–			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		140	140	8.5	
WF10	80	16	25	–	39	2.5	40	40	30	–
WF10	120		25	39	74	3			5	30

Table continued on next page.

Type	Dimensions in mm									
	A1	D	D1	D2	D3	F1	I2	L	L1	L2
WF20	110	20	30	44	53	-4	40	40	27	35
WF20	120			-	45	2.5			37.5	-
WF30				48	63				18	27
WF30	160								33	42
WF37	120			-	70				-	10.5
WF37	160									25.5
WF47		30	35		92	3.5	10	60	6	–

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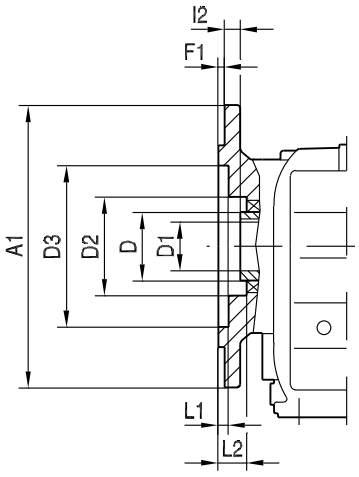
6.15 Flange contours of FAF.., KAF.., SAF.. and WAF.. gear units



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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		45	30	62	94		24	2	30
FAF47	200	50	35	70	115		25	3.5	31.5
FAF57	250	55	40	76	155	4	23.5	4	31
FAF67							23		
FAF77	300	70	50	95	205		37	5	45
FAF87	350	85	60	120	220	5	30		39
FAF97	450	95	70	135	320		41.5	5.5	51
FAF107		118	90	224			41	16	52
FAF127	550	135	100	185	420		51	6	63
FAF157	660	155	120	200	520	6	60	10	74
KAF19	120	30	20	60	70	2.5	25	9	25.5
KAF19	160				100				
KAF29	160	40	25 / 30	-	105	3.5	33.5	-	6.5
KAF29	200			–	118				
KAF37	160	45	30	62	94		24	2	30
KAF47	200	50	35	70	115		25	3.5	8.5
KAF57	250	55	40	76	155	4	23.5	4	31
KAF67							23		
KAF77	300	70	50	95	205		37	5	45
KAF87	350	85	60	120	220	5	30		39
KAF97	450	95	70	135	320		41.5	5.5	51
KAF107		118	90	224			41	16	52
KAF127	550	135	100	185	420		51	6	63
KAF157	660	155	120	200	520	6	60	10	74
SAF37	120	35	20	-	68	3	15	6	-
SAF37	160				96	3.5		5.5	
SAF47		45	30 / 25	62	94		24	2	30
SAF57	200	50	35 / 30	70	115		25	3.5	31.5
SAF67		65	45 / 40	91			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

Table continued on next page.

Type	Dimensions in mm								
	A1	D	D1	D2	D3	F1	I2	L1	L2
SAF97	450	120	90 / 70	160	320	5	60	6.5	69
WAF10	80	25	16	-	39	2.5	23	30	–
WAF10	120			39	74	3		5	30
WAF20	110	30	18 / 20	44	53	-4	30	27	35
WAF20	120			-	45	2.5		37.5	-
WAF30			20	48	63		19.5	18	27
WAF30	160				63		34.5	33	42
WAF37	120	35	20 / 25	54	70		19.5	10.5	27
WAF37	160						34.5	25.5	42
WAF47		45	25 / 30	72	92	3.5	10	6	45

6.16 Fixed covers

The following gear unit types with hollow shaft and shrink disk are equipped with a rotating cover as standard:

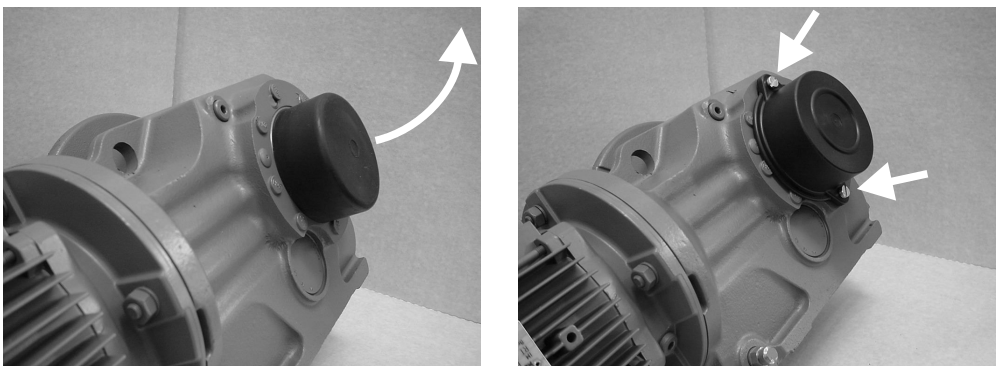
- Parallel-shaft helical, helical-worm and SPIROPLAN® gear units of sizes 37 – 97
- Helical-bevel gear units of sizes 19 – 29 and 37 – 97

If you require a fixed cover for safety reasons, the relevant part numbers can be found in the next chapter.

The following gear unit types with hollow shaft and shrink disk come equipped with a fixed cover with gasket as standard.

- Explosion-proof parallel-shaft, helical-bevel, helical-worm and SPIROPLAN® gear units
- Parallel-shaft helical gear units size 27
- Parallel-shaft and helical-bevel gear units size 107 and greater

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

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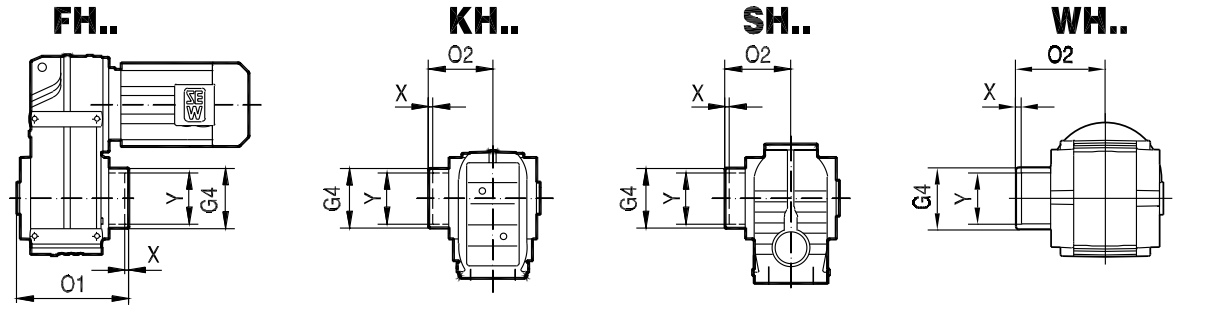
6.16.1 Part numbers and dimensions for fixed covers



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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 in mm	78	88	100	100	121	164	185
O1 in mm	157	188.5	207.5	221.5	255	295	363.5
X in mm	2	4.5	7.5	6	6	4	6.5
Y in mm	75	83	83	93	114	159	174

Helical-bevel gearmotors[1)]	KH..19	KH..29
Part number	1 068 415 8	1 068 416 6
G4 in mm	62	68
O2 in mm	83	90
X in mm	2	4
Y in mm	50	60

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

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 shaft 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

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6.17 Condition monitoring: Oil aging sensor

6.17.1 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	Polyglycol CLP PG	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: Maximum temperature exceeded T_{max} 4: DUO10A is ready for operation		
Permitted oil temperature	-40°C – +130°C		
Permitted temperature sensor	PT1000		
EMC	IEC1000-4-2/3/4/6		
Ambient temperature	-25°C – +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		

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Designations and part numbers

Designation	Description	Part number
DUO10A  *4310626315*	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	Angle bracket	1 343 880 8
DUO10A D = 34	Installation clamp	1 343 879 4
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  *4310631563*	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

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7 Important information on selection tables and dimension drawings

7.1 Possible geometrical combinations

7.1.1 Structure of the combination tables

These tables show geometrically possible combinations of single-speed gear units and AC (brake) motors. Contact SEW-EURODRIVE for information on pole-changing AC (brake) motors.

For each combination, the input speed n_e = 1400 rpm and the output speed n_a, the maximum output torque M_{amax}, the permitted overhung load F_{RA} at maximum output torque (valid for foot-mounted gear units with solid shaft), the torsion angle φ (/R) and the gear unit ratio are specified.

If no value is specified for the torsion angle $\varphi_{(/R)}$, the gear unit with this gear unit ratio is not available with "reduced backlash (/R)" option. If a numerical value is given, this gear unit is also available with "reduced backlash (/R)" option. The numerical value specifies the rotational clearance of the reduced backlash version in angular minutes '.

R77, n_e=1400 1/min											820Nm
n_a rpm	M_{amax} Nm	F_{Ra} [1] N	$\varphi_{(/R)}$ ´	i	DR63S DR63M ...	DRN80M DRN90S ...	DRN90L	DRN100LS DRN100L ...	DRN112M	DRN132S DRN132M ...	DRN132L DRN160M
				3							
7.2	820	9920	6.4	195.24*							
8.4	820	9920	6.5	166.59							

Gear unit ratio; a value with * refers to finite gear unit ratio

No value (-): The reduced backlash option (/R) is not possible for this i
Numerical value: Reduced backlash option is possible möglich; the numeric value indicates the rotational clearance of the reduced backlash design in angular minutes.

Permitted overhung load at maximum output torque M_{amax} ; [1] The value refers to the foot-mounted design with solid shaft

Maximum output torque

Output speed

Combination with motor in the header **is possible**.

Combination with motor in the header **is not possible**.

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2 Number of stages of the gear ratios (1, 2 or 3 stages). Helical gear units (R) – with the exception of the single-stage RX gear units – and parallel-shaft helical gear units (F) have 2 or 3 stages, depending on the gear unit ratio.

RX helical, helical-bevel, helical-worm and SPIROPLAN® gear units (RX, K, S, and W) have a defined number of stages:

- RX helical gear units: RX.. always single-stage
- Helical-bevel gear unit: K..7 always 3-stage, K..9 always 2-stage

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- Helical-worm gear units: always 2-stage
- SPIROPLAN® gear units: W..10 to W..30 always single-stage, W..37 and W..47 always 2-stage

Stages of the double gear unit ratios (2-2, 3-3, 2-3 or 3-2 stages). The number of stages of the primary gear unit (= small gear unit) is given on the right; the number of stages of the output gear unit (= large gear unit) is given on the left. The primary gear unit of the double gear unit is always a helical gear unit.

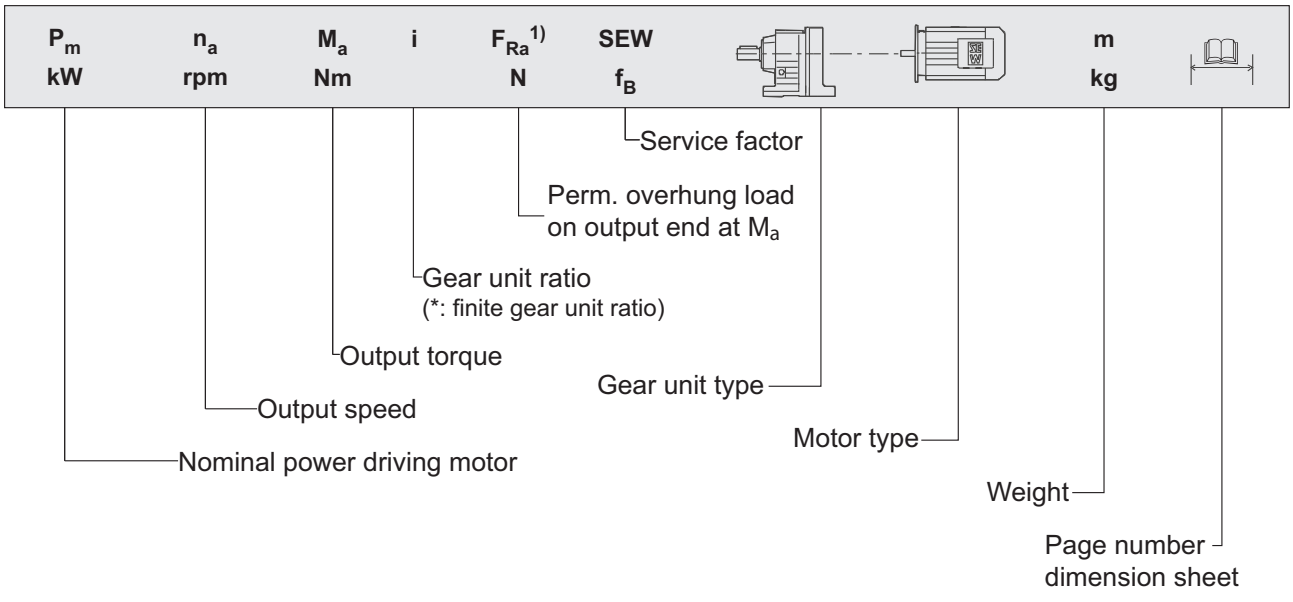
7.2 Selection tables for gearmotors

7.2.1 Structure of the selection tables

The two figures below illustrate the structure of the selection tables for gearmotors. There are two types of selection tables:

1. For standard output speeds, sorted according to the rated power P_m of the driving motor in kW.
2. For particularly low output speeds, multi-stage gearmotors are always sorted according to the maximum permitted output torque $M_{a\,max}$ in Nm.

Table for standard output speeds:



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[1] Overhung load for foot-mounted gear units with solid shaft; overhung loads for other gear unit types upon request

INFORMATION

Only applies to SPIROPLAN® (W) gearmotors:

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

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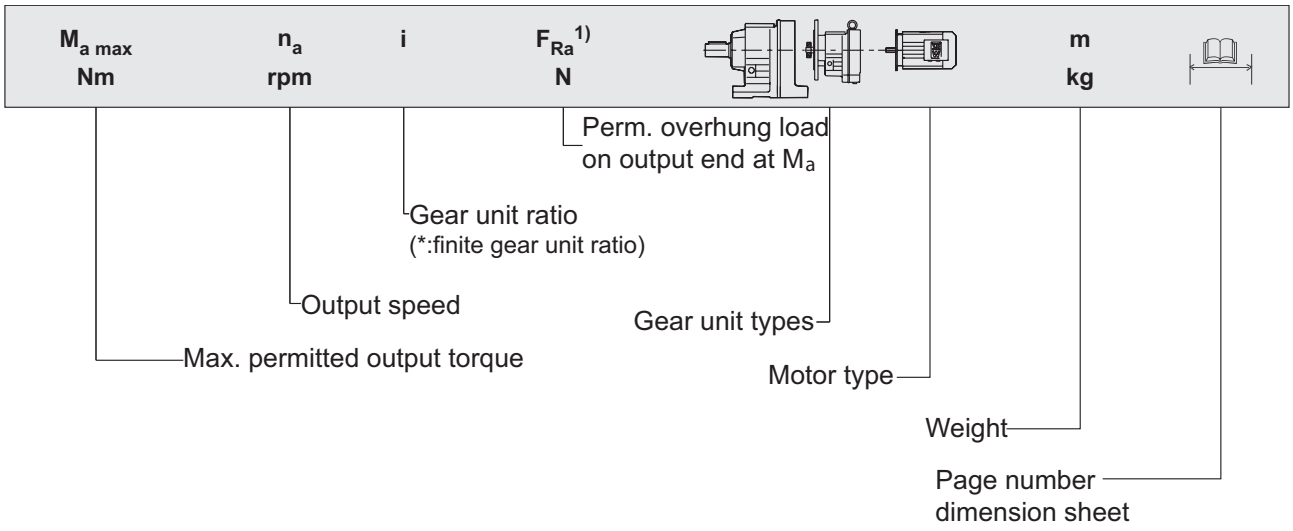
Table for extremely low output speeds (multi-stage gearmotors):



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

INFORMATION

In drives for particularly low output speeds (multi-stage gearmotors), the motor power must be limited to the maximum permitted output torque of the gear unit.

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7.3 Dimension sheet information

7.3.1 Symbols for scope of delivery

Standard parts supplied by SEW-EURODRIVE.

Standard parts not supplied by SEW-EURODRIVE.

7.3.2 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 holes in accordance with 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 (shallow pattern)

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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 possible flanges for each size are shown in the relevant dimension sheets.

7.3.3 Eyebolts, lifting eyes

R07...R27 helical gear units, motors up to DR100 and the SPIROPLAN® gearmotors W..10 to W..30 are delivered without special transportation fixtures. All other gear units and motors are equipped with cast-on lifting eyes, screw-on lifting eyes or screw-on eyebolts.

Gear unit/motor type	Screw-on		Cast-on
	Eyebolts	Lifting eyes	Eyebolts
R..37 – R..57	-	•	–
R..67 – R..167	•	–	–
RX57 – RX67	-	•	–
RX77 – RX107	•	–	–
F..27 – F..157	-	-	•
K..19 – K..29	-	•	–
K..37 – K..157	-	-	•
K..167 – K..187	•	–	–
S..37 – S..47	-	•	–
S..57 – S..97	-	-	•
W37 – W47	-	•	–
≥ DR112	•	–	–

7.3.4 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.

7.3.5 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.

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7.3.6 Splined hollow shaft

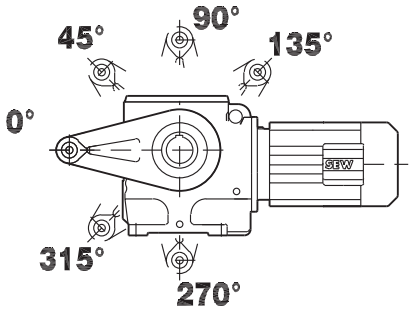
FV.. hollow shaft gear unit sizes 27 to 107, and KV.. sizes 37 to 107 are supplied with splining according to standard 5480.

7.3.7 Rubber buffer for FA/FH/FV/FT

Preload rubber buffer by the indicated value ΔL The characteristic curve of the rubber buffers is available from SEW-EURODRIVE on request.

7.3.8 Position of the torque arm

The following illustration shows the possible torque arm positions for helical-worm gear units, the 2-stage K..9 helical-bevel gear units, and SPIROPLAN® gear units (135 ° position not possible with SPIROPLAN® gear units) as well as the respective angles:



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For more information about torque arms, refer to the respective dimension sheets of the gearmotors.

Gearmotor	Dimension sheets on page
Helical-bevel gearmotors	(→ 🗎 513)
Helical-worm gearmotors	(→ 🗎 619)
SPIROPLAN® gearmotors	(→ 🗎 701)

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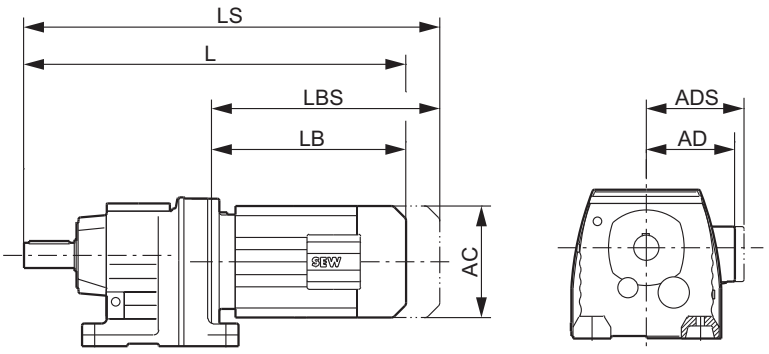
7.3.9 Dimension designations of motors

The following is an overview of the motor dimension designations:



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L	Total length of gearmotor
LS	Total length of gearmotor including brake
LB	Length of motor
LBS	Length of brakemotor
AC	Diameter of motor
AD	Center of motor shaft to top part of terminal box
ADS	Center of brakemotor shaft to top part of terminal box

7.4 Gearmotor dimensions

7.4.1 Motor options

The motor dimensions may change when installing motor options. Refer to the dimension drawings of the motor options in the "AC Motors" catalog.

7.4.2 Special designs

The terminal box dimensions in special designs might vary from the standard.

7.4.3 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.

7.4.4 FZ../KZ.. gear unit designs

The gear unit designs FZ../KZ.. are not considered in the gearmotor dimension sheets. Contact SEW-EURODRIVE if required.

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