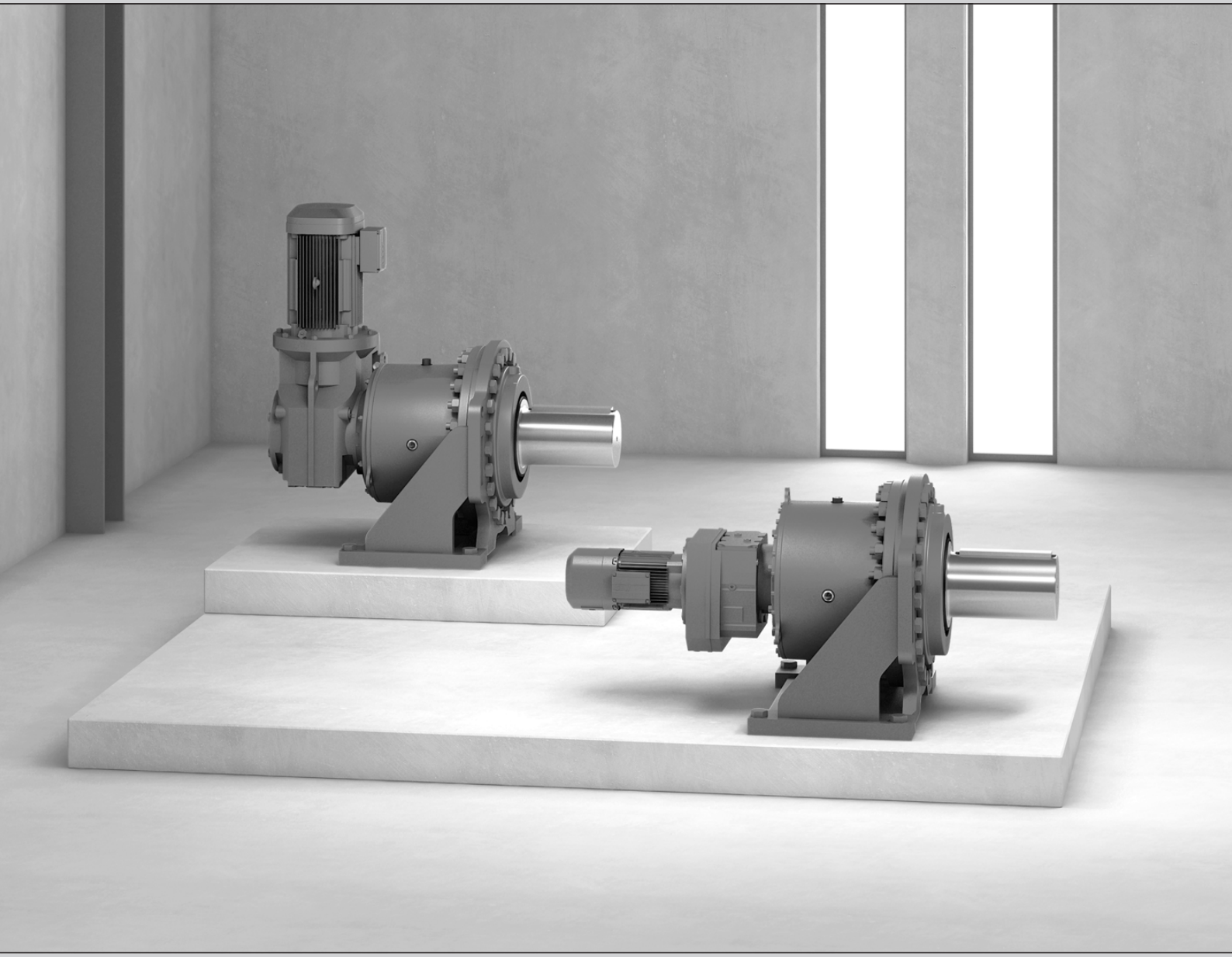
SEW EURODRIVE

Assembly and Operating Instructions



Industrial Gear Units

P.002 – P.102 Series Planetary Gearmotors

Torque Classes from 24 – 631 kNm

Edition 12/2022

27788024/EN

Contents

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1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Other applicable documentation

The following documentation and documents should also be observed:

- When operating gearmotors, also observe the safety notes for motors and primary gear units in the accompanying operating instructions.
- Operating instructions of any attached options
- Order-specific documents, such as dimension sheet and order confirmation
- P.002 – P.102 series catalog

1.3 Structure of the safety notes

1.3.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes:

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

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1.3.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard
	Warning of hot surfaces
	Warning about suspended load
	Warning of automatic restart

1.3.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

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1.4 Decimal separator in numerical values

In this document, a period is used to indicate the decimal separator.

Example: 30.5 kg

1.5 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 Copyright notice

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2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Duties of the user

As the user, you must ensure that the basic safety notes are observed and complied with. Make sure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it.

As the user, you must ensure that all of the work listed in the following is carried out only by qualified specialists:

- Setup and installation
- Installation and connection
- Startup
- Maintenance and repairs
- Shutdown
- Disassembly

Ensure that the persons who work on the product pay attention to the following regulations, conditions, documentation, and information:

- National and regional safety and accident prevention regulations
- Warning and safety signs on the product
- All other relevant project planning documents, installation and startup instructions, and wiring diagrams
- Do not assemble, install or operate damaged products
- All system-specific specifications and conditions

Ensure that systems in which the product is installed are equipped with additional monitoring and protection devices. Observe the applicable safety regulations and legislation governing technical work equipment and accident prevention regulations.

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2.3 Target group

Specialist for mechanical work

Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of mechanics in accordance with the national regulations
- Familiarity with this documentation

Specialist for electrotechnical work

Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications:

- Qualifications in the field of electrical engineering in accordance with the national regulations
- Familiarity with this documentation

Additional qualifications

In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation.

The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.

Instructed persons

All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.4 Designated use

The industrial gear units are gear units run by motors for industrial and commercial systems. The units may only be run at the speeds and powers shown in the technical data or on the nameplate. Implementing gear unit loads other than the permitted values or operating the gear units in areas of application other than industrial and commercial systems is only permitted after consultation with SEW-EURODRIVE.

Using these products in potentially explosive atmospheres is prohibited, unless specifically designated otherwise.

In compliance with the EC Machinery Directive 2006/42/EC, the industrial gear units are partly completed machinery for installation in machinery and systems. In the scope of the EC directive, you must not take the machinery into operation in the designated fashion until you have established that the end product complies with Machinery Directive 2006/42/EC.

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2.5 Symbols on the gear unit

Symbols, nameplates, or information signs can become dirty or otherwise illegible over time. Always make sure that safety, warning, and operating notes are legible. Replace damaged symbols, nameplates, and information signs.

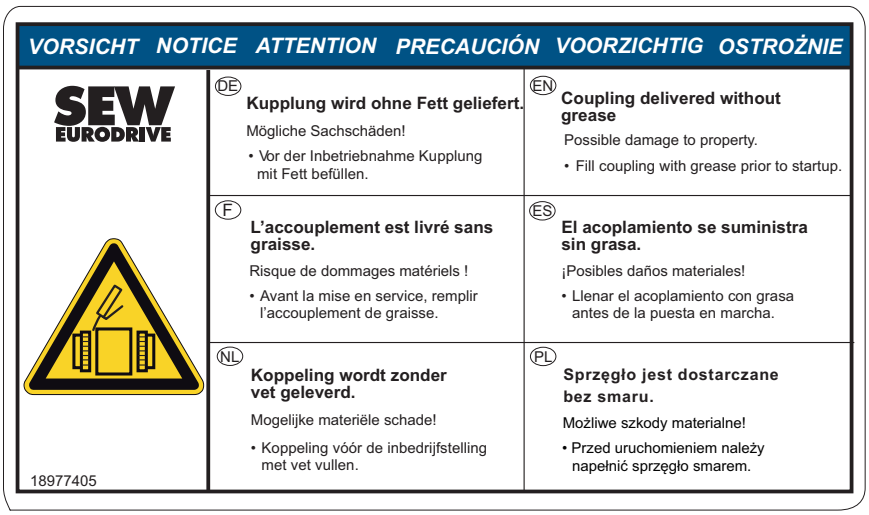
Observe the symbols on the gear unit. They have the following meaning:

Symbol	Meaning
	Indicates the **oil filling location**. Also serves as proper venting during the oil change.
	Indicates the **oil drain**.
	Indicates the position of the **breather**. Serves to avoid mistaking the oil measuring position for the venting position.
	Helps avoid errors caused by lack of understanding. Read the information in the operating instructions.
	Indicates the **oil sight glass**.
	Indicates the **oil dipstick**.
	Indicates the **magnetic oil drain plug**.
	Indicates the positions for **relubrication** and makes it easier to find the locations to be lubricated. Helps avoid bearing damage.
	Indicates the **water supply** and serves to locate the connection option.
	Indicates the **water return** and serves to locate the connection option.
	Indicates the **oil supply** and serves to locate the connection option.
	Indicates the **oil return** and serves to locate the connection option.

Symbol	Meaning
	For pivoted mounting positions, this symbol on the information sign indicates the mounting position of the gear unit for **checking the oil**.
	Indicates the position of the **temperature sensor/temperature switch**.
	Indicates the **grease drain plug** and serves to locate the grease drain. Helps avoid bearing damage.
	Indicates the **air outlet screw**.
	Caution: Risk of burns due to hot surface.
	Caution: Removing the dipstick during operation may result in damage to the gear unit.
	Caution: Risk of burns due to hot gear oil.

After startup, you may remove the following labels from the gear unit.

Meaning
The coupling is delivered without grease.



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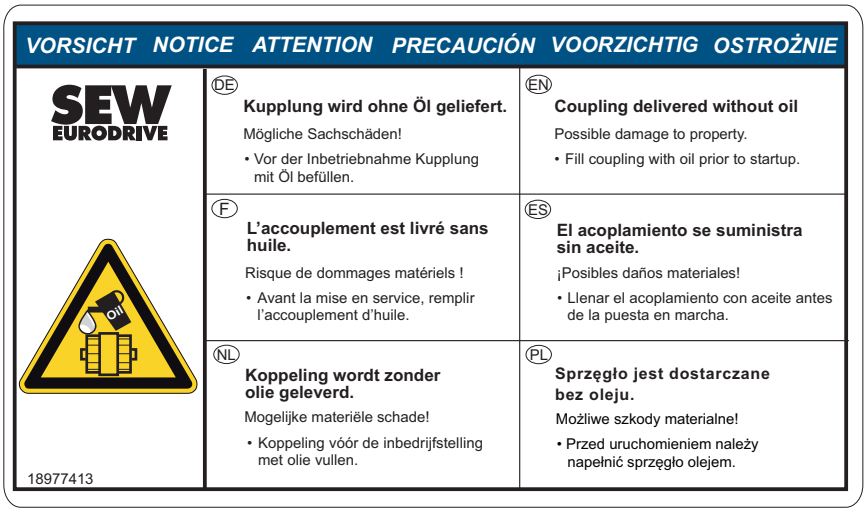
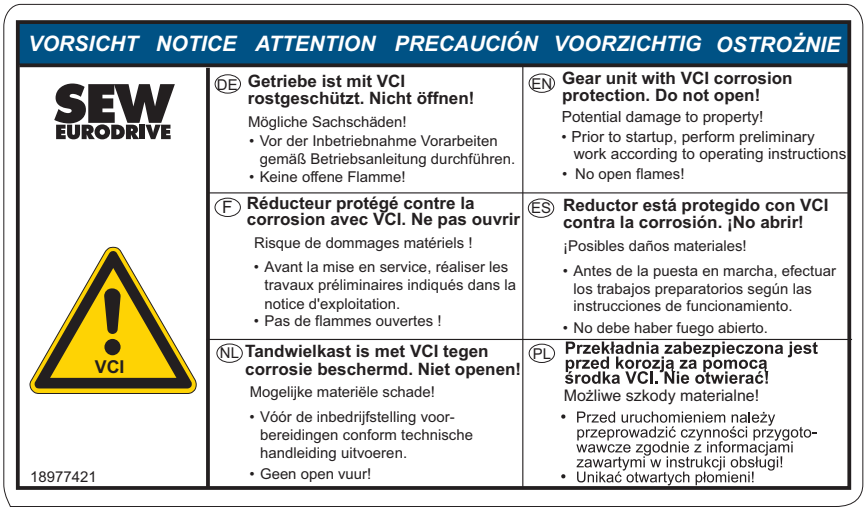
Meaning

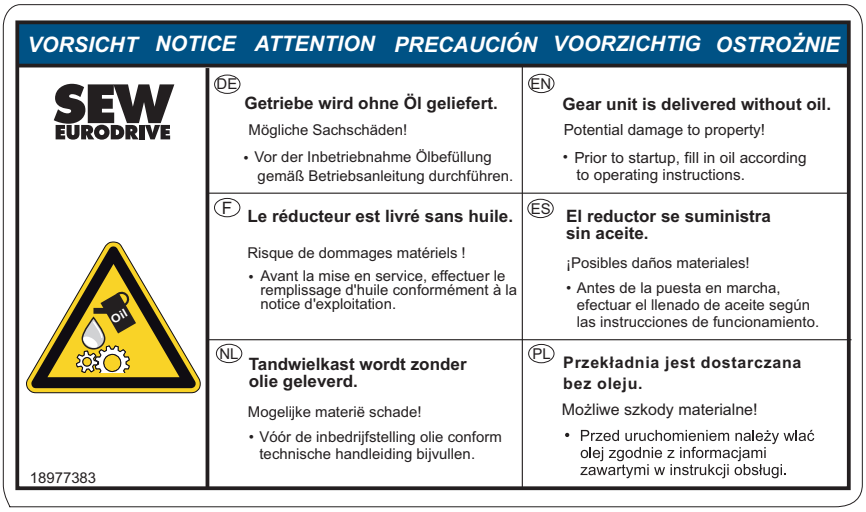
The coupling is delivered without oil.



The gear unit is protected against corrosion with VCI.



The gear unit is delivered without oil.



2.6 Symbols on the dimension sheet

The safety symbols on the dimension sheet must be observed. They have the following meaning:

Safety symbol	Meaning
	Indicates the **oil filling location**.
	Indicates the **oil drain**.
	Indicates the position of the **breather**.
	Indicates the position of the attachment points for **transport**.
	Indicates the position of the **oil dipstick**.
	Indicates the position of the **oil sight glass**.
	Indicates the position(s) that need to be **lubricated**.
	Indicates the position of the **grease nipples** on the gear unit.
	Indicates the position of the **grease outlet**.
	Indicates the position of the **magnetic screw plug**.
	Indicates the position of the **oil heater**.
	Indicates the oil level plug.

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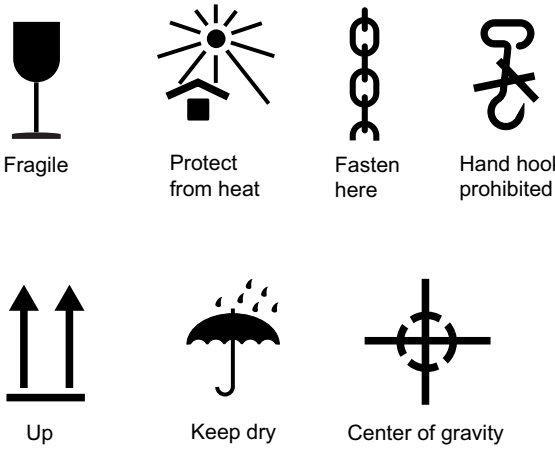
2.7 Symbols on the packaging

The symbols on the packaging must be observed. They have the following meaning:



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2.8 Transport

2.8.1 Notes on transport

Observe the following notes during transport.

⚠ WARNING

Suspended loads can fall.

Severe or fatal injuries.

- Do not stand under the suspended load.
- Secure the danger zone.
- Use suitable, sufficiently rated, and undamaged handling equipment.
- Consider the gear unit dimensions, the center of gravity, and the weight that has to be moved when selecting lifting equipment or crane (see dimension drawing). The weight to be moved is the total weight of the drive package including mount-on components (not only the weight of the gear unit).

⚠ WARNING

Lifted loads may fall over.

Severe or fatal injuries.

- Secure the gear unit against falling over during the lifting process.
- Secure the danger zone.
- Use suitable, sufficiently rated, and undamaged handling equipment.
- Consider the gear unit dimensions, the center of gravity, and the weight that has to be moved when selecting lifting equipment or crane (see order documents). The weight to be moved is the total weight of the drive package including mount-on components (not only the weight of the gear unit).

⚠ CAUTION

Risk of slipping of unsecured mount-on components, such as keys.

Potential risk of crushing due to falling parts.

- Secure the mount-on components.

⚠ CAUTION

Danger due to lubricant leaking from damaged seals and the breather.

Minor injuries.

- Check the gear unit and mount-on components for leaking lubricant.
- The seals must not come in contact with cleaning agent as this may damage the seals.
- Protect the breather against damage.
- Make sure that there is not too much oil in the gear unit. If the oil level is too high and the temperature rises, lubricant may escape from the breather.

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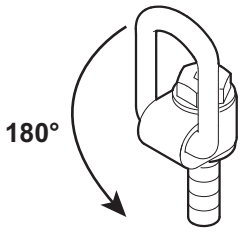
NOTICE

Improper transport may cause damage to the gear unit.

Possible damage to property.

- Observe the following information.

- Inspect the shipment for any possible transport damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. In the event of damage, do not start up the gear unit.
- The weight of the gear unit (without oil) is indicated on the nameplate or on the order documents. Observe the loads and specifications given on the nameplate.
- If possible, transport the gear unit without oil fill. If this is not possible, note that the weight indicated on the nameplate refers only to the no-load weight of the gear unit, and replace the breather with a screw plug.
- The gear unit must be transported in a manner that prevents damage to the gear unit and to attached components. For example, impacts against exposed shaft ends can damage the gear unit.
- Use only the prescribed attachment points [1] to transport the gear unit (see order documents). The load suspensions of the motor or attached components are provided for stabilization purposes only.
- The figures on the following pages are exemplary.
- Note that the load ring must be screwed in completely and must be flush to the contact surface. Tighten the load rings at least hand-tight. The following type of freely rotatable load ring is suitable for gear unit transport.



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2.8.2 Horizontal mounting positions (M1/M3/M5/M6)

Preliminary work for transport

Transport in the horizontal mounting positions (M1/M3/M5/M6) does not require preliminary work.

Transport

NOTICE

Danger due to improper transport protection.

Possible damage to property.

- The gear unit must not be attached using only the lifting eyes [2]. Always use the main attachment points [1] for transport.
- The tethers shown as dotted lines must only be used for stabilization purposes and do not replace the tethers attached to the attachment points.

Required resources

- Straps that are dimensioned according to the load's mass.
- Proper lifting equipment such as a crane.

Procedure

1. Choose the sling according to the load's mass.
2. Check the sling for damage. Do not use any damaged slings.

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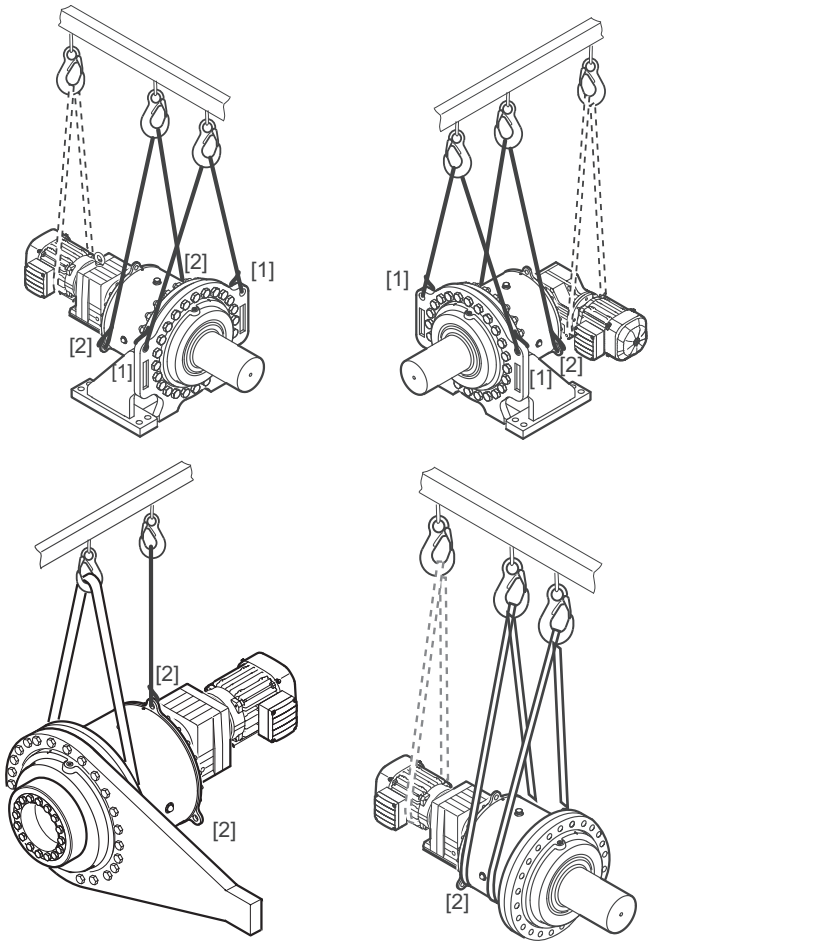
3. Install the sling on the gear unit as shown in the following figures.



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4. Slowly and carefully lift the gear unit.
5. ⚠ **DANGER!** Lifted loads can fall over or severely swing. Severe or fatal injuries. To prevent severe swinging, transport the gear unit at a slow speed.
6. Slowly lower the gear unit at the destination. Place the gear unit on an even, slip-resistant, and load-bearing surface.
7. Remove the sling.

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2.8.3 Transporting in vertical mounting position M2

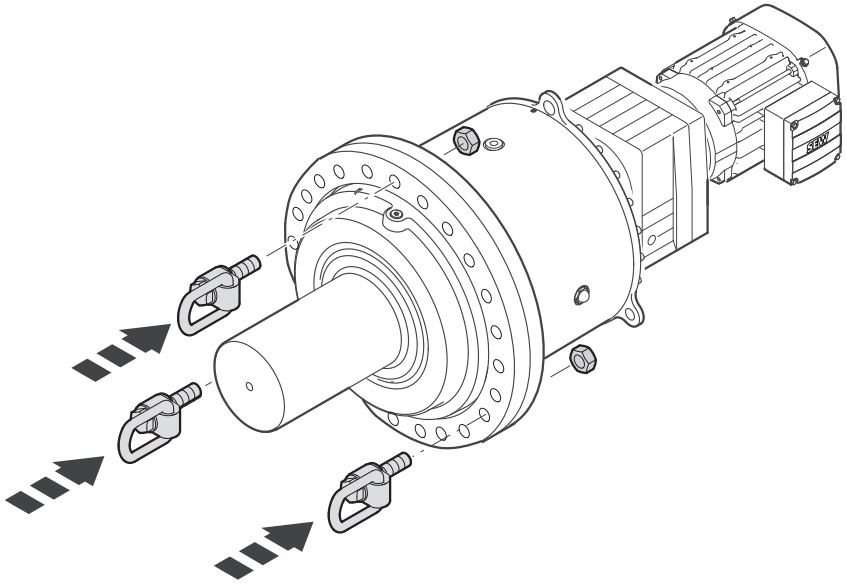
SEW-EURODRIVE recommends the following procedure.

Preliminary work for transport

This chapter describes the preparatory steps for transporting the gear unit in vertical mounting position M2.

Required resources

- 3 load rings that are dimensioned according to the load's mass. For the required thread size, refer to chapter "Gear units with flange-mounted design" (→ 🗎 96).
- 3 nuts according to the thread size of the load ring.
- Straps that are dimensioned according to the load's mass.
- Proper lifting equipment such as a crane.



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Procedure

1. Check the sling for damage. Do not use any damaged slings.
2. Insert 3 load rings with a distance of approx. 120° into the through holes on the output shaft side.
3. Screw one nut to each load ring on the other side. Tighten the nuts by hand.

Transporting

⚠ WARNING

Danger due to insufficient transport protection.

Severe or fatal injuries.

- Consider the center of gravity of the gear unit.
- Select strap lengths that ensure the stability of the gear unit during transport. The diagonal pull on the load rings may not exceed 45°.

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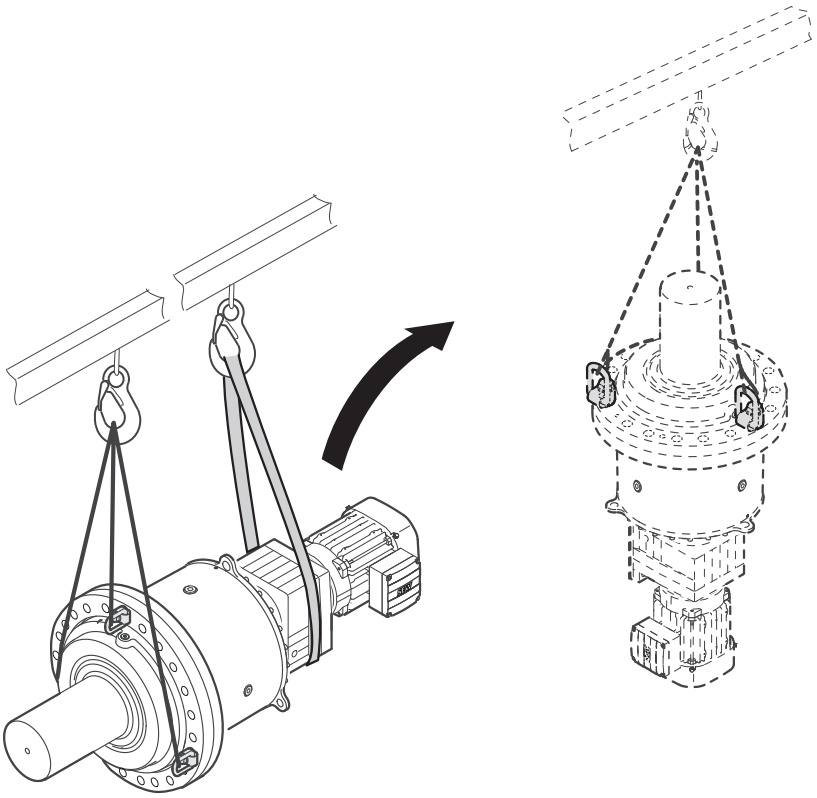
Procedure

1. Install the straps on the load rings as shown in the following figure.



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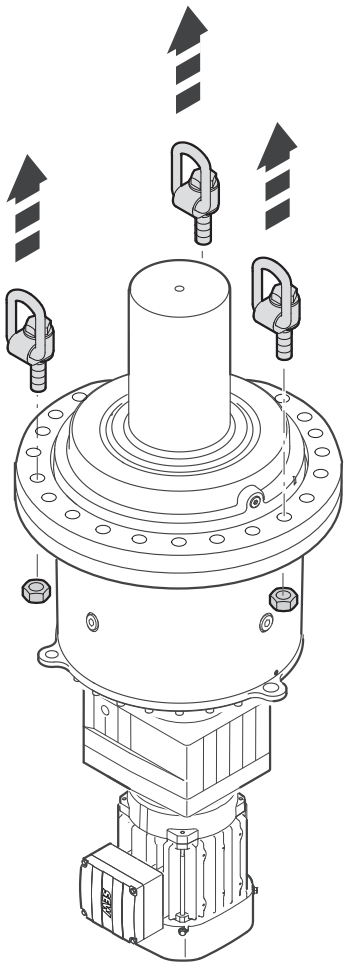
2. Slowly and carefully lift the gear unit in the horizontal mounting position until there is enough free space below the gear unit to rotate it into the vertical mounting position without touching the ground.
3. ⚠ **DANGER!** Lifted loads can fall over or severely swing. Severe or fatal injuries. To prevent severe swinging, transport the gear unit at a slow speed.
4. Do not place the gear unit in the vertical mounting position on the motor.
5. Remove the straps after transport.

Work steps after transport

Perform the following tasks after transport.



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Procedure

1. Remove the 3 load rings.

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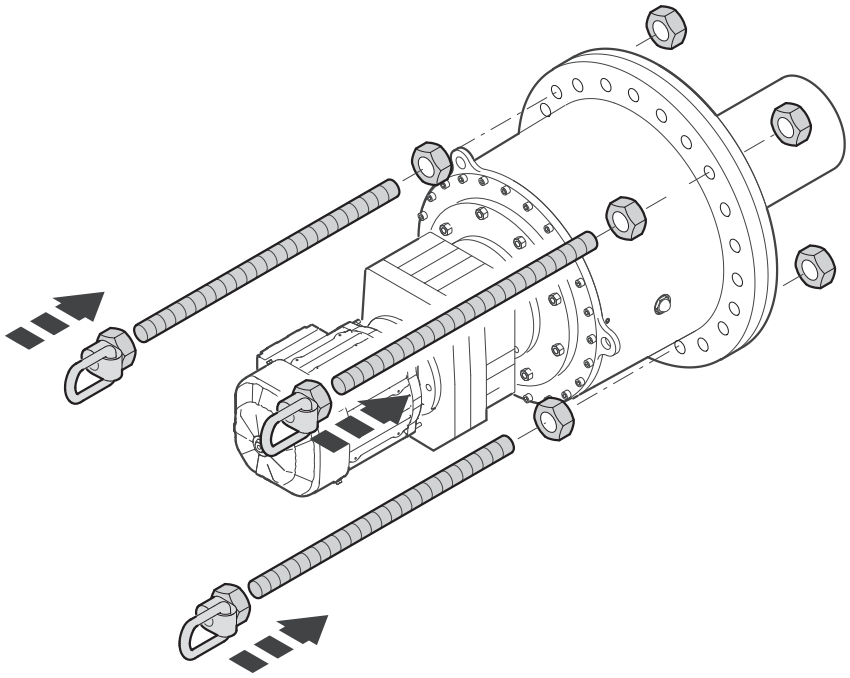
2.8.4 Transporting in vertical mounting position M4

Preliminary work for transport

This chapter describes the preparatory steps for transporting the gear unit in vertical mounting position M4.

Required resources

- 3 threaded rods that are dimensioned according to the load's mass. The threaded rods must be sufficiently long so that the center of gravity of the load is below the load ring. For the required thread size, refer to chapter "Gear units with flange-mounted design" (→ 🗎 96).
- 6 nuts according to the thread size of the threaded rods.
- 3 load rings according to the thread size of the threaded rods.
- Straps that are dimensioned according to the load's mass.
- Proper lifting equipment such as a crane.



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Procedure

1. Check the sling for damage. Do not use any damaged slings.
2. Screw a nut onto each threaded rod.
3. Insert the threaded rods at a distance of approx. 120° into the through holes on the mounting flange.
4. Screw one nut to each threaded rod on the output shaft side.
5. Tighten the nuts.
6. Screw one load ring to each threaded rod.

Transporting

⚠ WARNING

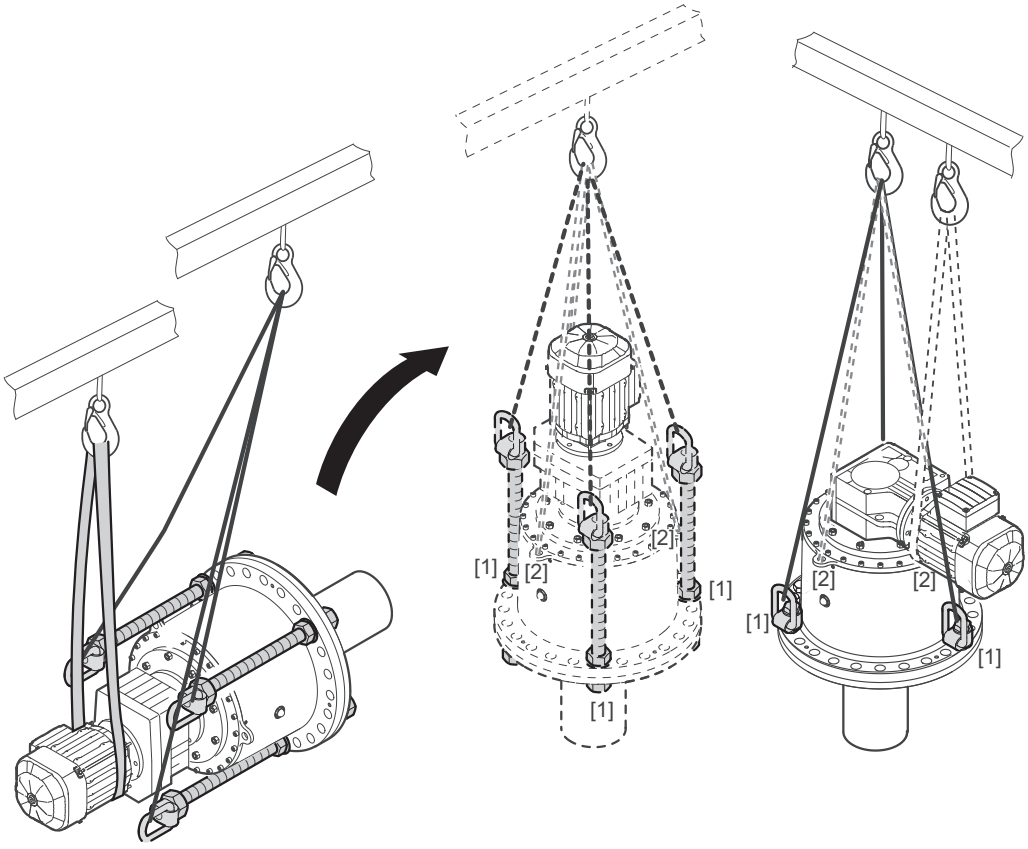
Danger due to insufficient transport protection.

Severe or fatal injuries.

- Consider the center of gravity of the gear unit.
- Select strap lengths that ensure the stability of the gear unit during transport. The diagonal pull on the load rings may not exceed 45°.

Procedure

1. Install the straps on the load rings as shown in the following figure. The gear unit must not be attached using only the lifting eyes [2]. The load suspensions of the motor or attached components are provided for stabilization purposes only. Use only the provided attachment points [1] to transport the gear unit.



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2. Slowly and carefully lift the gear unit in the horizontal mounting position until there is enough free space below the gear unit to rotate it into the vertical mounting position without touching the ground.
3. ⚠ **DANGER!** Lifted loads can fall over or severely swing. Severe or fatal injuries. To prevent severe swinging, transport the gear unit at a slow speed.
4. Do not place the gear unit in the vertical mounting position on the output shaft.
5. Remove the straps.

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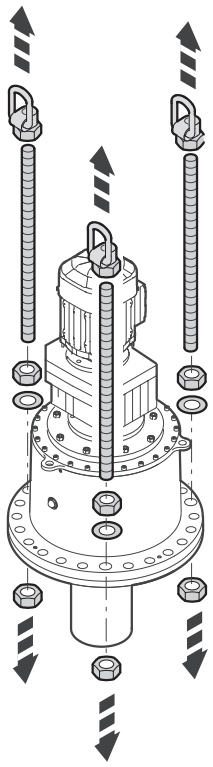
Work steps after transport

Perform the following tasks after transport.



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Procedure

1. Remove the 3 load rings and threaded rods.

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2.9 Storage and transport conditions

The gear units can be shipped with the following protection and packaging types depending on the storage and transport conditions.

2.9.1 Internal conservation

Standard corrosion protection

After the test run of the gear unit at the factory, the gear unit is protected against corrosion for a limited time.

Long-term corrosion protection

After the test run of the gear unit at the factory, a phase inhibitor is filled into the gear unit to protect it against corrosion for a limited time. The breather filter is replaced by a screw plug and enclosed with the gear unit.

2.9.2 Exterior corrosion protection

The following measures are taken for exterior corrosion protection:

- Anti-corrosion agent is applied to bare, non-painted functional surfaces of shafts, flanges, mounting and foot surfaces of the housing. The anti-corrosion agent must be removed only with a suitable solvent that does not damage the oil seal.
- Small spare parts and loose pieces, such as bolts, nuts, etc., are packed in corrosion protection plastic bags (VCI corrosion protection bags).
- Threaded holes and blind holes are covered with plastic plugs.
- If the gear unit is stored longer than 6 months, you must regularly check the protective coating of unpainted areas as well as the paint coating. Renew areas with damaged protective coating/paint.

2.9.3 Packaging

Standard packaging

The gear unit is delivered on a pallet without cover.

Use: transport by truck or rail

Long-term packaging

The gear unit is delivered in a wooden box that is also appropriate for sea transport.

Use: transport by ship and/or extended storage

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2.9.4 Storage conditions

Improper storage may result in damage to the gear unit. Observe the following information to prevent damage to the gear unit:

- While in storage until startup, the gear unit must be stored in a shock-free manner to prevent damage to the rolling bearing races.
- Only fill gear units with oil up to the uppermost rolling element. This ensures a remaining air volume for the oil to expand in case of higher temperatures. Add VCI Anticorit and tightly seal the gear unit (replace the breather with a screw plug)
- The permissible storage temperature is -30 °C to +50 °C.
- If stored in tropical zones, provide for sufficient protection against insect damage. Contact SEW-EURODRIVE in the case of differing requirements.

The gear units are delivered without oil as standard; different protection systems are required depending on the storage period and storage conditions as shown in the following table.

Corrosion protection + packaging	Storage location	Storage duration
Standard corrosion protection + standard packaging	Under a roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). No aggressive vapors and no shocks.	Max. 6 months with intact surface protection.
Long-term corrosion protection + standard packaging	Under a roof and enclosed at constant temperature and atmospheric humidity (5 °C < ϑ < 60 °C, < 50% relative humidity). No sudden temperature fluctuations. Controlled ventilation of the storage location with filter (free from dust and dirt). No aggressive vapors and no shocks.	Max. 3 years with regular inspection and checking for intactness.
Long-term corrosion protection + long-term packaging	Under a roof, protected against rain and free from shocks.	Max. 3 years with regular inspection and checking for intactness.

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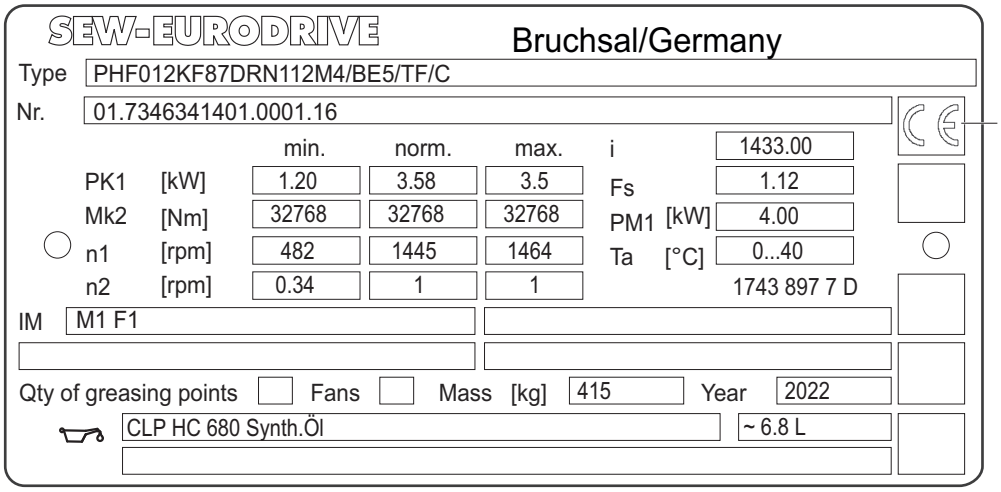
3 Gear unit structure

3.1 Planetary gear unit nameplates

The following figures show examples of the nameplates of a planetary gear unit.

Nameplate 1



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Type		Type designation
No.		Production number
PK1	kW	Operating power on the input shaft (HSS)
MK2	Nm	Gear unit output torque
n1	rpm	Input speed (HSS)
n2	rpm	Output speed (LSS)
norm.		Normal operating point
min.		Operating point at minimum speed
max		Operating point at maximum speed
I		Exact gear unit ratio
F_S		Service factor
PM1	kW	Nominal motor power
T_A	°C	Deviation from standard temperature range (−20 °C to +40 °C)
Mass	kg	Gear unit weight
Qty. of greasing points		Number of points that require republication
Fans		Number of installed fans
		Oil grade and viscosity class/oil quantity
Year		Year of manufacture
IM		Mounting position and mounting surface
[1]		CE symbol

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Nameplate 2

Product label with QR code. The QR code can be scanned. You will be redirected to the digital services of SEW-EURODRIVE. There, you have access to product-specific data, documents, and further services.

The following figure shows an example of a product label:

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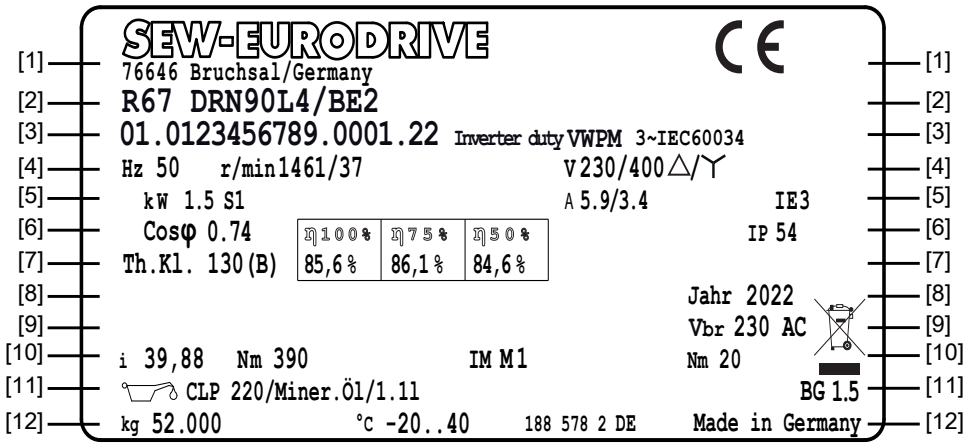
3.2 DRN.. gearmotor nameplates

The following figures show examples of the nameplates of a DRN.. gearmotor.

Nameplate 1



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Line	Information
[1]	• Manufacturer, address, CE mark
[2]	• Type designation
[3]	• Serial number • Suitability for inverter operation • Number of phases and underlying rating and performance standard
[4]	• Rated frequency • Rated speed of the motor / speed of the gear unit output shaft • Nominal voltage
[5]	• Rated power and operating mode • Rated current • Energy efficiency class according to IEC 60034-30-1
[6]	• Power factor • Efficiency after capacity utilization of 100%, 75%, and 50% • Degree of protection according to IEC 60034-5
[7]	• Thermal class
[8]	• Year of manufacture
[9]	• brake voltage • Waste disposal according to WEEE Directive
[10]	• Gear unit ratio • Output torque • Mounting position • Nominal braking torque
[11]	• Oil type and oil fill volume • Brake control

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Line	Information
[12]	• Gearmotor weight • Permitted ambient temperature range of the motor • Nameplate number • Country of manufacture

Nameplate 2

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The QR code on the product gives you quick access to the digital services from SEW-EURODRIVE.

In addition to being able to enter the QR code with the camera of your mobile device or an appropriate app, you can also use the "Product ID Plus" app from SEW-EURODRIVE. After scanning, you will see the technical data to identify the product directly.

In addition, the search for product-specific spare parts and documentation, as well as fault diagnostics and direct service requests are simple and fast.

3.3 Type designations for gear units and options

3.3.1 P..RF.. helical-planetary gear units

Gear unit design	Abbreviation	Meaning
Foot-mounted design (solid shaft)	**P..RF..**	• Solid shaft with key • Solid shaft with 2 keys (optional)
	PR..RF..	Smooth solid shaft
	PL..RF..	Splined solid shaft
Flange-mounted design (solid shaft)	**PF..RF..**	• Solid shaft with key • Solid shaft with 2 keys (optional)
	PRF..RF..	Smooth solid shaft
	PLF..RF..	Splined solid shaft
Foot-mounted design (hollow shaft)	**PH..RF..**	Hollow shaft with shrink disk
	PV..RF..	Splined hollow shaft
Flange-mounted design (hollow shaft)	**PHF..RF..**	Hollow shaft with shrink disk
	PVF..RF	Splined hollow shaft

3.3.2 P..KF../P..K.. bevel-planetary gear units

Gear unit design	Abbreviation	Meaning
Foot-mounted design (solid shaft)	**P..KF../ P..K..**	• Solid shaft with key • Solid shaft with 2 keys (optional)
	PR..KF../ PR..K..	Smooth solid shaft
	PL..KF../ PL..K..	Splined solid shaft
Flange-mounted design (solid shaft)	**PF..KF../ PF..K..**	• Solid shaft with key • Solid shaft with 2 keys (optional)
	PRF..KF../ PRF..K..	Smooth solid shaft
	PLF..KF../ PLF..K..	Splined solid shaft
Foot-mounted design (hollow shaft)	**PH..KF../ PH..K..**	Hollow shaft with shrink disk
	PV..KF../ PV..K..	Splined hollow shaft
Flange-mounted design (hollow shaft)	**PHF..KF../ PHF..K..**	Hollow shaft with shrink disk
	PVF..KF../ PVF..K..	Splined hollow shaft

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3.3.3 Additional features of gear units

Designation	
/T	With torque arm

3.3.4 Input shaft assembly

Designation	
AD	Input shaft assembly
.../P	With motor platform
.../RS	With backstop
.../ZR	With centering shoulder

3.3.5 Adapters

Designation	
AM	Adapter for mounting IEC/NEMA motors
AR	Adapter with slip clutch
AT	Adapter with hydraulic start-up coupling
.../RS	and backstop
.../BM(G)	and disk brake
.../HF	with manual brake release, lockable
.../HR	with manual brake release with automatic re-engaging function

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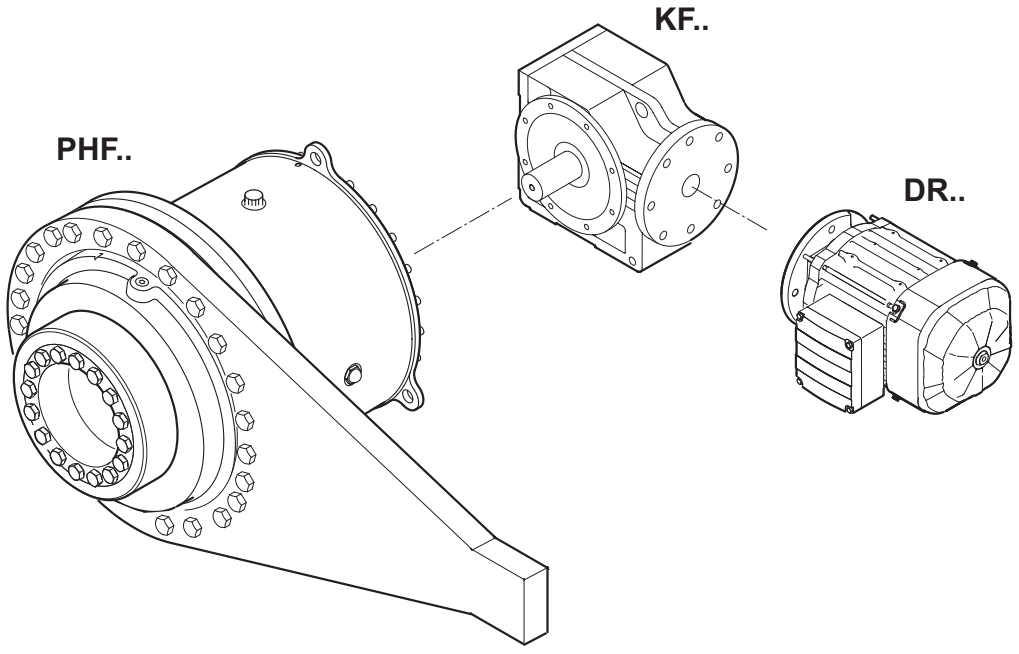
3.3.6 Example: Type designation for a PHF.. planetary gear unit with KF.. primary gear unit

The type designation of the gear unit is structured as follows:

Example: PHF012/T KF77 DRN112M4		
Planetary gear unit	P	Gear unit type
	H	Hollow shaft
	F	Flange-mounted design
	012	Gear unit size
	/T	Torque arm
Primary gear unit	KF	Series
	77	Gear unit size
Motor	DRN..	Series
	112M4	Size + number of poles



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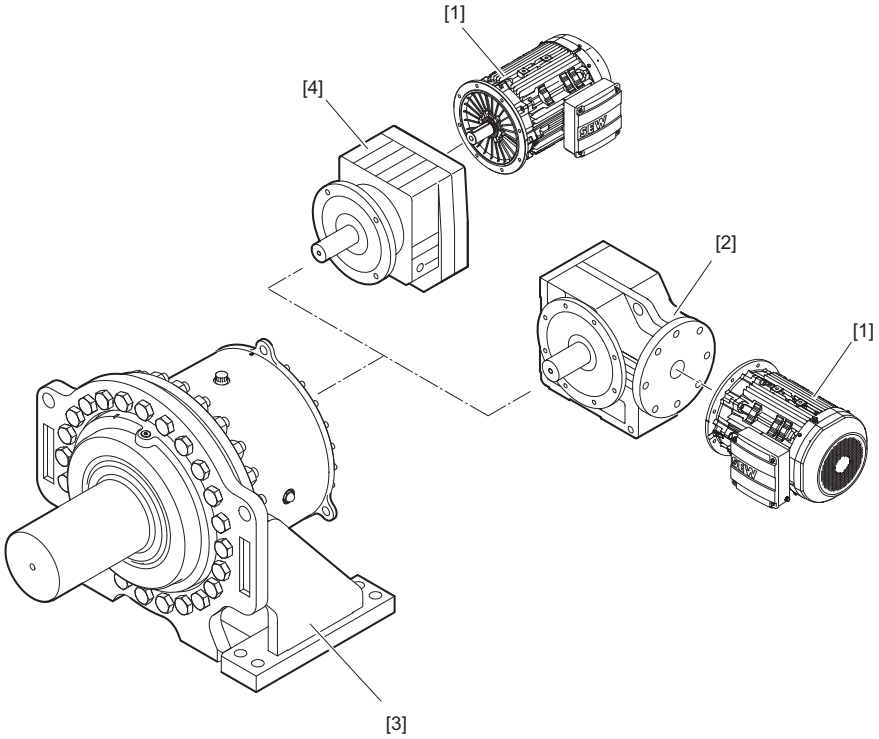
3.4 Planetary gear unit with primary gear unit combination

The planetary gear units are a combination of

- P.. planetary gear unit output stage
- RF../KF../K... primary gear unit
- Mount-on components: Motor, coupling, adapter, and backstop

The following figure shows a sample combination of a planetary gear unit, a primary gear unit and a motor.



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[1] Motor
[2] KF../K.. Bevel-helical gear unit (flange-mounted design)
[3] P.. Planetary gear unit
[4] RF.. Helical gear unit (flange-mounted design)

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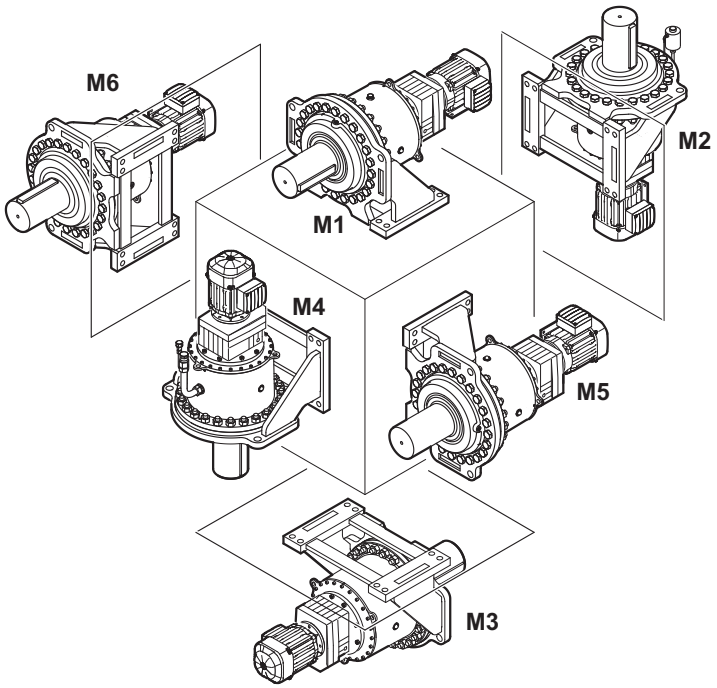
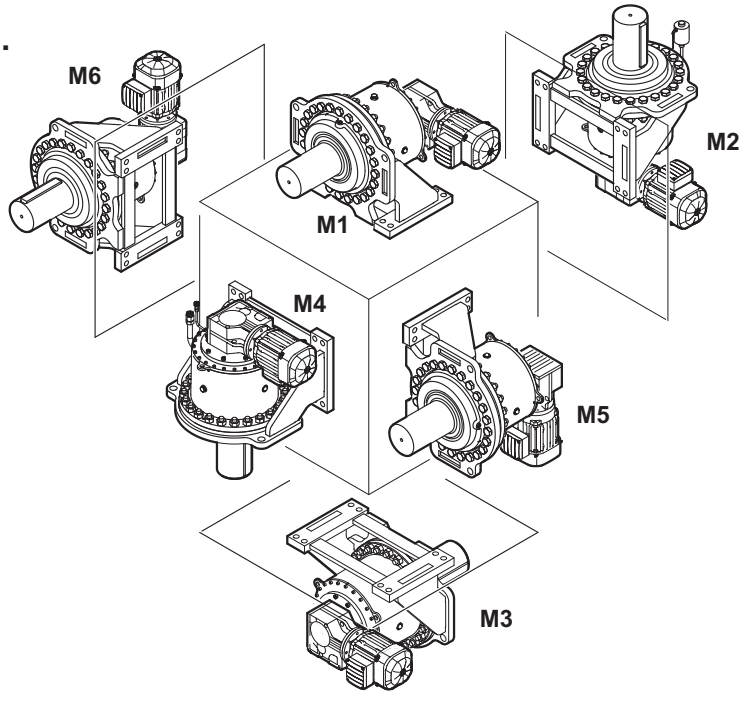
3.5 Mounting position

The mounting position defines the spatial orientation of the gear unit housing and is designated **M1..M6**.

P..RF..



P..KF..



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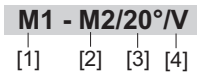
3.6 Pivoted mounting position: Fixed and variable mounting positions

Mounting positions deviating from the standard are distinguished as **fixed** or **variable** pivoted mounting position.

Gear units with a fixed pivoted mounting position have a fixed mounting position that differs from the standard. This means that the gear unit does not change its mounting position during operation.

Gear units with variable pivoted mounting position can change the mounting position **variably** during operation within the specified max./min. range.

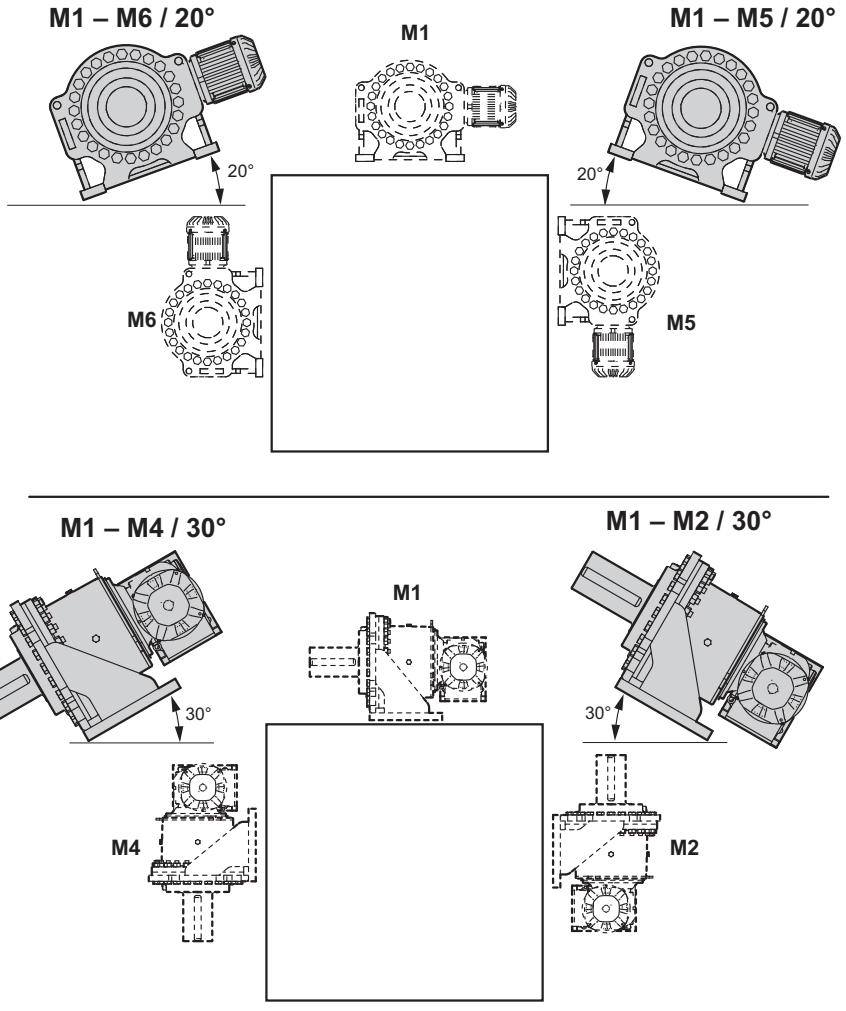
The designation of pivoted and variable mounting positions is set up as follows:



1811133707

[1]	Initial mounting position	[3]	Pivoting angle
[2]	Required mounting position	[4]	F = Fixed end position; V = Variable end position

The following figure shows examples:



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All final positions have to be specified if the mounting position of the gear unit deviates from standard mounting positions in several directions. Fixed and variable final positions can be combined.

Example of a gear unit based on mounting position M1 that is tilted by ±20° around the output shaft during operation and is mounted in a fixed angle of 30° around the longitudinal axis:

M1 – M2/20°/V – M4/20°/V – M5/30°/F

INFORMATION

Pivoted mounting positions may involve restrictions for accessories and technical data and possibly longer delivery times. Contact SEW-EURODRIVE.

3.7 Mounting positions of primary gear units

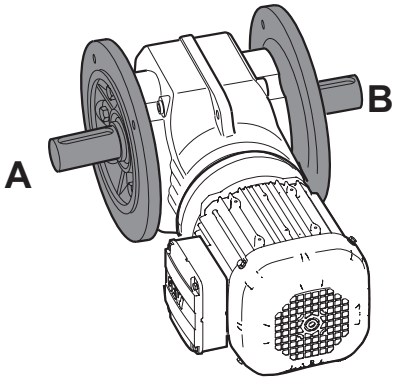
INFORMATION

In addition to the mounting position, the following information is specified for planetary gearmotors.

3.7.1 KF../K.. primary bevel gear units

For the KF../K.. primary bevel gear units, the positions **0°**, **90°**, **180°** or **270°** are specified.

The position of the mounting flange on the **A** or **B** side is also defined.



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To reduce the churning losses in the primary gear unit to a minimum, SEW-EURODRIVE recommends that you choose one of the standard mounting positions shown below.

INFORMATION

Contact SEW-EURODRIVE in case of deviating mounting conditions.

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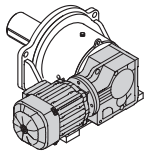
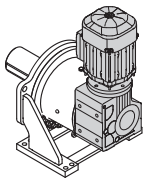
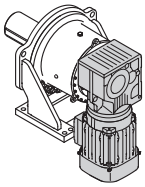
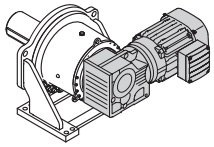
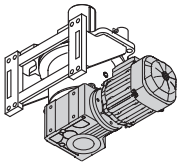
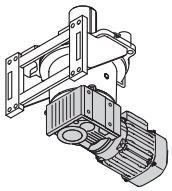
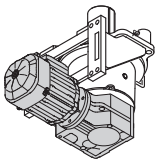
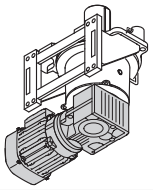
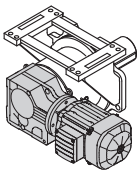
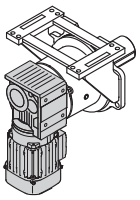
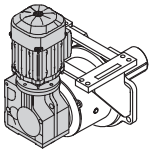
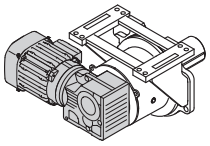
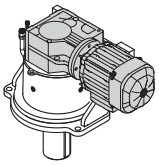
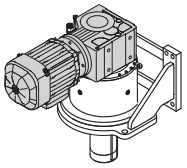
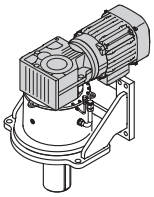
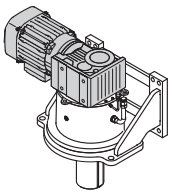
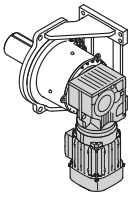
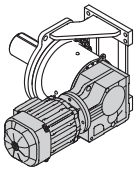
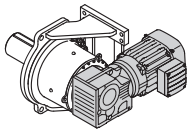
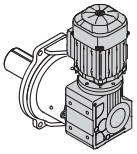
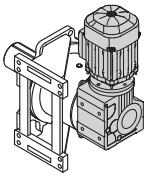
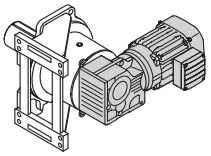
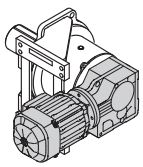
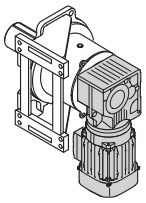
M1	
0° A	270° A
	
90° A	180° B
	

M2	
0° A	270° A
	
90° A	180° A
	

M3	
0° B	270° A
	
90° A	180° A
	

M4 [1]	
0° A	270° A
	
90° A	180° A
	

M5	
0° A	270° A
	
90° B	180° A
	

M6	
0° A	270° B
	
90° A	180° A
	

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Key	
M1/M2/M3/M4/M5/M6	= Mounting position of planetary gear unit
0°/90°/180°/270°	= Mounting position of primary bevel gear unit
A/B	= Position of the mounting flange at the primary bevel gear unit
1) Example position; the position of the piping deviates from the figure.	

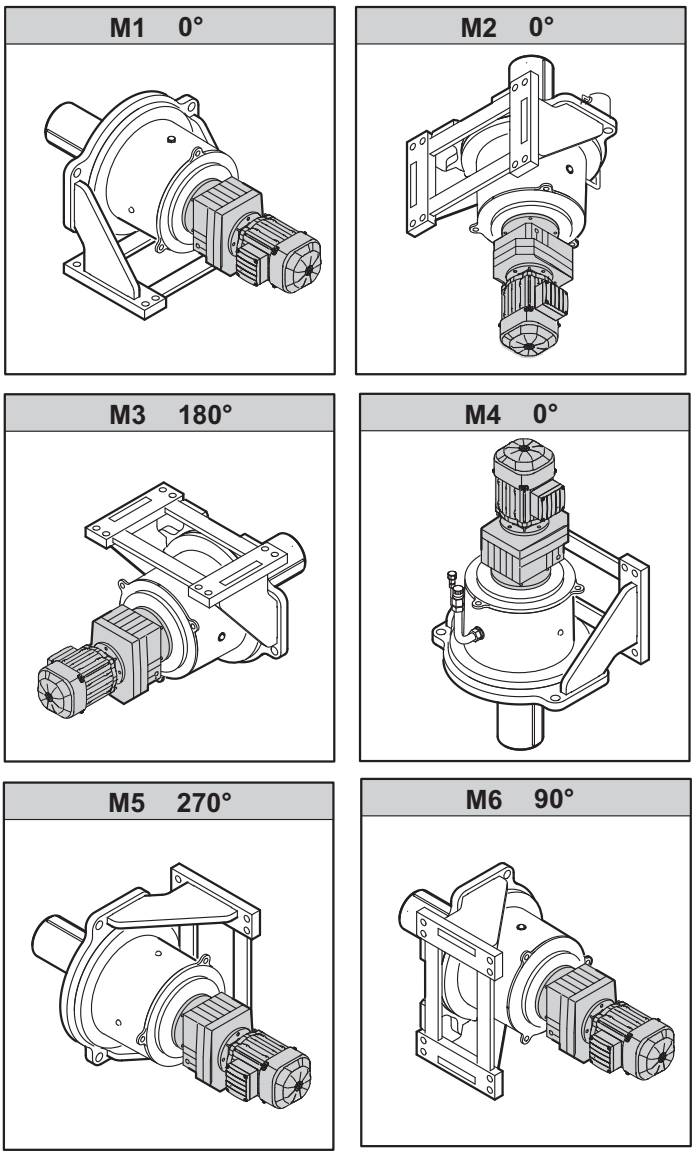
3.7.2 RF.. primary helical gear units

For the primary helical gear units RF.., positions **0**, **90**, **180** or **270** are fixed.

To reduce the churning losses in the primary gear unit to a minimum, SEW-EURODRIVE recommends that you choose one of the standard mounting positions shown below.

INFORMATION

Contact SEW-EURODRIVE in case of deviating mounting conditions.



1043719691

Key	
M1/M2/M3/M4/M5/M6	= Mounting position of planetary gear unit
0°/90°/180°/270°	= Mounting position of primary helical gear unit

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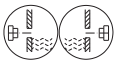
3.8 Mounting position sheets

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

Symbol	Meaning
	Breather plug
	Oil level plug
	Oil drain plug
	Breather
	Oil dipstick
	Oil sight glass

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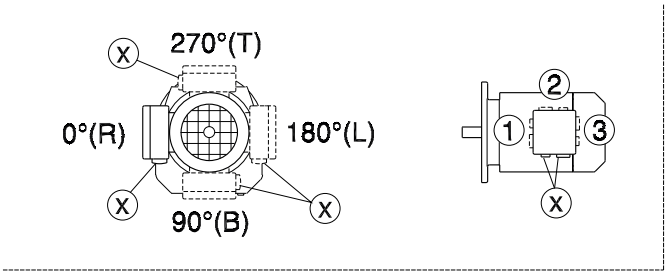
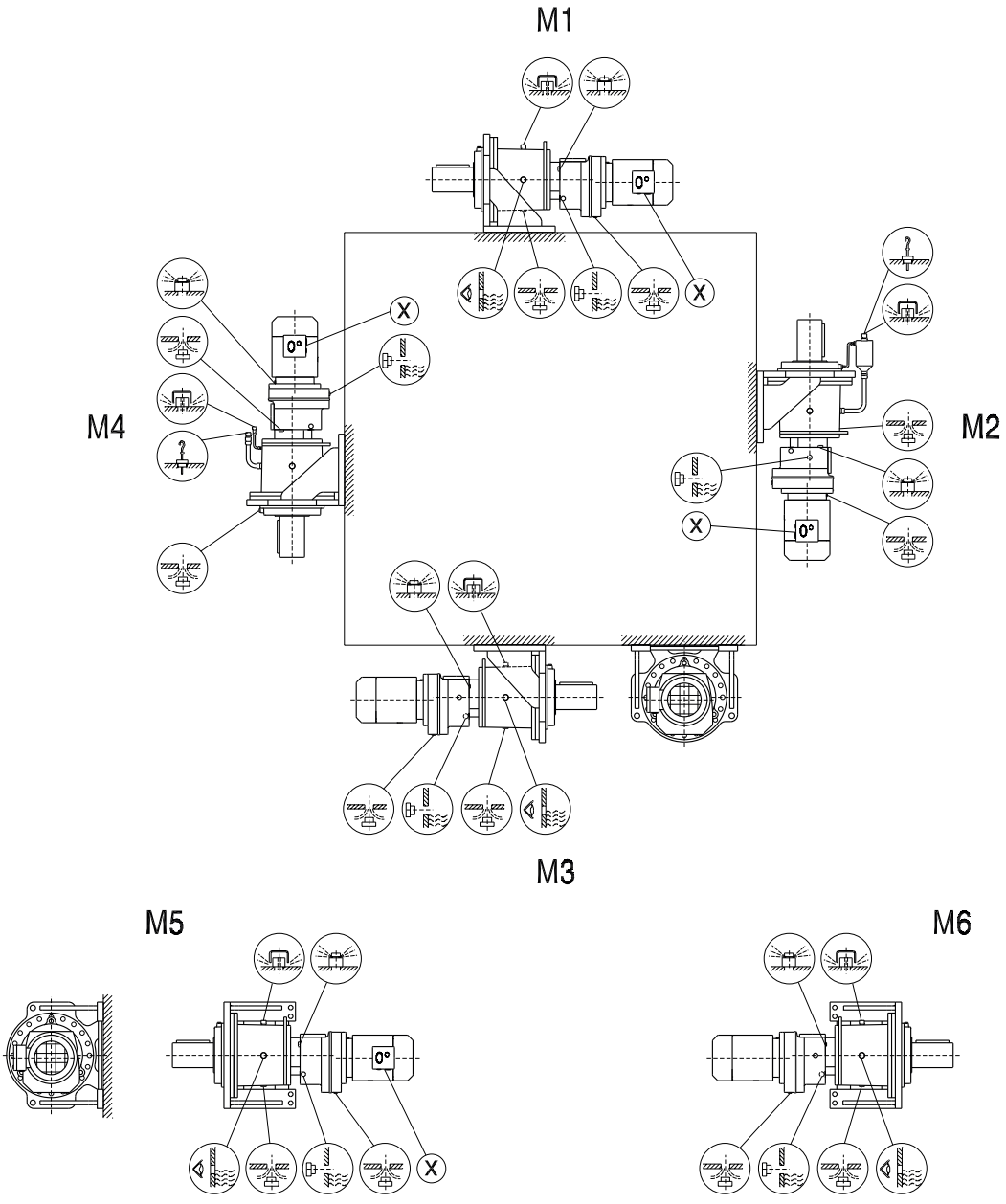
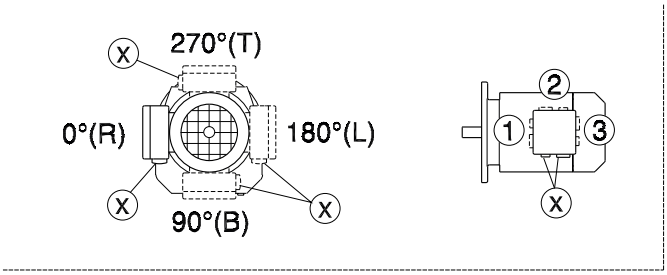
3.8.1 P..RF..



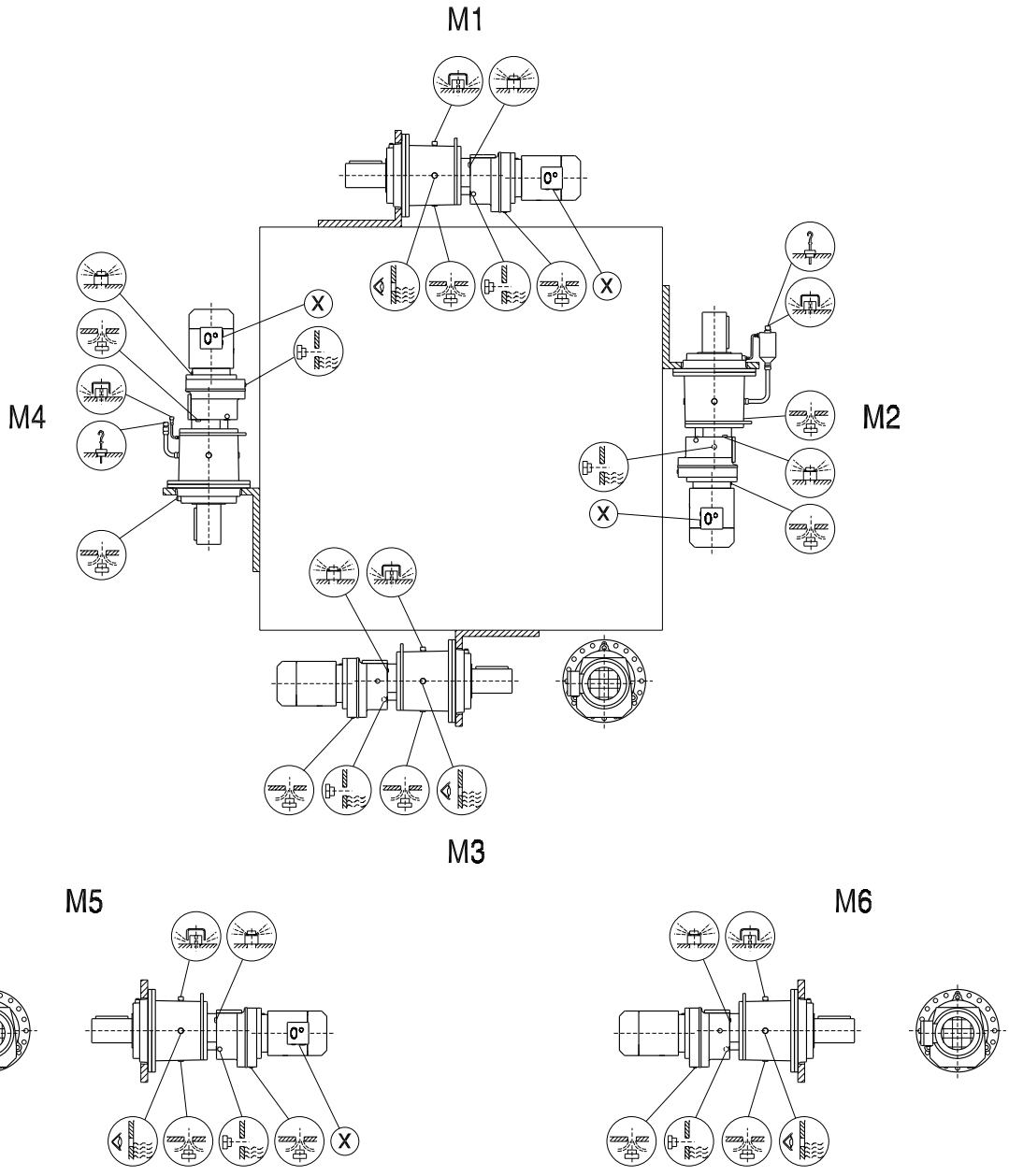
45 129 00 08



3.8.2 PF..RF..



45 130 00 08



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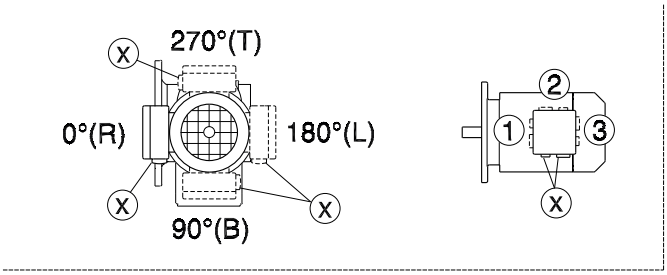
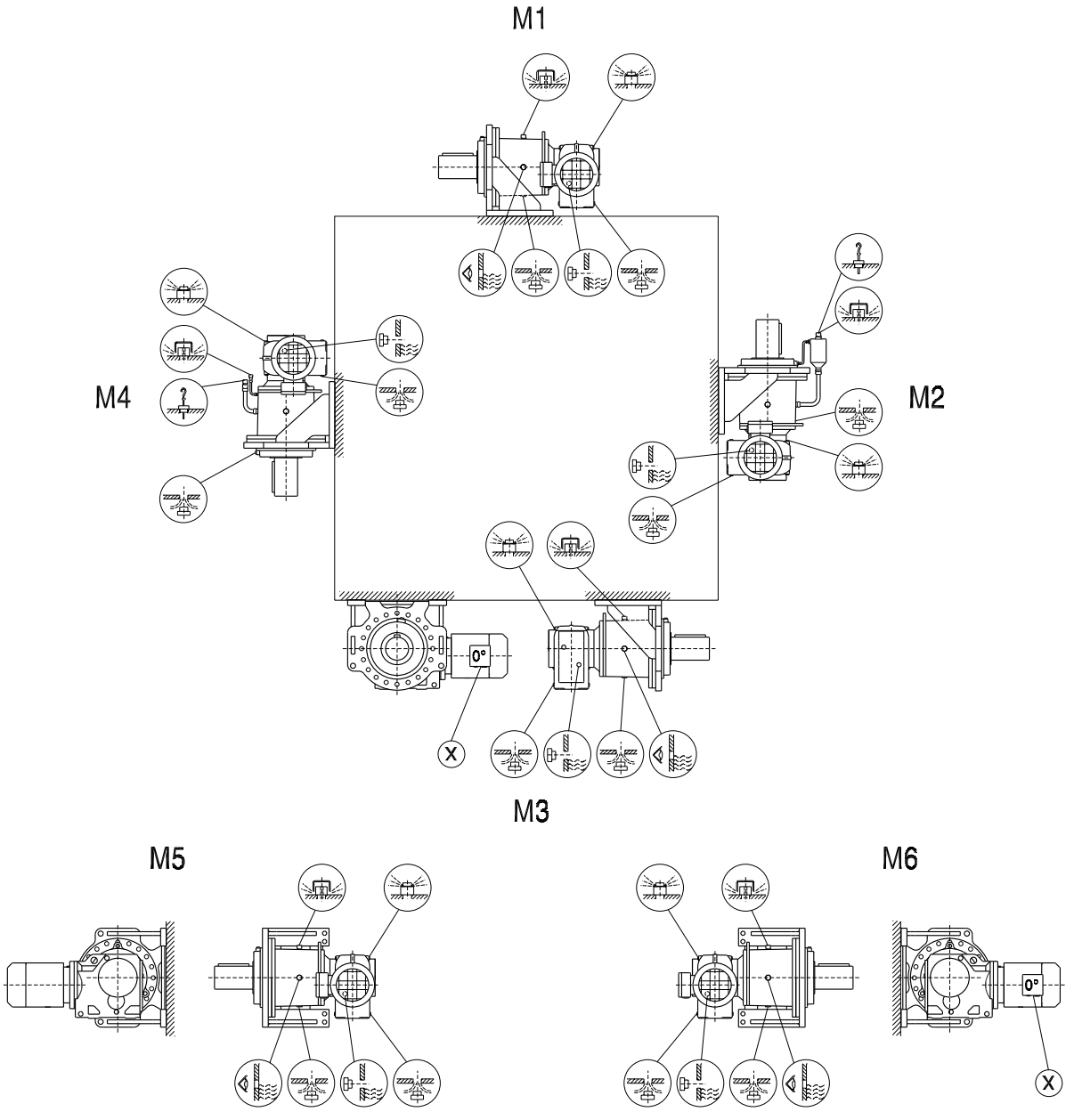
3.8.3 P..KF../K..



45 131 00 08



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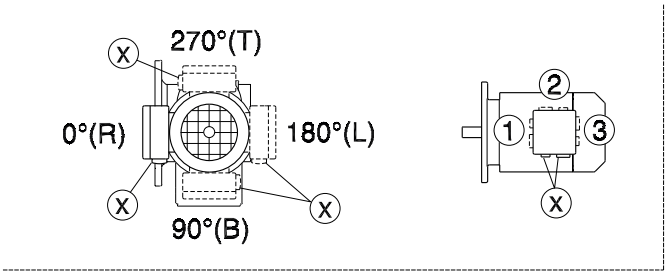
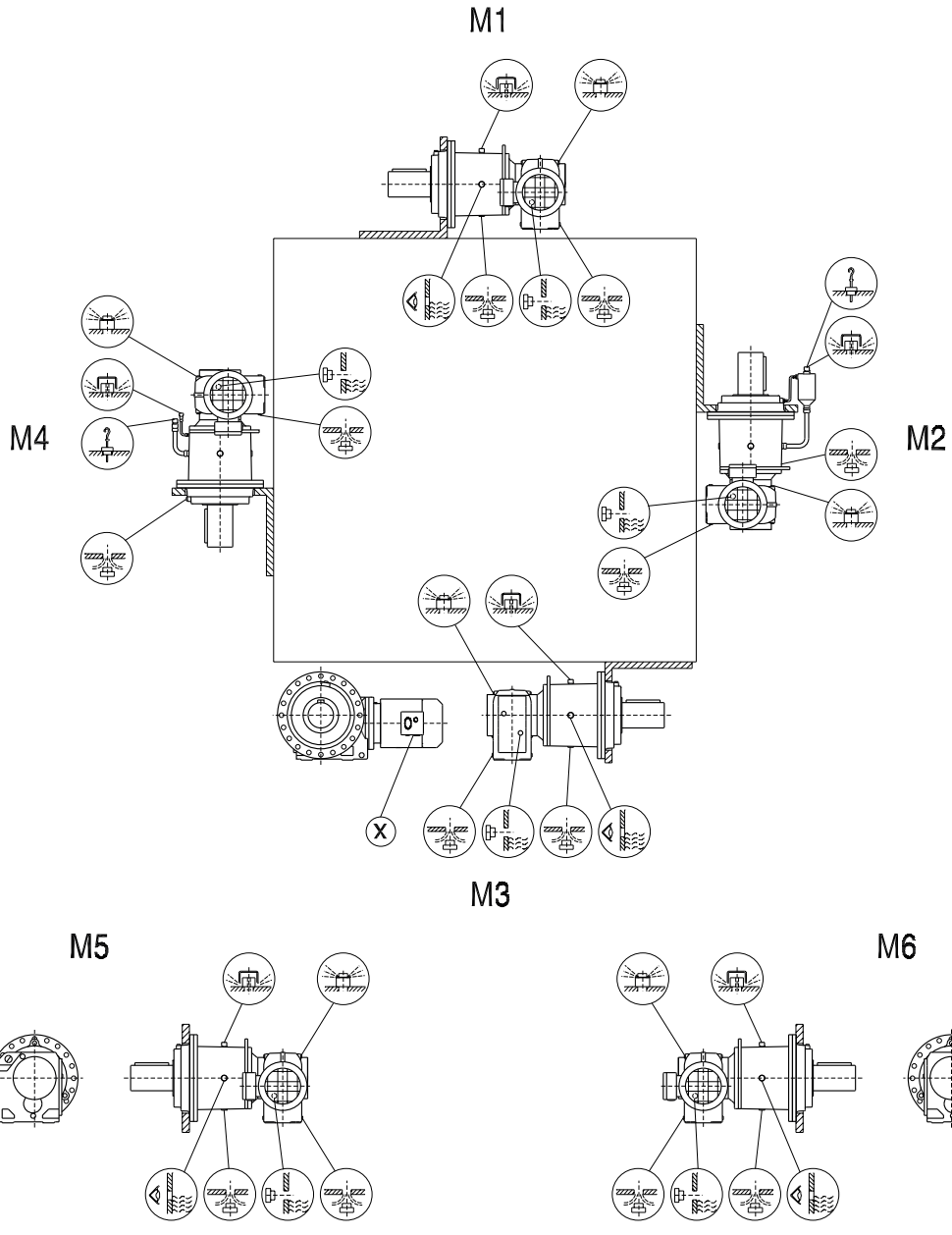
3.8.4 PF.KF../K..



45 132 00 08



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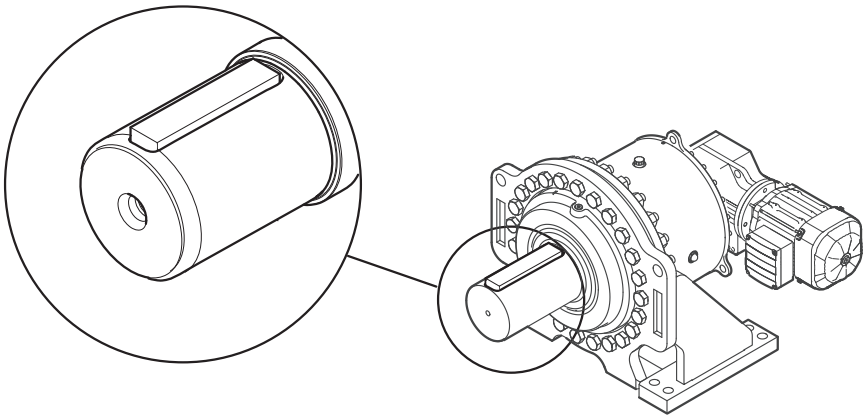
3.9 Output shaft variants

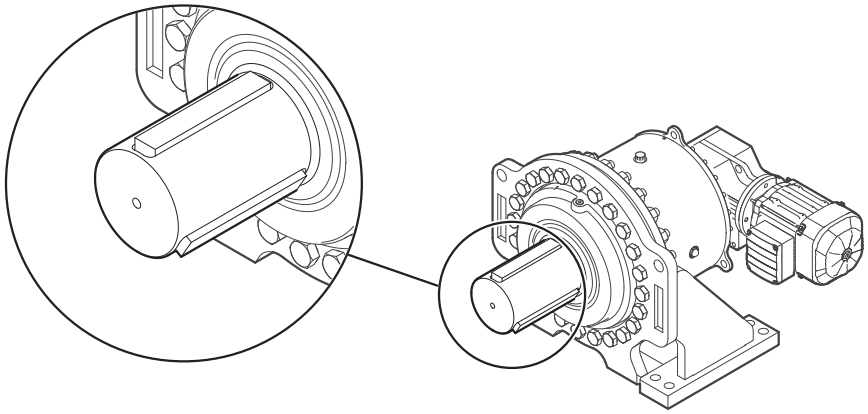
The output shaft [LSS] of the planetary gear unit can have the following design as standard:

3.9.1 P.. Solid shaft with key



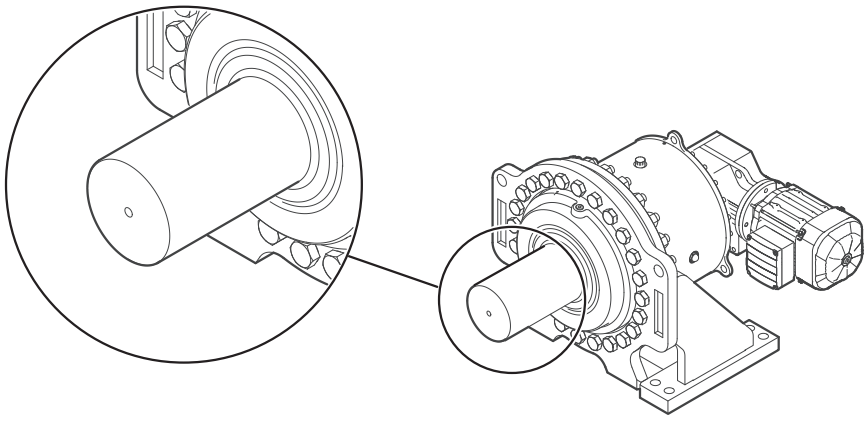
18014404808102667

3.9.2 P.. Solid shaft with 2 keys



9007217118269323

3.9.3 PR.. Smooth solid shaft



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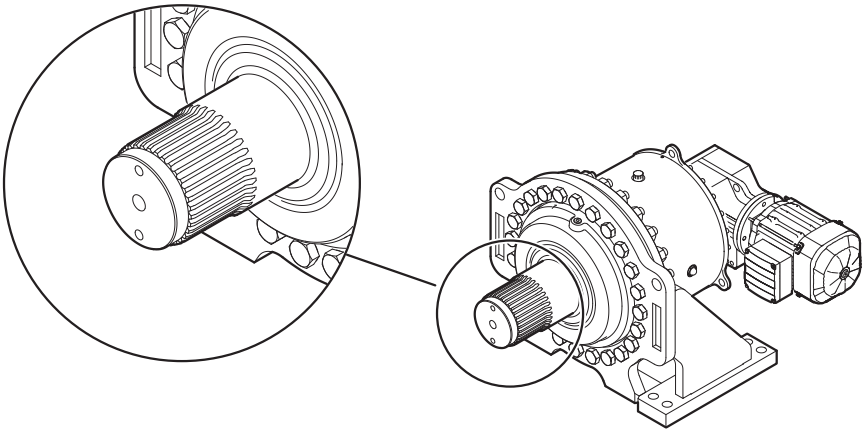
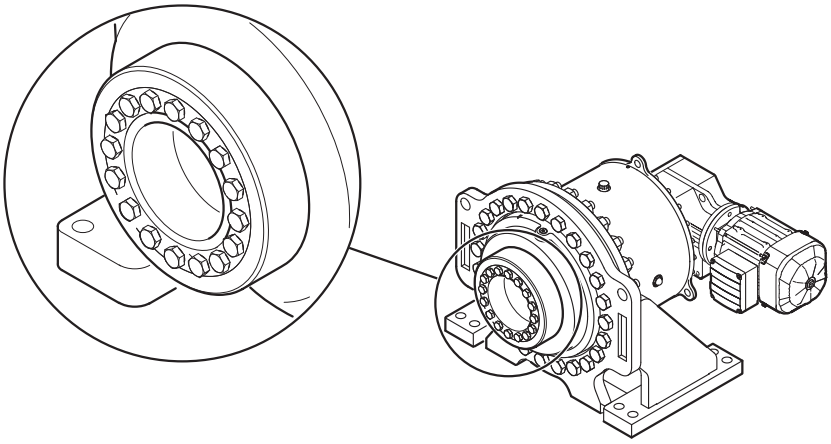
3.9.4 PL.. Splined solid shaft



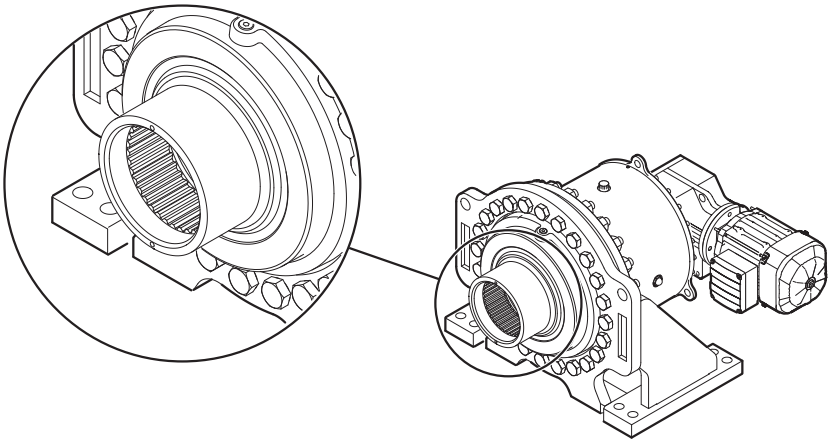
17863714187

3.9.5 PH.. Hollow shaft with shrink disk



9007205553363339

3.9.6 PV.. Splined hollow shaft



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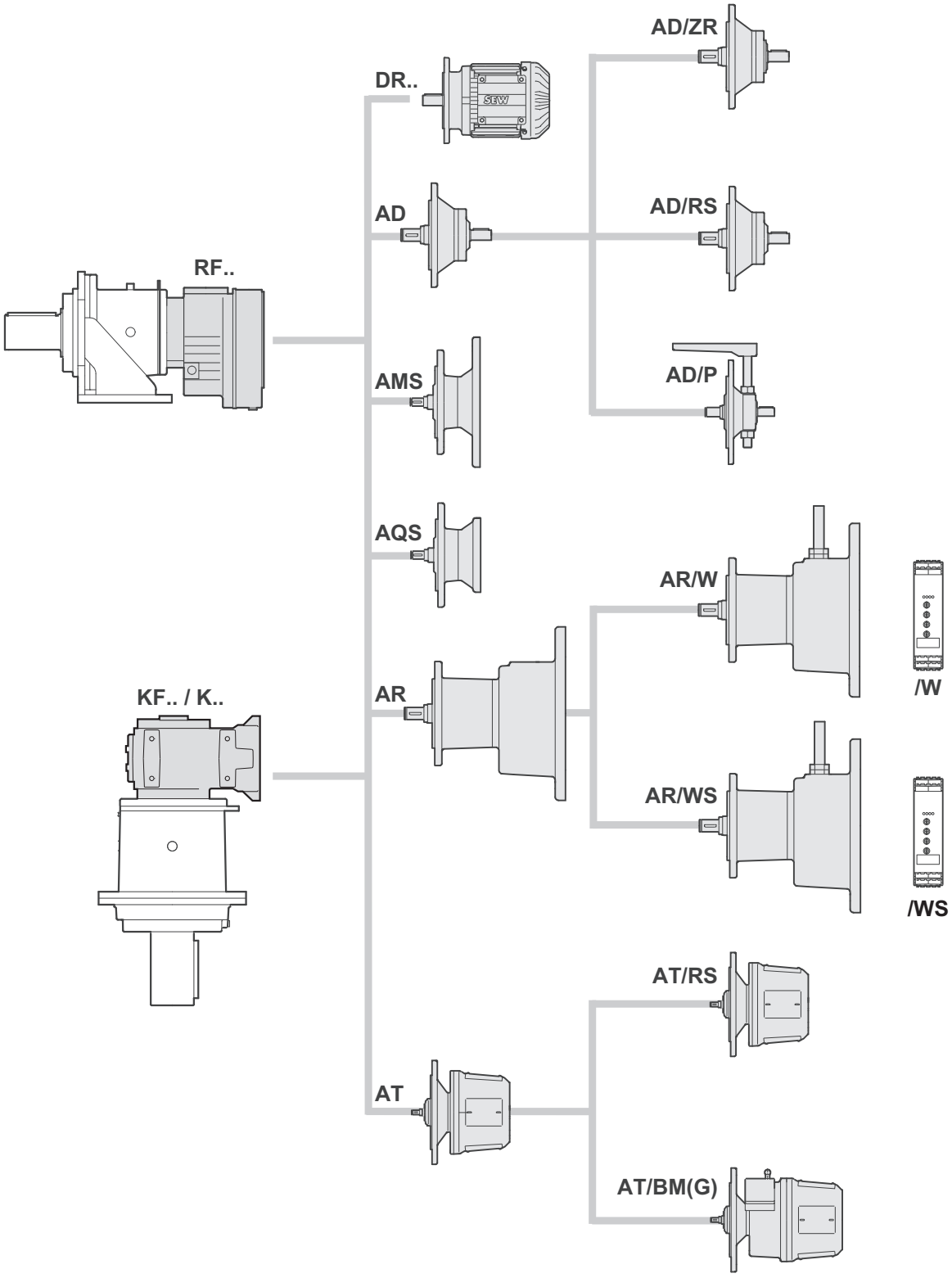
3.10 Components on the input side

The following figure shows the components on the input end.



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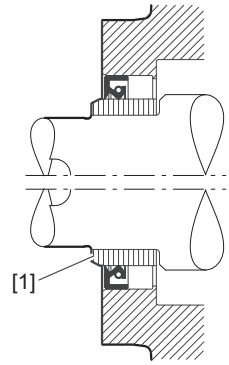
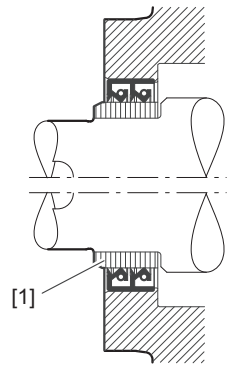
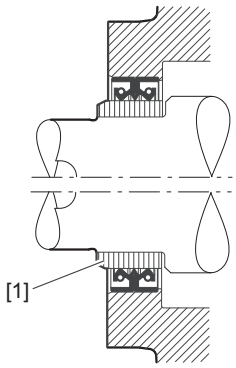
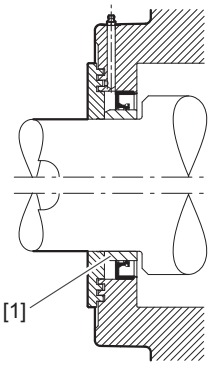
3.11 Sealing system

3.11.1 Output shaft

The following table shows the output sealing systems for horizontal and vertical mounting positions.

Designation	Property	Environment	Figure
Standard for mounting positions M1/M3/M5/M6	Single oil seal, inside sealing with dust protection lip on a hardened sleeve [1]	Normal environment	
Standard for mounting position M4 (optional for mounting positions M1/M3/M5/M6)	2 oil seals, inside sealing on a hardened sleeve [1]	**Medium** dust load with abrasive particles	
Standard for mounting position M2 (optional for mounting positions M1/M3/M5/M6)	1 oil seal, sealing on the inside, and 1 oil seal, sealing on the outside, on a hardened sleeve [1]	**High** dust load with abrasive particles and splash water load	
Radial labyrinth seal Regreasable for mounting positions M1/M2/M3/M4/M5/M6	Single oil seal with radial labyrinth seal on a hardened sleeve [1]	**Very high** dust load with abrasive particles	

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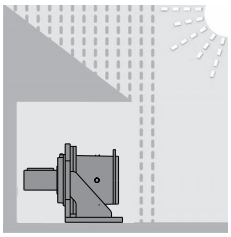
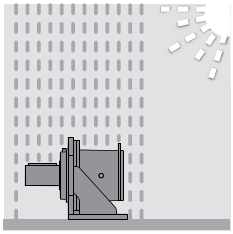
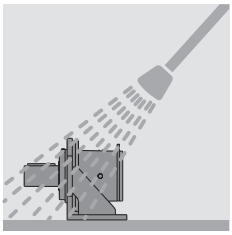
3.12 Coating and surface protection systems

The following description provides an overview of the coating and surface protection system.

Used as surface protection under typical ambient conditions, corrosivity category DIN EN ISO 12944-2.

OS 1 low environmental pollution	
	Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as outdoor applications under roof or with protection, unheated buildings where condensation can build up. According to corrosivity category: C2 (low)
Sample applications	• Systems in saw mills • Agitators and mixers
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	–

OS 2 medium environmental pollution	
	Suited for environments with high humidity or moderate atmospheric contamination, such as applications outdoors subject to direct weathering. According to corrosivity category: C3 (moderate)
Sample applications	• Applications in gravel plants • Cableways
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	240 h

OS 3 high environmental pollution	
	Suited for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasional acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt load. According to corrosivity category: C4 (high)
Sample applications	• Port cranes • Sewage treatment plants • Mining applications
Condensation test ISO 6270	240 h
Salt spray test ISO 7253	480 h

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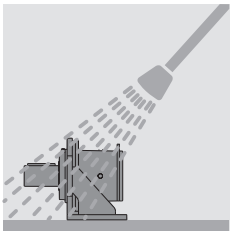
OS 4 high environmental pollution	
	Suitable for environments with permanent humidity or severe atmospheric or chemical contamination. Regular acidic and caustic wet cleaning also with chemical cleaning agents. According to corrosivity category: C5 (very high)
Sample applications	• Drives in malting plants • Wet areas in the beverage industry • Conveyor belts in the food industry
Condensation test ISO 6270	360 h
Salt spray test ISO 7253	600 h

INFORMATION

- Standard top coat color RAL 7031, can deviate depending on the order, see order documents.
- Color according to RAL
- Water and hand perspiration repelling rust preventive for external preservation applied to uncoated parts, shaft ends/flanges.
- Sheet metal parts (such as protection covers) are painted in RAL 1003 as standard.
- If you need surface protection systems of a higher quality, contact SEW-EURODRIVE.

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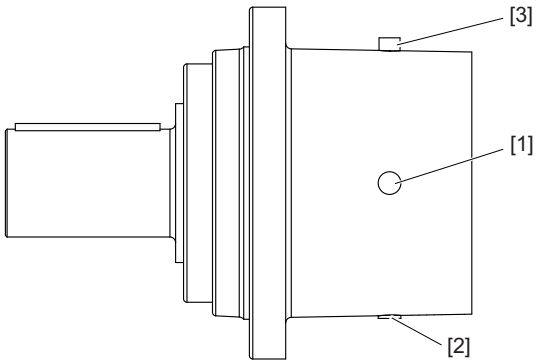
3.13 Types of lubrication

Depending on the mounting position of the planetary gear unit, two different standard lubrication variants are possible.

3.13.1 Splash lubrication for horizontal mounting positions: M1/M3/M5/M6

The gear unit is half filled with oil. Gearing and bearing parts that are not immersed in the oil bath are lubricated by splashing oil. The oil level is checked at the oil sight glass [1] on the housing gear rim. The oil drain plug [2] can be replaced with an oil drain valve as an option. Oil is filled into the gear unit through the bore in which the breather [3] is installed. The breather [3] must be removed before you fill in oil.



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3.13.2 Bath lubrication for vertical mounting positions: M2/M4

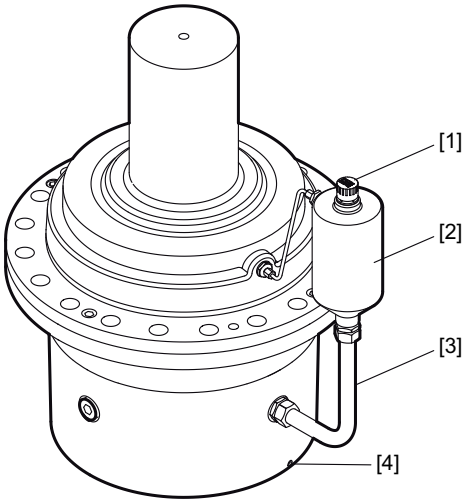
The gear unit is (almost completely) filled with oil. All tooth engagement or bearing points are immersed in the oil bath completely or partly.

Mounting position M2

Standard lubrication type with oil expansion tank:

- Oil expansion tank [2] for volume compensation
- The oil level is checked by means of a combined oil dipstick with breather [1]
- Oil is filled in via the oil expansion tank

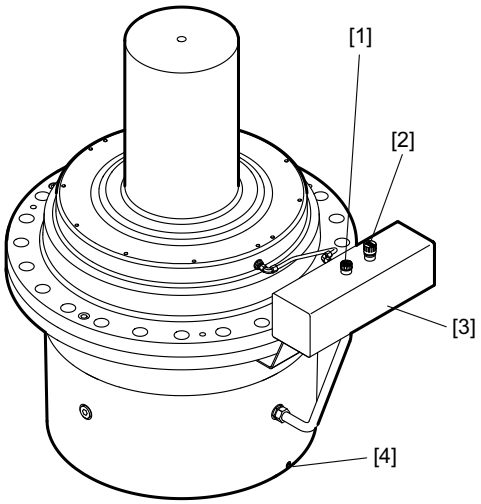
Sizes **P.002 – 082**:



18014402989780619

[1]	Oil dipstick with breather	[3]	Riser pipe
[2]	Oil expansion tank	[4]	Oil drain plug

Sizes **P.092 – P.102**:



18014402998269195

[1]	Oil dipstick	[3]	Oil expansion tank
[2]	Breather	[4]	Oil drain plug

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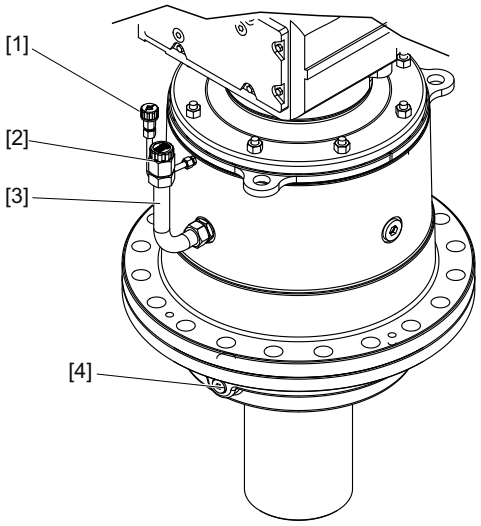
Mounting position M4

Standard lubrication type without oil expansion tank:

- Oil level is checked using an oil dipstick
- Separate breather
- Oil is filled in via the riser pipe



18014402999766283

[1]	Breather	[3]	Riser pipe
[2]	Oil dipstick	[4]	Oil drain plug

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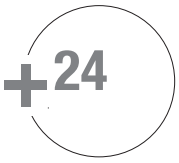
3.14 Extended warranty



The prerequisite for claiming extended warranty is an acceptance test of the customer-installed gear unit performed by a service technician from SEW-EURODRIVE. In the interest of both parties, the inspection ensures correct installation, alignment, and proper preparation of the drive system for operation. For this reason, inspection by SEW-EURODRIVE must be performed after installation and before startup.

The following requirements apply to assembly acceptance:

- Qualified service technician of SEW-EURODRIVE
- Inspection scope:
  - Individual drive: 100 %
  - Projects > 4 gear units: 50% of the gear units/drive systems are inspected
  - Projects > 9 gear units: 30% of the gear units/drive systems are inspected

The following packages are available for the gear units.

Packages	Scope	Benefits
+24	24 months of warranty on the gear unit.	• The correct installation of the gear unit is checked by an SEW service technician.
+24 advanced	Gear unit filled with premium lubricant GearOil by SEW-EURODRIVE, giving you an additional 24 months warranty for your industrial gear unit free of charge.	• The correct installation of the gear unit is checked by an SEW service technician.

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4 Structure of options and additional features

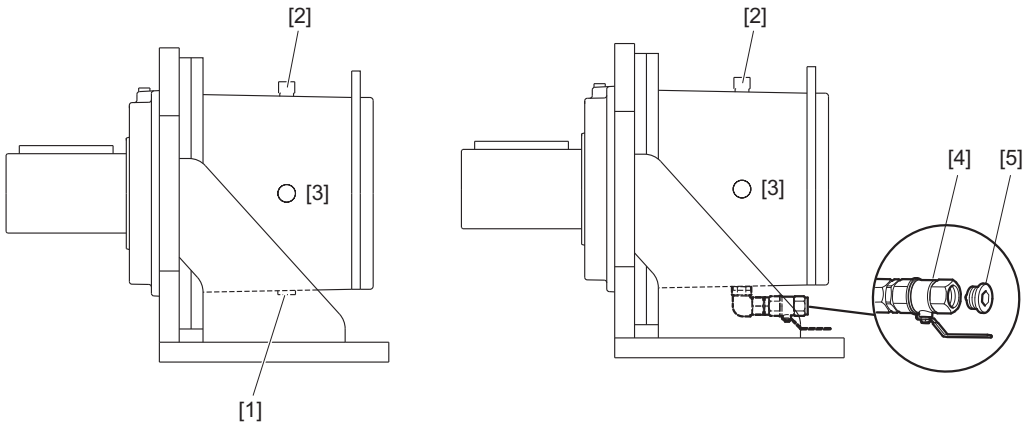
4.1 Oil expansion tank /ET

The oil expansion tank is designed to compensate for oil volume variations in the system caused by temperature fluctuations. When the gear unit temperature increases, the oil expansion tank absorbs some of the increasing oil volume and feeds it back to the gear unit as the temperature goes down, which means the gear unit is always completely filled with oil.

Based on the oil level specified by SEW-EURODRIVE, the oil expansion tank is designed to compensate the oil volume change within the permitted operating temperature range. A temperature decrease below the permitted temperature range causes the oil expansion tank to be completely emptied and air being sucked into the gear unit. This might result in insufficient lubrication and a malfunction of the gear unit. An increase above the permitted temperature range causes an overfilling of the expansion tank and oil might leak from the gear unit. During operation, any oil level above the level specified by SEW-EURODRIVE is permitted as long as there is oil in the expansion tank and the oil expansion tank does not overflow. During operation, the oil level must not be below the min. marking on the oil dipstick.

4.2 Oil drain

The gear unit is equipped with an oil drain plug [1] as standard. An oil drain valve [4] with screw plug [5] can optionally be added to mounting position M1, M3, M5, or M6. This valve allows for a drain pipe to be easily attached when changing the gear unit oil.



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NOTICE

The oil drain valve might be damaged if it is not sufficiently secured.

Possible damage to property.

- The oil drain valve must be additionally secured using a screw plug. At temperatures below -20 °C, the permeability of the valve might be limited.

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4.3 Torque arm /T

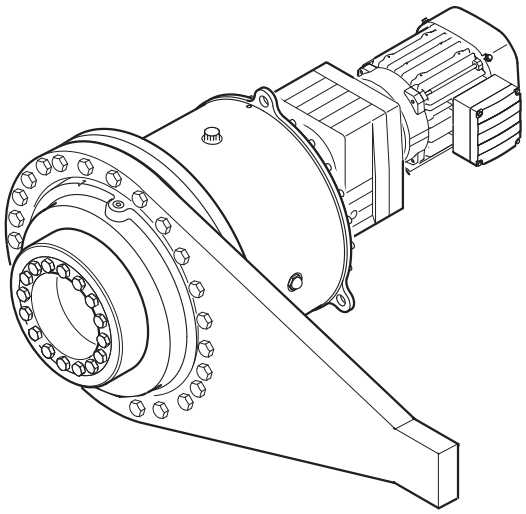
A torque arm is available to support the reaction torque of solid and hollow shaft gear units in the shaft-mounted design.

Depending on the load direction and type of the customer load bearing point, the reaction torque acts as a tensile or compressive force.

4.3.1 Single-sided torque arm

The torque arm is enclosed in the delivery or can be mounted according to customer requirements. The retaining screws are included in the delivery.

The following figure shows a sample combination of a planetary gearmotor with a torque arm on one side.



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4.4 Breather /BPG

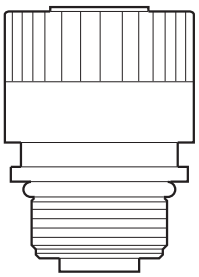
The breather serves to prevent non-permitted pressure generated by heating or cooling during operation.

INFORMATION

Refer to the dimension sheet and the order documents for further information on the breather.

The following breathers can be used.

4.4.1 Standard

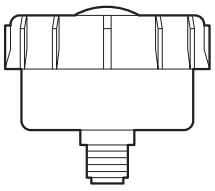


18847956107

Structure

Features	
Housing material	Polyamide
Filter inserts	Polyester filter, not exchangeable
Filter size	2 µm
Threads	3/4" or 1"

4.4.2 Breather with filter insert /PI



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The breather has the following characteristics:

- Corrosion-resistant

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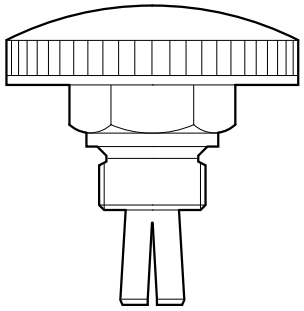
- Robust filter housing
- High dirt-absorbing capacity

Structure

The breather has a corrosion-proof housing with an air intake opening at the top. The cover with protection lip keeps splashing water off.

Features	
Housing material	Polyamide
Filter inserts	Wire mesh, galvanized
Filter size	10 µm
Threads	3/4" or 1"

4.4.3 Steel breather for harsh operating conditions

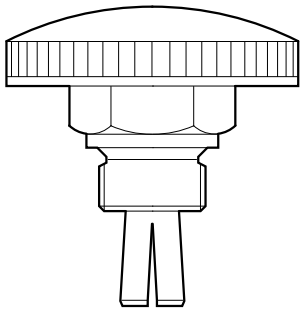


19118584971

Structure

Characteristics	
Housing material	Steel
Filter inserts	Steel and aluminum wire mesh
Design	Cylindrical pipe thread according to DIN EN ISO 228-1 Dimensioned for operating conditions with special protection against drip and splash water

4.4.4 Stainless steel breather for harsh operating conditions

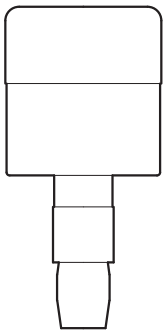


19118584971

Structure

Characteristics	
Housing material	Stainless steel
Filter inserts	Steel and aluminum wire mesh
Design	Cylindrical pipe thread according to DIN EN ISO 228-1 Dimensioned for operating conditions with special protection against drip and splash water

4.4.5 Desiccant breather filter /DC



9007222800055435

The breather has the following characteristics:

- Absorbs water moisture and humidity
- Reduces oil mist

Structure

Features	
Housing material	Polycarbonate
Filter inserts	• Polyester filter: Removes air particles > 3 µm • Silica gel: Absorbs water moisture and humidity. Saturation is indicated by the color changing from blue to pink. • Foam pad: Absorbs oil mist.
Threads	3/8" or 1"

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4.5 Temperature sensor /Pt100

The Pt100 temperature sensor can be used to measure the temperature of the gear unit oil.

The temperature sensor is located in the oil sump of the gear unit. The exact position depends on the gear unit variant.

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5 Installation/assembly

5.1 Required tools/resources

The following tools and aids are required for installation/assembly:

- Set of wrenches
- Torque wrench
- Mounting device
- Compensation elements (washers, spacing rings), if necessary
- Fasteners for input and output elements
- Lubricant, such as NOCO® fluid from SEW-EURODRIVE → except for hollow shaft gear units with shrink disk
- For hollow-shaft gear units → aids for mounting onto/removal from the machine shaft
- Fastening parts for the gear unit base

The listed tools and aids are not included in the scope of delivery.

5.2 Tolerances

Observe the following tolerances.

INFORMATION

Refer to the dimension sheet in your order documents for the tolerances of the interfaces (e.g. mounting flange) for gear unit connection.

5.2.1 Planetary gear units P..

Shaft ends			
Diameter tolerance according to DIN 748:	Ø	> 50 mm	→ ISO m6
Center bores:	Ø	120 – 210 mm	→ M20
	Ø	240 – 290 mm	→ M24
Mounting flange			
Centering shoulder tolerance: ISO f9			

5.2.2 Primary gear units RF../KF../K..

Shaft ends			
Diameter tolerance according to DIN 748:	Ø	≤ 50 mm	→ ISO k6
	Ø	> 50 mm	→ ISO m6
Centering bores according to DIN 332 D:	Ø	>85 – 130 mm	→ M24
	Ø	>130 – 180 mm[1)]	→ M30
Keys according to DIN 6885 (domed type)			

1) Dimensions not according to DIN 332; the thread depth including the counterbore is at least twice that of the nominal thread diameter

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5.3 Important information

Read the following notes prior to installation/mounting.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Attach an information sign near the ON switch to warn that the gear unit is being worked on.

⚠ WARNING

Danger due to mounting in impermissible mounting position.

Severe or fatal injuries.

- Install/mount the gear unit only in the specified mounting position on a level, vibration-damping, and torsionally rigid support structure. Do not twist housing legs and mounting flanges against each other.
- Contact SEW-EURODRIVE before mounting the gear unit in another mounting position than the one permitted.

⚠ WARNING

Danger due to freely accessible, rotating parts.

Severe or fatal injuries.

- Secure rotating components such as shafts, couplings, gears or belt drives using suitable protection covers.
- Ensure that installed protection covers are sufficiently attached.

⚠ WARNING

An operator machine that is not appropriately secured can fall down during gear unit installation or removal.

Severe or fatal injuries.

- Protect the operator's machine against unintentional movement when installing or removing the gear unit.
- Before releasing shaft connections, make sure that there are no active torsional moments present (tensions within the system).

⚠ WARNING

Danger due to installing impermissible components.

Severe or fatal injuries.

- Do not mount any impermissible components to the gear unit.
- Mounting impermissible components may lead to material failure at the gear unit. This may cause the gear unit to fall over or down.

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⚠ WARNING

Danger due to using impermissible gear unit oil.

Severe or fatal injuries.

- Only use food-grade oils when the gear unit is used in the food industry.

⚠ WARNING

Risk of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Remove the oil drain plug very carefully.

⚠ CAUTION

Risk of falling or ejection of unsecured mount-on components, such as keys.

Possible injuries.

- Install appropriate protective devices.
- Secure the mount-on components.

⚠ CAUTION

Danger due to lubricant leaking from damaged seals and the breather.

Minor injuries.

- Check the gear unit and mount-on components for leaking lubricant.
- The seals must not come in contact with cleaning agent as this may damage the seals.
- Protect the breather against damage.
- Make sure that there is not too much oil in the gear unit. If the oil level is too high and the temperature rises, lubricant may escape from the breather.

⚠ CAUTION

Risk of injury due to protruding parts.

Minor injuries.

- Gear units and mount-on components must not protrude into footways.

NOTICE

Starting up the gear unit below the permitted ambient temperature may damage the unit.

Possible damage to property.

- Before startup, the oil must be heated up to the specified temperature.

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NOTICE

Improper installation and assembly can damage the gear unit.

Possible damage to property.

- Observe the following notes.

- Make sure that the customer components are designed for the load.
- The most important technical data is provided on the nameplate.
- You can find more information on operation together with the dimension sheet and further documents in the overall documentation for the gear unit.
- Do not modify the gear unit or the mount-on components without prior consultation of SEW-EURODRIVE.
- Do not change the mounting position without prior consultation with SEW-EURODRIVE. The warranty will become void without prior consultation. An oil expansion tank and/or an oil riser pipe are required if you change to a vertical mounting position. Adjust the lubricant fill quantities and the position of the breather accordingly.
- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have two separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- Note that the oil quantities on the nameplates are approximate values. The marks on the oil sight glass or oil dipstick are decisive for determining the correct oil quantity.
- The oil level plug and the oil drain plug as well as the breather must be freely accessible.
- Use plastic inserts (2 to 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and stainless steel). Also fit the bolts with plastic washers. Always ground the gear unit housing.
- Only mechanical specialists may assemble gear head units with motors and adapters.
- Do not weld anywhere on the drive. Do not use the drives as a ground point for welding work. Welding may destroy gearing components and bearings.
- Units installed outdoors must be protected from the sun. Suitable protection devices are required, such as covers or roofs. When using protective devices, avoid heat build-up. The user must ensure that no foreign objects impair the function of the gear unit (e.g. due to falling objects or spillage).
- Protect the gear unit from direct cold air currents. Condensation may cause water to accumulate in the oil.
- Repair any damage to the paint work (e.g. on the breather).

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5.4 Prerequisites for installation

NOTICE

Danger due to insufficiently cleaned flange surfaces.

Possible damage to property.

- Clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not let the solvent come into contact with the oil seals.

Check that the following conditions have been met:

- The specifications on the nameplate of the motor and the electrical components match the voltage supply system.
- The drive has not been damaged during transportation or storage.
- The ambient temperature matches the information in the order documents.
- No harmful oils, acids, gases, vapors, radiation etc. in the vicinity.

5.4.1 Extended storage

Observe the following: The service life of the lubricant in the bearings is reduced if the unit is stored for ≥ 1 year (applies only to bearings with grease lubrication).

Replace the breather with a screw plug.

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5.5 Installing the gear unit

⚠ WARNING

Danger due to insufficient attachment options on the part of the operator.

Severe or fatal injuries.

- Make sure that there are sufficient and suitable attachment options for the gear unit at the operator's machine before mounting the gear unit to the operator's machine.

NOTICE

An improper foundation may result in damage to the gear unit.

Possible damage to property.

- The foundation must be level and flat; the gear unit must not be deformed when the retaining screws are tightened. Any irregularity of the surface must be leveled out appropriately.
- Observe the weight specified on the nameplate.

To ensure the quick and reliable mounting of a gear unit with foot mounting, the proper foundation should be selected and the mounting carefully planned in advance. System drawings with all necessary construction and dimension details should be available.

To ensure the quick and reliable mounting of a gear unit with flange mounting, a suitable steel construction should be selected and the mounting carefully planned in advance. System drawings with all necessary construction and dimension details should be available.

To prevent harmful vibrations and oscillations, ensure sufficient rigidity of the foundation or the steel construction during installation of the gear unit with foot or flange mounting. The foundation and steel construction must be dimensioned according to the weight and torque of the gear unit, taking into account the forces acting on the gear unit.

Tighten the retaining screws or nuts with the specified tightening torque. Use the screws and tightening torques specified in chapter "Gear unit mounting" (→ 68).

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5.5.1 Tightening torques: Recommendations for gear unit mounting with foot-mounted design

The following table shows the thread sizes and tightening torques for mounting the individual gear unit sizes.

Mount the gear unit according to the order-specific mounting position and mounting surface using all the holes provided for the foot screw fitting.

The values given in the table for the recommended tightening torques for foot screw fittings are based on the following friction coefficient:

Friction coefficient μ_{GK} for thread and head contact surface	Strength class of the screws
0.14 – 0.24	8.8

Do not lubricate the screw connections during installation.

If you use screws with another friction coefficient, adapt the tightening torques accordingly.

Size	Screw/nut	Tightening torque screw/nut Strength class 8.8	Quantity
		Nm	
P.002	M20	460	8
P.012			
P.022			
P.032	M24	795	
P.042	M30	1590	
P.052	M36	2760	
P.062			
P.072	M42	4410	
P.082			
P.092	M48	6650	
P.102			

Use one of the recommended tools to tighten the screw connections:

- Torque wrench
- Motorized torque wrench with dynamic torque measurement
- Torque-controlled, gradual hydraulic tools

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5.5.2 Tightening torques: Recommendations for retaining screws of gear unit mount-on parts

Tighten the screws of gear unit mount-on parts and protection covers using the following tightening torque. Do not lubricate the screw connections during installation.

The tightening torques do not apply to mounting types such as torque arm, flange-mounted gear unit, hollow shaft with shrink disk etc. These are described in the individual chapters.

Screw/nut	Tightening torque Strength class 8.8 Nm
M5	6.8
M6	12
M8	28
M10	56
M12	96

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5.5.3 Foot-mounted gear unit with RF.. /KF../K.. primary gear unit

In case of the following combinations of foot-mounted planetary gear units with RF../ KF../K.. primary gear units, the primary gear unit can be lower than the mounting surface.

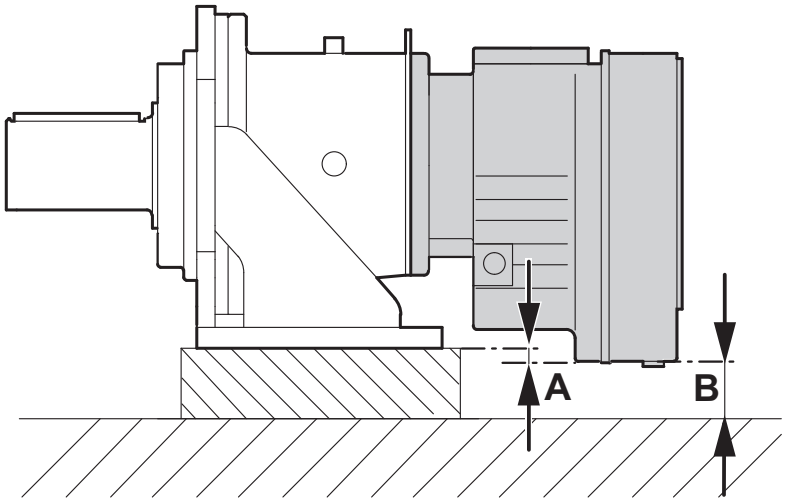
INFORMATION

Observe **dimension A** for the following gear unit combinations. The customer base construction must be prepared accordingly.

In addition, you need enough room to perform an oil change. The customer has to specify a **dimension B** for this purpose.

Size/combinations			Dimension A mm
	RF..	KF../K..	
P.002	-	97	10
P.012	-	107	32.5
P.022	-	107	2.5
P.022	137	-	7.5
P.032	147	-	18.5
P.092	-	187	15

The following figure shows a planetary gear unit with RF primary gear unit.



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5.5.4 Aligning the shaft axis

⚠ WARNING

Shafts can break if the shaft axis is not aligned accurately.

Severe or fatal injuries.

- Refer to the separate operating instructions regarding the requirements of the coupling.

The service life of the shafts, bearings and couplings depends on the precision of the alignment of the shaft axes with each other.

Always try to achieve zero misalignment. When doing so, you should also consult the special operating instructions regarding the requirements of the couplings, for example.

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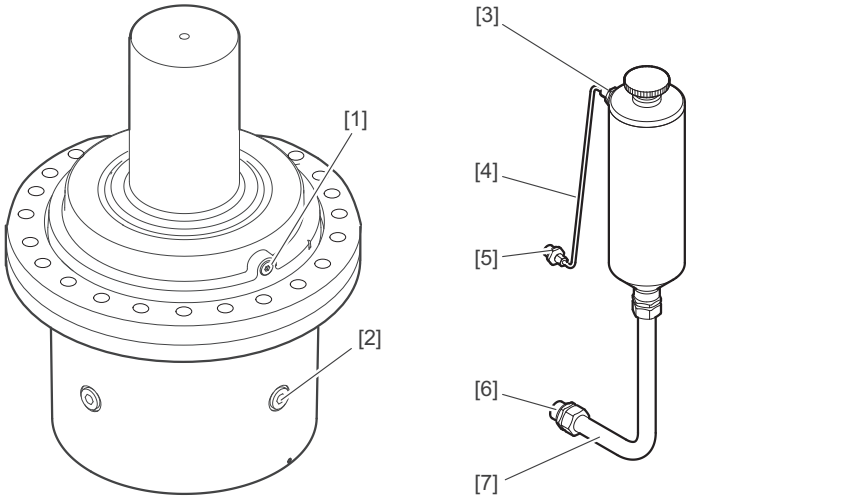
5.6 Mounting the oil expansion tank

If the oil expansion tank has not already been installed at the factory (option), it must be installed before startup. The delivery includes the piping for installing the oil expansion tank. Install the oil expansion tank as follows depending on mounting position, size, and lubrication type.

5.6.1 Sizes P.002 – P.082 with bath lubrication in mounting position M2

The gear unit must not be filled with oil while installing the oil expansion tank. For gear units with factory-filled oil, drain the oil before mounting the oil expansion tank. For gear units without oil filled at the factory, do not fill the gear unit with oil until the oil expansion tank has been installed.



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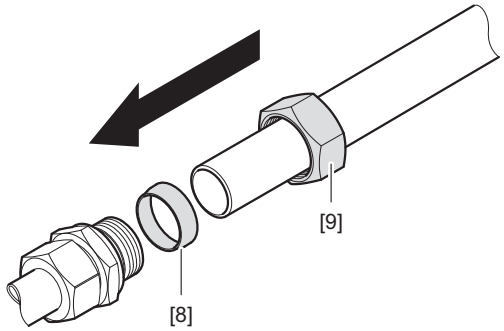
Procedure

1. Remove the two screw plugs from the connection bores [1] and [2] of the planetary gear unit.
2. Loosen the pipe fitting of the fittings [5] and [6] on the enclosed oil expansion tank.
3. Screw the pipe fitting [5] and [6] into the connection bores [1] and [2] on the planetary gear unit.
4. Mount the piping [4] and [7] with cutting ring [8] and union nut [9] to the screwed-in pipe fitting [5] and [6] on the planetary gear unit.



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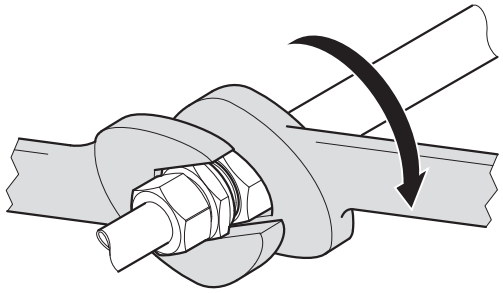
5. If necessary, loosen the screw fitting [3] to being able to position the piping more easily. Tighten the screw fitting [3] again.
6. Screw the two pipes [4] and [7] to the planetary gear unit using the pipe fitting [5] and [6]. When doing so, hold the pipe fitting [5] and [6] using a wrench and tighten the union nut with a wrench for approx. ¼ turn after you feel a resistance.



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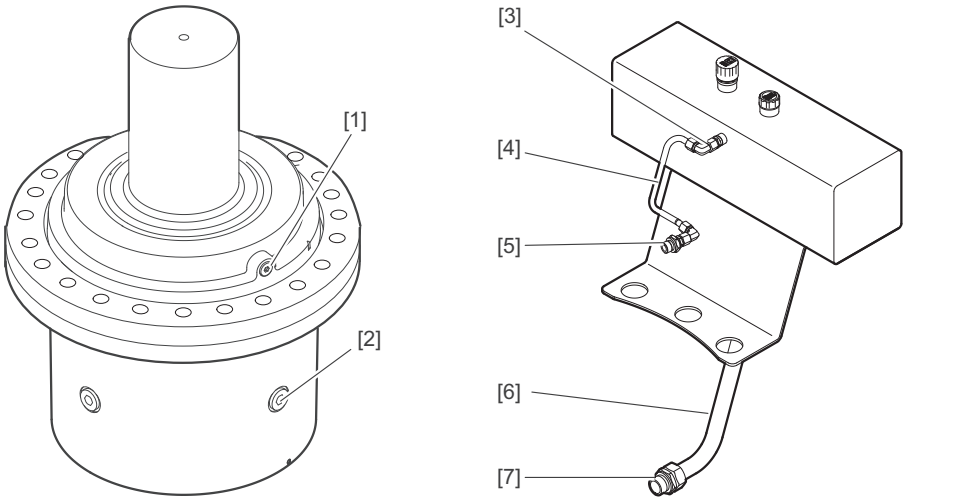
5.6.2 Sizes P.092 – P.102 with bath lubrication in mounting position M2

The gear unit must not be filled with oil while installing the oil expansion tank. For gear units with factory-filled oil, drain the oil before mounting the oil expansion tank. For gear units without oil filled at the factory, do not fill the gear unit with oil until the oil expansion tank has been installed.



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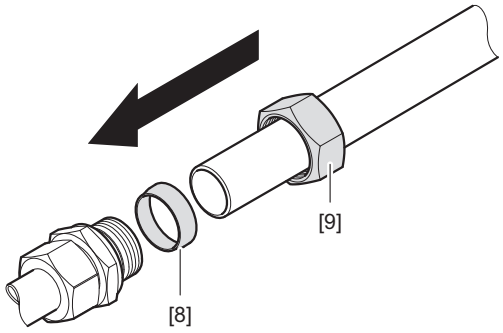
Procedure

1. Remove the two screw plugs from the connection bores [1] and [2] of the planetary gear unit.
2. Loosen the pipe fitting of the fittings [5] and [7] on the enclosed oil expansion tank.
3. Screw the pipe fitting [5] and [7] into the connection bores [1] and [2] on the planetary gear unit.
4. Mount the piping [4] and [6] with cutting ring [8] and union nut [9] to the screwed-in pipe fitting [5] and [7] on the planetary gear unit.



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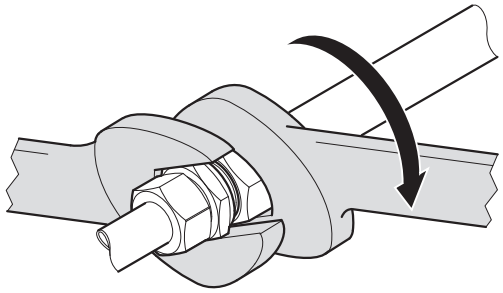
5. If necessary, loosen the screw fitting [3] to being able to position the piping more easily. Tighten the screw fitting [3] again.
6. Screw the two pipes [4] and [6] to the planetary gear unit using the pipe fitting [5] and [7]. When doing so, hold the pipe fitting [5] and [7] using a wrench and tighten the union nut with a wrench for approx. ¼ turn after you feel a resistance.



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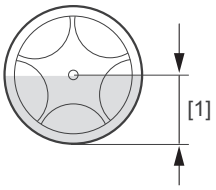
5.7 Filling the gear unit with oil

Observe the notes in chapter "Important information" (→ 🗎 63).

Requirements

- Use an oil from the current lubricant table: **www.sew-eurodrive.de/lubricants**
- Fill in the oil when the gear unit is in the intended mounting position.
- Make sure the oil is fluid when filling it into the gear unit. The flowability can be improved by prior heating, e.g. by using an oil heater. SEW-EURODRIVE recommends an oil temperature of 20 °C to 40 °C for filling in oil.
- Fill the gear unit with the oil grade specified on the nameplate. The oil quantity specified on the nameplate is an approximate quantity. The required oil quantity is indicated by the marks on the oil level glass.
- The required oil fill quantity is higher when additional attachments are mounted to the gear unit, such as an oil supply system. In this case, observe the respective "Oil Cooling System" operating instructions from SEW-EURODRIVE.
- For gear units with external supply pipes, e.g. oil cooling systems, establish the connections before filling the oil.
- Use a clean filling aid (plastic funnel or similar) for filling the oil. Avoid using galvanized filling aids.

Procedure



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1. Open the oil fill plug.
2. Fill in the oil via the oil fill plug until the oil level reaches the center [1] of the oil sight glass.
3. Screw in the oil fill plug.

INFORMATION

Gear unit with splash guard adapter

To speed up the filling process, remove the splash guard adapter at the oil fill opening. Then fill the oil into the gear unit. Observe chapter "Installing the splash guard adapter" for mounting the splash guard adapter.

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5.7.1 Gear units with oil expansion tank /ET

Also observe the notes in chapter "Changing the oil" (→ 🗎 134).

NOTICE

An oil viscosity above the permitted level of 3500 mm^2/s may result in inadequate venting and an insufficient oil filling which could damage the gear unit.

Possible damage to property.

- Observe the oil viscosity during the filling process.

NOTICE

An oil temperature outside the permitted range during the filling process may cause oil deficiency or oil leakage during operation.

Possible damage to property.

- The temperature of the oil to be filled must generally be within a temperature range of 10 °C and 40 °C.

A higher minimum filling temperature might be required depending on the selected oil type. The following table lists guide values.

Minimum oil filling temperature in °C		
Viscosity class	**Mineral**	**Synthetic**
ISO VG 220	10	10
ISO VG 320	10	10
ISO VG 460	15	10
ISO VG 680	20	15

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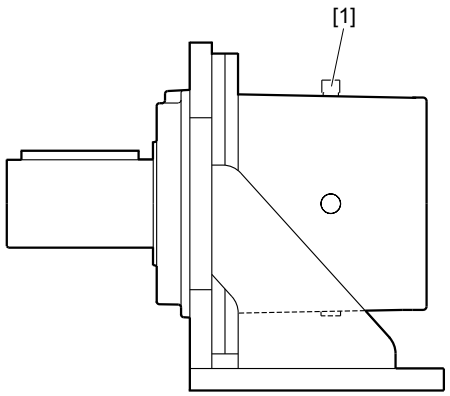
5.8 Gear units delivered with oil fill (option)

If the gear unit is delivered with oil fill, you have to install the breather prior to startup. It is enclosed with the delivery.

The following illustration serves as an example. The position of the breather is specified in the order documents.



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1. Remove the closing plug.
2. Insert the breather [1].
3. Check the oil level. Observe chapter "Checking the oil level at the planetary gear unit" (→ 🗎 130).

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5.9 Gear unit with splash guard adapter (option)

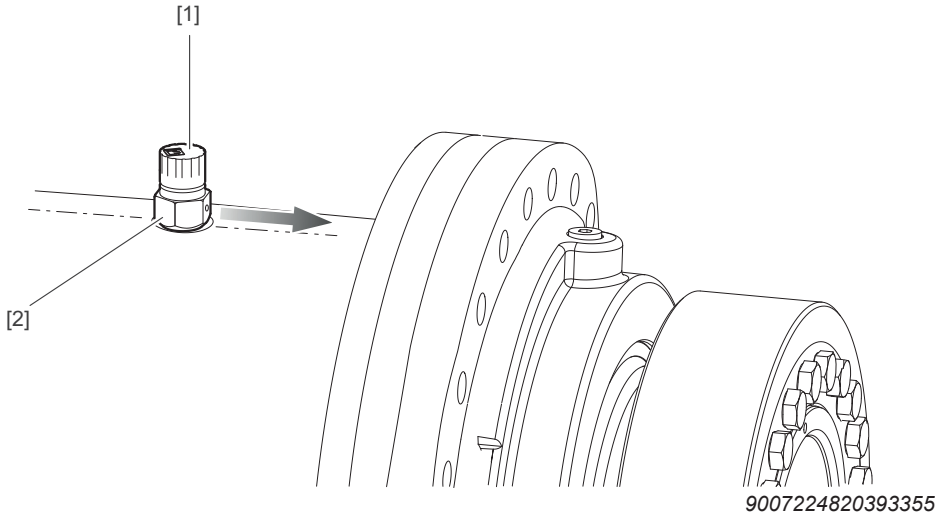
NOTICE

Improper mounting of the splash guard adapter may result in damage to the gear unit.

Possible damage to property.

- Prevent foreign particles from entering into the gear unit when performing the following work.

The splash guard adapter [2] and the breather [1] must be installed prior to startup if the gear unit is delivered with oil fill or after an oil change. They are included in the delivery of the gear unit.



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5.9.1 Installing the splash guard adapter

Procedure

1. Clean the tapped hole and the thread of the splash guard adapter with solvent.
2. Apply liquid threadlocker, e.g. Loctite® 577, to the thread of the splash guard adapter.
3. Screw the splash guard adapter into the gear unit.
4. Align the splash guard adapter [2] in a way that the positioning mark shows in the direction of the output shaft.
5. Screw the breather [1] on the splash guard adapter [2].

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5.10 Gear units with solid shaft

INFORMATION

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm².

5.10.1 Assembling the input and output components

NOTICE

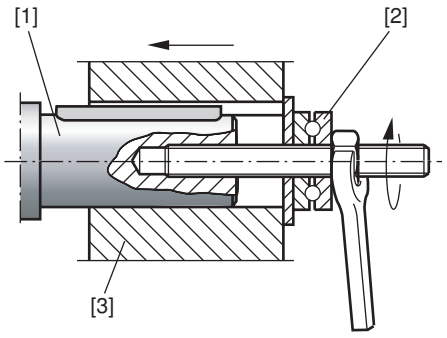
Bearings, housing or shaft may be damaged due to improper assembly.

Possible damage to property.

- Always use a mounting device for installing input and output elements. Use the threaded centering bore on the shaft end for positioning.
- Never force belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer. This may damage the bearing, the housing and the shaft.
- If belt pulleys are used, make sure that the belt is tensioned correctly in accordance with the manufacturer's instructions.

Installation with mounting device

The following figure shows a mounting device for installing couplings or hubs on gear unit ends or motor shaft ends. Should you be able to tighten the screw connection without any problems, you may not need the thrust bearing on the mounting device.



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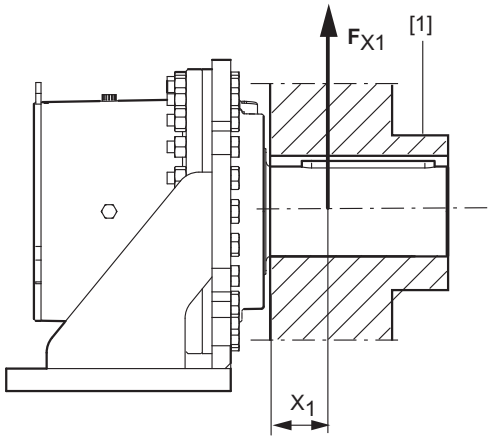
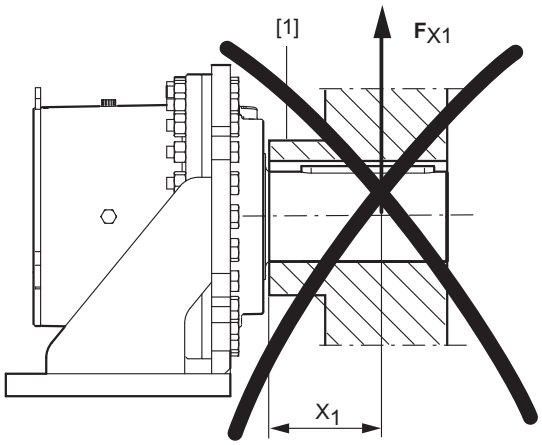
[1] Gear unit shaft end
[2] Thrust bearing
[3] Coupling hub

Avoid excessive overhung loads

To avoid high overhung loads: Install gear wheels or chain sprockets according to figure **A**, if possible.



[A]



[B]

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[1] Hub
[A] Correct
[B] Incorrect

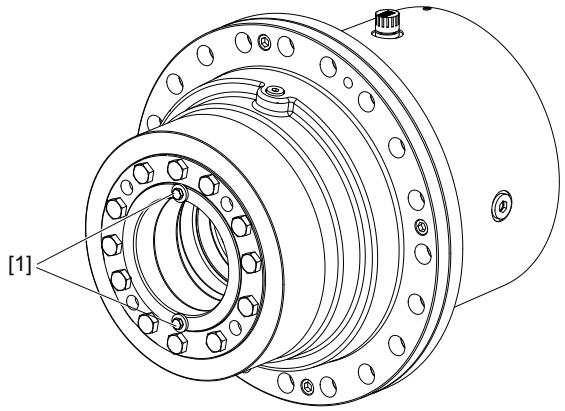
INFORMATION

Mounting is easier if you first apply lubricant containing MoS_2 to the output element and/or heat it up briefly (to 80 – 140° C).

5.11 Output shaft as hollow shaft with shrink disk

Note the following points when you assemble the shrink disk:

- Ensure that the dimensions of the machine shaft correspond to the specifications of SEW-EURODRIVE.
- The material of the machine shaft should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm².
- Note that the shrink disk is secured with 2 screws [1] on delivery. Remove the screws prior to assembly.



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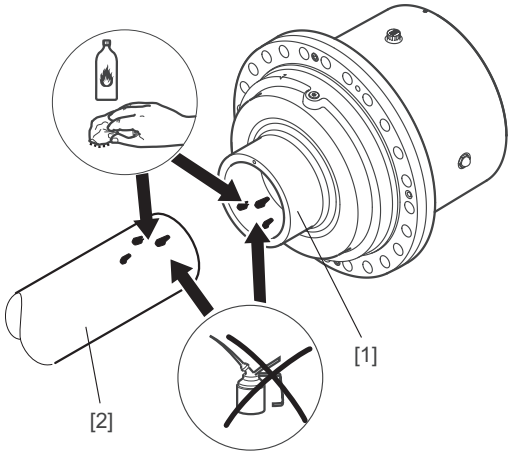
5.11.1 Assembly

Observe the notes in chapter "Important information" (→ 🗎 63).

1. Before installing the shrink disk, clean and degrease the hub [1] and the machine shaft [2]. This is very important for reliable torque transmission.



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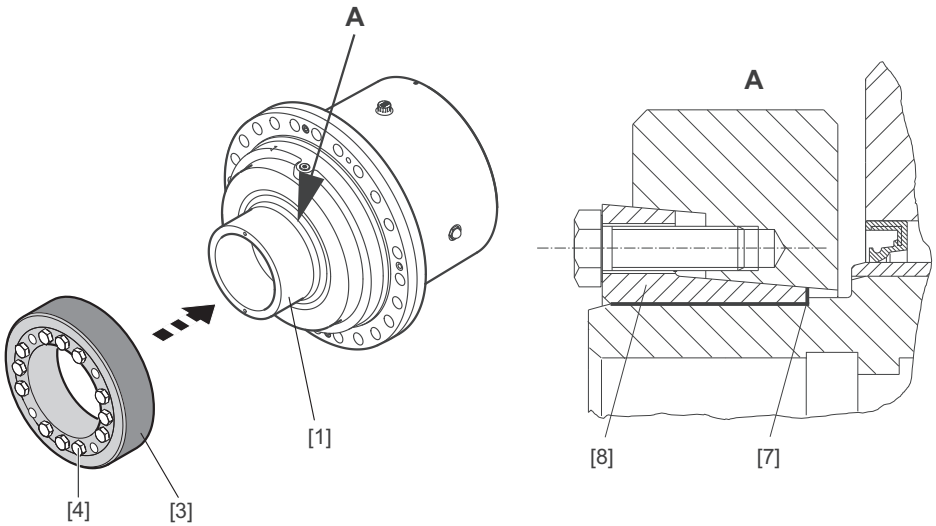
2. ⚠ **CAUTION!** The loose shrink disk could slip. Risk of injury to persons and damage to property. Secure the shrink disk against slipping.
   Slide the shrink disk with untightened screws onto the hollow shaft [1] and position the inner ring of the shrink disk [8].

3. **NOTICE!** Tightening the locking screws [4] without installed machine shaft may result in the hollow shaft being deformed. Possible damage to property. Only tighten the locking screws [4] with the machine shaft [2] installed.
   Check the correct position of the shrink disk [3]. The shrink disk is positioned correctly when it is in contact with the shaft shoulder [7].



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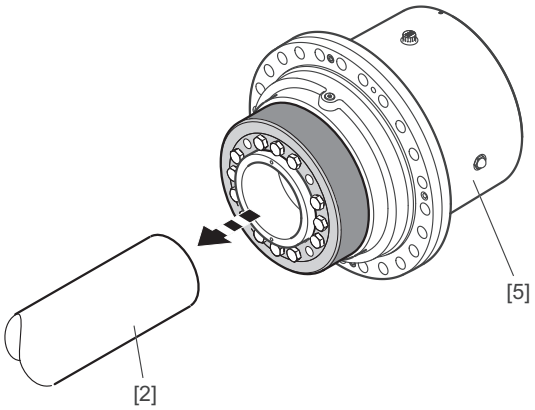
4. Install the machine shaft [2], or push the gear unit [5] onto the machine shaft [2] to the stop. Carry out the individual installation steps slowly to allow the compressed air to escape around the outside of the shaft.



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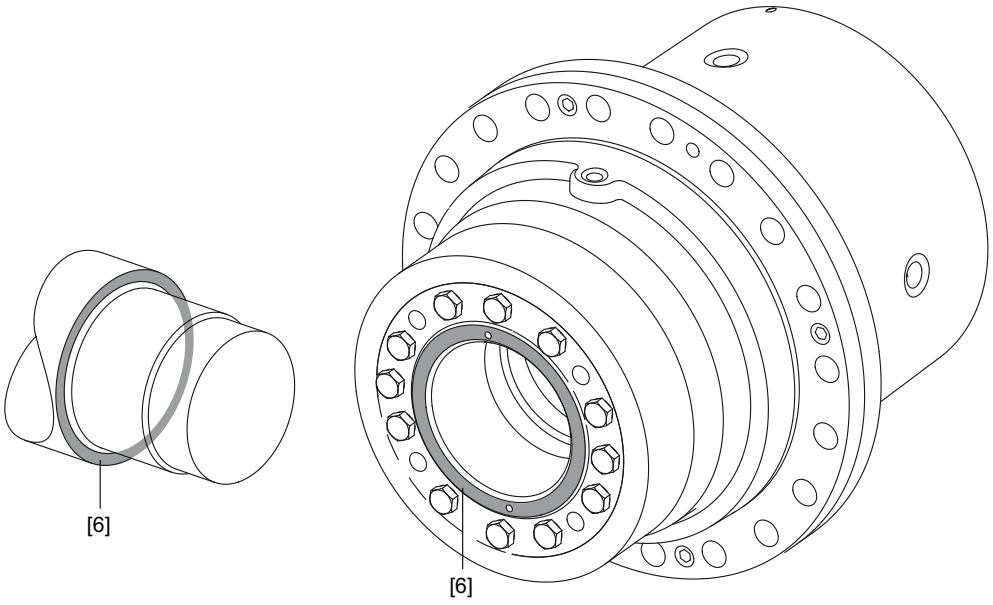
5. To guarantee a complete torque transmission from the gear unit to the machine shaft, observe the following procedure during assembly. Push the gear unit onto the machine shaft until the contact surfaces [6] touch.



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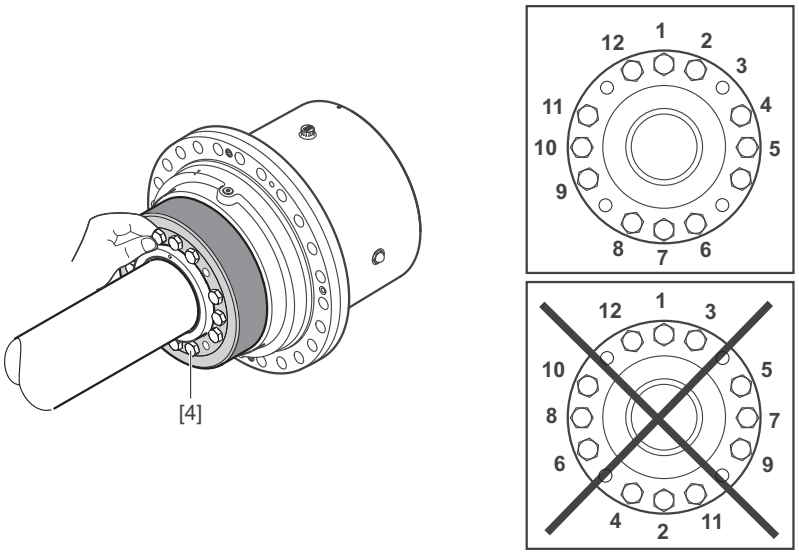
6. First tighten the locking screws [4] manually. Tighten all locking screws by working round equally (not in diametrically opposite sequence) in ¼ turn increments.



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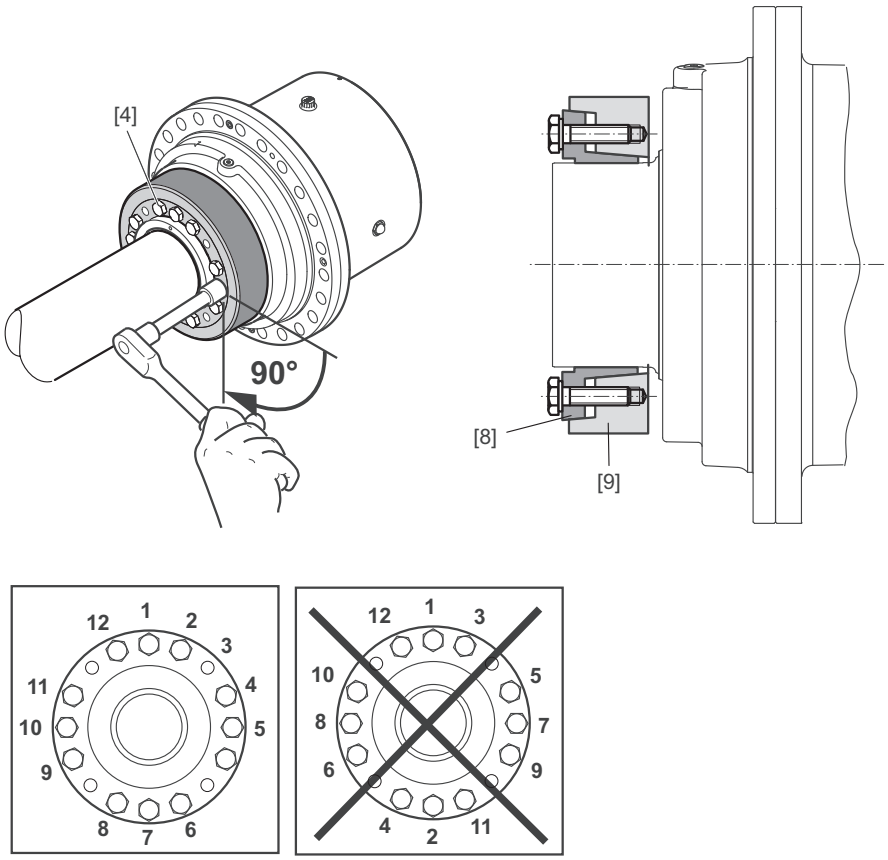
7. Adhere to the tightening torque in the following table. Tighten the locking screws [4] by continuing to work round in ¼ turns until you reach the tightening torque.



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8. Verify the type details on your shrink disk and choose the tightening torque.

Shrink disk type	Size	Screws	Rated torque Nm	Tightening torque Nm ± 20%
3191	P.002	M16	41000	250
3181	P.012	M16	75500	290
3181	P.022	M16	95500	290
3181	P.032	M20	134000	570
3181	P.042	M20	194000	570
3181	P.052	M20	255000	570
3181	P.062	M24	405000	980
3181	P.072	M24	525000	980
3181	P.082	M24	720000	980
3181	P.092	M27	906000	1450
3181	P.102	M27	1160000	1450

INFORMATION

The front end surfaces of inner ring [8] and outer ring [9] need not necessarily be flush when the locking screws are tightened.

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For gear units with hollow shaft and shrink disk, a protection cover may be installed as an option. The protection cover provides protection against touching the rotating output shaft.

⚠ CAUTION

Improper assembly of the protection cover may result in risk of injury due to rotating parts.

Possible injury to persons.

- After assembly, check to see that the protection cover is properly attached.

5.11.2 Removal

⚠ WARNING

Improper disassembly may cause the shrink disk and/or the gear unit to fall down.

Serious injury.

- Never completely unscrew the shrink disk locking screw.
- Secure the shrink disk and the gear unit against slipping.

NOTICE

Removing the gear unit incorrectly from the machine shaft may damage bearings and other components.

Possible damage to property.

- You may only use the hollow shaft as a support for disassembly. Note that supporting on any other parts of the gear unit may damage the material.
- Remove the shrink disk properly. Never completely unscrew the retaining screws because the shrink disk might jump off and cause an injury.
- Shrink disks and corresponding parts of different gear units must not be swapped.

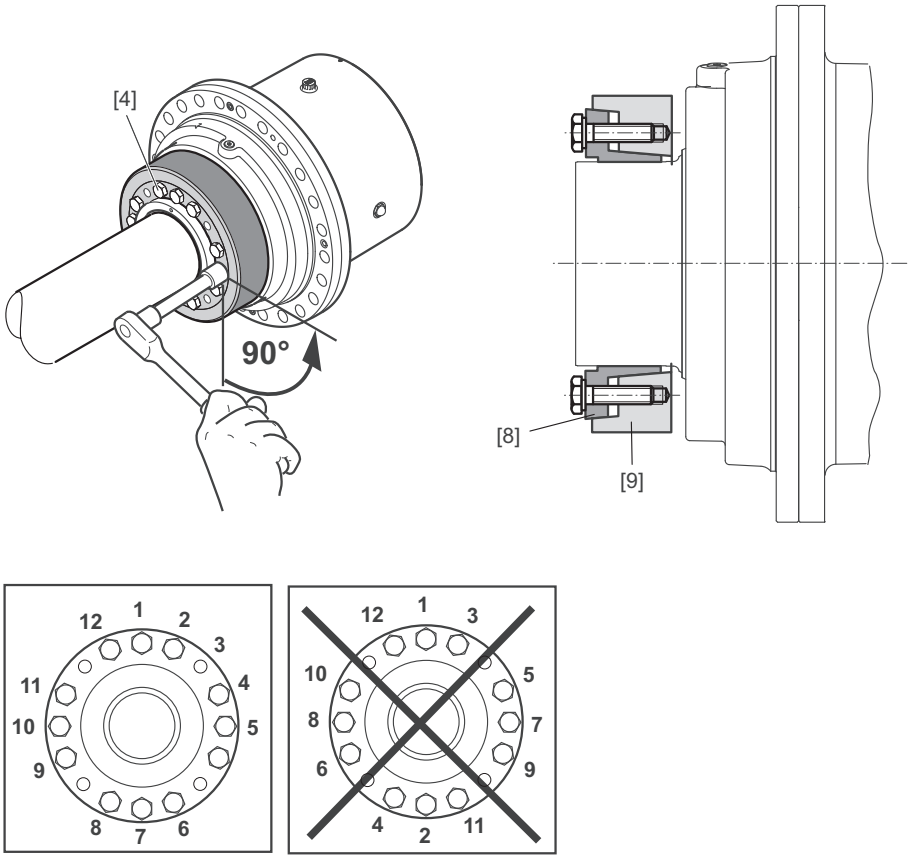
Observe the notes in chapter "Important information" (→ 🗎 63).

1. **NOTICE!** Improper loosening of the locking screws can lead to straining of the connecting surface. Possible damage to property.
   Loosen the locking screws [4] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION

If the bevel (outer ring) [9] and the taper bushing (inner ring) [8] do not separate by themselves:

- Take the necessary number of locking screws and screw them evenly into the disassembly bores. Tighten the locking screws in several steps until the tapered bushing separates from the tapered ring.



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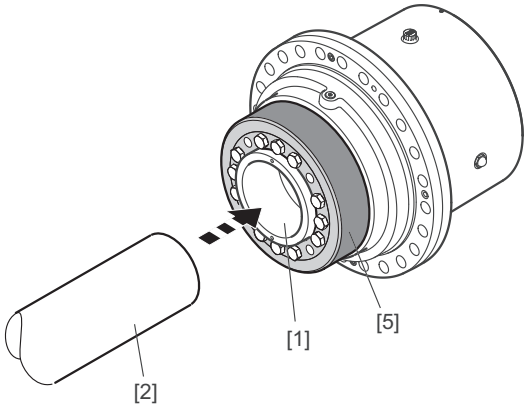
2. Remove the machine shaft [2] or pull the hub [1] off the machine shaft. If rust has formed on the shaft in front of the hub, you must remove the rust first.



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3. ⚠ **WARNING!** The loose shrink disk could slip. Risk of injury to persons and damage to property. Secure the shrink disk against slipping.
Remove the shrink disk [3] from the hub [1].

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5.11.3 Cleaning and lubrication

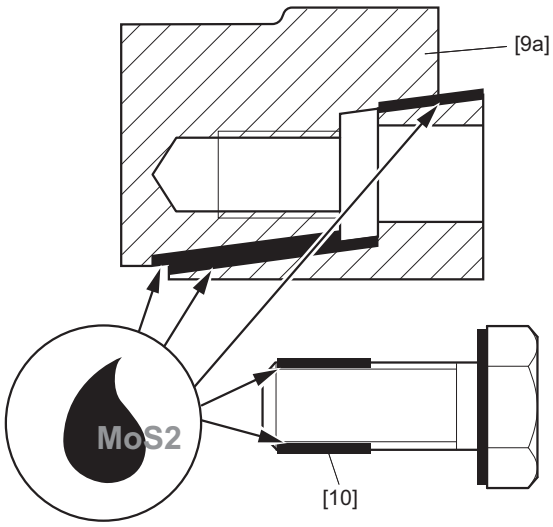
INFORMATION

You must perform the following steps carefully to ensure proper functioning of the shrink disk. Use only products that are comparable to the specified solid lubricant.

If the tapered surfaces of the shrink disk are damaged, the shrink disk can no longer be used and must be replaced.

Procedure

1. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.
2. Apply an MoS2 compound onto the threads and under the screw heads of the locking screws [10], for example "gleitmo 100" by FUCHS LUBRITECH (www.fuchs-lubritech.com).
3. Also evenly lubricate the tapered surface of the taper (outer ring) [9a] with a thin layer of an MoS2 compound.



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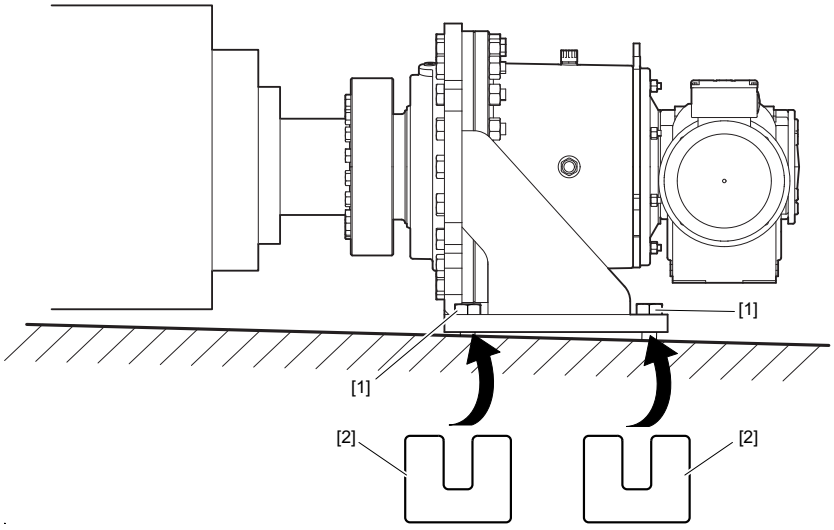
[9a] Taper (outer ring)
[10] Locking screws

5.12 Gear unit in foot-mounted design with hollow output shaft with shrink disk

1. Install the hollow shaft with shrink disk onto the machine shaft according to chapter "Output shaft as hollow shaft with shrink disk" (→ 🗎 81).
2. If there is a gap between foundation and mounting surface of the gear unit foot, compensate with shims [2] before tightening the retaining screws [1] at the gear unit foot.
3. Tighten the retaining screws [1] at the gear unit foot. Observe the tightening torques in chapter "Tightening torques: Recommendations for gear unit mounting with foot-mounted design" (→ 🗎 68).



18570924299

NOTICE

Static overdetermination of the gear unit might result in damage to the gear unit.

Possible damage to property.

- Make sure the gear unit is not statically overdetermined. A statically overdetermined gear unit might result in damages to the gear unit.

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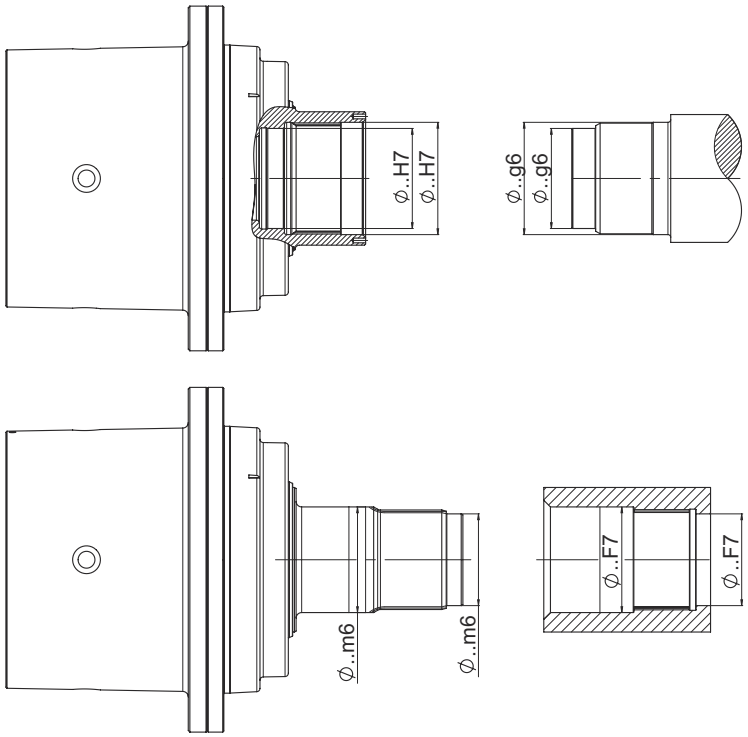
5.13 Gear unit with splining

5.13.1 Notes for mounting the gear unit

INFORMATION

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm².



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The specified tolerances for gear shaft and machine shaft correspond to the standard design. If requested by the customer, other tolerances of the gear shaft are possible.

NOTICE

Constraining forces can occur on the output shaft bearing due to the rigid connection between the machine shaft and the gear shaft. This may result in damages to the output shaft bearing and increased fretting corrosion in the connection between the machine shaft and the gear shaft.

Possible damage to property.

- The gear unit is usually foot or flange-mounted and used as bearing point when the machine shaft has no individual bearing or merely provides one bearing point. You have to provide for an accurate coaxial alignment with the bearing point.
- If the machine shaft has at least 2 bearing points, the gear unit should be connected merely to the machine shaft and supported with a torque arm. In order to prevent excess stress on the bearing, gear units with foot or flange mounting are to be avoided.

5.13.2 Mounting the gear unit onto the machine shaft

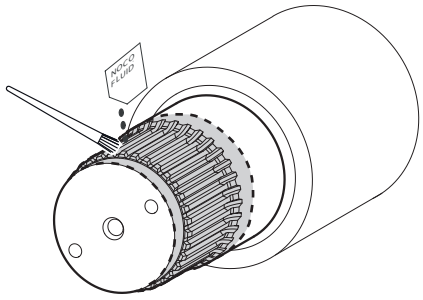
INFORMATION

Make sure the dimensions of the machine shaft correspond to SEW-EURODRIVE specifications → refer to the dimension sheet in your order documents.

Output shaft as a splined hollow shaft /..V

Observe the notes in chapter "Important information" (→ 🗎 63).

1. Apply some NOCO® FLUID on the machine shaft around the centering seat and the splining.



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2. Push the gear unit onto the machine shaft. The splining of the gear shaft must mesh with the splining of the machine shaft.
3. Make sure that the customer shaft is at the correct position in axial direction.

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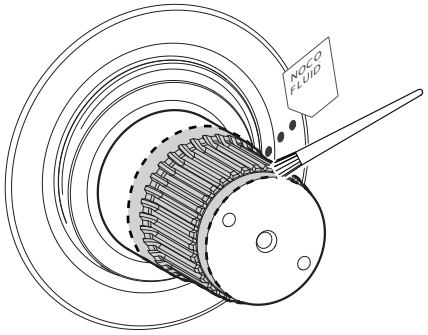
Output shaft as a splined solid shaft /..L

Observe the notes in chapter "Important information" (→ 🗎 63).

1. Apply some NOCO® FLUID on the gear shaft around the centering seat and the splining.



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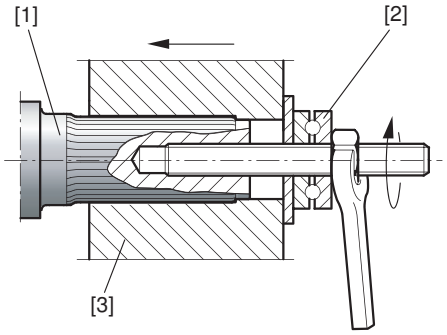
2. Push the gear unit onto the machine shaft. Use a mounting device, if necessary. The splining of the gear shaft must mesh with the splining of the machine shaft.



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[1] Splined solid shaft
[2] Thrust bearing
[3] Coupling hub

3. Make sure that the customer shaft is at the correct position in axial direction.

5.13.3 Disassembling the gear unit from the machine shaft

NOTICE

Improper disassembly of the gear unit and machine shaft may damage bearings and other components.

Possible damage to property.

- You may only use the gear shaft as a support for disassembly. Note that supporting on any other parts of the gear unit may damage the material.

5.14 Torque arm

5.14.1 Notes on installation

⚠ WARNING

Insufficiently secured gear units can fall down during assembly/disassembly.

Severe or fatal injuries.

- Secure the gear unit during assembly/disassembly. Support the gear unit using appropriate tools.

NOTICE

Deforming the torque arm leads to constraining forces on the output shaft, which may negatively influence the service life of the output shaft bearings.

Possible damage to property.

- Do not deform the torque arm.

NOTICE

Strain on the torque arm may break the housing.

Possible damage to property.

- Adhere to the specified screw size, tightening torques and required screw strength.

INFORMATION

- Retaining screws are included in the scope of delivery.
- When using a shrink disk cover, install the torque arm before mounting the cover.

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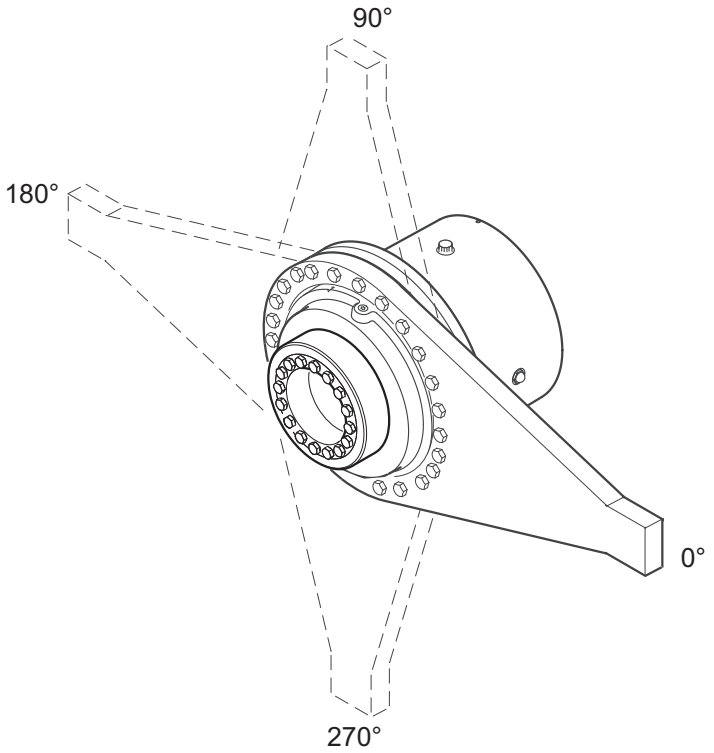
5.14.2 Single-sided torque arm

Installation situation

The torque arm can be installed at 0° to 360° in consideration of the order-specific configuration.



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The reactive force resulting from the gear unit torque is absorbed via the torque arm with lever arm A. The figure on the next page shows an example of a customer fixture in a welded structure. Two supporting plates are welded on the machine design with the suggested dimensions. Once the gear unit has been mounted, a connecting cover plate is welded onto the two supporting plates. The force of the gear unit torque acts on the support, divided by the length of the lever arm A. The reaction force also acts on the gear unit and machine shafts.

The figure shows a sample mounting position and the combination of a planetary gear unit with torque arm.

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Dimensions

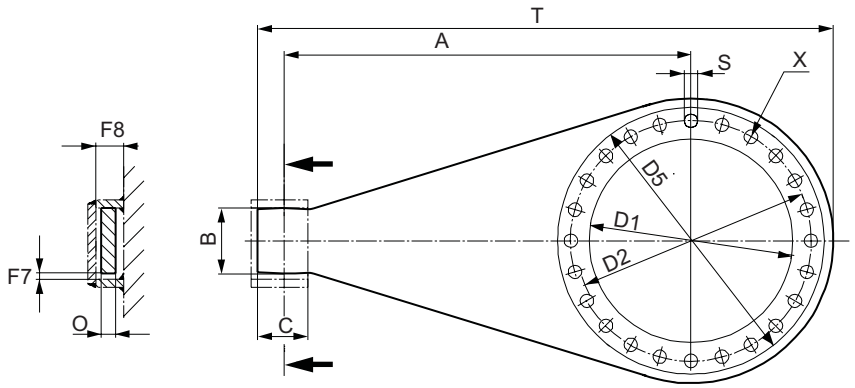
The following figure shows a sample torque arm with dimensions.

NOTICE

Mounting elements may be damaged by to high impacts.

Possible damage to property

- Limit the maximum clearance for the torque arm bearing according to F7 and F8 in the following table.



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Size	Dimensions in mm										Quantity	Mass
	A	B	C	D1	D2	O	F7	F8	S	T	X	kg
P.002	650	60	50	334	370	25	2	50	22	880	16	25
P.012	700	70	60	374	410	30	2	60	22	955	20	35
P.022	750	90	70	414	460	35	2	70	22	1035	24	48
P.032	800	110	90	464	510	35	2	70	26	1125	20	58
P.042	900	150	120	484	560	40	2	80	33	1270	20	93
P.052	1000	160	130	534	590	40	2	80	33	1390	24	102
P.062	1200	180	150	614	690	50	2	100	39	1655	24	183
P.072	1500	230	200	694	770	60	2	120	39	2020	24	317
P.082	1600	230	200	754	840	70	2	140	45	2160	24	420
P.092	1650	250	220	804	870	70	2	140	45	2235	24	440
P.102	1700	250	220	854	960	70	2	140	45	2335	24	510

INFORMATION

The torque arm seat must be sufficiently dimensioned by the user.

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Tightening torques

INFORMATION

The tightening torques listed in the following table are based on the friction coefficient for threads and a mounting surface of μ = 0.11.

If you use other screws than those included in the delivery, adjust the tightening torques to the new friction conditions.

Use only the following tools for installation:

- Signal-generating torque wrench
- Motorized torque wrench with dynamic torque measuring
- Torque-controlled, gradual hydraulic tools

Size	Thread	Tightening torque	Strength class	DIN screws
		Nm		
P.002 – P.022	M20	555	10.9	DIN EN ISO 4017 DIN EN ISO 4762
P.032	M24	960		
P.042 – P.052	M30	1910		
P.062 – P.072	M36	3320		
P.082 – P.102	M42	5310		

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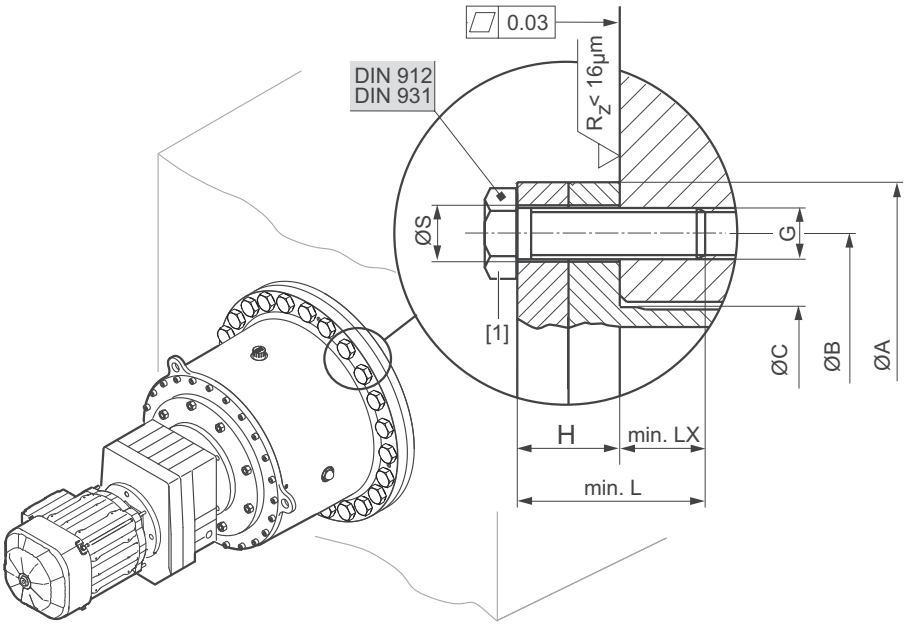
5.15 Flange-mounted gear units

The following figure shows an example of how gear units with a flange-mounted design are installed.

Retaining screws are not included in the delivery.



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INFORMATION

The tightening torques listed in the following table are based on the friction coefficient for threads and a mounting surface of µ = 0.11.

The screws are not included in the delivery. Adjust the tightening torques to the new friction conditions.

Use only the following tools for installation:

- Signal-generating torque wrench
- Motorized torque wrench with dynamic torque measuring
- Torque-controlled, gradual hydraulic tools

The following values in the table apply to steel constructions.

Size	Thread	Quantity	Tightening torque	Dimensions in mm							Strength classes	Screws EN ISO
			Nm	Ø S	H	min. L	min. LX	Ø A	Ø B	Ø C		
P.002	M20	16	555	22	39.5	73.5	34	410	370	330_{f9}	10.9	4017 4762
P.012	M20	20	555	22	41.5	73.5	32	450	410	370_{f9}		
P.022	M20	24	555	22	48	84	36	500	460	410_{f9}		
P.032	M24	20	960	26	50	84	34	560	510	460_{f9}		
P.042	M30	20	1910	33	64	114	50	620	560	480_{f9}		
P.052	M30	24	1910	33	64	114	50	650	590	530_{f9}		
P.062	M36	24	3320	39	74	134	60	760	690	610_{f9}		
P.072	M36	24	3320	39	84	144	60	840	770	690_{f9}		
P.082	M42	24	5310	45	84	154	70	920	840	750_{f9}		
P.092	M42	24	5310	45	90	160	70	950	870	800_{f9}		
P.102	M42	24	5310	45	100	180	80	1050	960	850_{f9}		

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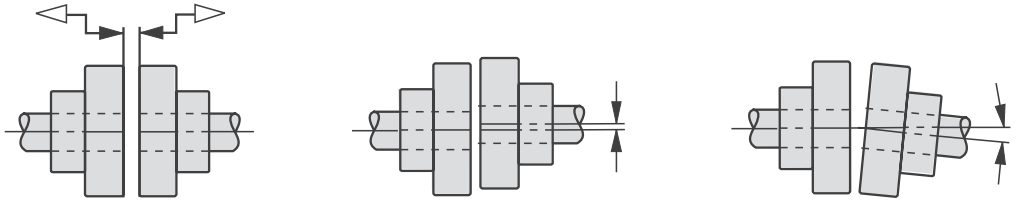
5.16 Couplings

5.16.1 Aligning the coupling

Adjust the following misalignments when mounting couplings.

Axial misalignment | Radial misalignment | Angular offset



Use a laser-optical alignment system to align the coupling as accurately as possible.

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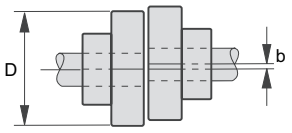
5.16.2 Mounting tolerances

INFORMATION

- The table values for radial offset and angular offset apply to common mechanical couplings, such as elastic claw couplings or couplings with steel lamella package.
- The values listed below result from the consideration of the entire drive train and therefore differ from the tolerance values of the coupling manufacturers.
- Drive speeds greater than 1500 min^{-1} in conjunction with coupling diameters greater than 400 mm require a case-by-case test and approval.
- All tooth and barrel couplings must be set and aligned according to the respective manufacturer's operating instructions.
- The setting and alignment tolerances for special couplings must be checked and agreed on in individual cases.

Observe the following information.

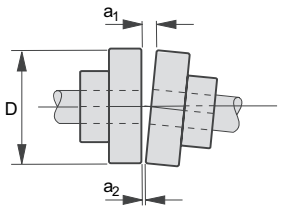
Radial misalignment



b = Max. radial offset

D = Outer diameter

Angular offset



$a_1 - a_2$ = Max. radial offset

The installation tolerances stated in the following table apply to flexible couplings.

Outer diameter D in mm	Mounting tolerances in mm					
	n < 500 min^{-1}		n: 500 – 1500 min^{-1}		n > 1500 min^{-1}	
	$a_1 - a_2$	b	$a_1 - a_2$	b	$a_1 - a_2$	b
0 – 200	0.2	0.2	0.2	0.2	0.2	0.2
200 – 400	0.3	0.3	0.3	0.3	0.3	0.3
> 400	0.3	0.3	0.3	0.3	–	–

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5.17 AMS.. adapter

5.17.1 Figure and note concerning the installation of the AMS.. adapter

NOTICE

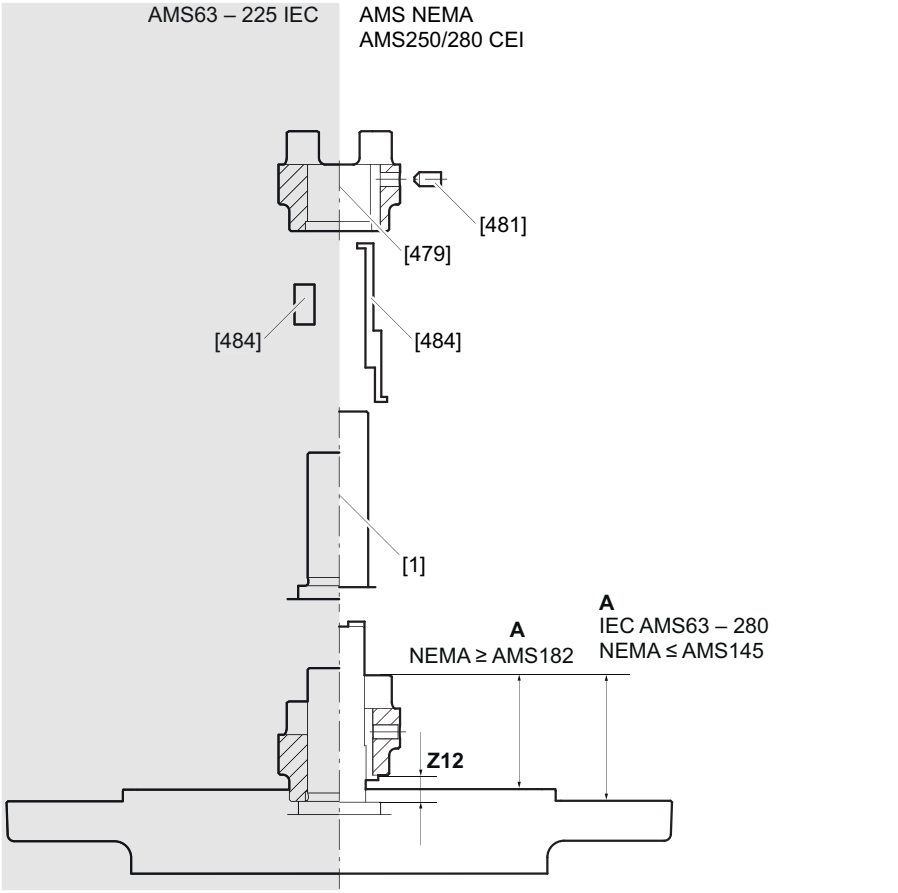
Damage to the adapter due to ingress of moisture or dirt (e.g. dust) when a motor/drive is attached to the adapter.

Damage to the adapter.

- Seal the adapter with an anaerobic fluid seal.
- When the motor/drive to be attached has openings or bores that provide access to the inside of the adapter, seal these against dust or liquid.

INFORMATION

To avoid contact corrosion, SEW-EURODRIVE recommends applying NOCO® fluid to the motor shaft before mounting the coupling half.



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[1] Motor shaft
[479] Coupling half
[481] Set screw
[484] Key
A Distance A
Z12 Distance between shaft shoulder and coupling

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5.17.2 Fitting the motor to IEC adapters AMS63 – 225

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Remove the key from the motor shaft. Replace this key with the supplied key [484]. **Notice!** The key must not protrude beyond the base of the coupling claw in the installed condition!
3. Heat the coupling half [479] to approx. 80 °C to a **maximum** of 100 °C. Slide the coupling half onto the shoulder of the motor shaft as far as it will go.
4. Check the position of the coupling half. The values for distance "A" are listed in the following table.
5. Secure the key and the coupling half to the motor shaft using the set screw [481]. Refer to the following table for the required tightening torque "T_A".
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Fit the motor to the adapter in such a way that the coupling claws of the adapter shaft engage in the plastic coupling ring. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106).

IEC adapter AM63 to 225: Distance A and tightening torque T_A

	63/71	80	90	100/112	132	160/180	200	225
A /mm	27.3	30	39	48.5	56.5	80.5	78	93
T_A /Nm	1.5	2	2	4.8	10	17	17	17
Thread	M4	M5	M5	M6	M8	M10	M10	M10

5.17.3 Fitting the motor to IEC adapter AMS250/280 and NEMA adapter AMS56 – 365 with the provided key

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Remove the key from the motor shaft.
3. Install the supplied key [484]. The position of the key is dependent upon the adapter:
   - ⇨ **AMS250-280**: The key must lie against the shoulder of the motor shaft.
   - ⇨ **NEMA**: The shoulder of the key must lie against the front of the motor shaft.
4. Heat the coupling half [479] to approx. 80 °C to a maximum of 100 °C and slide the coupling half onto the motor shaft. Slide the coupling half onto the shoulder of the key as far as it will go.
5. Check the position of the coupling half. The values for distance "A" are listed in the following table.
6. Secure the key and the coupling half to the motor shaft using the set screw [481]. Refer to the following table for the required tightening torque "T_A".
7. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
8. Fit the motor to the adapter in such a way that the coupling claws of the adapter shaft engage in the plastic coupling ring. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106).

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IEC adapter AMS250/280: Distance A and tightening torque T_A

	250/280
A /mm	139
T_A /Nm	17
Thread	M10

NEMA adapter AMS56 – 365: Distance A and tightening torque T_A

	56	143/145	182/184	213/215	254/256 284/286	324/326 364/365
A /mm	37.7	46.3	54.2	61.2	81.6	90.4
T_A /Nm	2	2	4.8	10	17	17
Thread	M5	M5	M6	M8	M10	M10

5.17.4 Fitting the motor to IEC adapters AMS250/280 and NEMA adapters AMS56 – 365 with standard key

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Remove the key from the motor shaft. Replace this with a standard key. The required standard key size can be found in the following table. **Notice!** The key must not protrude beyond the base of the coupling claw in the installed condition!
3. Heat the coupling half [479] to approx. 80 °C to a **maximum** of 100 °C and slide the coupling half onto the motor shaft. Slide the coupling half onto the motor shaft up to distance Z12. The values for distance "Z12" are listed in the following table.
4. Check the position of the coupling half. The values for distance "A" are listed in the table in chapter "Fitting the motor to IEC adapter AMS250/280 and NEMA adapter AMS56 – 365 with the provided key" (→ 🗎 100).
5. Secure the key and the coupling half to the motor shaft using the set screw [481]. The required tightening torque "T_A" can be found in the table in chapter "Fitting the motor to IEC adapter AMS250/280 and NEMA adapter AMS56 – 365 with the provided key" (→ 🗎 100).
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Fit the motor to the adapter in such a way that the coupling claws of the adapter shaft engage in the plastic coupling ring. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106).

Adapter	Z12 mm	Standard key[1)] inch	Standard key[2)] mm
AMS56	3.1	B3/16 × 3/16 × 7/16	–
AMS143/145	10.6	B3/16 × 3/16 × 9/16	–
AMS182/184	9	B1/4 × 1/4 × 1/2	–
AMS213/215	11.3	B5/16 × 5/16 × 13/16	–
AMS254/256	7.4	B3/8 × 3/8 × 1 1/4	–
AMS284/286	13.8	B1/2 × 1/2 × 1 1/4	–
AMS324/326	18.7	B1/2 × 1/2 × 1 1/2	–

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Adapter	Z12 mm	Standard key[1] inch	Standard key[2] mm
AMS364/365	19	B5/8 × 5/8 × 1 1/4	–
AMS250	19	–	B18 × 11 × 70
AMS280	19	–	B20 × 12 × 70

1) The key size relates to material type 1045 or type 1018 in accordance with ASTM A 29/A29M.
2) The key size relates to material C45+C in accordance with DIN EN 10277-2.

5.17.5 Permitted loads

NOTICE

The gear unit can become overloaded due to excessive weight or the excessive power rating of an attached motor.

Gear unit damage.

- Note that the load data specified in the following table is not to be exceeded.
- Ensure that the permitted power rating (torque and speed) on the adapter is adhered to according to the nameplate.

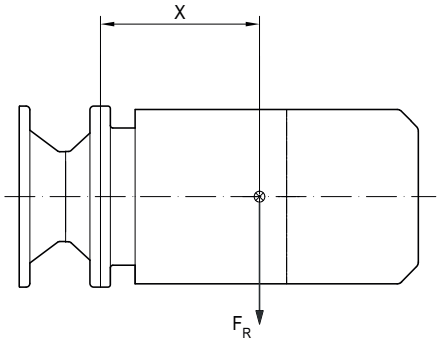
NOTICE

Danger due to static overdetermination if motors are additionally attached via a foot plate.

Damage to property.

- A motor attached at the foot relieves the interface at the adapter; however, make sure that the installed foot-mounted motor is attached to the customer's construction in a stress-free manner.

The following figure shows the load caused by the mass of the motor:



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⊗ Motor center of gravity
x Distance between adapter flange and motor center of gravity
F_R Overhung load

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Permitted loads for gear unit type series R.., F..[2], K.., S.., and W..9:

IEC adapter	x[1]	Gear unit input end flange diameter	Standard	Option /DH	Option /RS
	mm	mm	F_R[1] in N	F_R[1] in N	F_R[1] in N
AMS63/71 [2]	77	105	260	220	–
		≥ 120	530	455	–
AMS80 [2]	113	105	300	265	–
		120	420	370	350
		≥ 160	1000	880	820
AMS90 [2]	113	120	420	375	350
		≥ 160	1000	895	840
AMS100/112 [2]	144	≥ 160	2000	1685	1685
AMS132 [2]	186	160	1600	1375	1370
		≥ 200	4700	4060	4055
AMS160/180	251	≥ 250	4600	4200	4600
AMS200/225	297	≥ 300	5600	5600	5600
AMS250/280	390	≥ 450	11200	11200	11200

NEMA adapter	x[1]	Gear unit input end flange diameter	Standard	Option /DH	Option /RS
	mm	mm	F_R[1] in N	F_R[1] in N	F_R[1] in N
AMS56	77	105	215	185	–
		≥ 120	445	385	–
AMS143/145	113	120	410	370	345
		≥ 160	965	865	820
AMS182/184	144	≥ 160	1960	1660	1660
AMS213/215	186	160	1585	1360	1360
AMS213/215		≥ 200	4640	4010	4010
AMS254 – 286	251	≥ 250	4525	4135	4525
AMS324 – 365	297	≥ 300	5600	5600	5600

1) Maximum load values for connection screws of strength class 8.8. If the center of gravity distance x increases, the maximum permitted weight F_R of the attached motor must be reduced linearly. If the center of gravity distance x decreases, the maximum permitted weight F_R must not be increased.

2) An extended adapter is used for certain adapter combinations with parallel-shaft helical gear units (see following table) to avoid collisions with the safety cover. This changes the maximum permitted weight F_R.

Permissible power ratings and mass moments of inertia

The following table shows the permitted power ratings and mass moments of inertia:

Adapter		P_m [1]	$J_{Adapter}$
IEC	NEMA	kW	kg × m²
AMS63	–	0.25	0.44×10^{-4}
AMS71 [2]	–	0.37	0.44×10^{-4}
AMS80 [2][3]	AMS56	0.75	1.3×10^{-4}
AMS90 [2]	AMS143/145	1.5	2.5×10^{-4}
AMS100 [2]	AMS182	3	7.8×10^{-4}
AMS112 [2]	AMS184	4	7.8×10^{-4}
AMS132S/M [2]	AMS213/215	7.5	22×10^{-4}
AMS132ML [2]	–	9.2	22×10^{-4}
AMS160	AMS254/256	15	72×10^{-4}
AMS180	AMS284/286	22	72×10^{-4}
AMS200	AMS324/326	30	201×10^{-4}
AMS225	AMS364/365	45	204×10^{-4}
AMS250	–	55	442×10^{-4}
AMS280	–	90	547×10^{-4}

1) Maximum rated power of the mounted standard electric motor at 1400 min^{-1}.

2) An extended adapter is used for certain adapter combinations with parallel-shaft helical gear units (see following table) to avoid collisions with the safety cover. This changes the mass moment of inertia.

3) $J_{AMS80/VL} = J_{AMS90} = 2.5 \times 10^{-4}$ kg × m²

The specified mass moments of inertia apply for the standard adapter and the adapter with reinforced bearings (VL). An exception is the AMS80/VL adapter, which has the same inertia as the AMS90 adapter. The mass moments of inertia of the adapters with backstop AMS../RS and drain hole AMS../DH can be found in the tables in chapters "Adapter with backstop AMS../RS" and "Adapter with drain hole AMS../DH" (→ 🗎 105).

5.17.6 Adapter with backstop AMS../RS

Check the direction of rotation of the drive prior to assembly or startup. In case of a wrong direction of rotation, contact SEW-EURODRIVE.

The backstop is maintenance-free in operation. Backstops have a minimum lift-off speed depending on the size (see following table).

NOTICE

If the speed is below the minimum lift-off speed of the drive, the backstop is subject to wear and heats up.

Possible damage to property.

- In nominal operation the lift-off speed of the drive must not drop below the specified minimum.
- During startup or braking, the lift-off speed of the drive may drop below the minimum levels.

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Adapter		Maximum locking torque of the back-stop	Minimum lift-off speed	$J_{Adapter}$
IEC	NEMA	Nm	min^{-1}	$kg \times m^2$
AMS80/RS	–	130	720	4.5×10^{-4}
AMS90/RS	AMS143/145/RS			
AMS100/RS	AMS182/RS	190	625	15×10^{-4}
AMS112/RS	AMS184/RS			
AMS132/RS	AMS213/215/RS	500	550	44×10^{-4}
AMS160/RS	AMS254/256/RS	900	515	108×10^{-4}
AMS180/RS	AMS284/286/RS			
AMS200/RS	AMS324/326/RS	1900	490	257×10^{-4}
AMS225/RS	AMS364/365/RS			
AMS250/RS	–			496×10^{-4}
AMS280/RS	–			601×10^{-4}

5.17.7 Adapter with drain hole AMS../DH

The following table shows the maximum permissible rotational speeds and mass moments of inertia for the adapters with the drain hole option (condensation drain hole):

Adapter		Max. permitted speed	$J_{Adapter}$
IEC	NEMA	min^{-1}	$kg \times m^2$
AMS63/71/DH	–	3600	0.6×10^{-4}
AMS80/DH	AMS56/DH	3600	1.8×10^{-4}
AMS90/DH	AMS143/145/DH	3600	3.1×10^{-4}
AMS100/DH	AMS182/DH	3600	11×10^{-4}
AMS112/DH	AMS184/DH	3600	11×10^{-4}
AMS132/DH	AMS213/215/DH	3200	31×10^{-4}
AMS160/DH	AMS254/256/DH	2600	87×10^{-4}
AMS180/DH	AMS284/286/DH	2600	86×10^{-4}
AMS200/DH	AMS324/326/DH	1900	201×10^{-4}
AMS225/DH	AMS364/365/DH	1900	204×10^{-4}
AMS250/DH	–	1900	442×10^{-4}
AMS280/DH	–	1900	547×10^{-4}

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5.17.8 Mounting of third-party motor(s) to AR../AL.. adapters

If a third-party motor is mounted, the customer must ensure that the permitted weight and the power at the adapter are adhered to according to the operating instructions. For information on the permitted loads, refer to chapter "Permitted loads" (→ 🗎 102).

Adapter	x[1)] mm	F_R[1)] N
AR/AL71	77	375
AR/AL80/90	113	320
AR/AL100/112	144	1560
AR/AL132[2)]	186	1230
AR/AL132	186	3630
AR/AL160/180	251	3540

1) Maximum load values for connection screws of strength class 8.8. If the center of gravity distance x increases, the maximum permitted weight F_R of the attached motor must be reduced linearly. If the center of gravity distance x decreases, the maximum permitted weight F_R must not be increased.

2) Gear unit input end flange diameter: 160 mm.

5.17.9 Tightening torques for motor to adapter

Screw the motors to the adapters with the following tightening torques. When doing this, observe the tightening torques in chapter "Notes concerning tightening torques".

Screw size	Strength class	Tightening torque ±15% Nm
M5	8.8	7
M6	8.8	12
M8	8.8	28
M10	8.8	56
M12	8.8	96
M16	8.8	235

5.17.10 AMS.. adapter with attached foot-mounted motor

A foot-mounted motor reduces the loads at the adapter interface. The foot-mounted motor at the adapter must be installed without tension on the customer's construction.

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5.18 AQS.. adapter

5.18.1 Figure and note concerning the installation of the AQS.. adapter

NOTICE

Damage to the adapter due to ingress of moisture or dirt (e.g. dust) when a motor/drive is attached to the adapter.

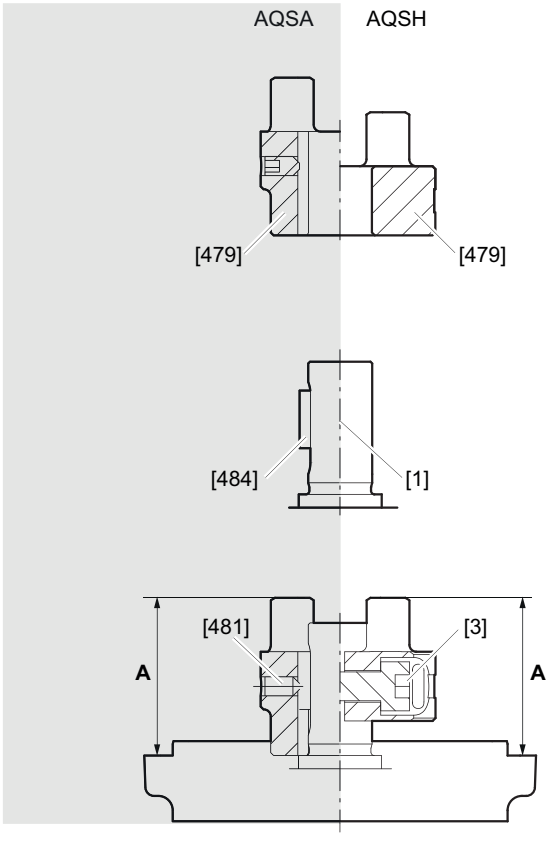
Damage to the adapter.

- Seal the adapter with an anaerobic fluid seal.
- When the motor/drive to be attached has openings or bores that provide access to the inside of the adapter, seal these against dust or liquid.

INFORMATION

With AQSA..: To avoid contact corrosion, SEW-EURODRIVE recommends applying NOCO® fluid to the motor shaft before mounting the coupling half.

With AQSH..: The use of NOCO® fluid is not permitted.



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[1] Motor shaft
[3] Clamping screw
[479] Coupling half
[481] Set screw
[484] Key
A Distance A

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5.18.2 Mounting of motor to adapter AQSH.. with coupling half pre-mounted in adapter

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Ensure that the clamping screw [3] of the coupling is accessible through the lateral hole in the housing. **Information!** The coupling half [479] is spread apart in the delivery state.
3. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
4. Fit the motor to the adapter. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106).
5. Tighten the clamping screw of the coupling half. The values for tightening torque "T_A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
6. Close the lateral holes using the closing plugs.

5.18.3 Mounting of motor to adapter AQSH.. with coupling half pre-mounted to motor shaft

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Unscrew the clamping screw [3] of the coupling until the screw head is lying against the lateral pin. Then continue turning for half a revolution so that the coupling half [479] is spread apart.
3. Slide the coupling half onto the motor shaft up to distance "A". The values for distance "A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
4. Check the position of the coupling half. The values for distance "A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
5. Secure the coupling half to the motor shaft. Tighten the clamping screw of the coupling half. The values for tightening torque "T_A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Mount the motor onto the adapter, making sure that the claws of the two coupling halves engage in each other. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106). **Information!** The amount of mounting force can be reduced by lightly greasing or oiling the coupling ring or the coupling half. To do this, only use mineral oil-based oil or grease without additives.
8. Close the lateral holes using the closing plugs.

⇨ The force that must be applied when joining the two coupling halves is dissipated after final assembly, so there is no risk of any axial load being applied to adjacent bearings.

5.18.4 Mounting of motor to adapter AQSA..

1. Clean the motor shaft [1] and the flange surfaces of the motor and the adapter.
2. Remove the key [484] of the motor shaft.
3. Install the supplied key so that it is as flush as possible to the claw base of the coupling.
   ⇨ With AQSA100 – AQSA190, the key may protrude a maximum of 1 mm beyond the base of the coupling claw when installed!
4. Heat the coupling half [479] to approx. 80 °C to a **maximum** of 100 °C.

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5. Slide the coupling half onto the motor shaft up to distance "A". The values for distance "A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
6. Check the position of the coupling half. The values for distance "A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
7. Secure the coupling half and the key to the motor shaft using the set screw [481]. The values for tightening torque "T_A" are listed in the table in chapter "Distances and tightening torques" (→ 🗎 109).
8. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
9. Mount the motor onto the adapter, making sure that the claws of the two coupling halves engage in each other. Adhere to the tightening torques specified in chapter "Tightening torques for motor to adapter" (→ 🗎 106). **Information!** The mounting force can be reduced by lightly greasing or oiling the coupling ring or the coupling half. To do this, only use mineral oil-based oil or grease without additives.
10. Close the lateral holes using the closing plugs.

⇨ The force that must be applied when joining the two coupling halves is dissipated after final assembly, so there is no danger of any axial load being applied to adjacent bearings.

5.18.5 Distances and tightening torques

Adapter	Ø of coupling bore	Distance A	Screws		Tightening torque T_A Nm	
	mm	mm	AQSA..	AQSH..	AQSA..	AQSH..
AQSA/AQSH50	8	23.3	–	M4	–	4.1
	9		M3		0.6	
AQSA/AQSH80	11	27.3	M4	M5	1	8.1
	14					
AQSA/AQSH100	14	30	M5	M6	2	14
	16					
	19					
AQSA/AQSH115	19	39	M5	M6	2	14
	22		–		–	14
	24		M5		2	14
AQSA/AQSH140	24	48.5	M6	M8	4.8	34
	28					
	32					
AQSA/AQSH160	28	56.5	M8	M10	10	67
	32			M10		
AQSA/AQSH190/1 to 5	35		–	M10	–	
	38		M8	M10	10	
AQSA/AQSH190/6	35	68.5	M8	M10	10	67

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5.18.6 Permitted loads

NOTICE

The gear unit can become overloaded due to excessive weight or the excessive power rating of an attached motor.

Gear unit damage.

- Note that the load data specified in the following table is not to be exceeded.
- Ensure that the permitted power rating (torque and speed) on the adapter is adhered to according to the nameplate.

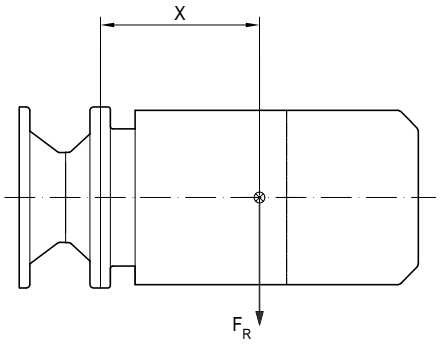
NOTICE

Danger due to static overdetermination if motors are additionally attached via a foot plate.

Damage to property.

- A motor attached at the foot relieves the interface at the adapter; however, make sure that the installed foot-mounted motor is attached to the customer's construction in a stress-free manner.

The following figure shows the load caused by the motor mass:



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⊗ Motor's center of gravity
x Distance from adapter flange to motor's center of gravity
F_R Overhung load

Permitted loads for gear unit series R..7, F..7, K..7, K..9, S..7, S..7p and W..9:

Adapter	x[1)] mm	Flange diameter of gear unit at the input end mm	F_R[1)] N
AQS50	45	≥ 105	200
AQS80	77	105	200
		≥ 120	370
AQS100	113	105	200
		≥ 120	350
AQS115	113	≥ 120	300

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Adapter	x[1)] mm	Flange diameter of gear unit at the input end mm	F_R[1)] N
AQS140	144	120	300
		≥ 160	1550
AQS160	144	≥ 160	1450
AQS190	186	160	1250
		≥ 200	3750

1) Maximum load values for connection screws of strength class 8.8. If the center of gravity distance x increases, the maximum permitted weight F_R of the attached motor must be reduced linearly. If the center of gravity distance x decreases, the maximum permitted weight F_R must not be increased.

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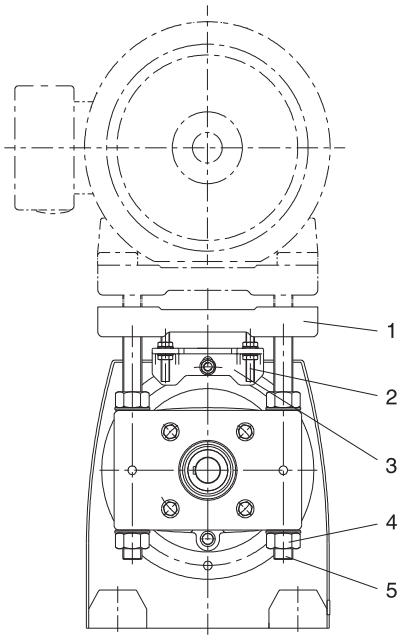
5.19 AD input shaft assembly

Observe chapter "Assembling the input and output components" (→ 🗎 79) when installing input components.

5.19.1 AD../P input shaft assembly with motor platform

Mounting the motor and adjusting the motor platform.



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[1] Motor platform
[2] Stud bolt (only AD6/P/AD7/P)
[3] Support (only AD6/P/AD7/P)
[4] Nut
[5] Threaded column

Observe the notes in chapter "Important information" (→ 🗎 63).

1. Set the motor platform to the required mounting position by evenly tightening the adjusting nuts. Remove the lifting eyebolt from helical gear units to achieve the lowest adjustment position. Touch up any damage to the paint work.
2. Align the motor on the motor platform (shaft ends must be in alignment) and secure it.
3. Mount the input elements on the input shaft end and the motor shaft, line them up with one another and correct the motor position again, if necessary.
4. Put on the traction elements (V-belt, chain, etc.) and apply a pretension by evenly adjusting the motor platform. Do not stress the motor platform and the columns against each other when doing this.
5. Tighten all the nuts not used for adjustment in order to fix the threaded columns.

5.19.2 Only AD6/P and AD7/P

Unscrew the nuts on the stud bolts before adjustment to allow the stud bolts to move axially in the support without restriction. Do not tighten the nuts until the final adjustment position has been reached. Do not adjust the motor platform using the support.

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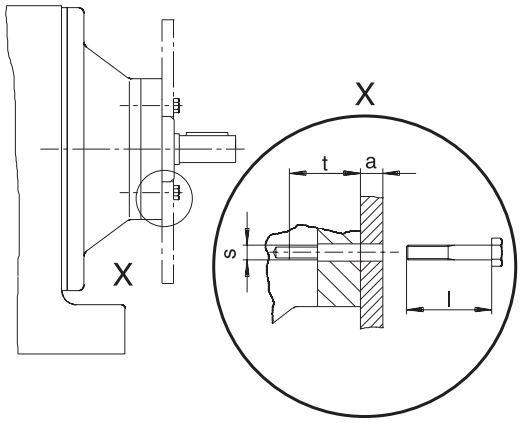
5.19.3 AD../ZR input shaft assembly with centering shoulder

Mounting components on the input shaft assembly with centering shoulder.

Observe the notes in chapter "Important information" (→ 🗎 63).

1. To fasten mount-on components to the cover with AD../ZR.. centering shoulder, use screws with appropriate length. The length l of the new screws is calculated as follows:



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[l] t+a
[t] Screw-in depth (see table)
[a] Thickness of the application
[s] Retaining thread (see table)

Round down the calculated screw length to the next smallest standard length.

2. Remove the retaining screws from the centering shoulder.
3. Clean the contact surface and the centering shoulder.
4. Clean the threads of the new screws and apply a thread locking compound (e.g. Loctite® 243) to the first few threads.
5. Attach the application to the centering shoulder and tighten the retaining screws with the specified tightening torque T_A (see table).

Type	Screw-in depth t mm	Retaining thread s	Tightening torque T_A for connection screws of strength class 8.8 Nm
AD2/ZR	25.5	M8	28
AD3/ZR	31.5	M10	56
AD4/ZR	36	M12	96
AD5/ZR	44	M12	96
AD6/ZR	48.5	M16	235
AD7/ZR	49	M20	460
AD8/ZR	42	M12	96

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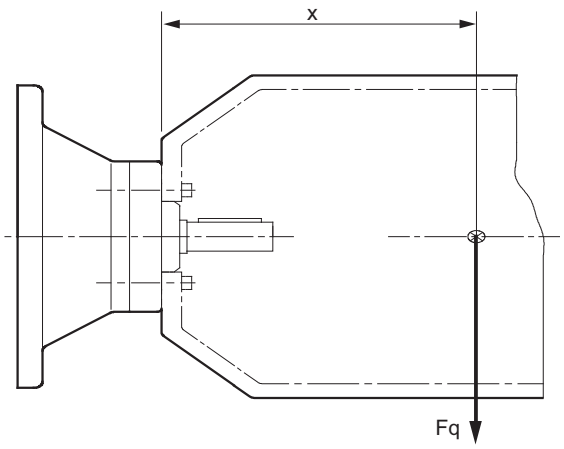
Permitted loads

NOTICE

Impermissibly high loads may occur when mounting a motor.

Possible damage to property.

- The load data specified in the following table are not to be exceeded.



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Type	x[1] mm	F_q[1] N
AD2/ZR	193	330
AD3/ZR	274	1400
AD4/ZR[2]	361	1120
AD4/ZR		3300
AD5/ZR	487	3200
AD6/ZR	567	3900
AD7/ZR	663	10000
AD8/ZR	516	4300

1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced linearly as the center of gravity distance x increases. When this distance x is reduced, F_{qmax} cannot be increased.

2) Diameter of the adapter output flange: 160 mm

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5.19.4 Cover with backstop AD../RS

Check the direction of rotation of the drive prior to mounting or startup. Inform the SEW-EURODRIVE service in the case of incorrect direction of rotation.

During operation, the backstop is maintenance-free and does not require any maintenance. Backstops have a minimum lift-off speed depending on the size (see following table).

NOTICE

If the actual speed level falls below the minimum lift-off speed level, the backstops are subject to wear and the resulting friction causes the temperature to increase.

Possible damage to property.

- In nominal operation, the lift-off speeds must not drop below the minimum values.
- During startup or braking, the lift-off speeds may drop below the minimum values.

Type	Maximum locking torque of the backstop Nm	Minimum lift-off speed 1/min
AD2/RS	45	800
AD3/RS	200	670
AD4/RS	470	660
AD5/RS	630	550
AD6/RS	1430	600
AD7/RS	1430	600
AD8/RS	1430	600

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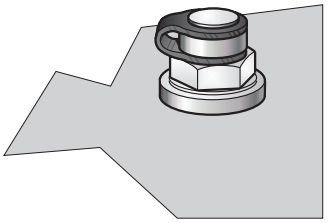
5.20 Breather for RF../KF../K... primary gear units

Check whether the breather is activated. If the breather has not been activated, you must remove the transport protection device from the breather before starting up the gear unit.

1. Breather with transport protection



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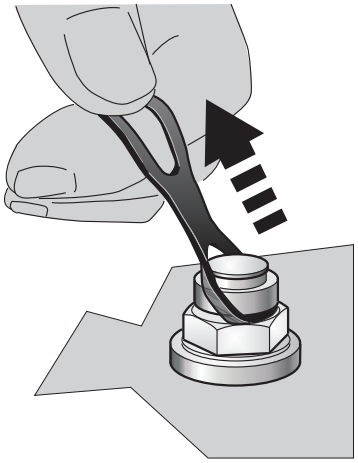
2. Remove the transport protection



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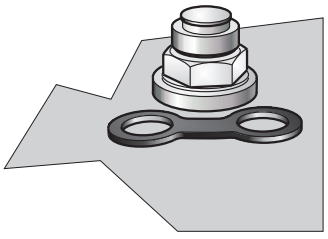
3. Activated breather



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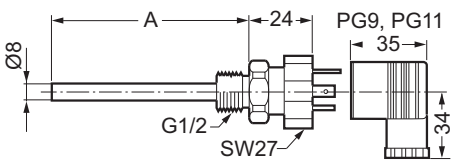
5.21 Temperature sensor /Pt100

5.21.1 Dimensions



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Dimension "A" is determined specifically in each order.

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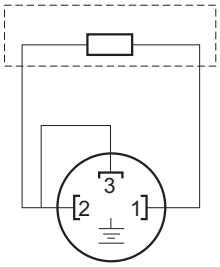
5.21.2 Electrical connection



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[1] [2] Resistor element connection

5.21.3 Technical data

- Design with thermowell and changeable measuring insert
- Sensor tolerance K ± (0.3 + 0.005 × T), (corresponds to DIN IEC 751 class B),

  T = Oil temperature °C
- Plug connector: DIN EN 175301-803 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 0.25 Nm.

6 Startup

6.1 Important information

Read the following notes prior to startup.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Attach an information sign near the ON switch to warn that the gear unit is being worked on.

⚠ WARNING

Danger due to freely accessible, rotating parts.

Severe or fatal injuries.

- Secure rotating components such as shafts, couplings, gears or belt drives using suitable protection covers.
- Ensure that installed protection covers are sufficiently attached.

⚠ CAUTION

Danger due to unsecured mount-on components, e.g. keys.

Possible injury to persons due to falling parts.

- Install appropriate protective devices.
- Secure the mount-on components.

⚠ CAUTION

Danger due to lubricant leaking from damaged seals and the breather.

Minor injuries.

- Check the gear unit and mount-on components for leaking lubricant.
- The seals must not come in contact with cleaning agent as this may damage the seals.
- Protect the breather against damage.
- Make sure that there is not too much oil in the gear unit. If the oil level is too high and the temperature rises, lubricant may escape from the breather.

NOTICE

Improper startup can damage the gear unit.

Possible damage to property.

- Observe the following information.

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- Before startup, check that the oil level is correct. For the lubricant fill quantities, refer to the respective nameplate.

  Check the oil level again after a few operating hours, see chapter "Checking the oil level at the planetary gear unit" (→ 🗎 130).
- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have two separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- Fill the gear unit with the oil grade specified on the nameplate. The oil quantity specified on the nameplate is an approximate quantity. The required oil quantity is indicated by the marks on the oil level glass or oil dipstick. When the gear unit is equipped with an oil dipstick and an oil sight glass, refer to the oil dipstick for the correct oil level. For additional information, refer to chapter "Checking the oil level at the planetary gear unit" (→ 🗎 130) and chapter "Changing the oil at the planetary gear unit" (→ 🗎 134).

  The required oil fill quantity is higher when additional attachments are mounted to the gear unit, such as an oil supply system. Observe the operating instructions of the oil supply system.
- Check the thermal rating/heating for the following operating conditions:
  - High ambient temperatures (over 45 °C).
  - Mounting position M2/M4 and/or motor speed above 1800 min^{-1}.

  Consult SEW-EURODRIVE.
- The most important technical data is provided on the nameplate. Additional data relevant for operation is available in drawings, technical specifications, or any order-specific documentation.
- After installing the gear unit, check to see that all retaining screws are tight.
- Make sure that the alignment has not changed after tightening the mounting elements.
- It is essential that there is no open fire or risk of sparks when working on the gear unit.
- If there are any oil drain valves, ensure that they cannot be opened unintentionally.
- Protect the oil sight glass against damage.
- Protect the gear unit from falling objects.
- Make sure that the gear unit is grounded. Electrical mount-on components, such as motor, frequency inverter, etc., must be grounded separately.
- Make sure that the monitoring devices (pressure switch, temperature switch etc.) are fully operational prior to and during startup.
- Observe the safety notes in the individual chapters.

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6.1.1 Permitted external loads

During project planning, the drives are dimensioned according to the radial and axial loads described in the order confirmation.

INFORMATION

If the configured loads are exceeded during operation, the drive may be damaged and impermissibly high temperatures may occur.

The warranty will become void without prior consultation with SEW-EURODRIVE.

6.2 Startup of gear units with long-term protection

Adhere to the following points for gear units with long-term protection:

6.2.1 Anti-corrosion agent

Clean the output shafts and flange surfaces thoroughly to ensure that they are free of anti-corrosion agents, contamination or similar. Use a standard solvent.

NOTICE

If the dust lips of the oil seal come in contact with solvents, the dust lips can be damaged.

Possible damage to property.

- Do not let the solvent, for example, Rivolta, come into contact with the dust lips.

6.2.2 Breather

Replace the screw plug at the location indicated on the gear unit with a breather (position → see order documents).

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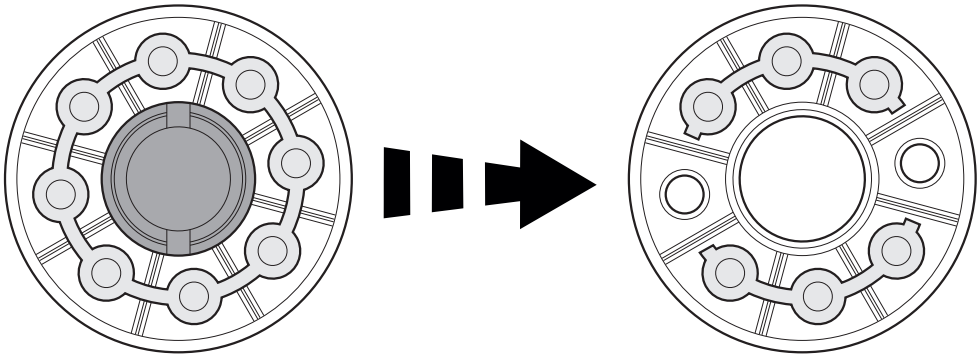
6.3 Desiccant breather filter /DC

6.3.1 Usage

Before startup

Open only 2 of the air openings (offset by 180°) at the bottom of the breather filter. Remove the blue cap that protects the rising pipe. If required, install a suitable adapter to the filter before installing the filter at the gear unit.



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6.4 Limit temperature for gear unit start

Check if the gear unit/gearmotor is designed for the ambient temperature. For the application limits, refer to the technical documentation, the nameplate, or the lubricant table, see chapter "Permitted lubricants" (→ 🗎 142).

NOTICE

Starting up the gear unit below the permitted minimum oil temperature may damage the unit.

Possible damage to property can occur.

- Observe the specified start temperatures for gear unit startup.

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6.5 Backstop

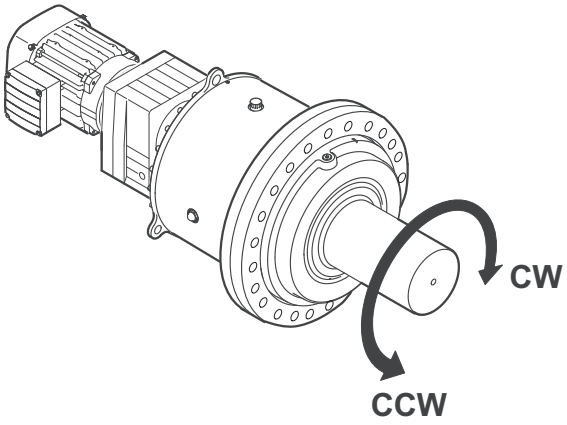
NOTICE

Operating the motor in the blocking direction could destroy the backstop.

Possible damage to property.

- Do not start up the motor in the blocking direction. Before motor startup, make sure the current supply of the motor for the direction of rotation is connected accordingly.
- For control purposes, operation in blocking direction with half the gear unit output torque is permitted once.

The backstop is installed in the AD../RS.. cover. The purpose of it is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in only one specified direction of rotation.



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The direction of rotation is specified as viewed onto the output shaft (LSS):

- CW rotation
- CCW rotation

The permitted direction of rotation is indicated on the housing.

6.6 Measuring the oil temperature

The oil temperature must be measured to determine the oil change intervals. See chapter "Lubricant change intervals" (→ 🗎 129) for a description. Measure the temperature at the bottom of the gear unit. If the gear unit has an oil drain plug, measure the temperature on this screw. Add 10 K to the measured value. This value is the basis for the oil change intervals.

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6.7 Gear unit shutdown / gear unit conservation

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Attach an information sign near the ON switch to warn that the gear unit is being worked on.

INFORMATION

Gear units with water cooling system: disrupt the cooling water supply and drain the water from the cooling circuit. For oil supply systems, please contact SEW-EURODRIVE.

Additional conservation measures are required if the gear unit is to be shut-down for a longer period. Note the installation site, ambient conditions and lubricant condition of the gear unit, depending on which conservation may be necessary after only a few weeks of downtime.

6.7.1 Internal conservation

- **New or hardly used gear units:**
  - SEW-EURODRIVE recommends the VCI conservation method for internal conservation of the gear unit.
  - Apply the required amount of VCI anti-corrosion agent to the inside of the gear unit (e.g. FUCHS Anticorit VCI UNI O-40, www.fuchs.com). The amount depends on the free space inside the gear unit. Any existing oil may usually remain in the drive.

    Corrosion protection with VCI anti-corrosion agent is not permitted for gear units that are operated with food grade lubricants. Contact SEW-EURODRIVE in such cases.
  - Replace the breather with a screw plug and close the gear unit so that it is air tight. Mount a new breather prior to startup.
- **After longer gear unit operation:**
  - The oil might be contaminated (oil sludge, water, etc.) after long periods of operation. Therefore, drain the oil and thoroughly rinse the inside of the gear unit with new oil prior to conservation. Observe the information in chapter "Changing the oil" (→ 🗎 134) in the corresponding operating instructions. The inside of the gear unit can then be conserved as described above.

For gear units without "contactless sealing systems", you may also use the oil type indicated on the nameplate to perform the conservation. In this case, the gear unit must be completely filled with clean oil. Replace the breather with a screw plug and fill in the oil from the highest point of the gear unit. To ensure sufficient conservation, all the gearing components and bearing components must be completely covered in oil.

For gear units with "contactless sealing systems", contact SEW-EURODRIVE.

Before startup, mount a new breather. Observe the information on the nameplate regarding the oil grade and oil quantity.

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6.7.2 Exterior corrosion protection

- Clean the respective surfaces.
- Grease the shaft near the sealing lip to separate the sealing lip of the oil seal and the anti-corrosion agent.
- Apply a wax-based protective coating to shaft ends and unpainted surfaces as external corrosion protection (e.g. Herm. Hölterhoff Hölterol MF 1424, www.hoelterhoff.de).

INFORMATION

Consult the respective supplier regarding the compatibility with the oil that is used and the duration of corrosion protection for your particular gear unit design.

Also observe the information in chapter "Storage and transport conditions" (→ 🗎 26). This chapter provides information on the possible storage periods in conjunction with adequate packaging – depending on the storage location.

Refer to chapter "Startup" (→ 🗎 118) before restarting the gear unit.

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7 Inspection/maintenance

7.1 Preliminary work regarding inspection/maintenance

Observe the following notes before you start with inspection/maintenance work.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Attach an information sign near the ON switch to warn that the gear unit is being worked on.

⚠ WARNING

An operator machine that is not appropriately secured can fall down during gear unit installation or removal.

Severe or fatal injuries.

- Protect the operator's machine against unintentional movement when installing or removing the gear unit.
- Before releasing shaft connections, make sure that there are no active torsional moments present (tensions within the system).

⚠ WARNING

Risk of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Remove the oil drain plug very carefully.

⚠ CAUTION

Danger due to lubricant leaking from damaged seals and the breather.

Minor injuries.

- Check the gear unit and mount-on components for leaking lubricant.
- The seals must not come in contact with cleaning agent as this may damage the seals.
- Protect the breather against damage.
- Make sure that there is not too much oil in the gear unit. If the oil level is too high and the temperature rises, lubricant may escape from the breather.

⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

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NOTICE

Filling in the wrong oil may result in significantly different lubricant characteristics.

Possible damage to property.

- Do not mix oils of different types and from different manufacturers.

NOTICE

Improper maintenance may result in damage to the gear unit.

Possible damage to property.

- Observe the following notes.

- Strict adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions.
- Observe the tightening torques.
- For primary gearmotors, also observe the maintenance information for motor and primary gear unit in the "Gear Unit Series R..7, F..7, K..7, K..9, S..7, SPIROPLAN® W" operating instructions.
- For the position of the oil level plug, oil drain plug and breather, refer to the "mounting position sheets" (→ 🗎 41).
- Note that planetary gear units and primary gear units have 2 separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- Use only original spare parts according to the delivered spare and wearing parts lists.
- Prevent foreign particles from entering into the gear unit when performing the following work.
- Never clean the gear unit with a high-pressure cleaning system. Water might enter the gear unit and the seals might be damaged.
- Replace any damaged seals.
- Perform a safety check and functional check following all maintenance and repair work.
- Observe the safety notes in the individual chapters.

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7.2 Inspection and maintenance intervals

Adhere to the following inspection and maintenance intervals:

7.2.1 P.. planetary gear units

Time interval	What to do?
• **Daily**	• Check the housing temperature: – Mineral oil: max 90 ˚C – Synthetic oil: max 100 °C • Check for gear unit noise.
• **Monthly**	• Check the gear unit for signs of leakage • Check the oil level
• **After 500 operating hours**	• First oil change after initial startup
• **Every 3000 operating hours, at least every 6 months**	• Check the oil consistency
• **Depending on the operating conditions, at least every 6 months**	• Fill regreasable sealing systems with grease
• **Depending on the operating conditions, at least every 12 months**	• Check whether retaining screws are tightly secured • Clean the oil filter, replace filter element if necessary • Check the breather, replace it if necessary • Check the alignment of the input and output shaft
• **Depending on the operating conditions, at least every 3 years**	• Change mineral oil
• **Depending on the operating conditions, at least every 5 years**	• Change synthetic oil
• **Varying (depending on external factors)**	• Touch up or renew the surfaces/anti-corrosion coating • Check installed hose pipes • Clean the outer gear unit housing

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7.2.2 RF../KF../K... primary gear units

Time interval	What to do?
• **Every 3000 operating hours, at least every 6 months**	• Check oil and oil level • Check running noise for possible bearing damage • Visual inspection of the seals for leakage
• **Depending on the operating conditions, every 3 years at the latest** • **According to oil temperature**	• Change mineral oil
	• Replace bearing grease (recommendation) • Replace oil seal (do not install it in the same track again)
• **Depending on the operating conditions, every 5 years at the latest** • **According to oil temperature**	• Change synthetic oil
	• Replace rolling bearing grease (recommendation) • Replace oil seal (do not install it in the same track again)
• **Varying (depending on external factors)**	• Touch up or renew the surface/anti-corrosion coating

7.2.3 AMS/AQS adapter

Time interval	What to do?
• Every 3000 operating hours, at least every six months	• Check the running noises to detect possible bearing damage. • Perform a visual check of the adapter for leakage. • With the drain hole design, check whether the condensation drain holes are clear.
• After 10 000 operating hours	• Check the rotational clearance. • Visually check the coupling ring (AMS.., EWH.., or AQS.., AL..).
• After 10 000 operating hours with NBR/FKM oil seals • After 20 000 operating hours with Premium Sine Seal adapter oil seals	• Change the oil seal. With standard NBR or FKM oil seals, the new oil seal must not be fitted on the previous track. This is allowed with Premium Sine Seal adapter oil seals.

7.2.4 Cover AD

Time interval	What to do?
• Every 3000 operating hours, at least every six months	• Check the running noises to detect possible bearing damage. • Perform a visual check of the adapter for leakage.
• After 10 000 operating hours	• Change the oil seal. Do not mount it in the same track.

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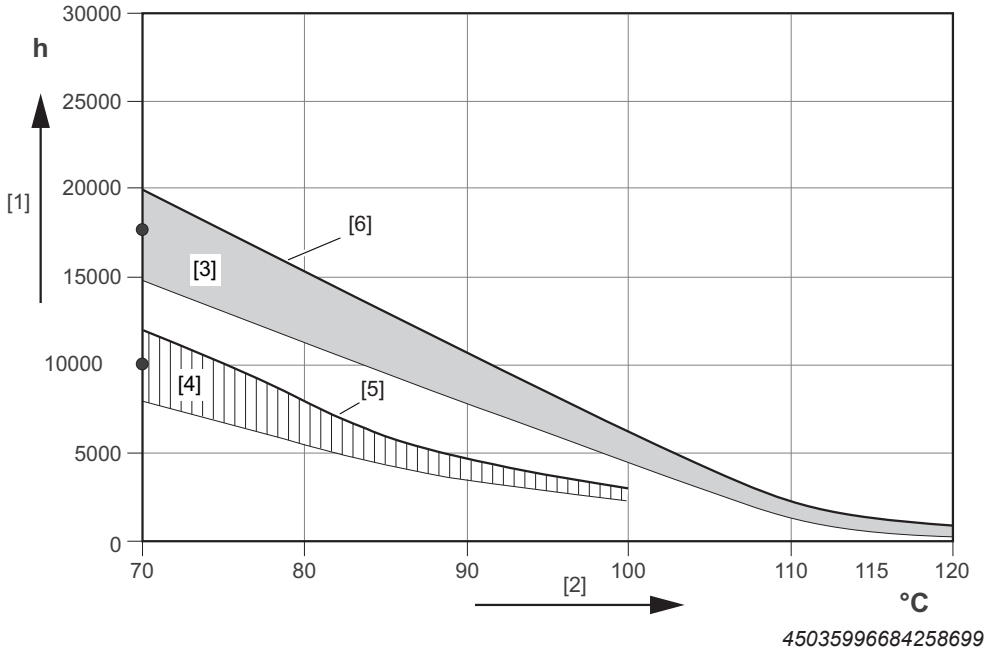
7.3 Lubricant change intervals

It might be necessary to change the oil more frequently when using special designs or under more severe/aggressive ambient conditions.

INFORMATION

Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following figure corresponds to the PAO oils.



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[1] Operating hours
[2] Sustained oil bath temperature – average value per oil type at 70 °C
[3] CLP HC/CLP HC NSF H1
[4] CLP (CC)/E
[5] SEW GearOil Base
[6] SEW GearOil Synth

INFORMATION

SEW-EURODRIVE recommends that the gear unit oil is analyzed regularly (see chapter "Checking the oil consistency" (→ 🗎 133)) to optimize the lubricant change intervals.

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7.4 Checking the oil level at the planetary gear unit

Note the following when checking the oil level.

7.4.1 General information

NOTICE

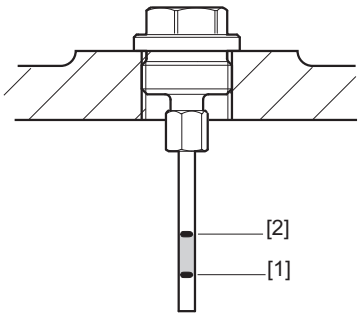
Improper checking of the oil level may result in damage to the gear unit.

Possible damage to property.

- Check the oil level only when the gear unit is cooled down to room temperature.
- Check the oil level again after a few operating hours.
- When the gear unit is equipped with an oil dipstick and an oil sight glass, refer to the oil dipstick for the correct oil level. The value of the oil sight glass is only a guide value.
- If you want to check the oil level at the primary gear unit, observe the "Gear units of the R..7, F..7, K..7, K..9, S..7, SPIROPLAN® W Series" operating instructions.

7.4.2 Oil dipstick

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).



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INFORMATION

For gear unit sizes P.002 – P.082 in mounting position M2, oil dipstick and breather are combined in one component. For gear unit sizes P.092 – P.102 in mounting position M2 as well as all other gear unit sizes in mounting position M4, oil dipstick and breather are separate.

1. Unscrew the oil dipstick and remove it.
2. Clean the oil dipstick.
3. Re-insert the oil dipstick by turning it hand-tight into the gear unit up to the stop.
4. Remove the oil dipstick and check the oil level. The oil level must be between the markings [1] and [2].
5. Proceed as follows if the oil level is too low:

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- Remove the oil fill plug.
- Fill in oil of the same oil grade until the oil level is in the middle between marking [1] and marking [2].

6. If you filled in too much oil, proceed as follows:

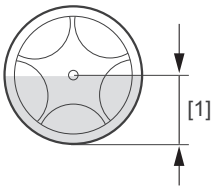
- Place a suitable container underneath the oil drain.
- Remove the oil drain plug or open the oil drain valve.
- Drain the oil until the oil level is between the markings [1] and [2].
- Insert the oil drain plug or close the oil drain valve.

7. Screw in the oil fill plug.
8. Screw in the oil dipstick.

7.4.3 Oil sight glass

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Check the oil level on the oil sight glass as shown in the following figure. The oil level must be within the marked range [1].



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2. Proceed as follows if the oil level is too low:
   - Open the oil fill plug.
   - Fill in new oil of the same type via the oil fill plug until the oil level reaches the center of the oil sight glass.
   - Screw in the oil fill plug.

INFORMATION

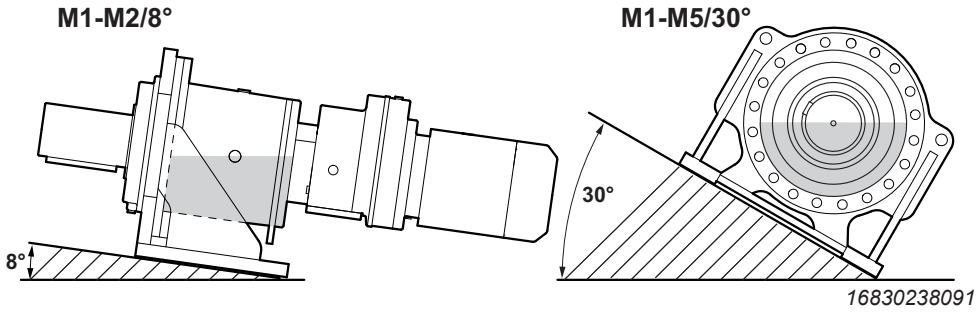
The oil fill quantity must not exceed the upper edge of the oil sight glass.

7.4.4 Notes on the procedure for fixed and variable pivoted mounting positions

Observe the information on the nameplate.

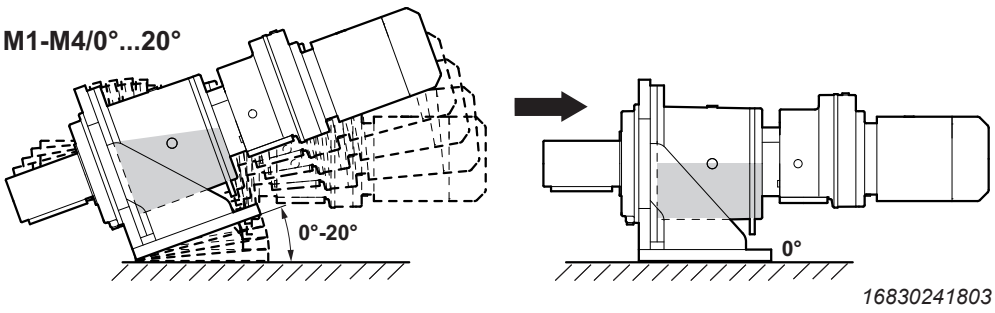
Fixed pivoted mounting positions

Check the oil level in the fixed, intended position.



Variable pivoted mounting positions

Before checking the oil level of gear units with variable pivoted mounting position, position the gear unit in the mounting position defined in the order documents.



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7.5 Checking the oil consistency

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

Proceed as follows to check the oil consistency:

1. Start the gear unit for a short time for the oil to mix with suspended particles.
2. Determine the oil drain position and place a container underneath.
3. ⚠ **WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Serious injury. Let the gear unit cool down before you start working on it. Remove the oil level plug and oil drain plug carefully.
   Open the oil drain carefully and drain some oil.
4. Close the oil drain valve.
5. Check the oil consistency:

- Check the drained oil for appearance, color, and contamination.
- If the oil sample is severely contaminated (e.g. water, color, dirt), consult a specialist to find out the cause.
- For more detailed information on checking the oil for water content and viscosity, contact your lubricant manufacturer.

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7.6 Changing the oil at planetary gear units

7.6.1 Important information

Observe the following when changing the oil.

⚠ WARNING

Risk of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Remove the oil drain plug very carefully.

NOTICE

Improper oil change can damage the gear unit.

Possible damage to property.

- Observe the following information.

- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have two separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- Oil grade and oil viscosity are listed on the nameplate of the gear unit. Note that the oil quantities on the nameplates are approximate values. The marks on the oil sight glass or oil dipstick are decisive for determining the correct oil quantity.

  The required oil fill quantity is higher when additional attachments are mounted to the gear unit, such as an oil supply system. Observe the operating instructions of the oil supply system.
- An oil level above the max marking might indicate that foreign liquids (e.g. water) have entered. An oil level below the min. marking might indicate a leakage. Find and eliminate the cause before you fill in new oil.
- Perform the oil change quickly after you have switched off the gear unit to prevent solids from settling. If possible, drain the oil while it is still warm. Avoid oil temperatures well above 50 °C.
- Remove the screw plug before draining the oil.
- Always fill the gear unit with the same oil grade as before. Mixing oils of different grades and/or manufacturers is not permitted. Synthetic oils in particular must not be mixed with mineral oils or other synthetic oils. When switching from mineral oil and/or when switching from synthetic oil of one basis to synthetic oil of another basis, thoroughly flush the gear unit with the new oil grade.

  Refer to the lubricant table for information on the permitted oil of the various lubricant manufacturers.

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- When changing the oil, flush the interior of the gear unit thoroughly with oil to remove oil sludge, oil residue, and abrasion. Use the same oil grade as for operating the gear unit. Fill in fresh oil only after all residues have been removed.
- For the position of the oil level plug, the oil drain plug, and the breather, refer to the order documents.
- If required, empty accessories e.g. filters and pipes.
- Replace any damaged seals on the oil drain plug.
- If present, clean the magnetic oil drain plug and the oil dipstick with magnet tip.
- Empty the oil-bearing system of gear units with circulation lubrication and oil supply systems according to the manufacturer's maintenance instructions.
- Elements for checking the oil level, oil drain and oil fill openings are indicated by safety symbols on the gear unit.

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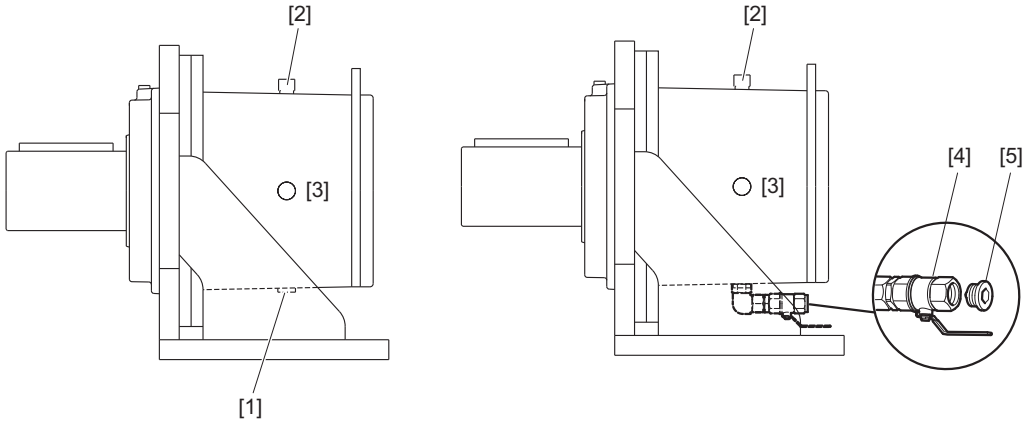
7.6.2 Procedure

Sizes P.002 - P.102 with splash lubrication in mounting positions M1/M3/M5/M6



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Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Place a suitable container underneath the oil drain plug [1].
2. Remove the oil drain plug [1]/screw plug [5].
3. Remove the oil fill plug or the breather [2]. With gear units that are not equipped with an oil fill plug due to their mounting position, the breather is used as oil filling hole.
4. Open the oil drain valve [4] if required.
5. Drain all the oil.
6. Close the oil drain valve [4] if required.
7. Screw in the oil drain plug [1]/screw plug [5] again.
8. Fill in new oil of the same grade through the oil fill opening.

- The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass [3] or the oil dipstick is the decisive indicator of the correct oil quantity, see chapter "Checking the oil level of the planetary gear unit" (→ 🗎 130).
- Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.

9. Insert the oil fill plug or the breather [2].

⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

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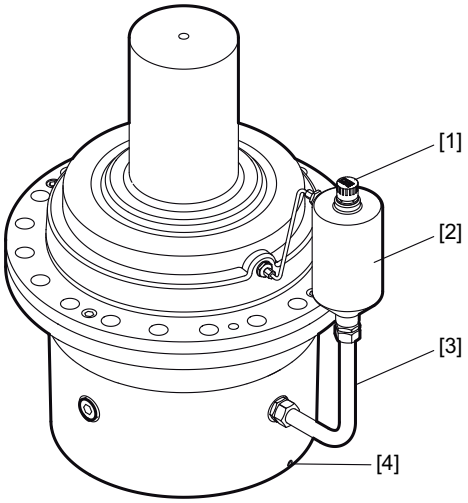
Sizes P.002 – P.082 with bath lubrication in mounting position M2



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[1] Oil dipstick with breather
[2] Oil expansion tank
[3] Riser pipe
[4] Oil drain plug

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick/breather [1].
4. Drain all the oil.
5. Re-insert the oil drain plug [4].
6. Fill in new oil of the same grade through the oil fill opening [1].

- The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 🗎 130).
- Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.

7. Screw in the oil dipstick/breather [1].

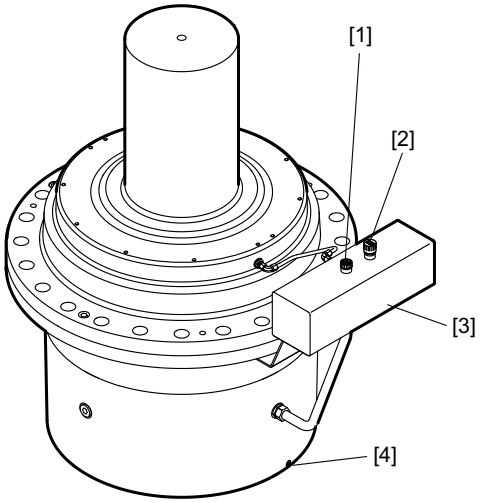
⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

Sizes P.092 - P.102 with bath lubrication in mounting position M2



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[1] Oil dipstick
[2] Breather
[3] Oil expansion tank
[4] Oil drain plug

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick [1].
4. Drain all the oil.
5. Re-insert the oil drain plug [4].
6. Fill in new oil of the same grade through the oil filling hole [1].

- The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 🗎 130).
- Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.

7. Screw in the oil dipstick [1].

⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

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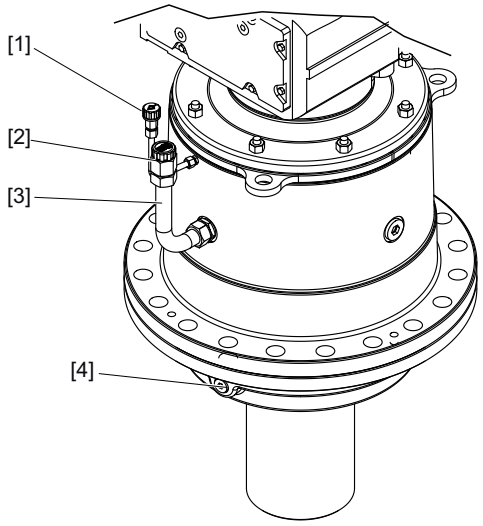
Sizes P.002 - P.102 with bath lubrication in mounting position M4



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[1] Breather
[2] Oil dipstick
[3] Riser pipe
[4] Oil drain plug

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick [2].
4. Drain all the oil.
5. Re-insert the oil drain plug [4].
6. Fill in new oil of the same grade through the oil filling hole [2].

- The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 🗎 130).
- Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.

7. Screw in the oil dipstick [2].

⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

7.7 Refilling sealing grease

⚠ WARNING

Risk of crushing due to rotating parts.

Severe or fatal injuries.

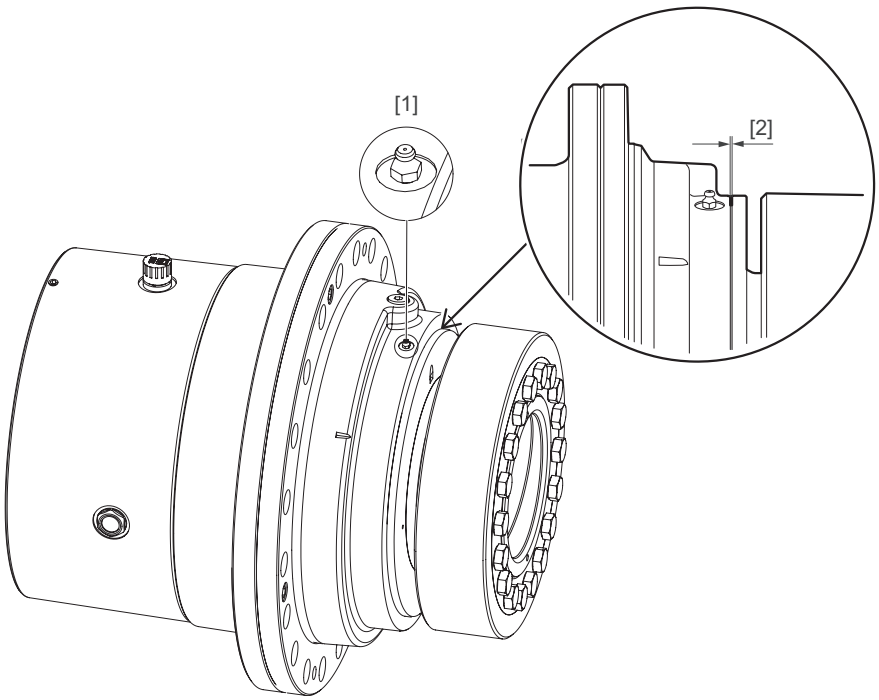
- Make sure to provide for sufficient safety measures during relubrication.

INFORMATION

Turn the shaft slowly when you relubricate the labyrinth seal. Doing so provides for a better grease distribution.

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Use moderate pressure to force grease into each lubrication point [1] until grease leaks out of the sealing gap [2]. The grease must leak out evenly over the entire circumference of the sealing gap.



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INFORMATION

Immediately remove the old grease that leaked out. Old grease can leak out between labyrinth ring and output flange.

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7.8 Breather /BPG

7.8.1 Checking and cleaning the breather

NOTICE

Improper cleaning of the breather may damage the gear unit.

Possible damage to property.

- Prevent foreign particles from entering into the gear unit when performing the following work.

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 🗎 125).

1. Remove any deposits near the breather.
2. If the breather is clogged, replace it.

7.8.2 Desiccant breather filter /DC

Proper operation:

If possible, use desiccant breather filters only for gear units filled with new oil that do not contain water. Only then can the maximum service life of the filter be ensured.

The service life of the filters usually is 12 months, after that time the filters must be replaced. In case the filters are operated in a highly contaminated environment, the service life of the filters can be limited to 2 months or less. The color of the granulate indicates whether a filter needs to be replaced or whether it can still be used.

Color/color transition	Distribution of color gradient	Meaning	Action
Blue → pink	Filter top → filter bottom	Moisture in the gear unit	Determine the cause
Entirely pink or white	Entire filter	Filter capacity exhausted	Replace the filter

Once the capacity of the filter is exhausted, the desiccant breather filters change their color from blue to pink, proceeding from the bottom of the filter to the top.

If the main part of the breather valve has changed its color to pink (or white after a longer time), the breather filter must be replaced by a new one.

If the color changes from top to bottom, this indicates that a large amount of moisture is in the gear unit.

Disposal

If the desiccant breather filter must be replaced, it is likely to contain oil vapor. The filter must be disposed of in accordance with the corresponding regulations.

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8 Permitted lubricants

This chapter describes the permitted lubricants and the permitted temperatures for industrial gear units from SEW-EURODRIVE.

8.1 Lubricant selection

Note the following when selecting the lubricants.

NOTICE

Selecting improper lubricants may damage the gear unit.

Possible damage to property.

- Observe the following notes.

- The oil viscosity and type (mineral/synthetic) to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate.

  If other lubricants are used in the gear units and/or in other temperature ranges as those recommended, the right to claim under warranty will become invalid. Exceptions are application-specific approvals that have to be confirmed by SEW-EURODRIVE in written form.

  The lubricant recommendation in the lubricant table in no way represents a guarantee regarding the quality of the lubricant delivered by each respective supplier. Each lubricant manufacturer is responsible for the quality of its product.
- Oils of the same viscosity class from different manufacturers do not have the same characteristics. In particular, the minimum permitted oil bath temperatures are manufacturer-specific. These temperatures are specified in the lubricant tables.
- The minimum permitted oil bath temperatures depend on the lubrication type used. These temperatures are specified in the lubricant tables. The values correspond to the maximum viscosity of the individual lubricants.
- The values specified in the lubricant tables apply as of the time of printing of this document. The data of the lubricants are subject to dynamic change on the part of the lubricant manufacturers. For up-to-date information about the lubricants, visit:

  www.sew-eurodrive.de/lubricants
- Before startup, ensure that the planetary gear unit and the primary gear unit are filled with the correct oil grade and quantity. You can obtain the corresponding information from the gear unit nameplate and the lubricant table on the following page.
- As standard, planetary gear units and primary gear units have separate oil chambers. With separate oil chambers, the planetary gear unit is delivered without oil, the primary gear unit is delivered with oil.
- The lubricant fill quantity and viscosity of planetary gearmotors with common oil chamber depend only on the information on the nameplate of the planetary gear unit. Planetary gear units and primary gear units with a common oil chamber are delivered without oil fill as standard.
- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.
- Check the compatibility of the greases and oils used.
- Observe the safety notes in the individual chapters.

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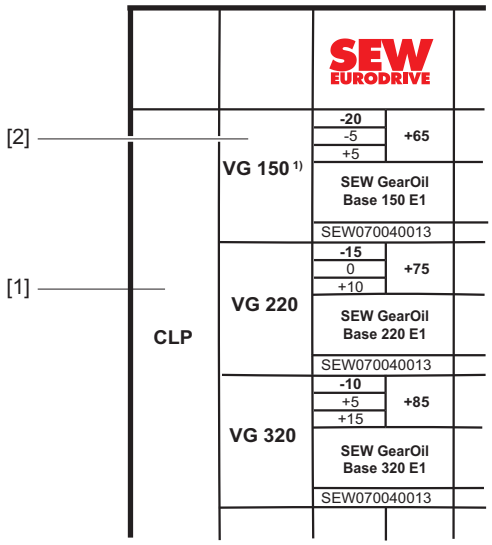
8.2 Structure of the tables and abbreviations



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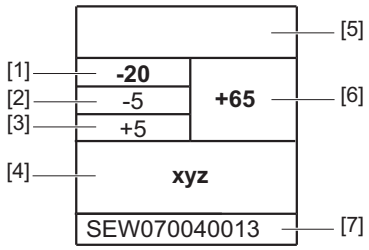
[1] Lubricant type
[2] Viscosity class

Abbreviations

Icons	Designation
CLP	= Mineral oil
CLP HC	= Synthetic polyalphaolefin (PAO)
E	= Ester-based oil
	= Mineral lubricant
	= Synthetic lubricant
	= Lubricant for the food industry (**NSF H1**-compliant)
	= Biodegradable oil (lubricant for agriculture, forestry, and water management)
1)	= Lubricants may only be used if service factor $F_s \geq 1.3$

8.3 Explanation of the various lubricants



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[1] Lowest cold start temperature in °C for splash lubrication[1)]
[2] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 5000 cSt[1)]
[3] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 2000 cSt[1)]
[4] Trade name
[5] Manufacturer
[6] Highest oil bath temperature in °C[2)]
[7] Approvals

1) In case of low temperatures, the oil must be heated to the specified minimum temperature, for example, by using an oil heater. For the maximum permitted oil viscosity per pump type, refer to the following chapter.
2) Service life is significantly reduced when exceeded. Observe chapter "Lubricant change intervals".

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8.4 Lubricant tables

This lubricant table is valid when the document is published. Please refer to www.sew-eurodrive.de/schmierstoffe for the latest version of the table.

[1]	[2]	SEW EURODRIVE				Castrol				FUCHS				Mobil				KLÜBER LUBRICATION				SINOPEC				TOTAL			
CLP	VG 150	-20	-5	+5	+65	-20	-5	+5	+65	-20	-5	+5	+65	-20	-5	+5	+65	-20	-5	+5	+65	-20	-5	+5	+65				
		SEW GearOil Base 150 E1 / US1 / CN1 / BR1				Optigear BM 150				Alpha SP 150				Renolin CLP 150 Plus				Renolin HighGear 150				Mobilgear 600 XP 150				Klüberoil GEM 1-150 N				AP-SGO 150			
		SEW070040013				SEW070030013																							
	VG 220	-15	0	+10	+75	-15	0	+10	+75	-15	0	+10	+75	-15	0	+10	+75	-15	0	+10	+75	-15	0	+10	+75				
		SEW GearOil Base 220 E1 / US1 / CN1 / BR1				Optigear BM 220				Alpha SP 220				Renolin CLP 220 Plus				Renolin HighGear 220				Mobilgear 600 XP 220				Klüberoil GEM 1-220 N				AP-SGO 220			
		SEW070040013				SEW070030013																							
	VG 320	-10	+5	+15	+85	-10	+5	+15	+80	-10	+5	+15	+80	-10	+5	+15	+80	-10	+5	+15	+80	-10	+5	+15	+80				
		SEW GearOil Base 320 E1 / US1 / CN1 / BR1				Optigear BM 320				Alpha SP 320				Renolin CLP 320 Plus				Renolin HighGear 320				Mobilgear 600 XP 320				Klüberoil GEM 1-320 N				AP-SGO 320			
		SEW070040013				SEW070030013																							
	VG 460	-5	+10	+20	+90	-5	+10	+20	+90	-5	+10	+20	+90	-5	+10	+20	+90	-5	+10	+20	+90	-5	+10	+20	+90				
		SEW GearOil Base 320 E1 / US1 / CN1 / BR1				Optigear BM 460				Alpha SP 460				Renolin CLP 460 Plus				Renolin HighGear 460				Mobilgear 600 XP 460				Klüberoil GEM 1-460 N				AP-SGO 460			
		SEW070040013				SEW070030013																							
	VG 680	0	+15	+25	+90	0	+15	+25	+90	0	+15	+25	+90	0	+15	+25	+90	0	+15	+25	+90	-5	+10	+20	+90				
		SEW GearOil Base 320 E1 / US1 / CN1 / BR1				Optigear BM 680				Alpha SP 680				Renolin CLP 680 Plus				Renolin HighGear 680				Mobilgear 600 XP 680				Klüberoil GEM 1-680 N				AP-SGO 460			
		SEW070040013				SEW070030013																							
	VG 1000	+5	+20	+30	+90																								
		Optigear BM 1000																											

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[1]	[2]	SEW EURODRIVE	Castrol	FUCHS	Mobil®	KLÜBER LUBRICATION	Shell	TOTAL
CLP HC	VG 32 [1]				-40 -30 -25 +30 SHC 624			
	VG 68 [1]				-40 -25 -15 +50 SHC 626	-35 -20 -10 +50 Klübersynth GEM 4-68 N		
	VG 150 [1]	-35 -15 -5 +75 GearOil Synth 150 E1 SEW 070040313	-25 -10 0 +70 Alphasyn EP 150	-30 -10 0 +70 Optigear Synthetic X 150	-30 -10 0 +70 Renolin Unisyn CLP 150	-25 -10 0 70 Klübersynth GEM 4-150 N	-30 -10 0 +75 Omala S4 GX 150	-35 -15 -5 +75 Carter SH 150
	VG 220	-30 -10 0 +85 GearOil Synth 220 E1 SEW 070040313	-25 -5 +5 +80 Alphasyn EP 220	-25 -5 +5 +80 Optigear Synthetic X 220	-25 -5 +5 +80 Renolin Unisyn CLP 220	-25 -5 +5 +80 Klübersynth GEM 4-220 N	-25 -5 +5 +85 Omala S4 GX 220	-25 -5 +5 +80 Carter SH 220
	VG 320	-25 -5 +5 +100 GearOil Synth 320 E1 SEW 070040313	-20 0 +10 +90 Alphasyn EP 320	-20 0 +10 +90 Optigear Synthetic X 320	-20 0 +10 +90 Renolin Unisyn CLP 320	-20 0 +10 +95 Klübersynth GEM 4-320 N	-20 0 +10 +95 Omala S4 GX 320	-20 0 +10 +90 Carter SH 320
	VG 460	-20 0 +15 +110 GearOil Synth 460 E1 SEW 070040313	-15 +5 +15 +100 Alphasyn EP 460	-15 +5 +15 +100 Optigear Synthetic X 460	-15 +5 +15 +100 Renolin Unisyn CLP 460	-15 +5 +20 +105 Klübersynth GEM 4-460 N	-15 +5 +15 +105 Omala S4 GX 460	-15 +5 +15 +100 Carter SH 460
	VG 680	-15 +5 +20 +110 GearOil Synth 680 E1 SEW 070040313	-10 +10 +25 +110 Optigear Synthetic X 680	-10 +10 +25 +110 Renolin Unisyn CLP 680	-10 +10 +25 +110 SHC 636	-10 +10 +25 +110 Klübersynth GEM 4-680 N	-10 +10 +25 +110 Omala S4 GX 680	-10 +10 +25 +110 Carter SH 680
	VG 1000				-10 +15 +30 +110 SHC 639	0 +20 +30 +110 Klübersynth EG4-1000		

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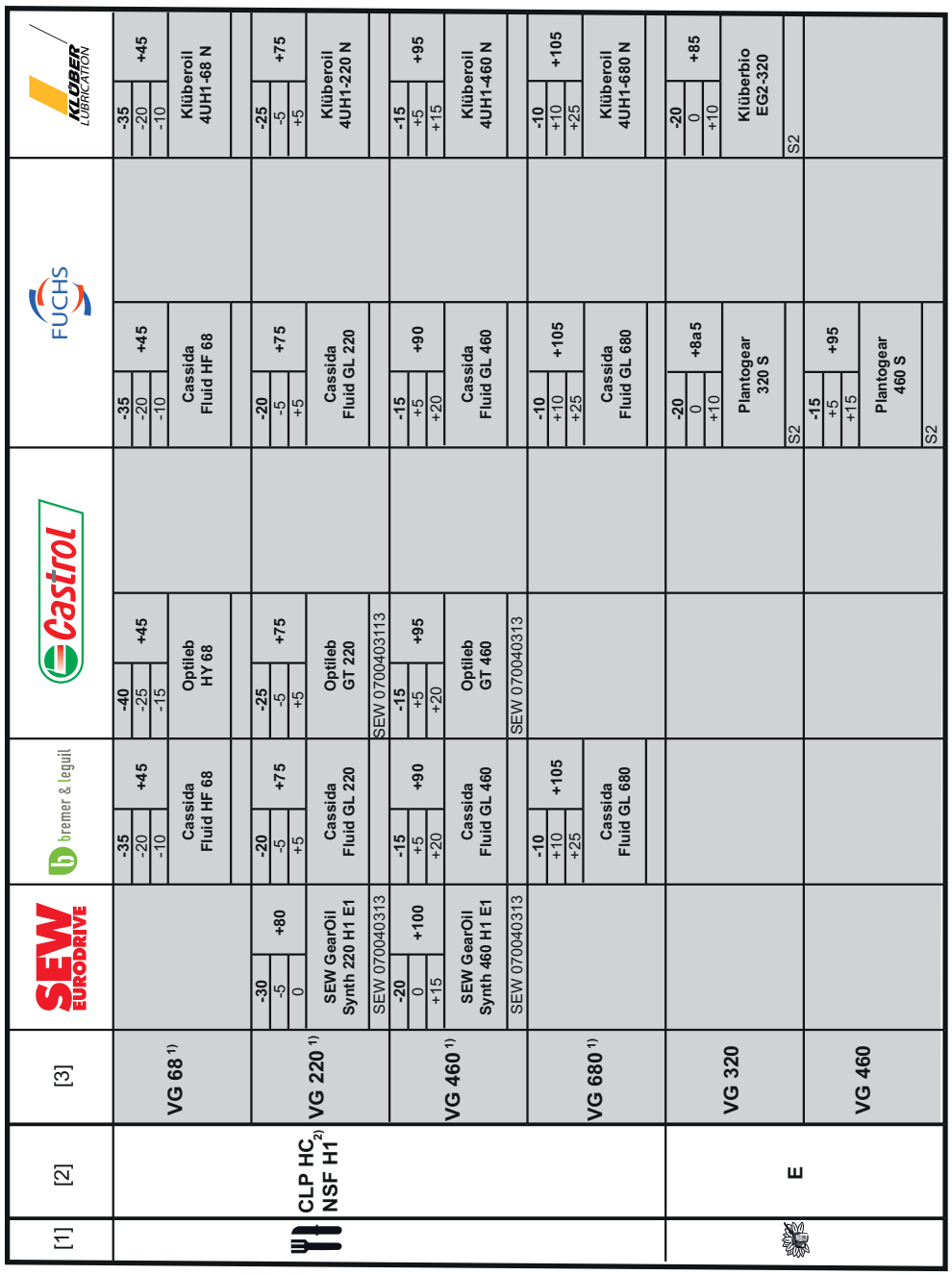
This lubricant table is valid when the document is published. Please refer to www.sew-eurodrive.de/schmierstoffe for the latest version of the table.



[1]	[2]	[3]	SEW EURODRIVE	bremer & leguil	Castrol	FUCHS	KLÜBER LUBRICATION
	CLP HC 2) NSF H1	VG 68 1)	-30 -5 0 +80	-35 -20 -10 +45 Cassida Fluid HF 68	-40 -25 -15 +45 Optileb HY 68	-35 -20 -10 +45 Cassida Fluid HF 68	-35 -20 -10 +45 Klüberoil 4UH1-68 N
		VG 220 1)	-20 -5 0 +100 SEW GearOil Synth 220 H1 E1	-20 -5 +5 +75 Cassida Fluid GL 220	-25 -5 +5 +75 Optileb GT 220	-20 -5 +5 +75 Cassida Fluid GL 220	-25 -5 +5 +75 Klüberoil 4UH1-220 N
			SEW 070040313		SEW 070040313		
		VG 460 1)	-20 0 +15 +100 SEW GearOil Synth 460 H1 E1	-15 +5 +20 +90 Cassida Fluid GL 460	-15 +5 +20 +95 Optileb GT 460	-15 +5 +20 +90 Cassida Fluid GL 460	-15 +5 +15 +95 Klüberoil 4UH1-460 N
			SEW 070040313		SEW 070040313		
		VG 680 1)	-10 +10 +25 +105 Cassida Fluid GL 680			-10 +10 +25 +105 Cassida Fluid GL 680	-10 +10 +25 +105 Klüberoil 4UH1-680 N
	E	VG 320				-20 0 +10 +8a5 Plantogear 320 S S2	-20 0 +10 +85 Klüberbio EG2-320 S2
		VG 460				-15 +5 +15 +95 Plantogear 460 S S2	

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1) Lubricants may only be used if the service factor F_s and peak load factor $F_F \geq 1.6$.
The peak output torque $MK2_{per}$ is limited as follows: $F_F \geq 1.6 \rightarrow M_{K2per} \leq 1.25$ x MN2 (nominal torque) $\rightarrow M_{K2per} \leq 2x\ M_{N2}/F_F = 2/1.6x\ M_{N2}$.
In case of deviations, contact SEW-EURODRIVE.

2) NSF-H1 registered oils for the food processing industry cannot be combined with the gear unit option "Extended storage" (a VCI anti-corrosion agent is added).

NOTICE:
The thermal operating limits of the oil seal materials must also be taken into account, see chapter "Lubricant compatibility with oil seal" (→ 151).

8.5 Lubricant fill quantities

Observe the notes in chapter "Lubricant selection" (→ 🗎 142).

The specified fill quantities are **guide values**. The precise values vary depending on the number of stages and gear ratios.

Observe the following information:

INFORMATION

- The oil chambers of planetary gear unit and primary gear unit are separate as standard. In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information.
- Planetary gear units are supplied without lubricant as standard.
- RF.., KF.., and K.. primary gear units are filled with lubricant at the factory depending on the mounting position.
- For pivoted mounting positions adhere to the lubricant fill quantity on the nameplates.
- The lubricant values und the nameplate are guide values. The required oil quantity depends on the respective marks on the oil sight glass or oil dipstick.

8.5.1 P.. planetary gear units

The oil level of planetary gear units is checked using the oil sight glass or oil dipstick.

The table below shows the lubricant fill quantities for planetary gear units.

Size	Mounting position					
	M1	M2	M3	M4	M5	M6
	Liters					
P.002	5	9	5	7	5	5
P.012	7	12	7	10	7	7
P.022	9	18	9	18	9	9
P.032	12	21	12	21	12	12
P.042	16	30	16	25	16	16
P.052	20	36	20	30	20	20
P.062	28	54	28	49	28	28
P.072	35	67	35	59	35	35
P.082	49	94	49	81	49	49
P.092	62	134	62	103	62	62
P.102	71	153	71	121	71	71

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8.5.2 Primary gear units

Bevel (KF/K) primary gear units

INFORMATION

- The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the KF.. and K.. primary gearmotor.
- For notes on the mounting positions of KF.. and K.. primary gear units, see chapter "KF../K.. primary bevel gear units" (→ 🗎 38).
- The oil level of primary gear units is checked using the oil level plug.

The table below shows the lubricant fill quantities.

Size	Fill quantities in liters											
	M1				M2				M3			
	0° A	90 ° A	180° B	270 ° A	0° A	90 ° A	180 ° A	270 ° A	0 ° B	90 ° A	180 ° A	270 ° A
KF67	1.1	2.4	1.1	3.7	2.7	2.7	2.7	2.7	1.1	3.7	1.1	2.4
KF77	2.1	4.1	2.1	5.9	4.5	4.5	4.5	4.5	2.1	5.9	2.1	4.1
KF87	3.7	8.2	3.7	11.9	8.4	8.4	8.4	8.4	3.7	11.9	3.7	8.2
KF97	7	14.7	7	21.5	16.5	16.5	16.5	16.5	7	21.5	7	14.7
KF107	10	21.8	10	35.1	25.2	25.2	25.2	25.2	10	35.1	10	21.8
KF127	21	41.5	21	55	41	41	41	41	21	55	21	41.5
KF157	31	62	31	92	62	62	62	62	31	92	31	66
K167	33	95	33	123	95	95	95	95	105	33	105	85
K187	53	152	53	200	152	152	152	152	167	53	167	143
Size	**Fill quantities in liters**											
	M4				**M5**				**M6**			
	0° A	**90 ° A**	**180° B**	**270 ° A**	**0° A**	**90 ° B**	**180 ° A**	**270 ° A**	**0 ° B**	**90 ° A**	**180 ° A**	**270 ° B**
KF67	2.7	2.7	2.7	2.7	2.4	1.1	3.7	1.1	3.7	1.1	2.4	1.1
KF77	4.5	4.5	4.5	4.5	4.1	2.1	5.9	2.1	5.9	2.1	4.1	2.1
KF87	8.4	8.4	8.4	8.4	8.2	3.7	11.9	3.7	11.9	3.7	8.2	3.7
KF97	15.7	15.7	15.7	15.7	14.7	7.0	21.5	7	21.5	7.0	14.7	7
KF107	25.2	25.2	25.2	25.2	21.8	10	35.1	10	35.1	10	21.8	10
KF127	41	41	41	41	41.5	21	55	21	55	21	41.5	21
KF157	62	62	62	62	66	31	90	31	92	31	66	31
K167	123	123	123	123	85	33	123	33	84	33	95	33
K187	200	200	200	200	143	53	200	53	143	53	152	53

Key:

M1/M2/M3/M4/M5/M6	= Mounting position of planetary gear unit
0°/90°/180°/270°	= Mounting position of bevel (KF/K) primary gear unit
A/B	= Position of the mounting flange at the primary bevel gear unit

Helical (RF) primary gear units

INFORMATION

- The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the RF primary gear unit.
- For information on the mounting positions of the RF.. primary gear unit, refer to chapter "RF.. primary helical gear units" (→ 🗎 40)
- The oil level of primary gear units is checked using the oil level plug.

The table below shows the lubricant fill quantities.

Size	Fill quantities in liters					
	M1	M2	M3	M4	M5	M6
	0°	0°	180°	→0°	270°	90°
RF77	1.2	3.10	3.30	3.60	2.40	3.00
RF87	2.4	6.4	7.1	7.2	6.3	6.4
RF97	5.1	11.9	11.2	14.0	11.2	11.8
RF107	6.3	15.9	17.0	19.2	13.1	15.9
RF127	6.6	18.3	18.2	21.4	15.9	17.0
RF137	9.5	27.0	29.0	32.5	25.0	25.0
RF147	16.4	47.0	48.0	52.0	42.0	42.0
RF167	26.0	82.0	78.0	88.0	65.0	71.0

Legend:

M1/M2/M3/M4/M5/M6	= Mounting position of planetary gear unit
0°/90°/180°/270°	= Mounting position of helical (RF) primary gear unit

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8.6 Lubricant compatibility with oil seal

Approval	Explanation
SEW07004_ _13:	A lubricant especially recommended with regard to compatibility with the approved oil seals. The lubricant exceeds the state-of-the-art requirements regarding elastomer compatibility.

Approved application temperature range of the oil seals

In the low temperature range, oil seals can withstand shaft deflections (e. g. through overhung load) only to a limited extent. Especially avoid or limit pulsating or changing radial displacements of the shaft. Contact SEW-EURODRIVE, if required.

Oil seal Material class	Permitted Oil sump temperature
NBR	-40 °C to +80 °C
FKM	-25 °C to +115 °C
FKM-PSS	-25 °C to +115 °C

Limitations of use of oil seals with the specific lubricant are described in the following table:

Material class			Manufacturer		Material	
S	1	NBR	1	Freudenberg		72 NBR 902
			2	Trelleborg		4NV11
	2	FKM	1	Freudenberg	1	75 FKM 585
					2	75 FKM 170055
			2	Trelleborg	1	VCBVR

Examples:

S11: Only the elastomer 72NBR902 of the Freudenberg company meets the requirements of the approval in conjunction with the specific lubricant.

S2: Only the elastomer FKM meets the requirements of the approval in conjunction with the specific lubricant.

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8.7 Sealing greases/bearing greases: Planetary gear unit

The table shows the grease types recommended by SEW-EURODRIVE for operating temperatures from the lower limit temperature to 100 °C.

Area of operation	Manufacturer	Grease	Lower limit temperature °C
Standard	Fuchs	**Renolit CX TOM 15 OEM**[1)]	-40
	BP	Energrease LS EP-2	-30
	Castrol	Longtime PD 2	-35
		Spheerol EPL 2	-20
	Klüber	Centoplex EP 2	-25
		Petamo GHY 133 N	-40
	Mobil	Moliux EP 2	-20
	Shell	Gadus S2 V220 2	-20
	Total	Multis EP 2	-20
	Bremer & Leguil	Cassida Grease GTS2[1)]	-40
	Fuchs	**Plantogel 2**[1)]	-40

1) Grease used by the factory should be preferred.

INFORMATION

- Do not mix permitted greases from different areas of application.
- If the lubricant used is not listed in the above table, you have to make sure that it is suitable for the intended application.

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8.8 Sealing grease: RF../KF../K.. primary gear units and motors

The rolling bearings in RF../KF../K.. primary gear units and motors are given a factory-fill with the greases listed below. SEW-EURODRIVE recommends regreasing rolling bearings with a grease fill at the same time as changing the oil. Observe the separate operating instructions for RF../KF../K.. primary gear units and motors.

	Ambient temperature	Manufacturer	Type
Gear unit rolling 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	Bremer & Leguil	Cassida Grease GTS 2
	-20 °C to +40 °C	Fuchs	Plantogel 2S

1) 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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9 Malfunctions/remedy

9.1 Troubleshooting information

Read the following notes before you proceed with troubleshooting.

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Attach an information sign near the ON switch to warn that the gear unit is being worked on.

⚠ WARNING

Risk of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Remove the oil drain plug very carefully.

NOTICE

Improper handling of the gear unit and the motor may lead to damage.

Possible damage to property.

- Only qualified personnel are permitted to separate drive and motor and to carry out repair work on SEW drives.
- Contact SEW-EURODRIVE.

9.2 Service

Please have the following information available if you require customer service assistance:

- Complete nameplate data
- Type and extent of the malfunction
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- If possible video and audio recordings

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9.3 Malfunctions of P.. planetary gear units

Fault	Possible cause	Measure
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage	• Check the oil consistency; change bearings
	• Knocking noise: Irregularity in the gearing	• Contact SEW-EURODRIVE. For a better assessment of the failure, send an audio recording of the noise
	• Deformation of the housing upon tightening	• Check the gear unit mounting for possible deformation and correct if necessary
	• Noise generation caused by insufficient rigidity of the gear unit foundation	• Reinforce the gear unit foundation
Unusual, irregular running noises	• Foreign objects in the oil	• Check the oil consistency • Stop the drive, contact SEW-EURODRIVE
Unusual noise in the area where the gear unit is mounted	• Gear unit mounting has loosened	• Tighten retaining screws and nuts to the specified torque • Replace the damaged/defective retaining screws or nuts
Operating temperature too high	• Too much oil	• Check oil level, correct if necessary
	• Oil too old	• Check when the oil was last changed; change the oil, if necessary
	• The oil is heavily contaminated	• Analyze the oil to determine the cause; take measures, if necessary; change the oil
	• Ambient temperature too high	• Protect the gear unit from external heat sources (e.g. provide shade)
Temperature at bearing points too high	• Not enough oil	• Check oil level; correct if necessary
	• Oil too old	• Check when the oil was last changed; change the oil if necessary
	• Bearing damaged	• Check the bearing and replace it if necessary. Contact SEW-EURODRIVE
Oil leaking • At the gear unit breather	• Too much oil	• Check oil level, correct if necessary
	• Drive not installed in proper mounting position	• Install gear unit breather correctly and adjust the oil level
	• Frequent cold starts (oil foaming) and/or high oil level	• Install oil expansion tank
Oil leaking • From the screw plug • From the oil drain valve	• Seal not tight	• Retighten the screw
	• Fittings loosened	• Retighten the fitting and screw

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Fault	Possible cause	Measure
Oil leaking[1)] • From oil seal	• Too much oil	• Check the oil level; correct if necessary
	• Venting sealed	• Check the breather and replace if necessary
	• Oil seal damaged/worn	• Check oil seals; replace if necessary

1) During the run-in phase (24-hour runtime), it is normal for (small amounts of) oil/grease to leak from the oil seal (see also DIN 3761).

9.4 Malfunctions of primary RF../KF../K.. primary gear units

Fault	Possible cause	Measure
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage	• Check the oil consistency; change bearings
	• Knocking noise: Irregularity in the gearing	• Contact SEW-EURODRIVE. For a better assessment of the failure, send an audio recording of the noise
	• Deformation of the housing upon tightening	• Check the gear unit mounting for possible deformation and correct if necessary
	• Noise generation caused by insufficient rigidity of the gear unit foundation	• Reinforce the gear unit foundation
Unusual, irregular running noises	• Foreign objects in the oil	• Check the oil consistency • Stop the drive, contact SEW-EURODRIVE
Oil leaking • From cover plate • From inspection cover • From bearing cover • From mounting flange	• Seal not tight at: – Cover plate – Inspection cover – Bearing cover – Mounting flange	• Tighten the bolts on the respective cover. Observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking
Oil leaking • At the gear unit breather	• Too much oil	• Check oil level, correct if necessary
	• Drive not installed in proper mounting position	• Install gear unit breather correctly and adjust the oil level
	• Frequent cold starts (oil foaming) and/or high oil level	• Install oil expansion tank
Oil leaking[1)] • From oil seal	• Too much oil	• Check the oil level; correct if necessary
	• Venting sealed	• Check the breather and replace if necessary
	• Oil seal damaged/worn	• Check oil seals; replace if necessary
Output shaft does not turn although the motor is running or the input shaft is rotated	• Shaft-hub connection in the gear unit interrupted	• Send in the gear unit/gearmotor for repair

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Fault	Possible cause	Measure
Operating temperature at backstop too high, no blocking function	• Damaged/defective backstop	• Check the backstop, replace it if necessary • Contact SEW-EURODRIVE

1) During the run-in phase (24-hour runtime), it is normal for (small amounts of) oil/grease to leak from the oil seal (see also DIN 3761).

9.5 Malfunctions of AMS/AQS adapters

Fault	Possible cause	Measure
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage	• Contact SEW-EURODRIVE
Oil leaking	• Seal defective	• Contact SEW-EURODRIVE
Output shaft does not turn although the motor is running or the input shaft is rotated	• Shaft-hub connection in the gear unit interrupted	• Send in the gear unit/gearmotor for repair
Change in running noise and/or vibrations	• Coupling ring wear, short-term torque transmission due to metal contact	• Replace coupling ring.
	• Screws to secure hub axially are loose	• Tighten the screws
Premature coupling ring wear	• Contact with aggressive fluids/ oils; ozone influence; excessive ambient temperatures, etc. that can change the physical properties of the coupling ring.	• Contact SEW-EURODRIVE
	• Impermissibly high coupling ring ambient/contact temperatures; max. permissible: -20 °C to +80 °C.	• Contact SEW-EURODRIVE
	• Overload	• Contact SEW-EURODRIVE

9.6 Malfunctions of AD input shaft assembly

Fault	Possible cause	Measure
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage	• Contact SEW-EURODRIVE
Oil leaking	• Seal defective	• Contact SEW-EURODRIVE
Output shaft does not turn although the motor is running or the input shaft is rotated	• Shaft-hub connection in the gear unit interrupted	• Send in the gear unit/gearmotor for repair

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9.7 Motor malfunctions

Fault	Possible cause	Measure
Motor does not start up	Supply cable interrupted	Check connections, correct if necessary
	Brake does not release	See chapter "Brake malfunctions"
	Fuse blown	Replace fuse
	Motor protection tripped	Check motor protection for correct setting, correct fault if necessary
	Motor protection does not switch, error in control	Check motor protection control, correct error if necessary
Motor only starts with difficulty or does not start at all	Motor designed for delta connection but used in star connection	Correct the connection
	Voltage or frequency differs considerably from the setpoint, at least when switching on the motor	Provide better power supply system; check cross section of supply cable
Motor does not start in star connection, only in delta connection	Star connection does not provide sufficient torque	Switch on directly if delta inrush current is not too great; else, use a larger motor or a special design. Contact SEW-EURODRIVE.
	Contact fault on star/delta switch	Rectify fault
Incorrect direction of rotation	Motor connected incorrectly	Swap two phases
Motor hums and has high current consumption	Brake does not release	See chapter "Brake malfunctions"
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
Fuses blow or motor protection trips immediately	Short circuit in the line	Eliminate short circuit
	Short circuit in the motor	Send motor to specialist workshop for repair
	Cables connected incorrectly	Correct the connection
	Ground fault on motor	Send motor to specialist workshop for repair
Severe speed loss under load	Overload	Measure the power, use larger motor or reduce load if necessary
	Voltage drops	Increase cross section of incoming cable

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Fault	Possible cause	Measure
Motor heats up excessively (measure temperature)	Overload	Measure the power, use larger motor or reduce load if necessary
	Insufficient cooling	Correct cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary
	Ambient temperature too high	Observe permitted temperature range
	Motor in delta connection instead of star connection as intended	Correct the connection
	Loose contact in incoming cable (one phase missing)	Tighten loose contact
	Fuse blown	Look for and rectify cause (see above); replace fuse
	The line voltage deviates from the rated motor voltage by more than 5%. A higher voltage has a particularly unfavorable effect in motors with a great number of poles since in these, the no-load current is already close to the rated current even when the voltage is normal.	Adjust motor to line voltage
	Nominal duty cycle (S1 to S10, DIN 57530) exceeded, e.g. caused by excessive starting frequency	Adjust the nominal duty cycle of the motor to the required operating conditions; consult a professional to determine the proper drive, if necessary
Excessively loud	Ball bearing compressed, dirty or damaged	Re-align motor, inspect ball bearing (→ chapter "Permitted ball bearing types"), grease if necessary (→ chapter "Lubricant table for rolling bearings of SEW motors"), replace
	Vibration of rotating parts	Rectify cause, possible imbalance
	Foreign objects in cooling air ducts	Clean cooling air ducts

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9.8 Brake malfunctions

Fault	Possible cause	Measure
Brake does not release	Incorrect voltage on brake control unit	Apply correct voltage
	Brake control unit failed	Install a new brake control system, check internal resistance and insulation of brake coil, check switchgear
	Max. permitted working air gap exceeded because brake lining worn down	Measure and set working air gap
	Voltage drop along supply cable > 10%	Ensure correct connection voltage; check cable cross section
	Inadequate cooling, brake overheats	Replace type BG brake rectifier with type BGE
	Brake coil has interturn short circuit or a short circuit to frame	Replace complete brake and brake control system (specialist workshop), check switchgear
	Rectifier defective	Replace the rectifier and brake coil
Motor does not brake	Working air gap not correct	Measure and set working air gap
	Brake lining worn	Replace entire brake disk
	Incorrect braking torque	Change the braking torque (→ chapter "Technical data") • by changing the type and number of brake springs • BG 05 brake: by installing the same brake coil body design as in the BMG 1 brake • BG 2 brake: by installing the same brake coil body design as in the BMG 4 brake
	BM(G) only: Working air gap so large that setting nuts come into contact	Set the working air gap
	BR03, BM(G) only: Manual brake release device not set correctly	Set the setting nuts correctly
Brake is applied with time lag	Brake is switched on AC voltage side	Switch on DC and AC voltage sides (e.g. BSR); observe wiring diagram
Noise in vicinity of brake	Gearing wear caused by jolting start-up	Check project planning
	Alternating torques due to incorrectly set frequency inverter	Check/correct setting of frequency inverter according to operating instructions

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9.9 Disposal

Dispose gear units in accordance with the regulations in force regarding respective materials:

- Steel scrap
  - Housing parts
  - Gears
  - Shafts
  - Rolling bearing
- Collect used oil and dispose of it according to the regulations in force.

Dispose of the motors in accordance with the material structure and the regulations in force:

- Iron
- Aluminum
- Copper
- Plastics
- Electronic parts
- Oil and grease (not mixed with solvents)

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10 Address list

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	Jakarta	PT. Cahaya Sukses Abadi Komplek Rukan Puri Mutiara Blok A no 99, Sunter Jakarta 14350	Tel. +62 21 65310599 Fax +62 21 65310600 csajkt@cbn.net.id
	Jakarta	PT. Agrindo Putra Lestari JL.Pantai Indah Selatan, Komplek Sentra Industri Terpadu, Pantai indah Kapuk Tahap III, Blok E No. 27 Jakarta 14470	Tel. +62 21 2921-8899 Fax +62 21 2921-8988 aplindo@indosat.net.id http://www.aplindo.com
	Surabaya	PT. TRIAGRI JAYA ABADI Jl. Sukosemolo No. 63, Galaxi Bumi Permai G6 No. 11 Surabaya 60111	Tel. +62 31 5990128 Fax +62 31 5962666 sales@triagri.co.id http://www.triagri.co.id
	Surabaya	CV. Multi Mas Jl. Raden Saleh 43A Kav. 18 Surabaya 60174	Tel. +62 31 5458589 Fax +62 31 5317220 sianhwa@sby.centrin.net.id http://www.cvmultimas.com
Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 http://www.alperton.ie info@alperton.ie
Israel			
Sales	Tel Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milan	SEW-EURODRIVE S.a.s. di SEW S.r.l. & Co. Via Bernini,12 20033 Solaro (Milano)	Tel. +39 02 96 980229 Fax +39 02 96 980 999 http://www.sew-eurodrive.it milano@sew-eurodrive.it
Ivory Coast			
Sales	Abidjan	SEW-EURODRIVE SARL Ivory Coast Rue des Pêcheurs, Zone 3 26 BP 916 Abidjan 26	Tel. +225 27 21 21 81 05 Fax +225 27 21 25 30 47 info@sew-eurodrive.ci http://www.sew-eurodrive.ci
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Kazakhstan			
Sales Service	Almaty	SEW-EURODRIVE LLP 291-291A, Tole bi street 050031, Almaty	Tel. +7 (727) 350 5156 Fax +7 (727) 350 5156 http://www.sew-eurodrive.com kazakhstan@sew-eurodrive.com
	Tashkent	Representative Office SEW-EURODRIVE Representative office in Uzbekistan 95A Amir Temur ave, office 401/3 100084 Tashkent	Tel. +998 97 134 01 99 http://www.sew-eurodrive.uz sew@sew-eurodrive.uz
	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230, MN	Tel. +976-77109997 Fax +976-77109997 imt@imt.mn

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Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C 1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.lv info@alas-kuul.com
Lebanon			
Sales (Lebanon)	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Sales (Jordan, Kuwait , Saudi Arabia, Syria)	Beirut	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 http://www.medrives.com info@medrives.com
Lithuania			
Sales	Alytus	UAB Irseva Statybininku 106C 63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 http://www.irseva.lt irmantas@irseva.lt
Luxembourg			
Representation: Belgium			
Macedonia			
Sales	Skopje	Boznos DOOEL Dime Anicin 2A/7A 1000 Skopje	Tel. +389 23256553 Fax +389 23256554 http://www.boznos.mk
Malaysia			
Assembly Sales Service	Johor	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Mexico			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO S.A. de C.V. SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Querétaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Sales Service	Puebla	SEW-EURODRIVE MEXICO S.A. de C.V. Calzada Zavaleta No. 3922 Piso 2 Local 6 Col. Santa Cruz Buenavista C.P. 72154 Puebla, México	Tel. +52 (222) 221 248 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Mongolia			
Technical Office	Ulaanbaatar	IM Trading LLC Olympic street 28B/3 Sukhbaatar district, Ulaanbaatar 14230, MN	Tel. +976-77109997 Tel. +976-99070395 Fax +976-77109997 http://imt.mn/ imt@imt.mn
Morocco			
Sales Service Assembly	Bouskoura	SEW-EURODRIVE Morocco SARL Parc Industriel CFCIM, Lot. 55/59 27182 Bouskoura Grand Casablanca	Tel. +212 522 88 85 00 Fax +212 522 88 84 50 http://www.sew-eurodrive.ma sew@sew-eurodrive.ma
Namibia			
Sales	Swakopmund	DB MINING & INDUSTRIAL SUPPLIES CC Einstein Street Strauss Industrial Park Unit1 Swakopmund	Tel. +264 64 462 738 Fax +264 64 462 734 anton@dbminingnam.com

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Netherlands			
Assembly Sales Service	Rotterdam	SEW-EURODRIVE B.V. Industrieweg 175 3044 AS Rotterdam Postbus 10085 3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl
New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
Sales	Lagos	Greenpeg Nig. Ltd 64C Toyin Street Opebi-Allen Ikeja Lagos-Nigeria	Tel. +234-701-821-9200-1 http://www.greenpegltd.com sales@greenpegltd.com
Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Pakistan			
Sales	Karachi	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk
Paraguay			
Sales	Fernando de la Mora	SEW-EURODRIVE PARAGUAY S.R.L Nu Guazu No. 642 casi Campo Esperanza Santisima Trinidad Asuncion	Tel. +595 991 519695 Fax +595 21 3285539 sewpy@sew-eurodrive.com.py
Peru			
Assembly Sales Service	Lima	SEW EURODRIVE DEL PERU S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Sales	Makati	P.T. Cerna Corporation 4137 Ponte St., Brgy. Sta. Cruz Makati City 1205	Tel. +63 2 519 6214 Fax +63 2 890 2802 mech_drive_sys@ptcerna.com http://www.ptcerna.com
Poland			
Assembly Sales Service	Łódź	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 92-518 Łódź	Tel. +48 42 293 00 00 Fax +48 42 293 00 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 293 0030 Fax +48 42 293 0043	24 Hour Service Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl
Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Av. da Fonte Nova, n.º 86 3050-379 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

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Romania			
Sales Service	Bucharest	Sialco Trading SRL str. Brazilia nr. 36 011783 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 http://www.sialco.ro sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ЗАО «СЕВ-ЕВРОДРАЙФ» 188660, Russia, Leningrad Region, Vse-volozhsky District, Korabselki, Aleksandra Nevskogo str. building 4, block 1 P.O. Box 36 195220 St. Petersburg	Tel. +7 812 3332522 / +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 http://www.senemeca.com senemeca@senemeca.sn
Serbia			
Sales	Belgrade	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor 11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs
Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. 9, Tuas Drive 2 Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bernolákovo	SEW-Eurodrive SK s.r.o. Priemyselná ulica 6267/7 900 27 Bernolákovo	Tel.+421 2 48 212 800 http://www.sew-eurodrive.sk sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED 32 O'Connor Place Eurodrive House Aeroton Johannesburg 2190 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 248-7289 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 bgriffiths@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 48 Prospecton Road Isipingo Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 902 3815 Fax +27 31 902 3826 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PROPRIETARY) LIMITED 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

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South Korea			
Assembly Sales Service	Ansan	SEW-EURODRIVE Korea Co., Ltd. 7, Dangjaengi-ro, Danwon-gu, Ansan-si, Gyeonggi-do, Zip 425-839	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-eurodrive.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE Korea Co., Ltd. 28, Noksansandan 262-ro 50beon-gil, Gangseo-gu, Busan, Zip 618-820	Tel. +82 51 832-0204 Fax +82 51 832-0230
Assembly Service	Siheung	SEW-EURODRIVE Korea Co., Ltd. 35, Emtibeui 26-ro 58beon-gil, Siheung-si, Gyeonggi-do	http://www.sew-eurodrive.kr
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Swaziland			
Sales	Manzini	C G Trading Co. (Pty) Ltd Simunye street Matsapha, Manzini	Tel. +268 7602 0790 Fax +268 2 518 5033 charles@cgtrading.co.sz www.cgtradingswaziland.com
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 553 03 Jönköping Box 3100 S-550 03 Jönköping	Tel. +46 36 34 42 00 Fax +46 36 34 42 80 http://www.sew-eurodrive.se jonkoping@sew.se
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Taiwan			
Sales	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Huw S. Road Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
Tanzania			
Sales	Daressalam	SEW-EURODRIVE PTY LIMITED TANZANIA Plot 52, Regent Estate PO Box 106274 Dar Es Salaam	Tel. +255 0 22 277 5780 Fax +255 0 22 277 5788 http://www.sew-eurodrive.co.tz info@sew.co.tz
Thailand			
Assembly Sales Service	Chonburi	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com
Tunisia			
Sales	Tunis	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

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Turkey			
Assembly Sales Service	Kocaeli-Gebze	SEW-EURODRIVE Ana Merkez Gebze Organize Sanayi Böl. 400 Sok No. 401 41480 Gebze Kocaeli	Tel. +90 262 9991000 04 Fax +90 262 9991009 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Ukraine			
Assembly Sales Service	Dnipropetrovsk	SEW-EURODRIVE, LLC Robochya str., bld. 23-B, office 409 49008 Dnipro	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua
United Arab Emirates			
Drive Technology Center	Dubai	SEW-EURODRIVE FZE PO Box 263835 Jebel Ali Free Zone – South, P.O. Box Dubai, United Arab Emirates	Tel. +971 (0)4 8806461 Fax +971 (0)4 8806464 info@sew-eurodrive.ae
Uruguay			
Assembly Sales	Montevideo	SEW-EURODRIVE Uruguay, S. A. Jose Serrato 3569 Esqina Corumbe CP 12000 Montevideo	Tel. +598 2 21181-89 Fax +598 2 21181-90 sewuy@sew-eurodrive.com.uy
USA			
Production Sales Service	Southeast Region	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Production +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly Sales Service	Northeast Region	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 202 W. Danieldale Rd. DeSoto, TX 75115	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Wellford	SEW-EURODRIVE INC. 148/150 Finch Rd. Wellford, S.C. 29385	Tel. +1 864 439-7537 Fax +1 864 661 1167 IGOrders@seweurodrive.com
		SEW-EURODRIVE INC. 220 Finch Rd. Wellford, S.C. 29385-9630	
	Additional addresses for service provided on request!		
Vietnam			
Sales	Ho Chi Minh City	SEW-EURODRIVE PTE. LTD. RO at Hochiminh City Floor 8, KV I, Loyal building, 151-151 Bis Vo Thi Sau street, ward 6, District 3, Ho Chi Minh City, Vietnam	Tel. +84 937 299 700 huytam.phan@sew-eurodrive.com
	Hanoi	MICO LTD Quảng Trị - North Vietnam / All sectors except Construction Materials 8th Floor, Ocean Park Building, 01 Dao Duy Anh St, Ha Noi, Viet Nam	Tel. +84 4 39386666 Fax +84 4 3938 6888 nam_ph@micogroup.com.vn http://www.micogroup.com.vn
Zambia			
Representation: South Africa			

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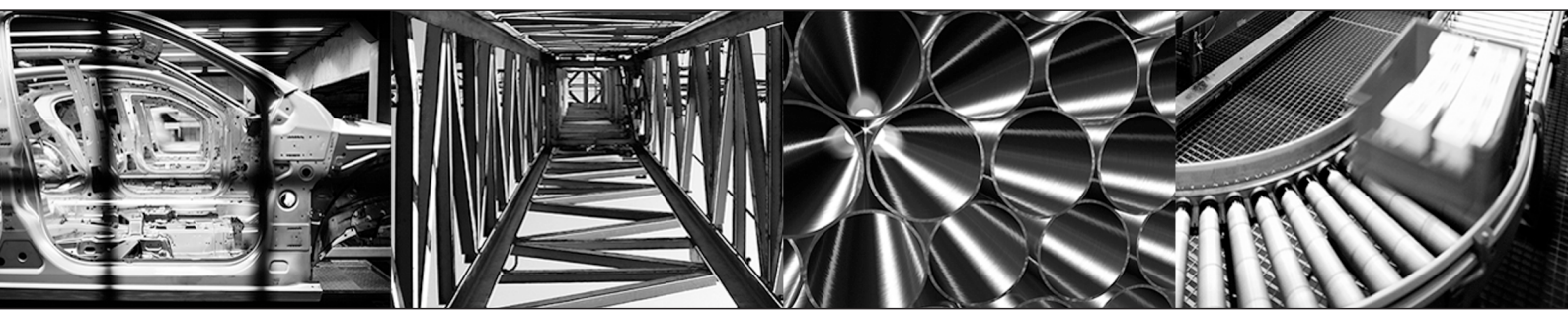

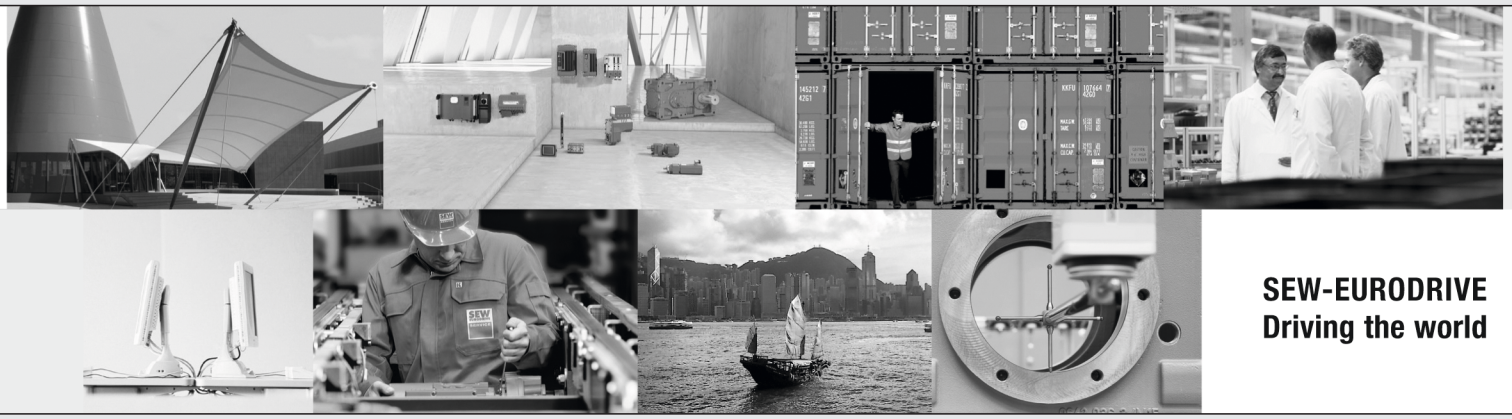

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