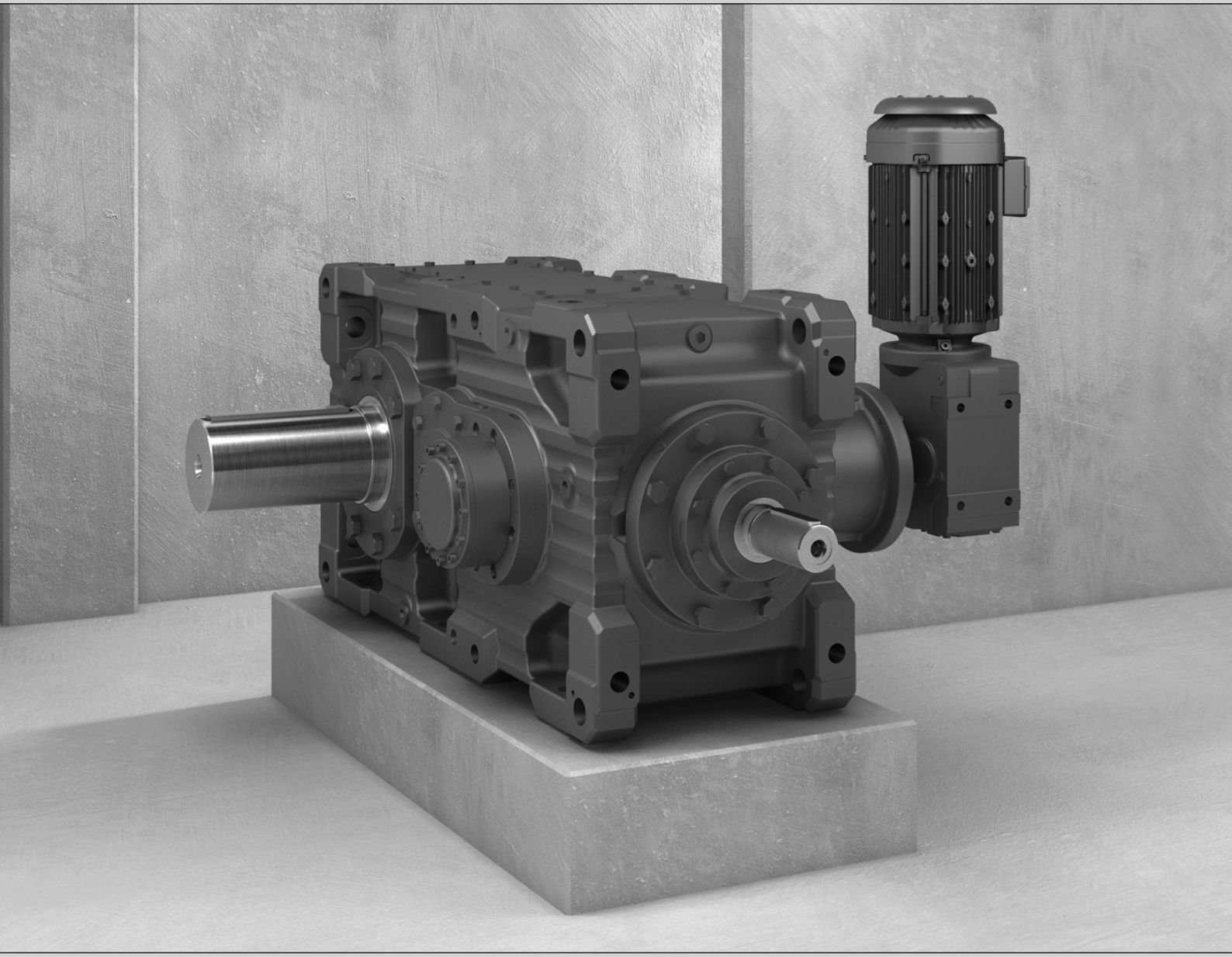
SEW EURODRIVE

Assembly and Operating Instructions



Industrial Gear Units

Bucket Elevator Drives – X..e Series

Torque Classes from 7.2 to 285 kNm

Edition 05/2024

31960243/EN



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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 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
⚠ **DANGER**	Imminent danger	Death or severe injuries
⚠ **WARNING**	Possibly dangerous situation	Death or severe injuries
⚠ **CAUTION**	Possibly 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.	

1.2.2 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.

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Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of hot surfaces
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

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1.3 Decimal separator in numerical values

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

Example: 30.5 kg

1.4 Recycling, reprocessing, reuse

SEW-EURODRIVE GmbH & Co KG strives to use as few new natural resources as possible in the production of its products. An important aspect of this is the circular economy with the recycling of materials as well as the inspection and/or reprocessing of returned components and their reuse in new products. SEW-EURODRIVE GmbH & Co KG only uses these processes if the resulting materials and components are of the same quality as new parts.

1.5 Product names and trademarks

The product names mentioned in this documentation are trademarks or registered trademarks of the respective titleholders.

1.6 Copyright notice

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1.7 Other applicable documentation

The following documentation should also be observed:

- Order documents, such as technical specification, spare and wearing parts list, dimension sheet, technical specification, order confirmation, etc.
- If required, the operating instructions of the options installed such as:
  - Operating instructions: Gear unit series R..7, F..7, K..7, S..7, SPIROPLAN®
  - Oil cooling system
  - Oil supply system
  - Flange coupling
  - Swing base and base frame
  - AC motors
  - DriveRadar®
  - Brake
  - Coupling

For up-to-date information about industrial gear units, visit:

www.sew-eurodrive.com

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1.8 Symbols on the gear unit

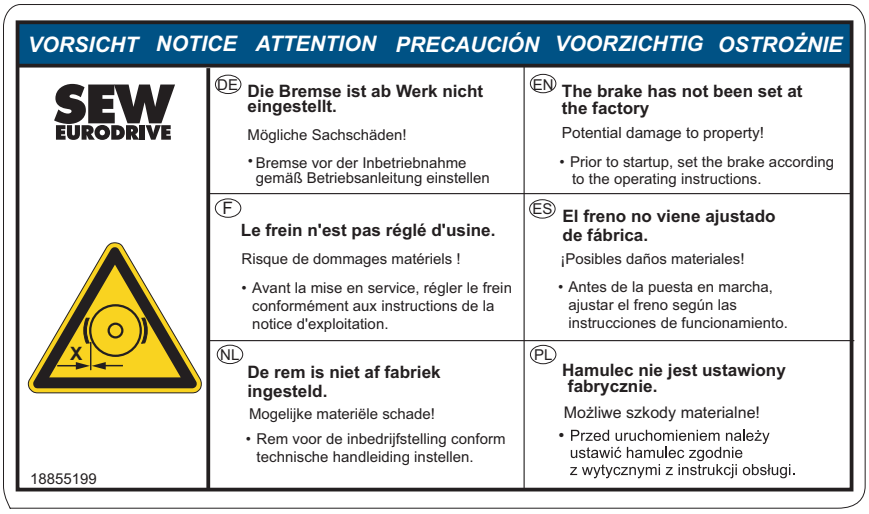
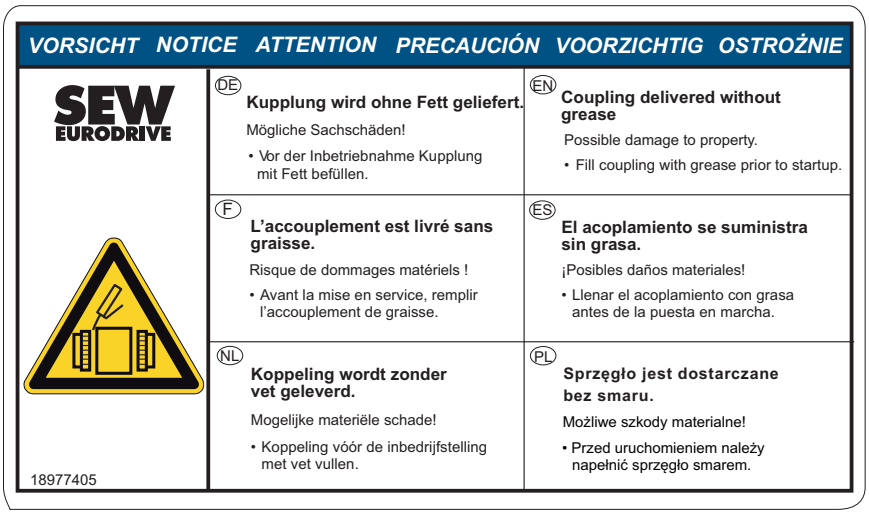
The symbols attached on the gear unit must be observed. They have the following meaning:

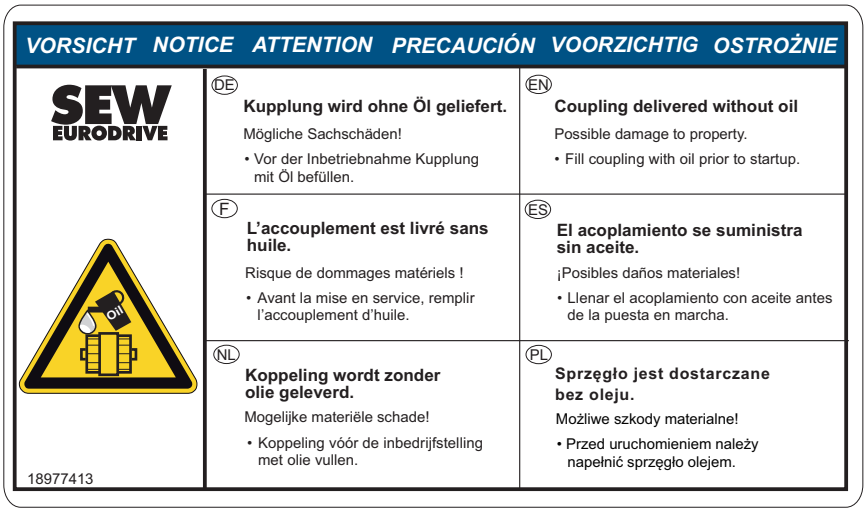
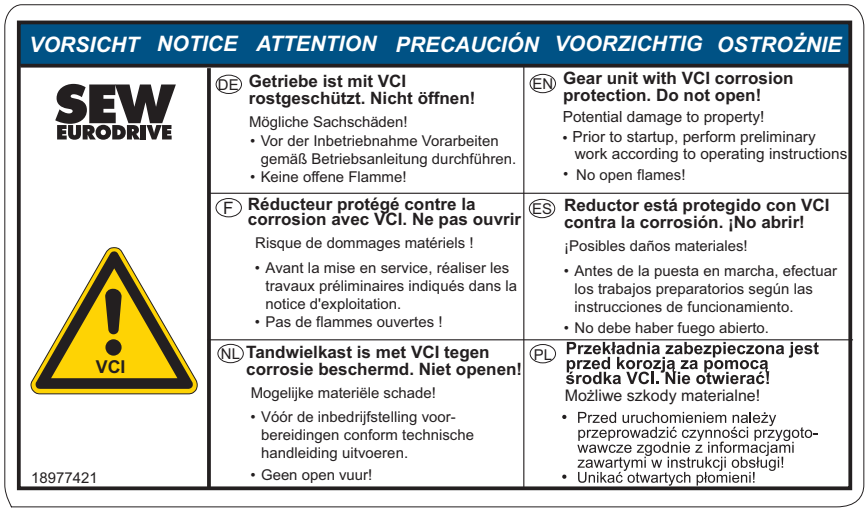
Icons	Meaning
	Indicates the **oil filling point**. Also serves as proper ventilation when changing the oil.
	Indicates the **oil drain**.
	Indicates the position of the **breather**. Serves to avoid mistaking the oil measuring position for the venting position.
	Used to avoid faults due to lack of understanding. Observe the information in the operating instructions.
	Indicates the **magnetic oil dipstick**.
	Indicates the **magnetic oil drain plug**.
	Indicates the position of the **relubrication points** and makes it easier to find the points to be lubricated. Helps prevent bearing damage.
	Indicates the **water supply** and is used to locate the connection option.
	Indicates the **water return** and is used to locate the connection option.
	Indicates the **oil supply** and is used to locate the connection option.
	Indicates the **oil return** and is used to locate the connection option.
	Indicates the mounting position of the gear unit for the **oil control** on the information sign for pivoted mounting positions.
	Indicates the position of the **temperature sensor/temperature switch**.

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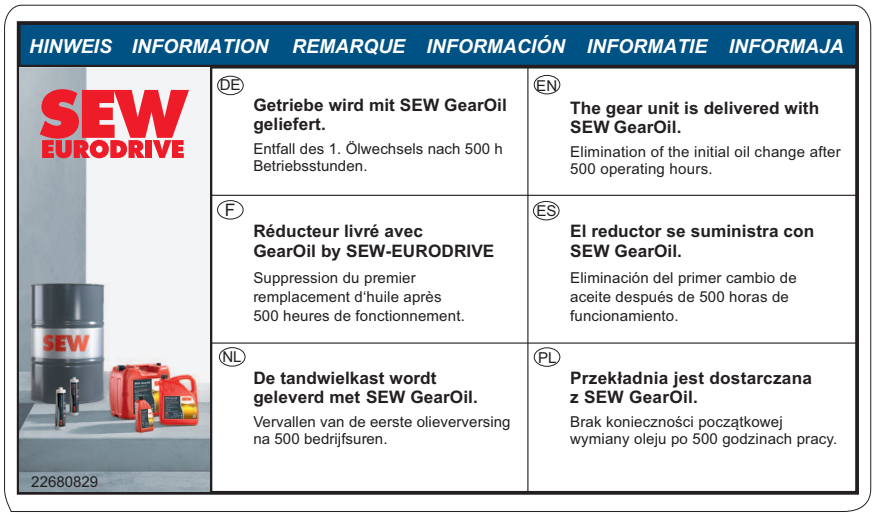
Icons	Meaning
	Indicates the **grease drain screw** and is used to locate the grease drain option.
	Indicates the **air outlet screw**.

The following gear unit labels can be removed from the gear unit after startup.

Meaning
Brake not set at the factory.  *9007204570571147*
Coupling is delivered without grease.  *9007204570573323*

Meaning
Coupling is delivered without oil.  *9007204571876363*
The gear unit is protected against corrosion with VCI.  *9007204570575499*

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Meaning
Gear unit is delivered without oil.  *27021603080059659*
The gear unit is delivered with SEW GearOil.  *32738717195*

1.9 Symbols on the dimension sheet

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

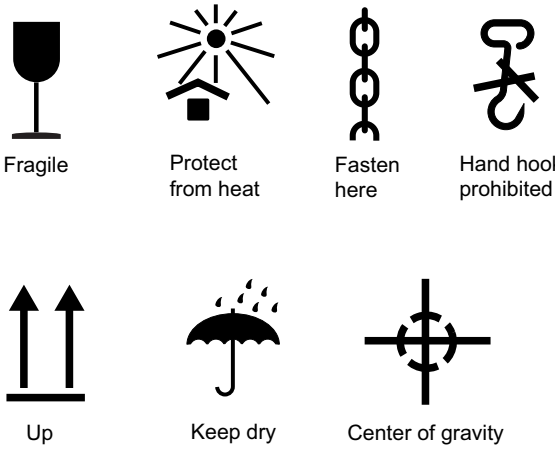
Icons	Meaning
	Indicates the **oil filling point**.
	Indicates the **oil drain**.

Icons	Meaning
	Indicates the position of the **breather**.
	Indicates the position of the **inspection cover**.
	Indicates the position of the attachment points for **transport**.
	Indicates the position of the **oil dipstick**.
	Indicates the position of the **oil level glass**.
	Indicates the position of the **oil sight glass**.
	Indicates the position of the **relubrication points**.
	Indicates the position of the **relubrication points**.
	Indicates the position of the **grease outlet**.
	Indicates the **water inflow** with connection dimensions.
	Indicates the **water return** with connection dimensions.
	Indicates the **oil inflow**.
	Indicates the **oil return**.
	Indicates the position of the **magnetic screw plug**.
	Indicates the position of the **torque arm**.
	Indicates the position of the operator's **vibration sensor** with connection dimensions.
	Indicates the position of the **oil heater**.

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1.10 Symbols on the packaging

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



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2 Safety notes

2.1 Designated use

Industrial gear units are gear units driven by motors and are designed for operation in industrial and commercial systems.

In case of installation in electrical systems or machines, startup of the product is prohibited until it is determined that the machine meets the requirements stipulated in the local laws and directives. For Europe, Machinery Directive 2006/42/EC as well as the EMC Directive 2014/30/EU apply.

For the technical data and the specifications for the installation conditions, refer to the nameplate and the technical specification in this documentation. You must adhere to the data and conditions.

Use in potentially explosive atmospheres is prohibited, unless specifically designated otherwise.

Unintended use of the product may result in severe injury to persons and damage to property.

2.2 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.

2.3 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:

- The national and regional regulations governing safety and the prevention of accidents
- Product safety label on the product
- All other associated project planning documents, installation and startup instructions, as well as wiring diagrams

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- Do not assemble, install or operate damaged products
- All system-specific specifications and regulations

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.

2.4 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.

2.5 Creating a safe working environment

Before you work on the product, ensure a safe working environment. Observe the following basic safety note:

2.5.1 Performing work on the product safely

Defective or damaged product

Never install defective or damaged products. Observe the following information to avoid injuries or damage:

- Before installation, check the product for external damage and replace a damaged product.

Rotating parts

When working on the product, there may be a risk of exposed rotating parts and uncontrolled movement of the components. Observe the following information to avoid body parts getting crushed or pulled in:

- Switch off the product before you start working on it.
- Observe all technical data of the product.
- Do not reach into the hazard zone.

Falling load

Observe the following information to avoid death or severe injury due to falling loads:

- Do not stand under the load.
- Secure the area where loads can fall down.
- Use personal protective equipment (such as helmet and safety shoes).
- Use a suitable lifting tool (chain hoist, forklift) and transport protection.

Hot surfaces

The surfaces of the product can become very hot during operation. Observe the following information to avoid burns:

- Let the product and its accessories cool down before touching it.
- Do not touch any surfaces of the product during operation, except for the control elements.
- Also observe the labels and hazard symbols on the product.

Use of hazardous substances, lubricants, adhesives

Observe the following information to avoid poisoning or fire hazards:

- Observe the safety data sheets of the used hazardous substances, lubricants and adhesives.
- Wear safety gloves.

Missing protective equipment

To avoid injuries, wear the appropriate protective equipment during all work on the product:

- Wear safety gloves.
- Wear safety shoes.
- Wear protective goggles.

2.5.2 Performing electrical work safely

Observe the following information to perform electrical work safely:

Electrical work may only be performed by an electrically skilled person or an electronically instructed person under the supervision of an electrically skilled person.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

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Live parts

Always adhere to the 5 safety rules for all work on electrical components:

1. Disconnect.
2. Secure the device against a restart.
3. Check that no voltage is applied.
4. Ground and short-circuit.
5. Cover or isolate neighboring live parts.

Depending on the situation, it is possible to deviate from rules 4 and 5. Observe standard EN 50110-1.

2.6 Transportation

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product is damaged, it must not be assembled, installed or started up.

Observe the following information to avoid danger.

- Secure the gear unit against falling over during the lifting process.
- Use suitable, adequately dimensioned and undamaged means of transport.
- Secure the attachment parts, such as keys.
- When selecting the lifting equipment or crane, take the gear unit dimensions, center of gravity and mass to be moved into consideration. The mass of the gear unit (without oil) is indicated on the nameplate. The mass to be moved is the total weight of the drive package including mount-on components (not only the weight of the gear unit).
- Transport the gear unit in such a way that damage to the gear unit and attached parts (e.g. breather) is avoided.
- 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.

2.7 Installation/assembly and inspection/maintenance

There is a risk of personal injury or damage to property during installation/assembly and inspection/maintenance. Observe the following information to avoid danger.

- 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 feet and mounting flanges against each other.
- 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.
- Protect the operator's machine against unintentional movement when installing or removing the gear unit.
- The seals must not come in contact with aggressive cleaning agents as this may damage the seals.
- Refer to the nameplate for information regarding the gear oil.
- Do not mix oils of different types and from different manufacturers.

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- Check whether lubricant leaks from the gear unit or mount-on parts.
- Immediately remove any lubricant that has escaped with a binding agent.

2.8 Startup

There is a risk of personal injury and damage to property during startup. Observe the following information to avoid danger.

- The gear unit may be damaged during gear unit startup below the permitted ambient temperature.
- After installing the gear unit, check to verify that all retaining screws are tight and aligned correctly.
- Make sure that the gear unit is grounded properly. 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 working.

2.9 Product safety label on the product

Product safety labels can become dirty or otherwise illegible over time. Always maintain them in a legible state. Replace damaged product safety labels. Failure to do so may result in injury due to illegible product safety labels.

Always observe the product safety labels attached to the gear unit. They have the following meaning:

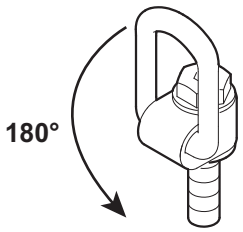
Product safety label	Meaning
	Caution: Risk of burns due to hot surface. The safety symbol is located on the top side of the gear unit.
	Caution: Gear unit damage when unscrewing the oil dipstick during operation. The safety symbol is located directly next to the oil dipstick.
	Caution: Risk of burns due to hot gear unit oil. The safety symbol is located directly next to the oil drain.

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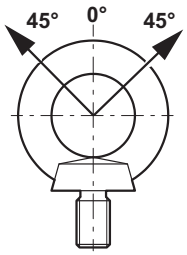
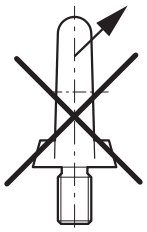
3 Transportation/Storage

Before transporting the gear unit, observe the safety notes in chapter "Transportation" (→ 🗎 19) and the following information.

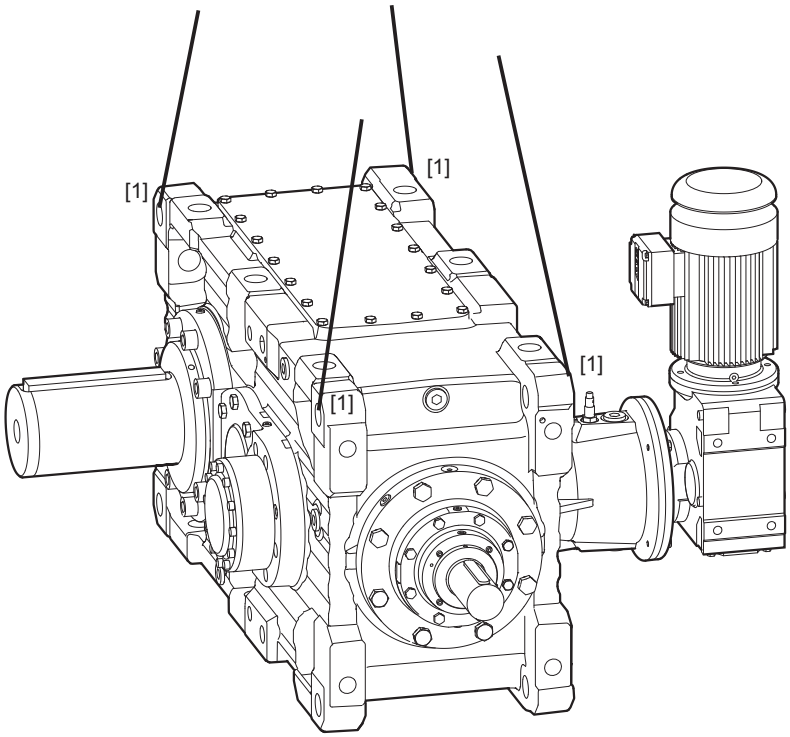
- The weight of the gear unit (without oil) is indicated on the nameplate or on the dimension sheet. Comply with the loads and regulations specified there.
- If possible, transport the gear unit without oil fill. If this is not possible, note that the weight information on the nameplate refers only to the no-load weight of the gear unit.
- For gear units with non-contact gasket and oil filling on delivery, ensure transport in horizontal mounting position.
- For gear units with a fan, the specified attachment points [1] might be inaccessible because of the fan guard. In this case, remove the fan guard before transporting the gear unit. Before starting up the fan, make sure that the fan guard is mounted properly.
- Only use the specified attachment points [1] to transport the gear unit, see the following illustrations and order documents. The load suspensions of the motor or mount-on components are provided for stabilization purposes only.
- Make sure that the lifting eyebolts are screwed in completely and are flush to the contact surface. Tighten the lifting eyebolts at least hand-tight. Observe the following information.



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Lifting eyebolts DIN 580/DIN 582	
Correct: **Angle of tension force vector towards the eye plane, max. 45°**	**Incorrect:** **Tension away from the eye plane**
	

The following figure shows an example for the transport.



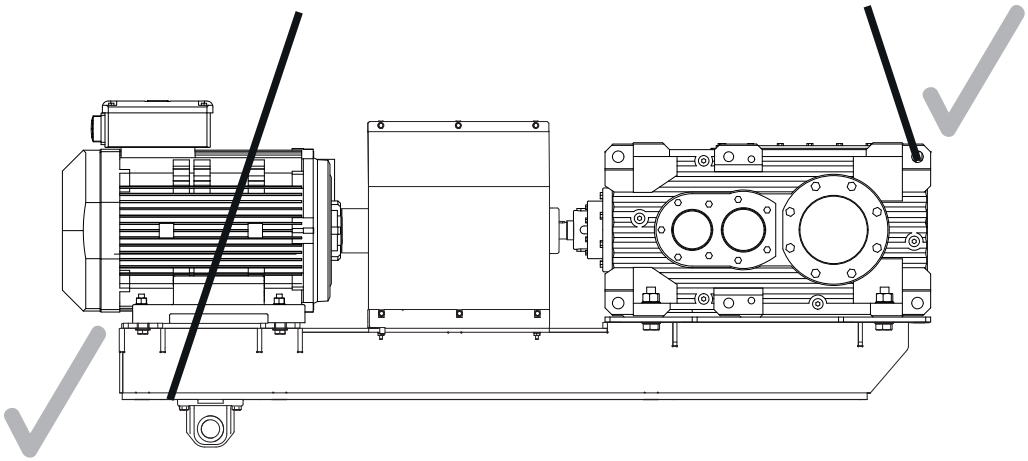
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3.1 On swing base/base frame

3.1.1 Swing base

Standard transport

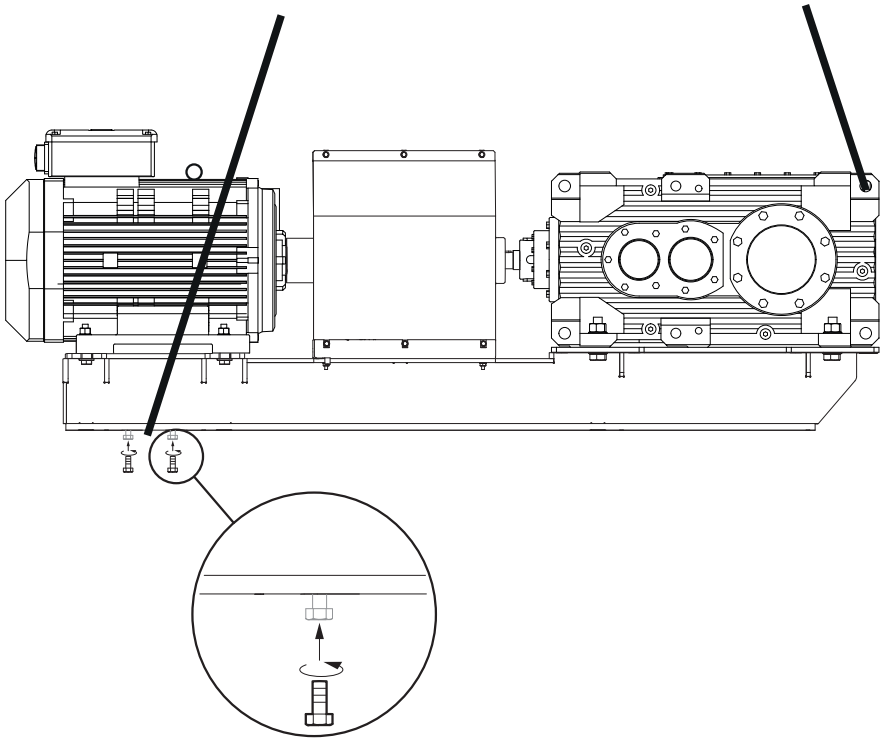
Attach the load handling device to the gear unit housing and underneath the motor swing arm to allow the drive package to be suspended above the center of gravity.



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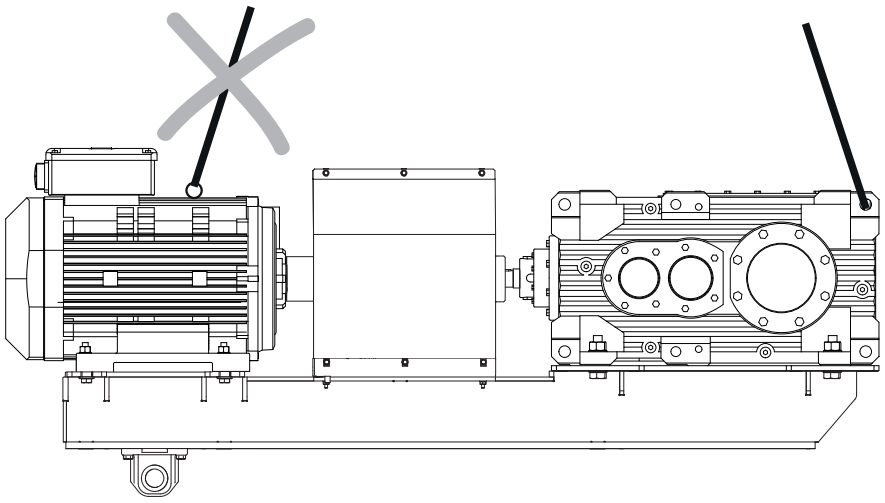
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If the support frame is not part of the delivery, you must secure the load handling device with a screw on the steel support construction to prevent it from slipping. Securing with 2 screws prevents the load sling from slipping away. The load handling device must be positioned between the screws.



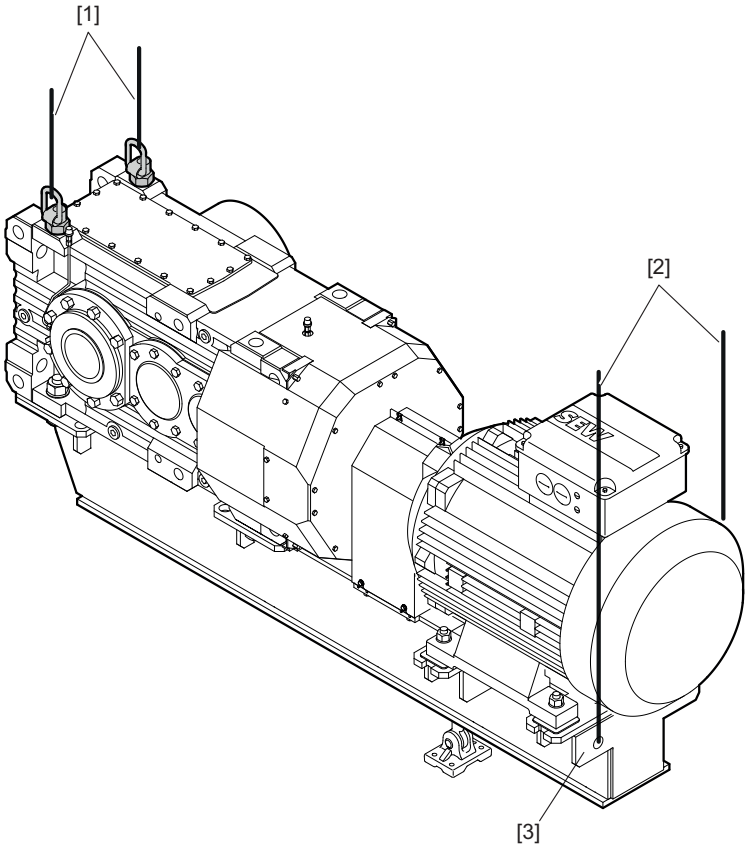
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Do not use the lifting eyebolts on the motor as a transport attachment.



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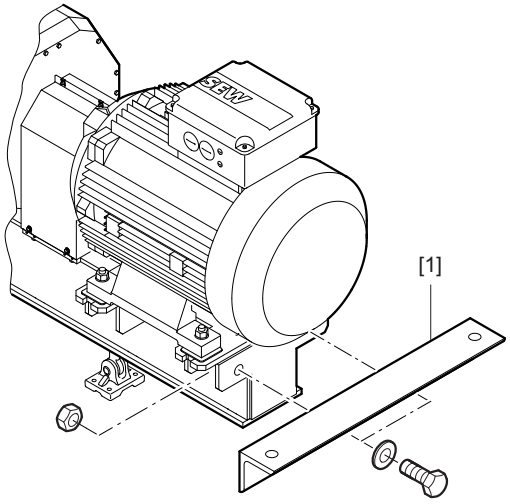
As an option, you can also attach the load handling device to the gear unit housing [1] and to the swing base [2].



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Optional, transport with lateral slinging aid

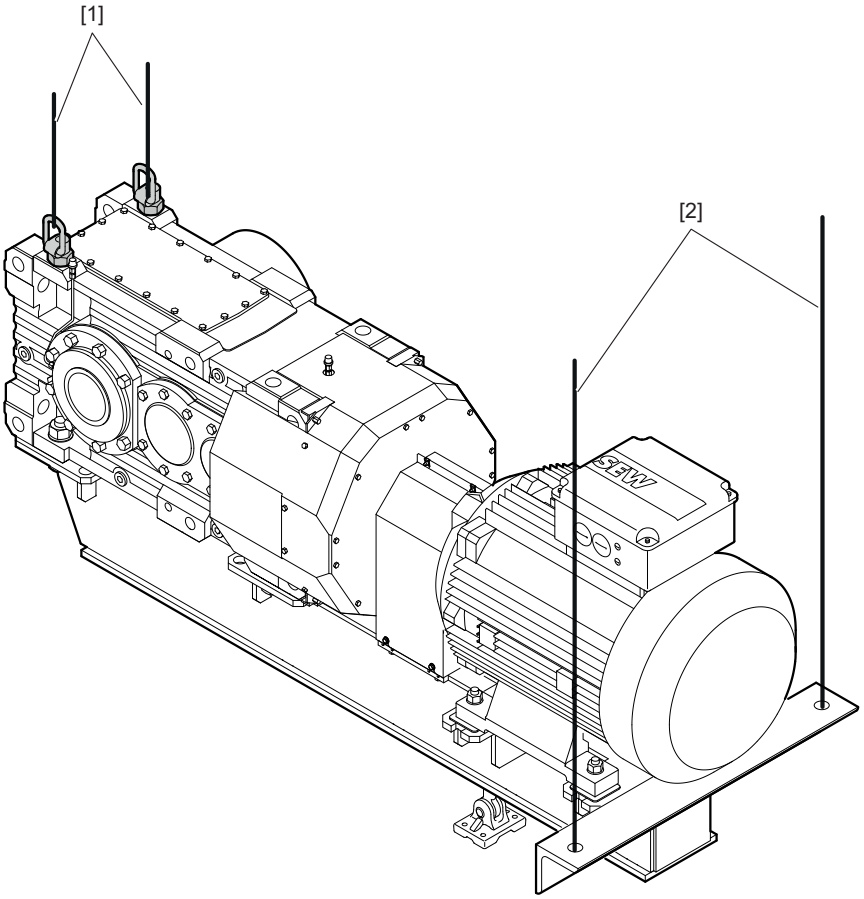
The slinging aid [1] is an option and can be ordered from SEW-EURODRIVE. This is mounted to the swing base. The fasteners are included in the scope of delivery.



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Attach the load handling device to the gear unit housing [1] and to the slinging aid [2].



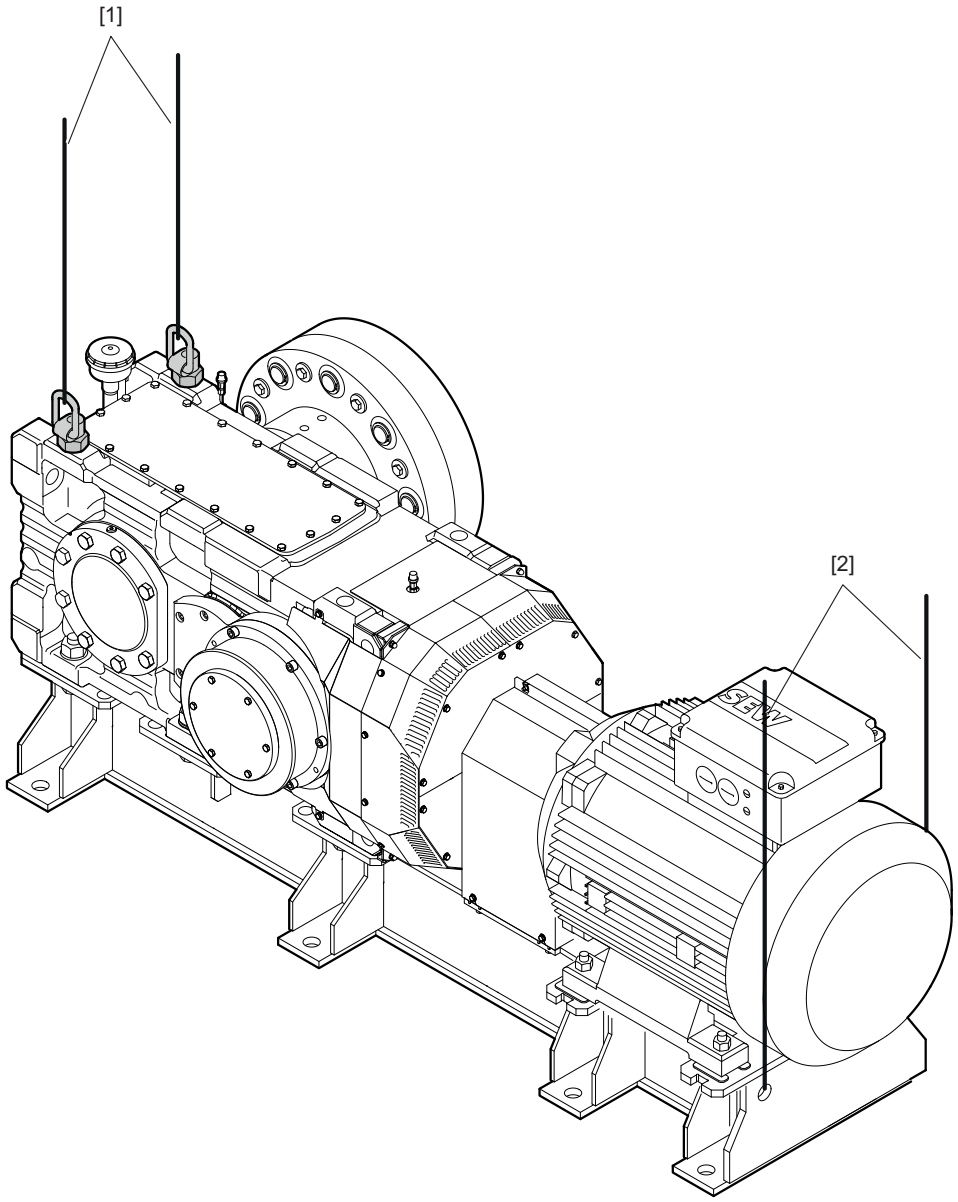
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3.1.2 Base frame

Attach the load handling device to the gear unit housing [1] and to the base frame [2].

The slinging aid, as described in chapter "Swing base" (→ 🗎 22), can also be ordered for the base frame.



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3.2 Storage and transport conditions

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

3.2.1 Internal conservation

Standard corrosion protection

After the test run, the test oil fill is drained out of the gear unit. The remaining oil film protects the gear unit against corrosion for a limited period of time. If specified in the order, the gear unit can be delivered with oil. Refer to the order documents for more information.

Long-term corrosion protection

After the test run, the test oil fill is drained out of the gear unit and the interior space is filled with a vapor phase inhibitor. The breather is replaced by a screw plug and included in the gear unit delivery.

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.

3.2.2 Exterior corrosion protection

In general, the following measures are used for external preservation:

- 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 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).
- Tapped holes and blind holes are sealed with plastic plugs.
- If the gear unit is stored longer than 6 months, regularly check the protective coating of unpainted areas as well as the paint coating. Areas with protective coating and/or paint that has been damaged may have to be repainted.

3.2.3 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

3.2.4 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.

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- 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 Anticorit VCI and tightly seal the gear unit (replace the breather with a screw plug)
- The permitted storage temperature is -30 °C to +50 °C.
- When storing in tropical areas, ensure adequate protection against insect damage. In case of deviating requirements, contact SEW-EURODRIVE.

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

Preservation + packaging	Storage location	Storage period
Standard preservation + standard packaging	Under roof and enclosed at constant temperature and humidity (5 °C < ϑ < 60 °C, < 50% relative humidity). No sudden temperature fluctuations and controlled ventilation with filter (free of dirt and dust). No aggressive vapors or shocks.	Maximum 6 months with intact surface protection
Long-term preservation + standard packaging	Under roof and enclosed at constant temperature and humidity (5 °C < ϑ < 60 °C, < 50% relative humidity). No sudden temperature fluctuations and controlled ventilation of the storage room with filter (free of dirt and dust). No aggressive vapors or shocks.	Maximum 3 years with regular inspection and checking for intactness
Long-term preservation + standard packaging	Under roof, protection against rain, vibration-free.	Maximum 3 years with regular inspection and checking for intactness

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3.3 Gear unit preservation/gear unit shutdown

If the gear unit is shut down for a longer period of time, additional preservation measures are required. Observe the installation location, ambient conditions and lubricant condition of the gear unit. Depending on this, preservation may be required within just a few weeks of downtime.

For gear units with water cooling, interrupt the cooling water supply and drain the water from the cooling circuit. For oil supply systems, contact SEW-EURODRIVE.

3.3.1 Internal conservation

- **With new or hardly used gear units:**
  - SEW-EURODRIVE recommends the VCI preservation method for internal preservation 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 quantity depends on the available internal volume of the gear unit. Filled oil can 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 (e.g. oil sludge, water, ...) after long periods of operation. Therefore, drain the oil and thoroughly rinse the inside of the gear unit with new oil prior to preservation. Observe the information in chapter "Changing the oil" (→ 🗎 199) in the corresponding operating instructions. The inside of the gear unit can then be protected again corrosion as described above.

For gear units, internal corrosion protection can also be performed by using the oil type indicated on the nameplate. 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 corrosion protection, all the gearing components and bearing points must be completely covered in oil.

For X2F160 – 320 gear units with contactless sealing system, press grease into the seal of the input shaft.

Then seal the input shaft airtight with adhesive tape. Make sure that the gear unit is stored in mounting position M1. To ensure permanent corrosion protection, fill the inside of the gear unit with the required amount of VCI anti-corrosion agent. 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.

Before startup, mount a new breather. Observe the oil type and oil quantity according to the nameplate.

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3.3.2 External corrosion protection

- Clean the surfaces to be preserved.
- Grease the shaft near the dust lip to separate the sealing lip of the oil seal and the anti-corrosion agent.
- Preservation the exterior of shaft ends and unpainted surfaces with a wax-based protective coating (e.g. Hölterol MF 1424 from Herm. Hölterhoff, 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.

Observe the information in chapter "Storage and transport conditions" (→ 🗎 27) in the corresponding operating instructions. This chapter provides information on the possible storage periods in conjunction with adequate packaging – depending on the storage location.

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4 Structure

4.1 Bucket elevator drive

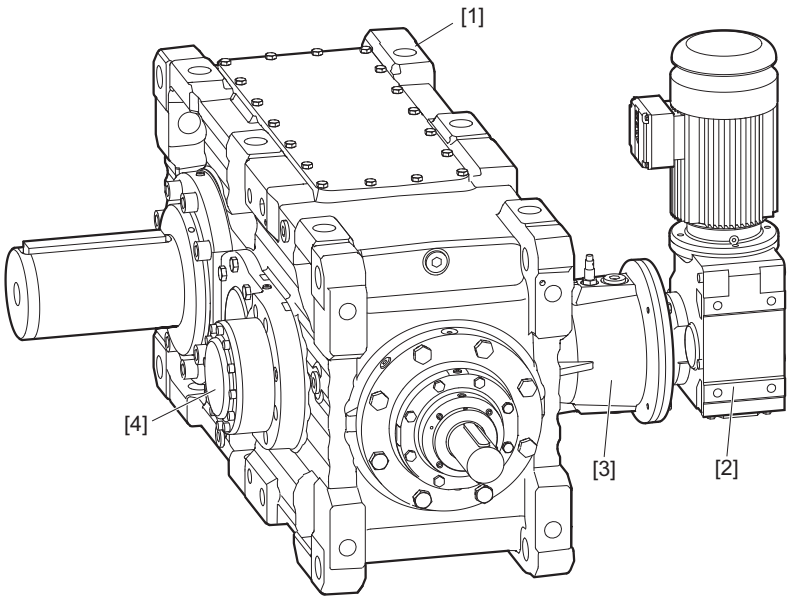
Bucket elevators are conveyor systems that vertically lift large quantities of bulk material. Depending on the volume of the buckets and on the needed conveyor height, high drive powers may be required.

Especially during maintenance, the bucket elevator drive may only be operated at reduced speed. This is the reason why bucket elevator drives are equipped with a directly mounted auxiliary drive [2] and a backstop [4].

The auxiliary drive is connected to the X..e series bevel-helical gear unit [1] using an auxiliary drive adapter [3] with overrunning clutch.

INFORMATION

The bevel-helical gear units [1] are delivered **without** lubricant filling. The auxiliary drive [2] is already filled **with** lubricant.



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[1] X.K.. bevel-helical gear unit

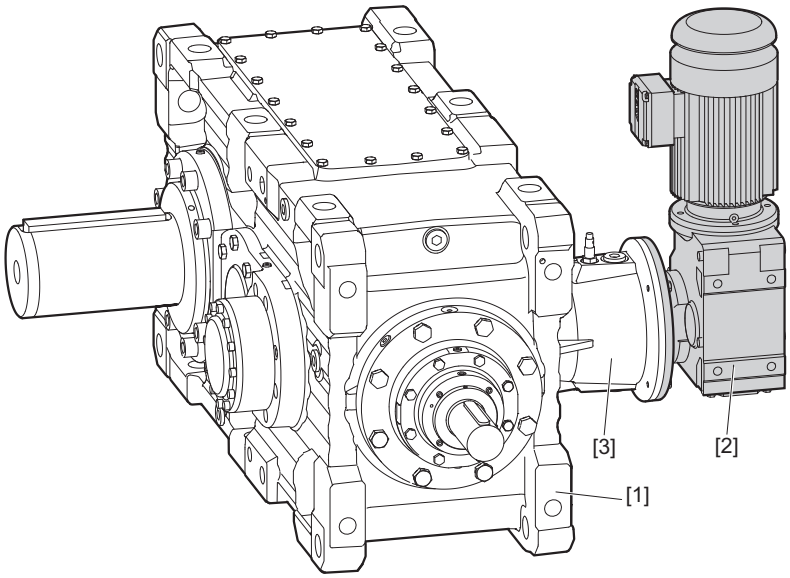
[2] Auxiliary drive

[3] Auxiliary drive adapter with overrunning clutch and incremental encoder for speed monitoring

[4] Backstop

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4.2 Auxiliary drive/IEC motor standard



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The mounted auxiliary drive [2] can be supplied in the "empty buckets" (exclusively for maintenance purposes) or "full buckets" designs. The auxiliary drive is mounted to the bevel-helical gear unit [1] via an auxiliary drive adapter [3]. For the precise output torques for operation via an auxiliary drive, refer to the order documents.

The auxiliary drive has its own oil circulation that is separated from the oil circulation of the bevel-helical gear unit. The auxiliary drive is delivered with oil fill.

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4.2.1 IEC motor standard

The DR.. motor supports all global standards and meets the current IEC motor standard.

As standard, the auxiliary drive is equipped with motors of the DRN.. (IE3) series by SEW-EURODRIVE. For duty types without special requirements on the energy efficiency class, DRS.. (IE1) motors can be used instead. The following table describes both variants.

IE3 motor standard: DRN.. type AC motors
• IE3 (High Efficiency) • Casting cage of the rotor made of aluminum or copper • Operating mode: S1/75

DRS motors can be mounted:

IE1 motor standard: DRS.. type AC motors
• IE1 (Standard Efficiency) • Casting cage of the rotor made of aluminum or copper • Operating mode: S3/75

INFORMATION

- The typical purpose of use of the auxiliary drive does not correspond to S1 continuous duty, so the motor is designed with duty type S3/75. This means that the cyclic duration factor (cdf) is 7.5 minutes or less over a period of 10 minutes (max. cdf 75%). This means that an IE1 motor can also be used in countries where an IE1 motor in S1 operation is no longer permitted due to efficiency regulations (e.g. the EU).
- For further information about DR motors, refer to the website ([www.sew-eurodrive.de]). If you are unclear about any of the information in this documentation or if you require further information, consult SEW-EURODRIVE.

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4.3 Overrunning clutch

The overrunning clutch [1] is installed in the auxiliary drive adapter [2] and allows for operation in one direction of rotation via the auxiliary drive [3].

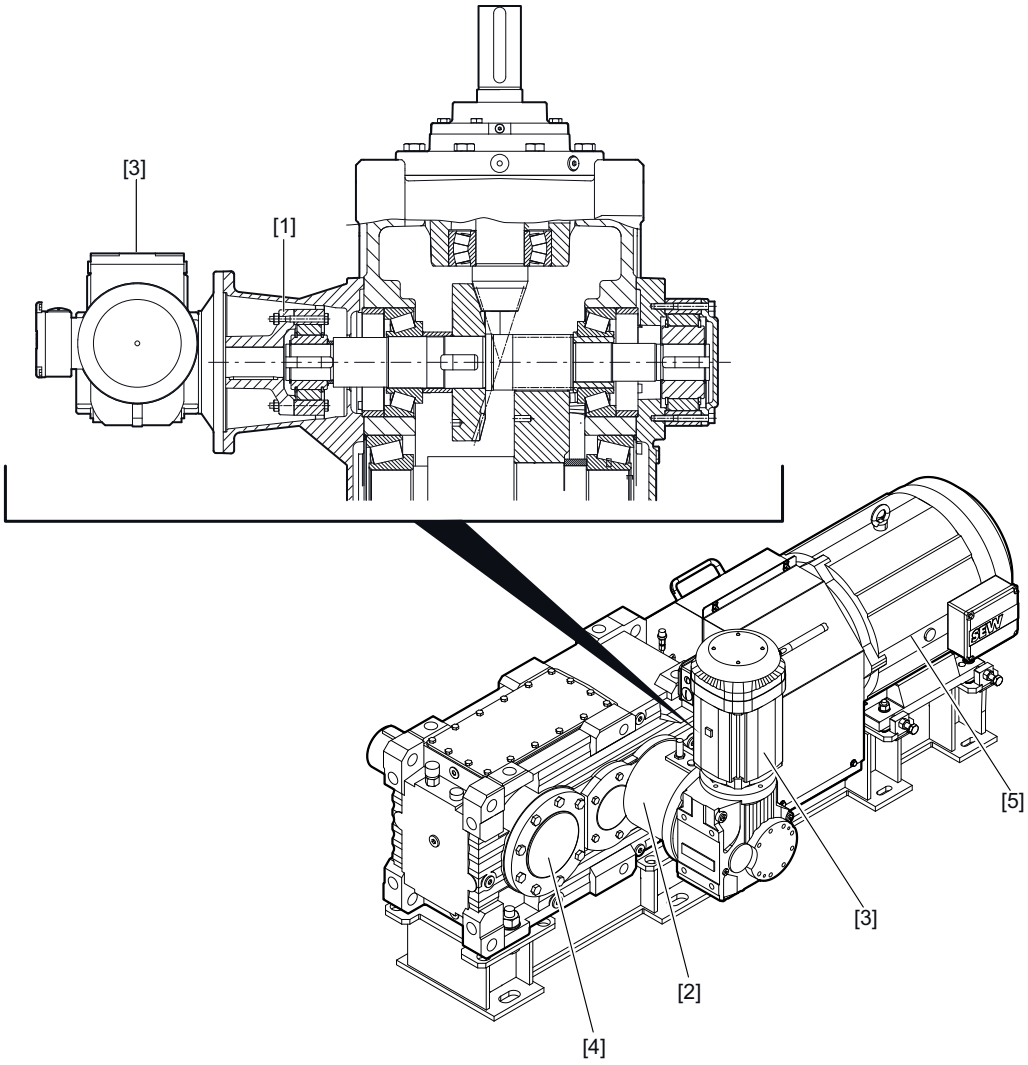
A distinction is made between 2 different operating modes:

- Operation via the main drive: The overrunning clutch [1] uncouples the auxiliary drive [3] and thereby prevents the auxiliary drive [3] from also rotating. The overrunning clutch is freewheeling.
- Operation via the auxiliary drive: The overrunning clutch [1] locks and thereby drives the pinion shaft of the gear unit. In this case, the input shaft of the bevel-helical gear unit [4] is rotating slowly.

Electrically interlock the main drive and auxiliary drive in such a way that only one of the two motors can be switched on at a time.

The rotary motion of the input shaft of the bevel-helical gear unit [4] must not be obstructed. Every brake present in the drive train of a main drive must be released when driving via the auxiliary drive [3].

The overrunning clutch [1] is integrated in the oil circuit of the bevel-helical gear unit [4]. Maintenance and oil change are carried out at the same time using this.



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4.4 Speed monitoring

NOTICE

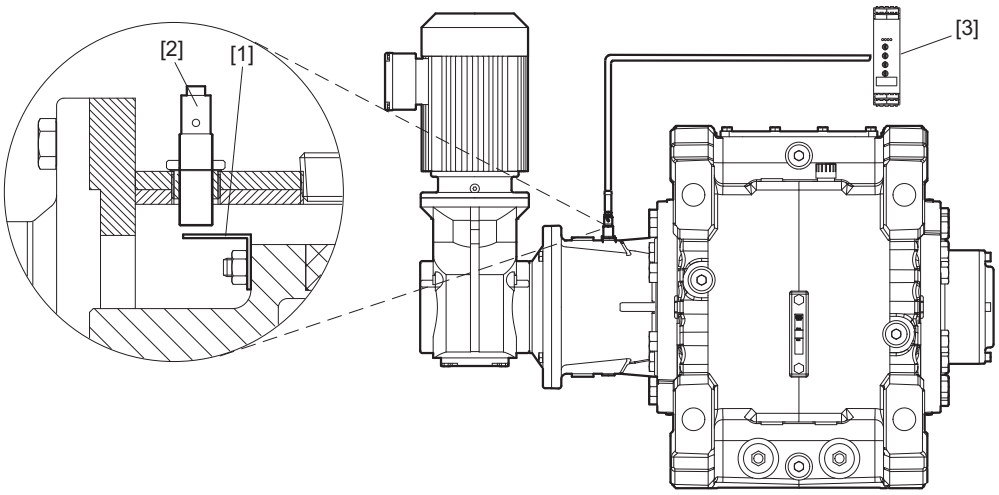
A malfunction of the overrunning clutch can destroy the auxiliary drive due to overspeed.

Possible damage to property.

- For safety reasons, the overrunning clutch absolutely must be equipped with speed monitoring.

INFORMATION

If components other than those listed here are used for speed monitoring, please contact SEW-EURODRIVE. The incremental encoder is included in the standard scope of delivery. The speed monitor, which is not included in the scope of delivery, can optionally be ordered from SEW-EURODRIVE.



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[1] Trip cam

[2] Inductive incremental encoder

[3] Speed monitor (optional)

The speed of the overrunning clutch is detected in a contactless manner via a trip cam [1] and an inductive incremental encoder [2]. The speed monitor [3] compares the pulses with a preset switching speed, see "Startup sequence".

If the switching speed is exceeded (e.g. due to a malfunction of the overrunning clutch), the output relay switches (optionally NC contact or NO contact). The connection must be made in such a way that the main drive motor is switched off in this case. This prevents overspeeds on the auxiliary drive.

INFORMATION

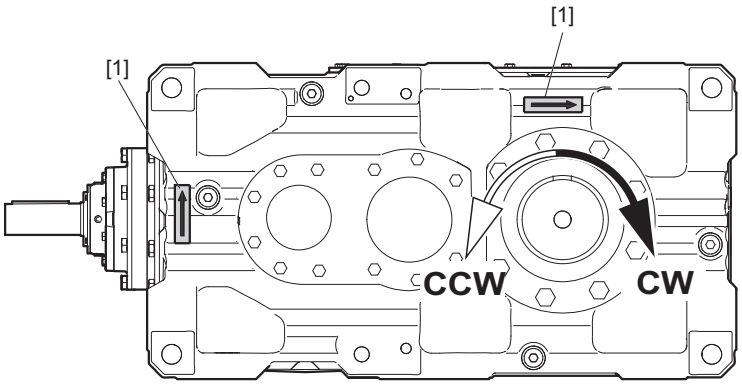
The number of trip cams is order-specific. Adhere to the order confirmation. The speed monitoring must be set to match the number of trip cams.

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4.5 Backstop /BS

The purpose of a backstop is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in only one specified direction of rotation.

The backstop functions by using centrifugal lift-off sprags. Once the lift-off speed is reached, the sprags completely lift off from the contact surface of the outer ring. The backstop is lubricated with gear oil.



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

- CW = clockwise rotation
- CCW = counterclockwise rotation

The permitted direction of rotation [1] is indicated on the housing.

Note that the wear may occur in the backstop when operated below lift-off speed.

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4.6 Position of motor terminal box and cable entry

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

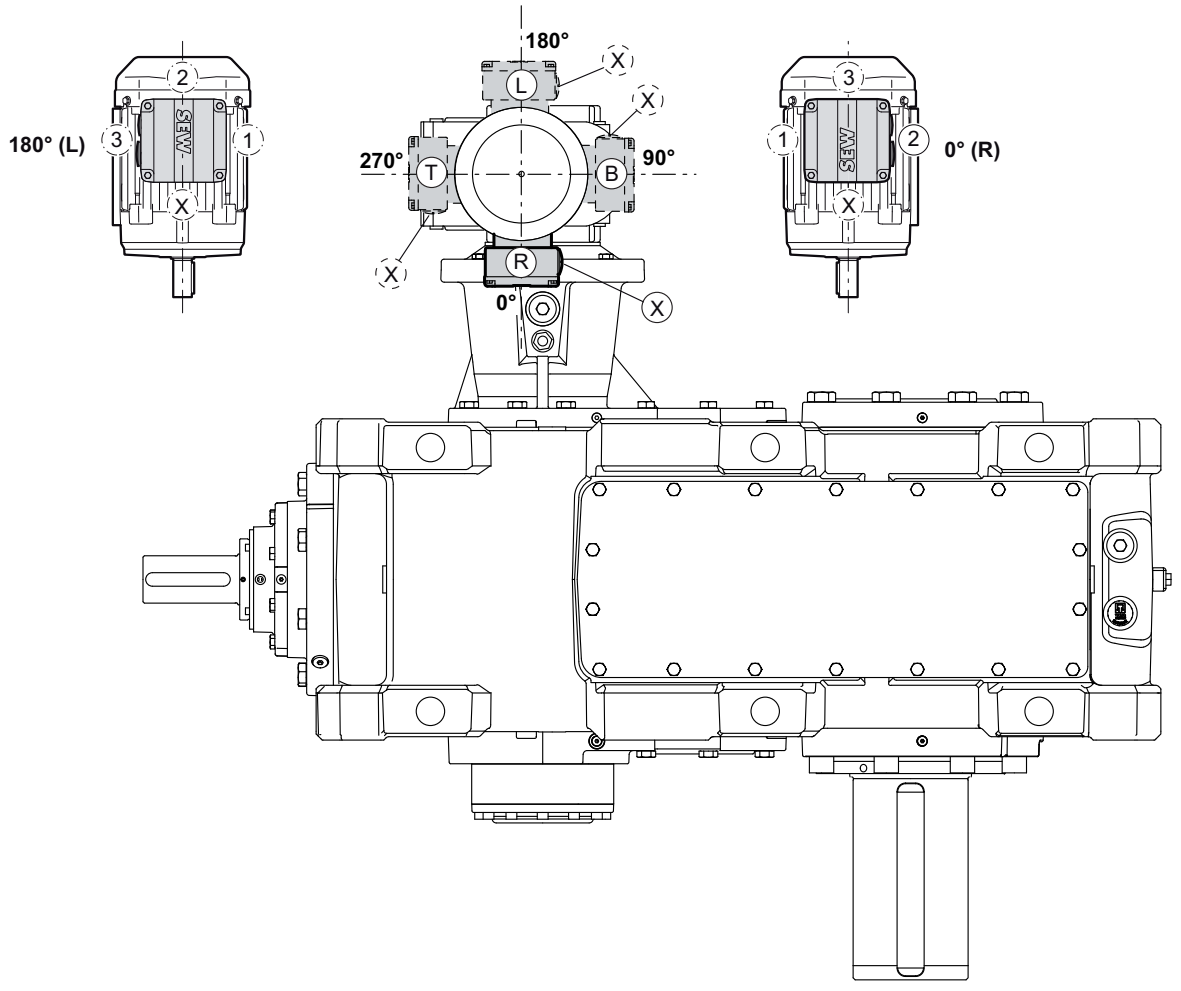
- As viewed onto the output shaft = A-side
- Designation as R (right), B (bottom), L (left) and T (top)

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

The position of the cable entry can be selected as well. Available positions are "X" (= standard position), "1," "2" or "3" (see the following figure).

INFORMATION

Unless other information is given regarding the terminal box, the 0° type (R) with "X" cable entry will be supplied.

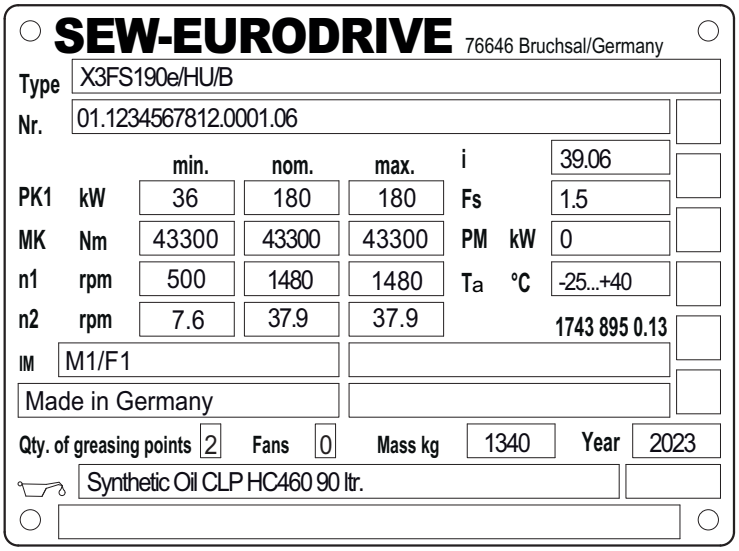


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4.7 Nameplate

4.7.1 Gear unit

The following example shows the structure of the nameplate.



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Type		Type designation
No.		Serial number
P_{K1}	kW	Operating power on the input shaft (HSS)
M_{K2}	Nm	Gear unit output torque
n_1	rpm	Input speed (HSS)
n_2	rpm	Output speed (LSS)
min.		Minimum operating point
norm.		Normal operating point
max.		Maximum operating point
i		Exact gear unit ratio
F_S		Service factor
P_M	kW	Nominal motor power
T_a	°C	Deviation from the standard temperature range (−20 °C to +40 °C)
Mass	kg	Gear unit weight
Greasing points		Number of greasing points
Fan		Number of mounted fans
		Oil grade and viscosity class/oil quantity
Year		Year of manufacture
IM		Mounting position and mounting surface

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4.7.2 QR code

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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4.8 Type designations

4.8.1 Gear units

The following example shows the structure of the type designation:

X3KSB250e /HU /B	
X	Industrial gear unit series
3	Number of gear unit stages • 3 = 3 stages • 4 = 4 stages
K	Gear unit design • K = Bevel-helical gear unit
S	Type of output shaft • S = Solid shaft with key • R = Smooth solid shaft • L = Splined solid shaft • A = Hollow shaft with keyway • H = Hollow shaft with shrink disk • V = Splined hollow shaft • T = Hollow shaft with TorqLOC® hollow shaft mounting system
	Application • B = Bucket elevator gear unit
250	Gear unit sizes • 100 – 280
e	Generation X.e
HU	Housing design • HU = Universal housing • HH = Horizontal housing • HT = Thermal housing
B	Gear unit mounting • /B = Foot • /T = Torque arm • /F = Flange

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4.8.2 Abbreviations for optional accessories

The table shows the abbreviations used and what they mean.

Abbreviation	Meaning
BF	Base frame
BS	Backstop
BSL	Torque-limited backstop
BPG	Breather
CCV	Water cooling cover
CCT	Water cooling cartridge
FC	Flange coupling
FAN	Fan
FAN-ADV	Fan, Advanced design
HH	Horizontal housing
HU	Universal housing
HT	Thermal housing
HSST	Through-going input shaft
LSST	Through-going output shaft
MA	Motor adapter
SB	Swing base
T	Torque arm
OAC	Circulation cooling oil-air cooler with motor pump
OWC	Circulation cooling oil-water cooler with motor pump
OAP	Circulation cooling oil-air cooler with pressure lubrication and motor pump
OWP	Circulation cooling oil-water cooler with pressure lubrication and motor pump
ONP	Pressure lubrication and motor pump
ONP1	Pressure lubrication and motor pump
ONP1L	Pressure lubrication and motor pump
OD	Oil dipstick
ODV	Oil drain valve
OLG	Oil level glass
OH	Oil heater

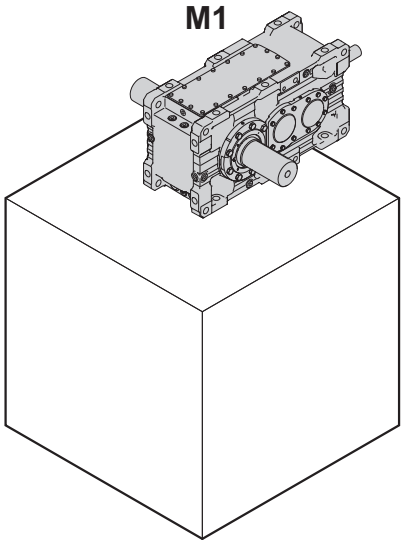
All options are not part of the type designation except for mounting flange, torque arm, horizontal and universal housing.

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4.9 Mounting positions

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

The bucket elevator drive is inserted in mounting position M1.

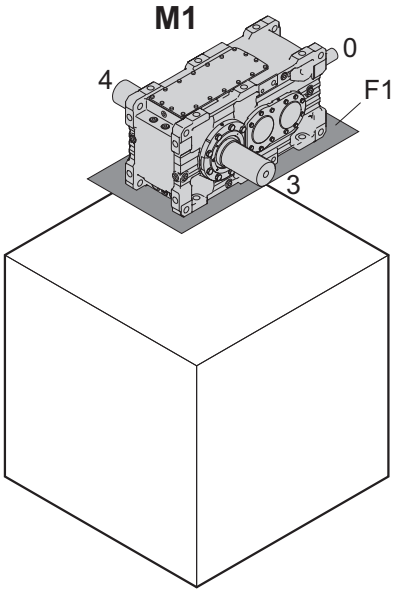


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4.10 Mounting surface

The drive unit is designed for mounting and operation in mounting position M1.

The mounting surface is defined as the surface where the gear unit is mounted. The gear unit has a defined mounting surface F1.

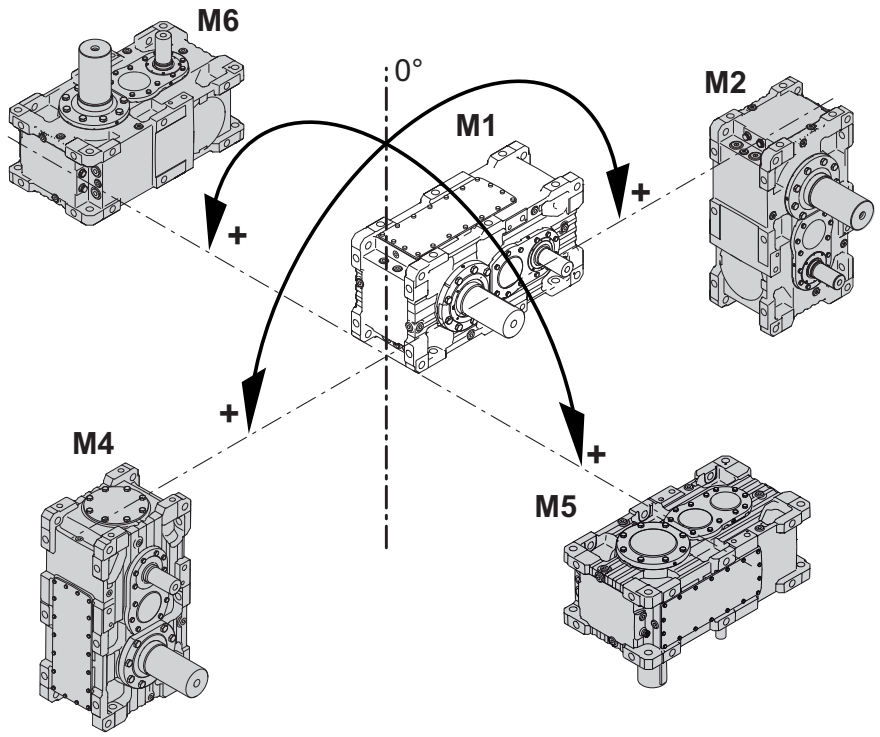


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4.11 Fixed and variable pivoted mounting positions

Mounting positions deviating from the standard are differentiated between **fixed** and **variable** pivoted mounting positions.



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4.11.1 Fixed pivoted mounting position

Definition

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

Example

The type designation is set up as follows:

M1-M4/9°

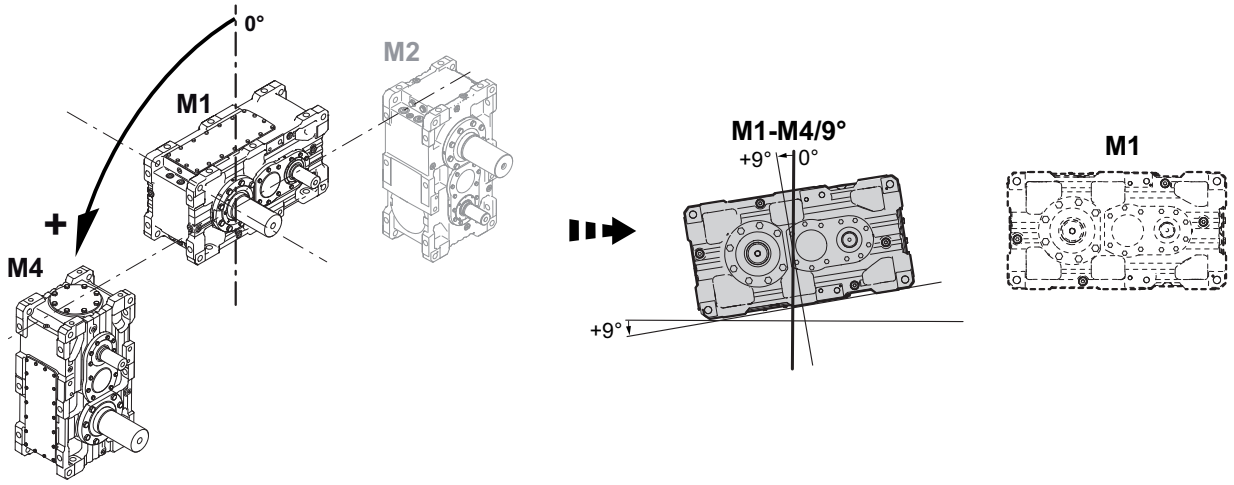
M1 = Initial mounting position

M4 = Pivoting direction

9° = Fixed pivoting angle

Pivoted from mounting position M1 to M4 by 9°

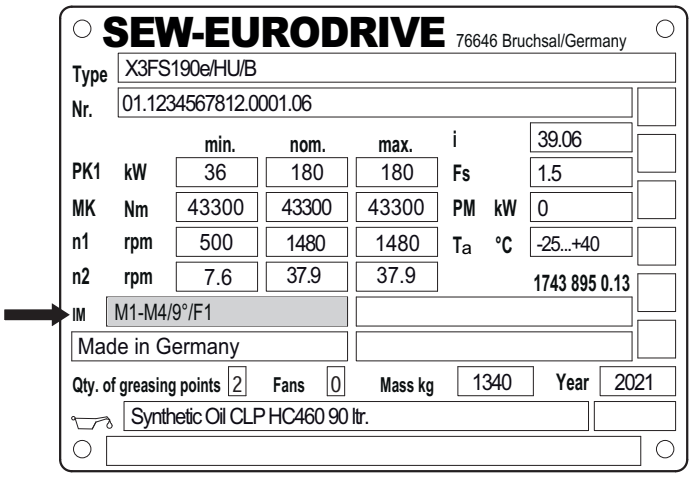
This results in the following fixed pivoted mounting position:



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The oil level is checked in the selected fixed pivoted mounting position.

The fixed pivoted mounting position is shown on the nameplate as follows:



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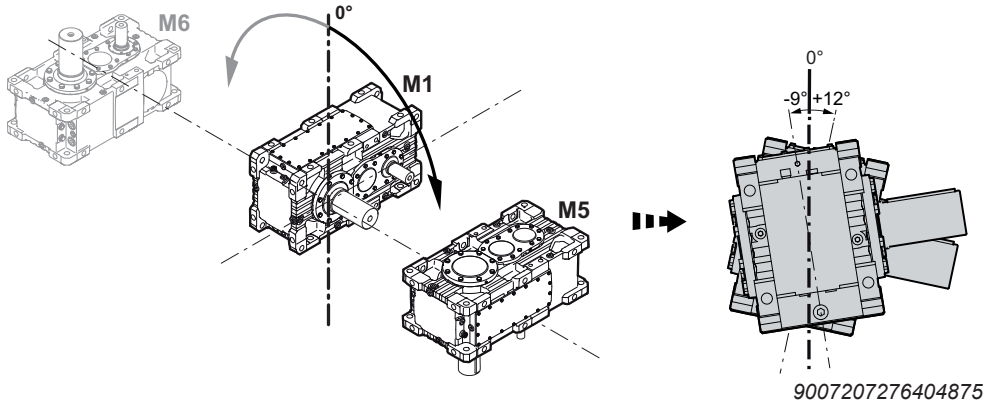
4.11.2 Variable pivoted mounting position

Definition

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

Example

The gear unit is operated in variable pivoted mounting position M1 to M6 = 9° and M1 to M5 = 12°.



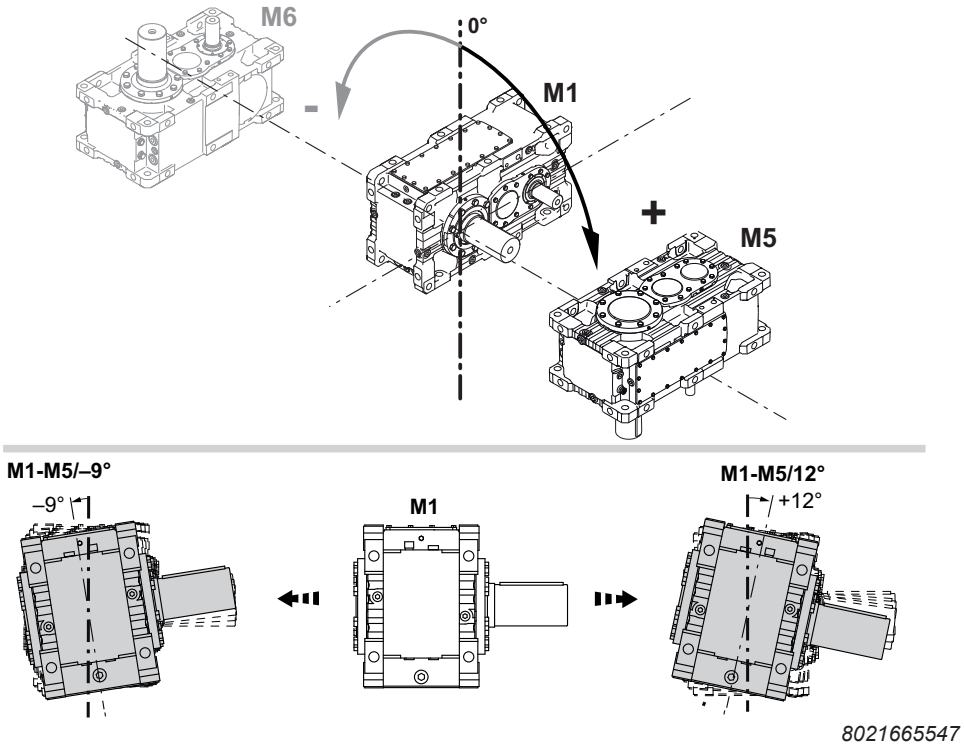
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Step 1:

The largest pivoting angle determines the positive pivoting direction (12° > 9°). In this example, this is 12° towards M5.

12° → from M1 to M5, pivoted by +12°

9° → from M1 to M5, pivoted by -9°



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This example results in the following type designation:

M1-M5/–9°...12°

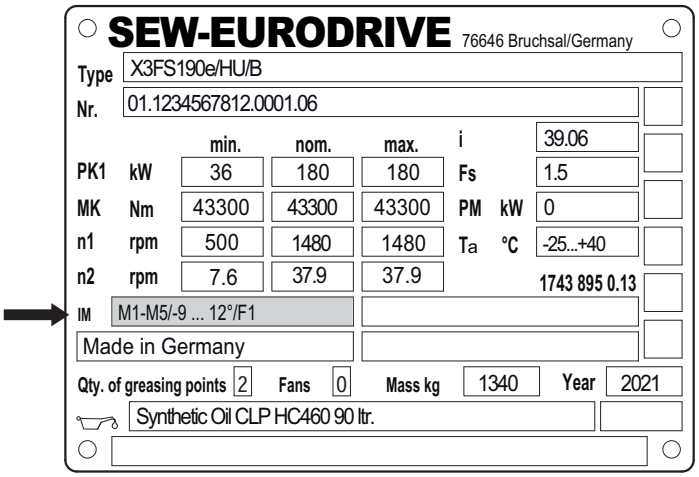
M1 = Initial mounting position

M5 = Pivoting direction

12° = from M1 to M5, pivoted by 12°

-9° = Pivoted from M1 to M5 by -9° (= from M1 to M6, pivoted by 9°)

The variable pivoted mounting position is shown on the nameplate.

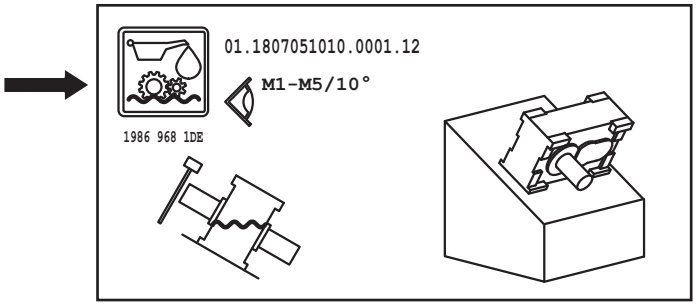


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Step 2:

With variable pivoted mounting positions, the customer must specify the pivoting angle in which the oil level is checked.

An additional nameplate is used to clearly indicate the oil check angle. This nameplate indicates the mounting position for checking the oil level.



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4.11.3 Combination of variable and fixed pivoted mounting positions

Fixed and variable pivoted mounting positions can be combined.

Example:

The following example shows a combination of fixed and variable pivoted mounting position. The type designation is set up as follows:

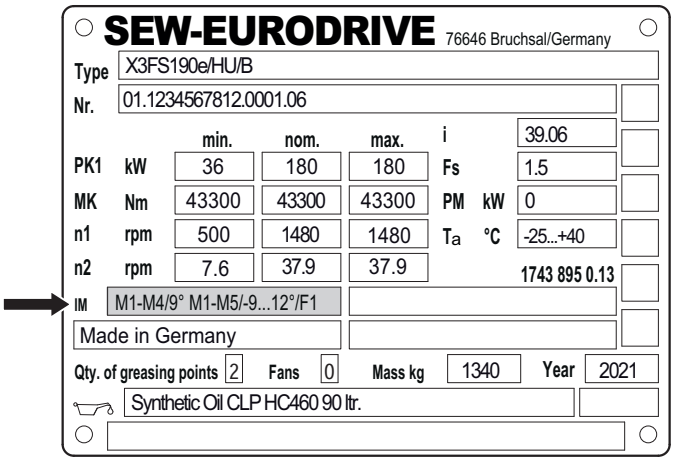
M1-M4/9° (fixed pivoted mounting position)

M1	= Initial mounting position
M4	= Pivoting direction
9°	= Fixed pivoting angle

M1-M5/–9°...12° (variable pivoted mounting position)

M1	= Initial mounting position
M5	= Pivoting direction
12°	= 12° from M1 to M5
-9°	= -9° from M1 to M5 (= 9° from M1 to M6)

The variable and the fixed pivoted mounting position are shown on the nameplate.

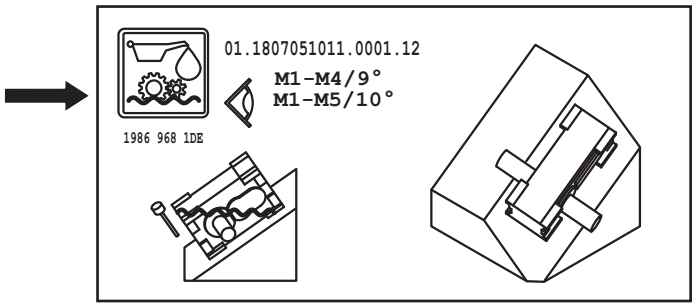


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When combining fixed and variable pivoted mounting positions, the customer must specify the variable pivoting in which the oil level is checked. The fixed angle for the oil level check is already defined.

The gear unit has an additional nameplate for correct oil level checks. This nameplate indicates the mounting position for checking the oil level.

In this example, the operator checks the oil level at M1-M4/9° M1-M5/10°.

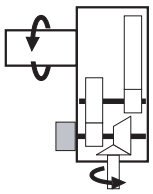
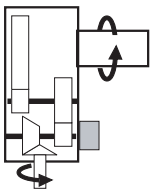
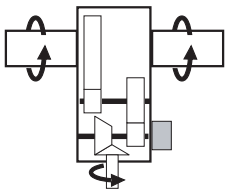
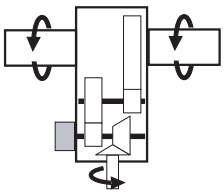
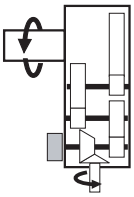
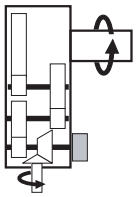
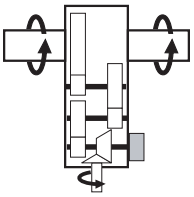
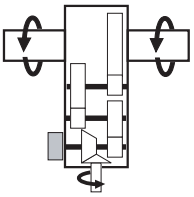


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4.12 Direction of rotation dependencies

4.12.1 X.K..

Standard

Shaft position	03	04	034[1]	043[1]
End wheel pos.	4	3	3	4
X3K..				
X4K..				

▯ = Backstop position

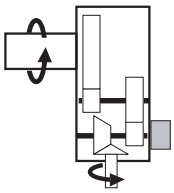
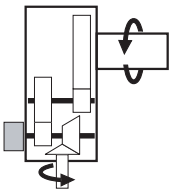
1) Note the restrictions regarding external forces on the LSS

INFORMATION: For more information and a 3D view of the gear unit, refer to chapter "Shaft position, directions of rotation, backstop, auxiliary drive".

INFORMATION

As standard, the auxiliary drive as well as the shrink disk are always located opposite of the output end of the gear unit. The backstop is mounted opposite of the auxiliary drive.

Direction of rotation reversal

Shaft position	03[1]	04[1]
End wheel pos.	3	4
X3K..		
X4K..	On request	On request

▯ = Backstop position

1) Note the restrictions regarding external forces on the LSS

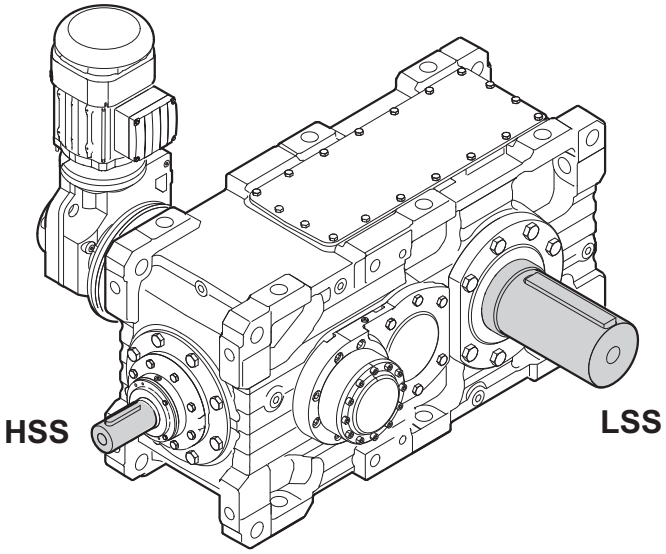
INFORMATION: For more information and a 3D view of the gear unit, refer to chapter "Shaft position, directions of rotation, backstop, auxiliary drive".

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4.13 Input and output shaft

There are two types of shafts:

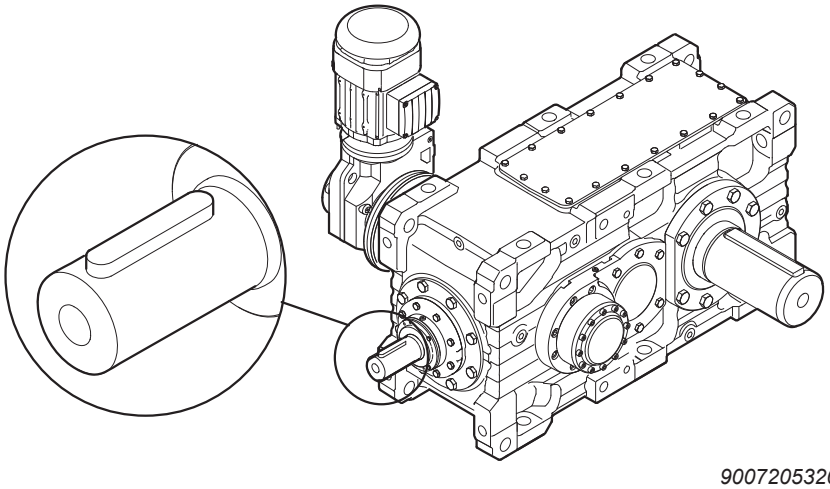
- High-speed shaft (**HSS**)
- Low-speed shaft (**LSS**)



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4.13.1 Input shaft

The input shaft is provided with a closed keyway according to DIN 6885/T1 and a centering bore according to DIN 332. The matching key according to DIN 6885/T1 - form A is included in the scope of delivery.

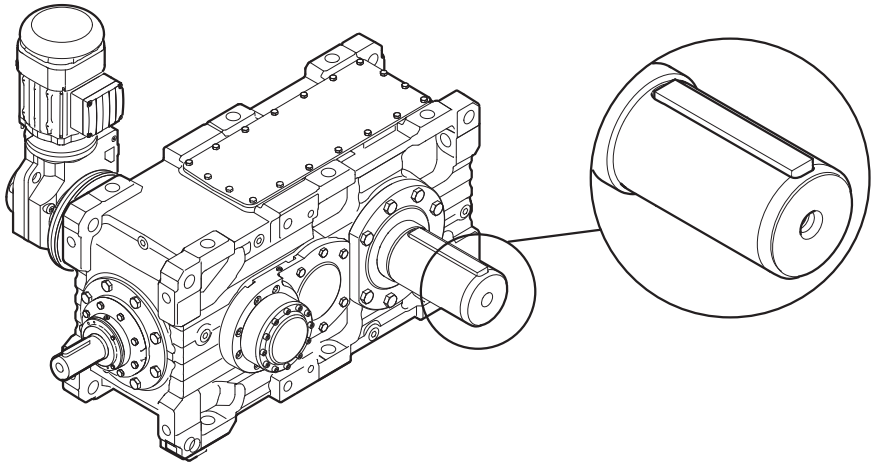


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4.13.2 Output shaft as a solid shaft with key /..S

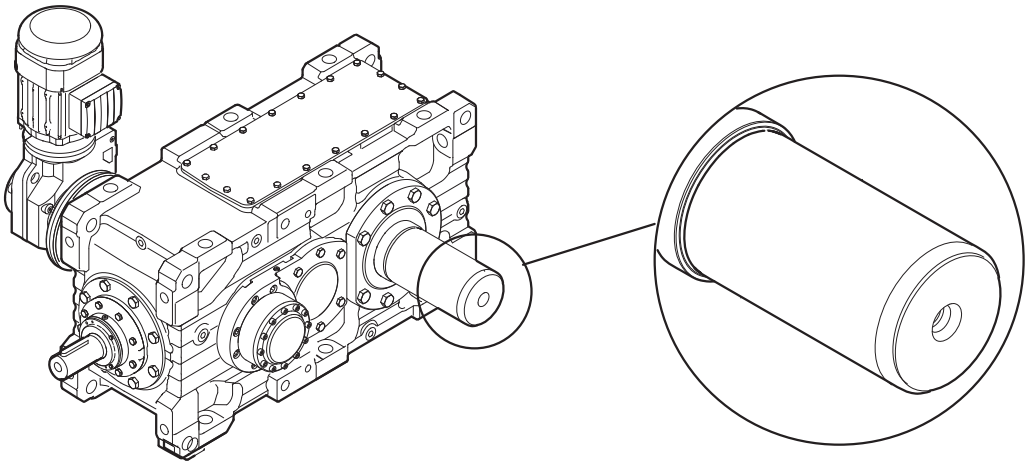
The output shaft is provided with a closed keyway according to DIN 6885/T1 and a centering bore (according to DIN 332). The delivery includes a key according to DIN 6885/T1 – form B. The shaft has an insertion area with a reduced diameter to simplify the mounting of output elements, such as a coupling hub.



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4.13.3 Smooth output shaft /..R

The gear units are available with a smooth output shaft to install non-positive output elements, such as flange couplings with a cylindrical interference fit. The shaft's face has a centering bore according to DIN 332. The insertion area with reduced diameter facilitates the mounting of output elements.



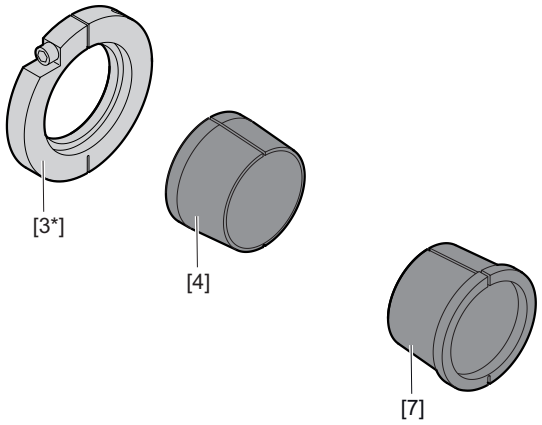
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4.13.4 Output shaft with TorqLOC® /..T

A TorqLOC® hollow shaft is installed in the gear unit with TorqLOC® hollow shaft mounting system upon delivery. The TorqLOC® assembly kit and shrink disk are included in the delivery. The protection cover is mounted on the gear unit.

The TorqLOC® assembly kit consists of the following components:

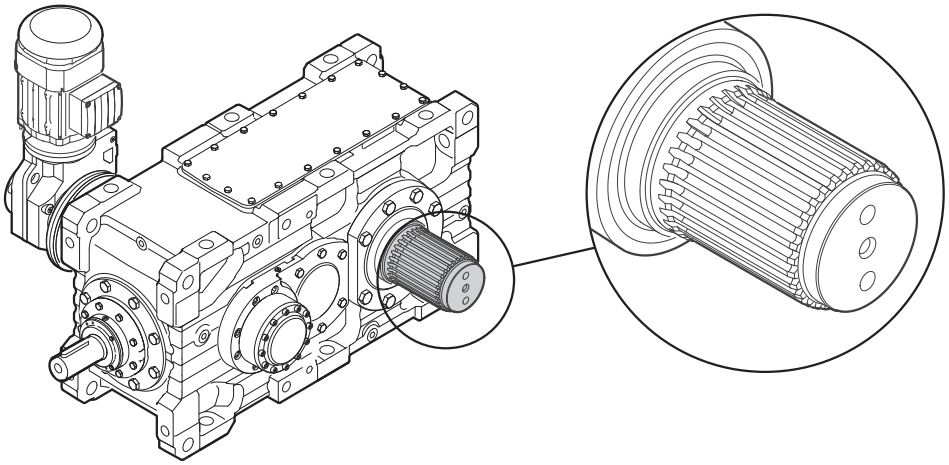


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[3*] Stop ring (* optionally available for size X100 – 170)
[4] Bushing on output end
[7] Counter bushing

4.13.5 Output shaft as a splined solid shaft/..L

The output shaft is a splined shaft according to DIN 5480. There is a centering in front of and behind the splined shaft to improve the guide of the output element. Two threads are available on the front end of the shaft for mounting an end plate.



21272019595

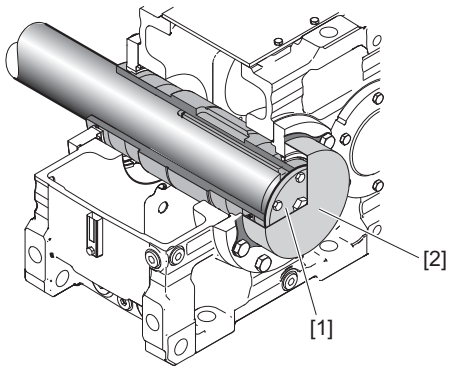
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4.13.6 Output shaft as a hollow shaft with keyway /..A

The hollow shaft is equipped with a keyway according to DIN 6885/T1.

Included in the delivery:

- Protection cover [2]
- Retaining screws [1] or
- 2 retaining rings



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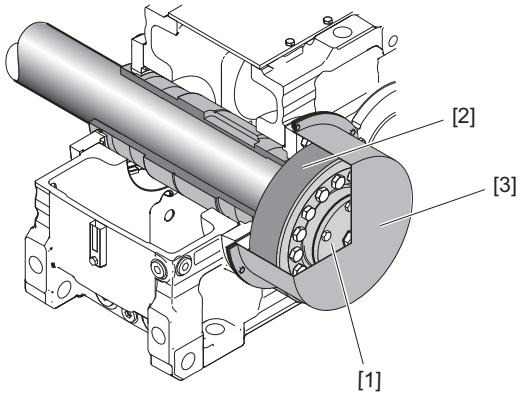
The protection cover is dust-tight. The standard sealing system is therefore normally used on the side of the safety cover.

4.13.7 Output shaft as a hollow shaft with shrink disk /..H

The shrink disk is positioned on the side opposite to the machine shaft.

Included in the delivery:

- Shrink disk [2] and protection cover [3]
- Endplate with retaining screws [1] or
- 2 retaining rings



324304523

The protection cover is dust-tight. The standard sealing system is therefore normally used on the side of the safety cover.

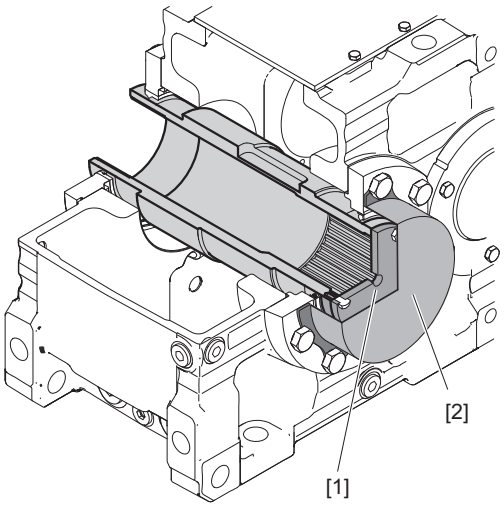
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4.13.8 Output shaft as a splined hollow shaft /..V

The output shaft is splined according to DIN 5480.

Included in the delivery:

- Protection cover [2]
- Endplate with screws [1] or
- 2 retaining rings



744271627

4.13.9 Gear unit mounting for hollow shaft gear units

NOTICE

Due to the rigid connection between the machine shaft and the hollow shaft of the gear unit, constraining forces can be imposed on the output shaft bearing. This damages the output shaft bearing and promotes the formation of friction corrosion in the connection between the machine shaft and the hollow shaft of the gear unit.

Possible damage to property.

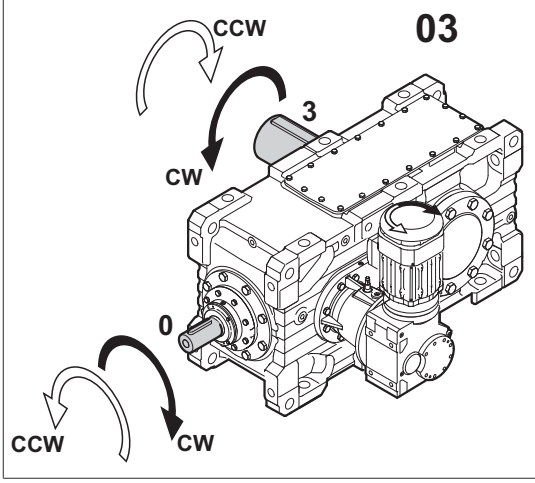
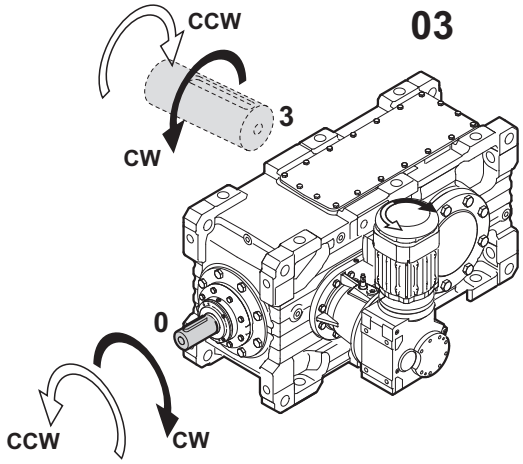
- For machine shafts without their own bearing or with only one bearing point, the gear unit is designed with foot or flange mounting and used as a bearing point. Make sure that the bearing is very well aligned coaxially to the existing bearing point.
- If the machine shaft has at least two bearing points, the gear unit should be connected merely to the machine shaft and supported with a torque arm. To prevent overdetermination of the bearing, gear units with foot or flange mounting must be avoided.

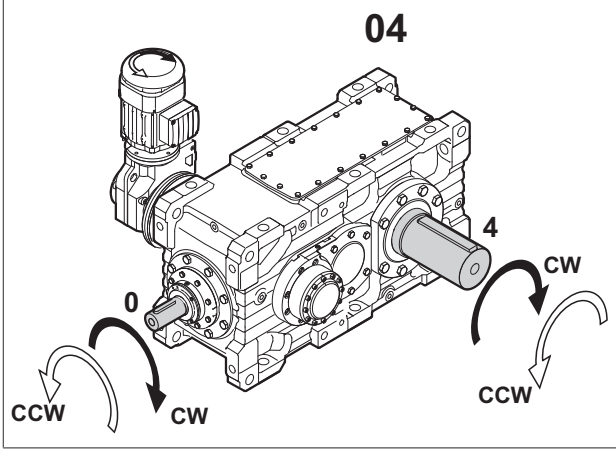
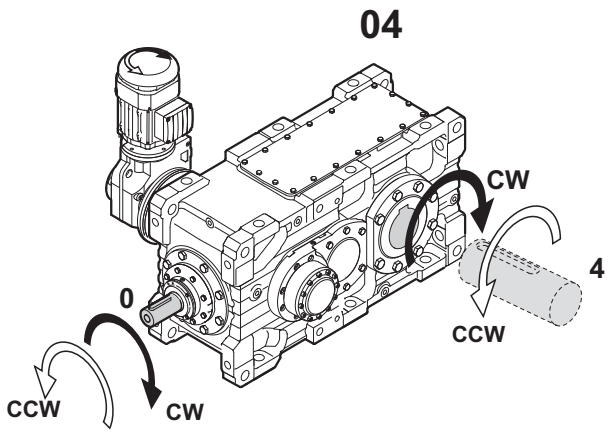
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4.14 Shaft positions, directions of rotation, backstops, auxiliary drives

The following figures show the standard variants of the bucket elevator gear units. The auxiliary drives are mounted in mounting position M4A with motor terminal box position 0°.

The shaft positions (**03** and **04**) and corresponding directions of rotation shown in the following diagrams apply to solid and hollow output shafts (LSS).

Shaft position 03 / X.KS..	Shaft position 03 / X.KH.. / X.KA..
	

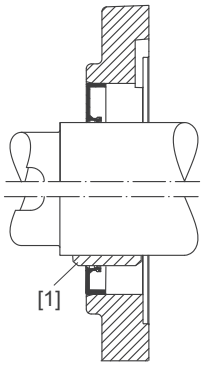
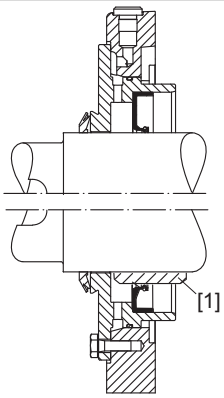
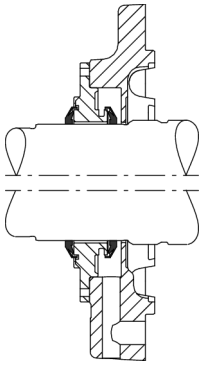
Shaft position 04 / X.KS..	Shaft position 04 / X.KH.. / X.KA..
	

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4.15 Sealing system

4.15.1 Input shaft

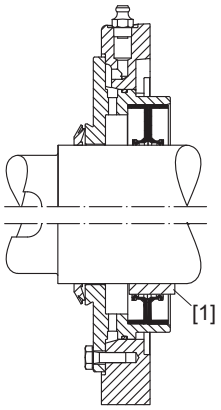
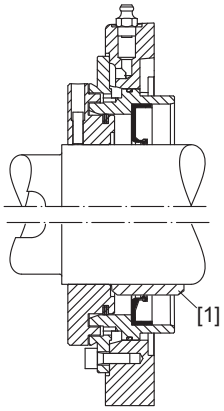
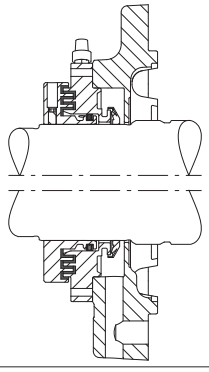
Non-regreasable seal

Designation	Property	Environment	Figure
Standard	Single oil seal with dust protection lip	Normal environment	
Dust-protected	Single oil seal with dust protection cover	**Medium** dust load with abrasive particles	
Contactless with dust protection	Contactless seal with dust protection and standstill sealing	**Low** dust load with abrasive particles	

[1] Optional with oil seal sleeve

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Regreasable seal

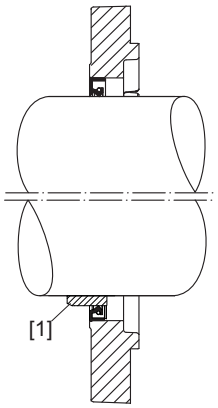
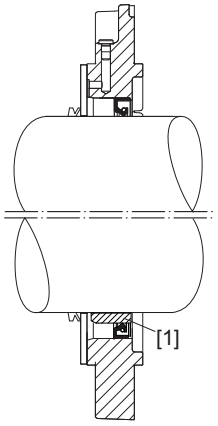
Designation	Property	Environment	Figure
Dust-protected regreasable	Double oil seal with dust protection cover	**High** dust load with abrasive particles	
Radial labyrinth seal (Taconite), regreasable	Single oil seal with radial labyrinth seal	**Very high** dust load with abrasive particles	
Non-contact with regreasable radial labyrinth seal	Contactless seal with radial labyrinth and standstill sealing	**Medium to very high** dust load with abrasive particles	

[1] Optional with oil seal sleeve

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4.15.2 Output shaft

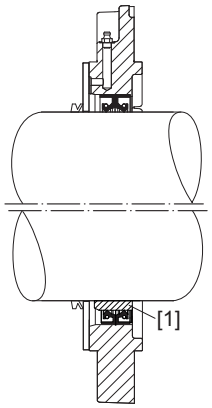
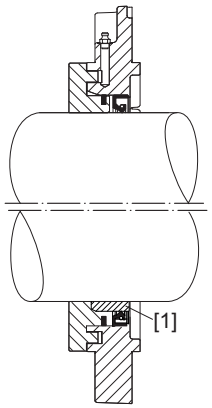
Non-regreasable seal

Designation	Property	Environment	Figure
Standard	Single oil seal with dust protection lip	Normal environment	
Dust-protected	Single oil seal with dust protection cover	**Medium** dust load with abrasive particles	

[1] Optional with oil seal sleeve

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Regreasable seal

Designation	Property	Environment	Figure
Dust-protected regreasable	Double oil seal with dust protection cover	**High** dust load with abrasive particles	
Radial labyrinth seal (Taconite), regreasable	Single oil seal with radial labyrinth seal	**Very high** dust load with abrasive particles	

[1] Optional with oil seal sleeve

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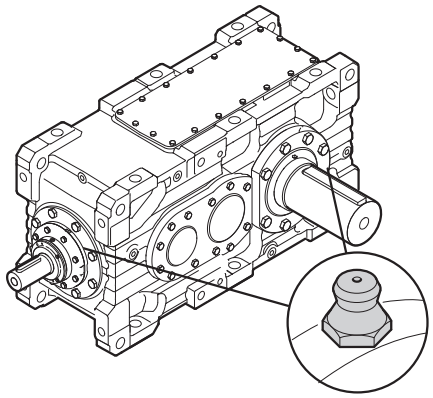
4.15.3 Position of lubrication points

Universal housing /HU, horizontal housing /HH, thermal housing /HT

Grease nipple on gear unit cover

Regreasable sealing systems are usually equipped with taper greasing nipples according to DIN 71412 A R1/8. Relubrication must be carried out at regular intervals. The lubrication points are near the input and/or output shaft.

Example



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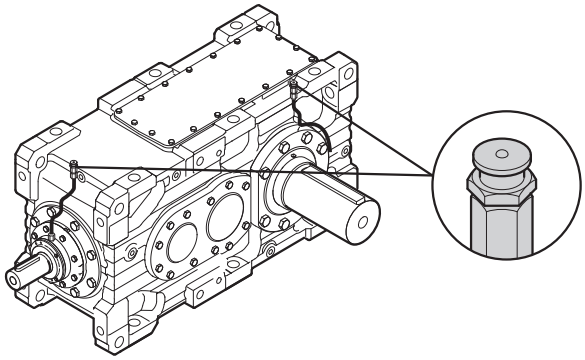
Grease nipple on the top side of the gear unit

When installed in a restricted space, the lubrication points can be relocated to the top side of the gear unit. Flat greasing nipples according to DIN 3404 A G1/8 are used. Relubrication must be carried out at regular intervals.

Note the following points:

- This option is normally used on drives with fans, motor adapters, or V-belt drives.
- The option applies to both input and/or output shaft(s).

Example



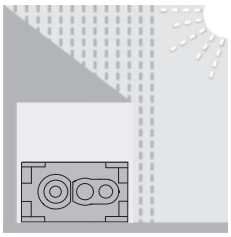
18014398833108107

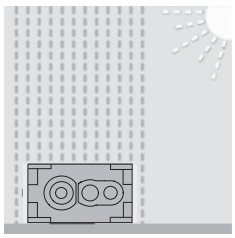
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4.16 Coating and surface protection systems

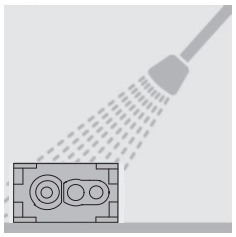
Used as surface protection under typical ambient conditions, corrosivity category DIN EN ISO 12944-2. The following tables give an overview of coating and surface protection systems.

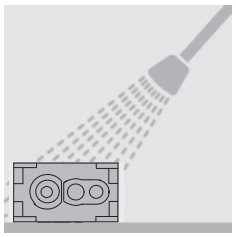
The gear unit is equipped with the following surface protection.

OS 1 low environmental pollution	
	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	
	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

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OS 3 high environmental pollution	
	Suitable for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasionally acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt exposure. Based on corrosivity category: C4 (high)
Application examples	• Port cranes • Sewage treatment plants • Mining applications
Condensation test ISO 6270	240 h
Salt spray test ISO 7253	480 h

OS 4 very 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. Based on 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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4.17 Type of lubrication

4.17.1 Splash lubrication

Standard lubrication type for horizontal mounting positions (M1 or M3). Gearing and bearing parts that are not immersed in the oil bath are lubricated by splashing oil.

Reduced oil level

The reduced oil level allows for operating the gear unit with a smaller oil quantity. The machine elements that are not submerged in the oil are sufficiently supplied with oil by an internal oil distribution system. This significantly reduces the power loss depending on the gear ratio.

For gear units of the size X4K.., the reduced oil level is not available.

4.17.2 Bath lubrication

The gear unit is (nearly) completely filled with oil; all gearing and bearing positions are completely or partially submerged in the oil bath.

4.17.3 Pressure lubrication

The gear unit is equipped with a motor pump. The oil level is low and possibly even reduced in comparison with the splash lubrication. The gearings and bearing positions that are not submerged in the oil bath are supplied with oil via lubrication lines.

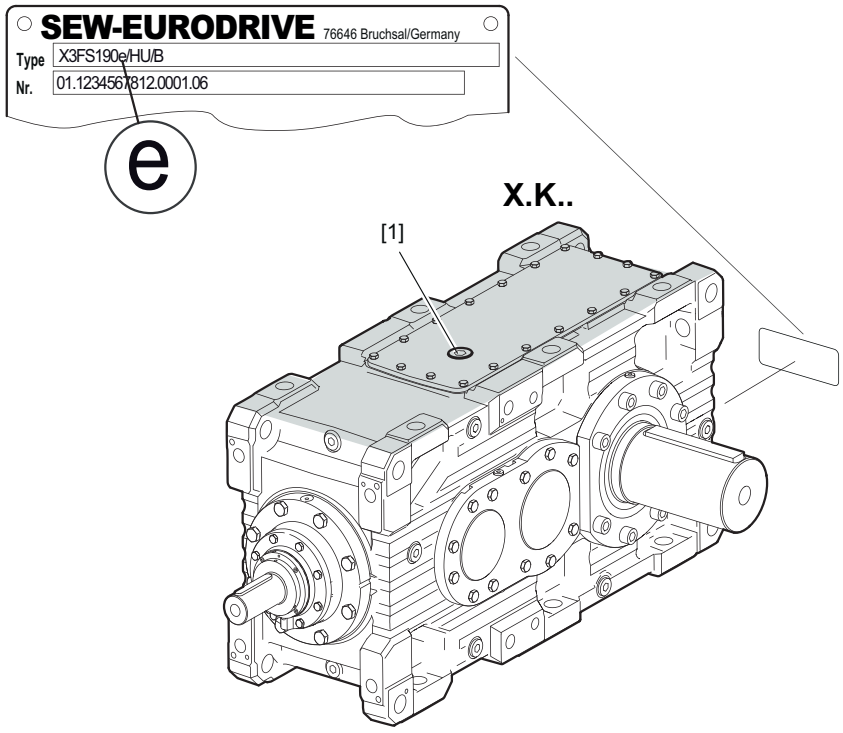
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4.18 Identifying features of a reduced oil level

The sizes X180e to X280e are available with a reduced oil level and the lubrication type splash lubrication.

All of the following features must be met to identify a Generation X.e helical gear unit and bevel-helical gear unit with reduced oil level:

- The type designation X..e, refer to the nameplate.
- The oil fill opening is located at the upper side of the gear unit (area marked in gray). The following figure shows an example of the oil fill opening on the gear unit cover.



41023796491

For further information, refer to the following chapters:

- Filling the gear unit with oil, see chapter "Filling the gear unit and auxiliary drive adapter with oil" (→ 🗎 87).
- Gear unit filled with oil upon delivery, see chapter "The gear unit is delivered with oil (optional)" (→ 🗎 89).
- Operation, see chapter "Speed limits with reduced oil level" (→ 🗎 184).
- Lubricant fill quantities in chapter "Reduced oil level" (→ 🗎 223).

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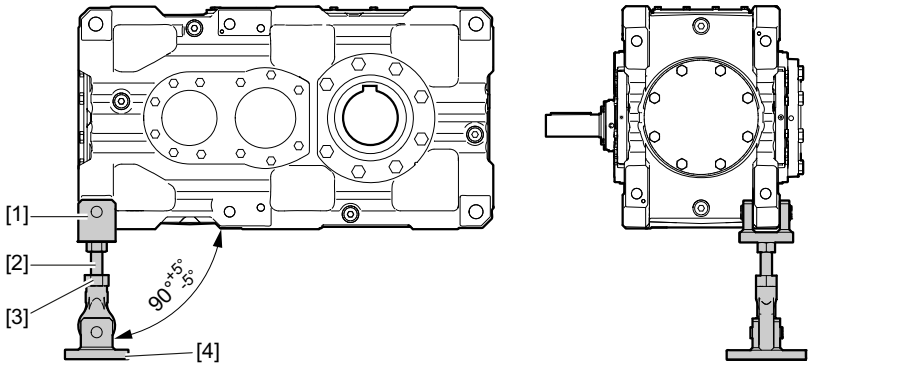
5 Design of options and accessories

5.1 Torque arm /T

A torque arm is available as option for shaft-mounted gear units to support the reaction torque. The torque arm can bear tensile stress as well as thrust loads.

The length of the torque arm can be adjusted within a certain range.

The torque arm consists of a yoke with bolt [1], a threaded bolt [2], a maintenance-free joint head [3], and a yoke plate with bolt [4]. The design with the joint head allows for compensating assembly tolerances and operational displacements. Constraining forces on the output shaft are avoided in this way.



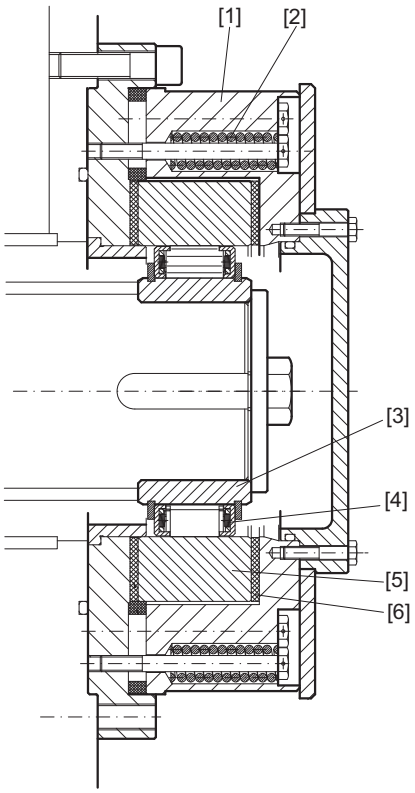
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[1] Yoke head with bolt
[2] Stud bolt with nuts
[3] Joint head
[4] Yoke plate with bolt

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5.2 Torque-limited backstop

Torque-limited backstops are optionally used for the 3-stage bevel-helical gear unit.



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[1]	Housing	[4]	Freewheel cage
[2]	Compression springs	[5]	Outer ring
[3]	Inner ring	[6]	Friction linings

Torque-limited backstops are used with multi-drives in which each drive is equipped with its own backstop.

The torque limiting prevents the restoring torque from being unevenly distributed to the individual backstops. Dynamic torque peaks are likewise reduced during the blocking phase.

As with a backstop without torque limiting, the locking torque is transmitted to the outer ring via sprags.

However, with a torque-limiting backstop, the outer ring [5] is not securely fitted on the gear unit housing, but rather held between two friction linings [6]. The friction linings are loaded via a housing [1] with screws and compression springs [2].

INFORMATION

The slip torque is factory-set. Changing the slip torque is not permitted.

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5.3 Motor adapter /MA

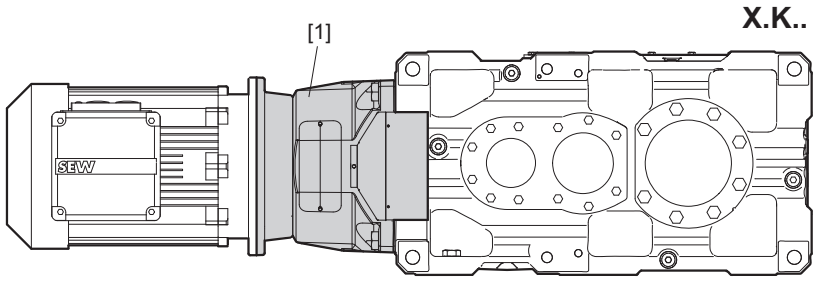
Motor adapters [1] are available for mounting:

- **IEC (B5) motors** of sizes 100 to 355
- **NEMA ("C" face) motors** of sizes 182 to 449

INFORMATION

- The gear unit must be installed in such a way that liquids cannot enter the motor adapter (HSS end) and accumulate there. Otherwise, the oil seal can be damaged, and subsequent damage can create a possible ignition source.
- An elastic claw coupling is included in the delivery.
- All motor adapters can have a fan installed.

The following figure shows an example of the motor adapter [1] connected to the gear unit:

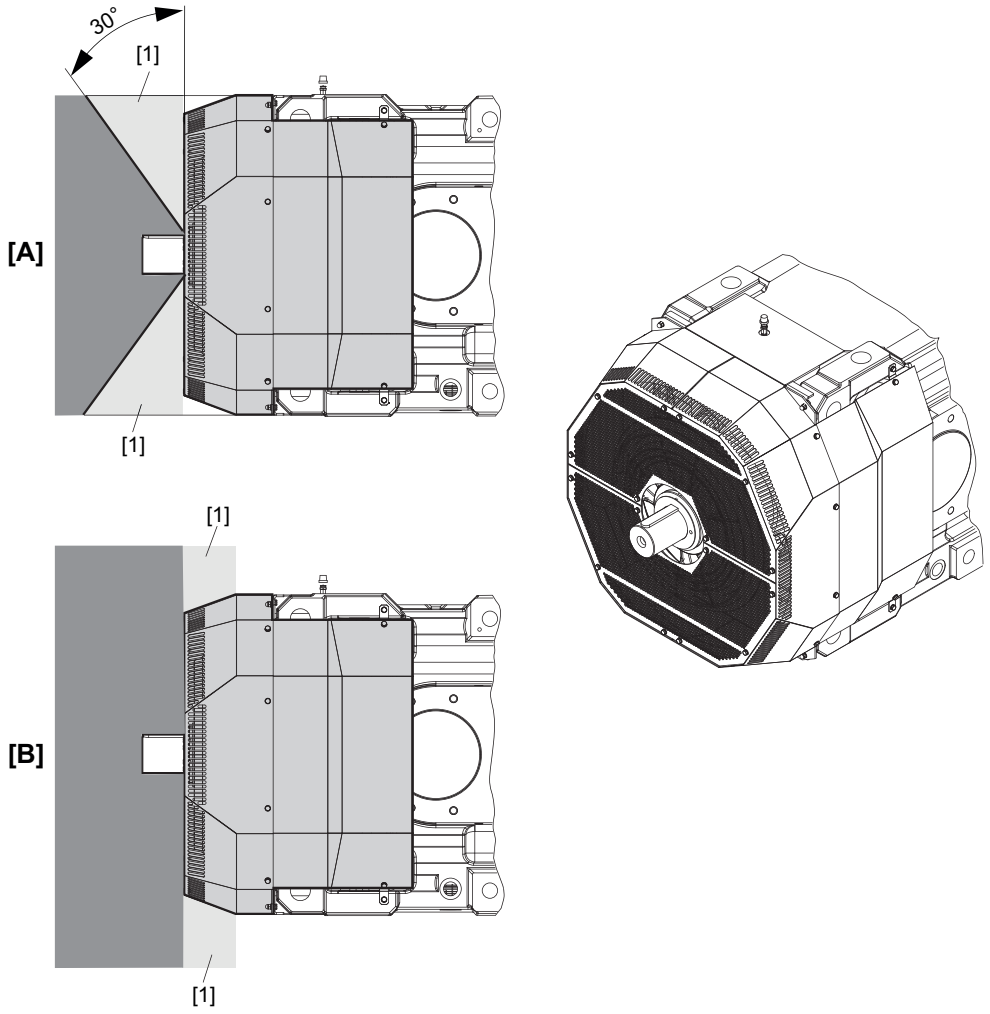


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5.4 Fan /FAN

A fan can be retrofitted to increase the thermal rating or when the ambient conditions change after gear unit startup. The direction of rotation of the gear unit does not influence the operation of the fan.

5.4.1 X.K.. Fan with universal fan guard

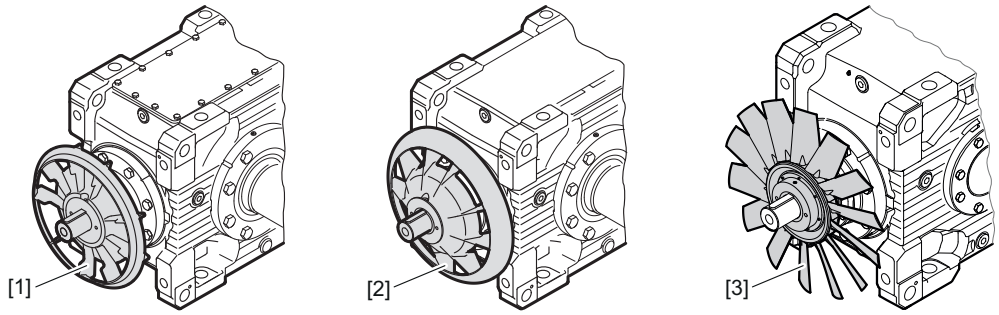


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[A] Radial fan and axial fan
[B] Diagonal fan
[1] Air intake clearance

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X.K.. fan designs

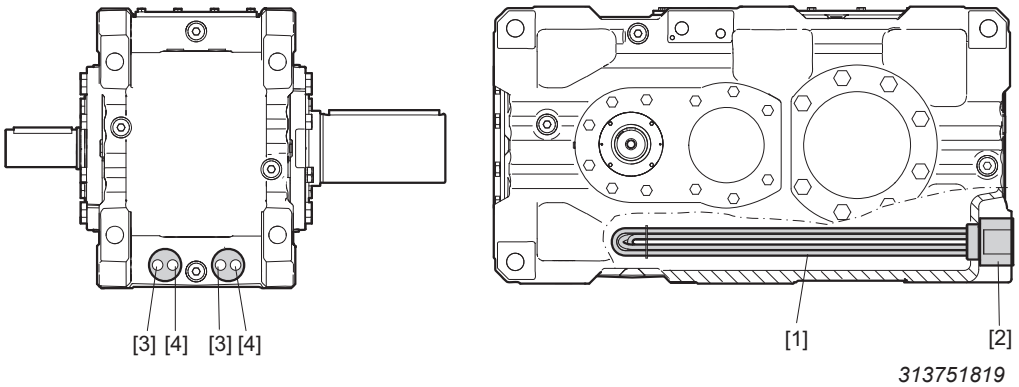


[1] Radial fan [2] Diagonal fan [3] Axial fan

5.5 Water cooling cartridge /CCT

The water cooling cartridge is mounted in the gear unit's oil sump and is supplied via a water connection. The water connection is provided by the customer. The heat quantity that can be dissipated depends on the inlet temperature and the volume flow of the cooling medium.

5.5.1 Structure



[1] Cooling pipes
[2] Tube plate with connection piece
[3] Return
[4] Supply

The water cooling cartridge consists of 3 main parts:

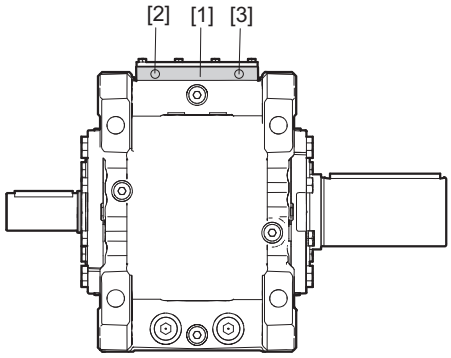
- Cooling pipes (copper and nickel alloy), optionally available in stainless steel
- Tube plate (brass)
- Connection piece (brass; gray cast iron; steel)

The water cooling cartridges can be retrofitted to a certain extent. Contact SEW-EURODRIVE.

5.6 Water cooling cover /CCV

The water cooling cover is located at the mounting opening of the gear unit and is supplied via a water connection. The water connection is provided by the customer. The heat quantity that can be dissipated depends on the inlet temperature and the volume flow of the cooling medium.

5.6.1 Structure



9007199568481675

[1] Water cooling cover
[2] Supply
[3] Return

The water cooling cover [1] is made of a corrosion-resistant aluminum alloy. A water cooling cover can be retrofitted. Contact SEW-EURODRIVE.

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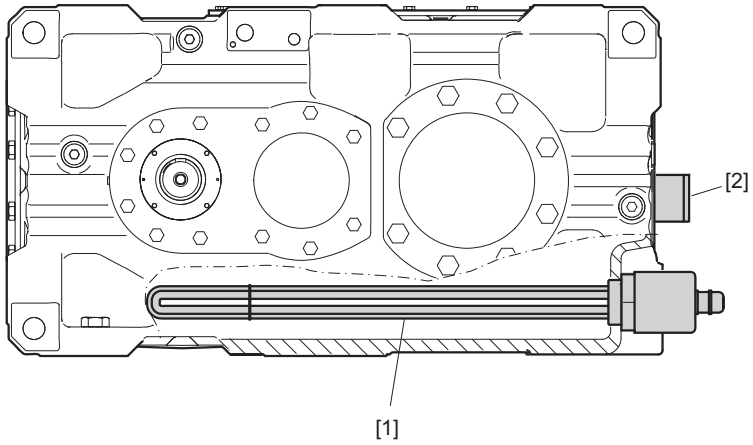
5.7 Oil heater /OH

An oil heater may be required to ensure lubrication during a cold gear unit startup when the ambient temperature is low.

5.7.1 Structure

The oil heater consists of 2 main parts:

1. Heating element in the oil sump ("oil heater") with connection unit
2. Thermostat with integrated temperature sensor



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[1] Oil heater
[2] Thermostat with integrated temperature sensor

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5.8 Oil cooling system

For information about the structure, function, startup, maintenance, etc. of the oil cooling system, refer to the separate operating instructions.

You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

The following oil cooling systems can be used:

- Oil-air cooler for splash or bath lubrication /OAC1
- Oil-air cooler for pressure lubrication /OAP1
- Oil-water cooler for splash or bath lubrication /OWC1
- Oil-water cooler for pressure lubrication /OWP1

5.9 Gear units on swing base/base frame

For information on the structure, function, and installation of the swing base/base frame, refer to the separate operating instructions.

You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

5.10 Flange coupling

For information about the structure, function, installation, etc. of the flange coupling, refer to the separate operating instructions.

You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

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5.11 Pressure switch /PS

The pressure switch signals the correct oil pressure in the pressure pipe and in this way indicates that the pressure lubrication is ready for operation. The pressure switch must be monitored by the operator.

Pressure might build up with a delay during the startup phase of the gear unit with a shaft end pump. The slow pressure build-up in this phase can lead to an error signal by the pressure switch that can be bridged. The pressure switch signal must then be bridged for **5 to a maximum of 10 seconds**.

Longer shutdown delays may result in damage to the gear unit and are not permitted.

5.12 Temperature sensor /Pt100

The Pt100 temperature sensor can be used to measure the temperature of the oil in the gear unit. The temperature signal is evaluated by the operator's control.

Observe the gear unit oil temperature in chapter "Permitted lubricants" (→ 🗎 212) and the information in the order-specific documents.

The temperature sensor is located in the oil sump of the gear unit. The exact position depends on the gear unit version and the location of the shaft.

5.13 Temperature switch /NTB

A temperature switch with preset switching temperatures of 70, 80, 90 or 100 °C is used for monitoring the gear unit oil temperature.

For various functions, the temperature switch is also used as a limit value switch, for example

- as an "early warning"

  or

- as a "main alarm" for switching off the main motor.

To guarantee a long service life and functioning under all conditions, it is recommended to use a relay in the power circuit instead of a direct connection through the temperature switch.

The temperature switch is located in the gear unit's oil sump. The exact position depends on the gear unit version and position of the shaft.

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5.14 Temperature switch /TSK2

A temperature switch with preset switching temperatures is available for monitoring the gear unit's oil temperature.

The temperature switch is designed with 2 fixed switching points for controlling and monitoring the system function.

The temperature switch is integrated into the circuit of the oil supply system as follows:

- The cooling system is activated when the oil temperature reaches 60 °C.
- Warning signal or stopping the gear unit if the maximum oil bath temperature is exceeded.

To guarantee a long service life and functioning under all conditions, it is recommended to use a relay in the power circuit instead of a direct connection through the temperature switch.

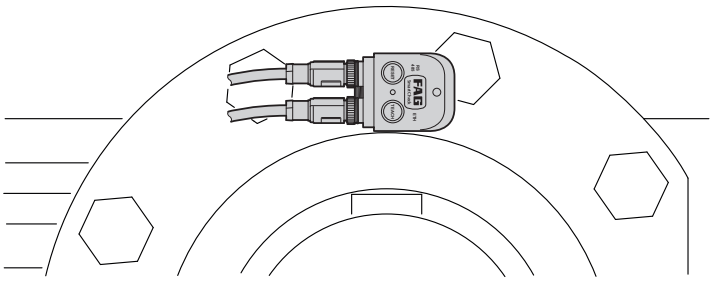
The temperature switch is located in the gear unit's oil sump. The exact position depends on the gear unit version and the location of the shaft.

The temperature switch must be integrated in the operator's controller in such a way that the order-specific switching points are achieved.

5.15 DUV40A (Diagnostic Unit Vibration)

The DUV40A vibration monitoring system is used for early detection of damage to gear units and gearmotors (e.g. bearing damage or imbalance). Permanent frequency-selective monitoring of the gearmotor is used for this purpose. Apart from the vibration analysis, additional measured values of up to 3 signal encoders can be detected, recorded and analyzed. The additional signals can be used as reference values for signal analysis e.g. to trigger time or event-controlled measuring tasks. After the analysis and depending on user-defined alarm limits, the system can switch outputs and display the state using LEDs.

DUV40A is configured using the SmartWeb software. If you use several Vibration SmartCheck systems, you can control them centrally from one PC using the SmartUtility Light software.



INFORMATION

For more information about DUV40A, refer to the "Diagnostic Unit Vibration" manual, part number: 31559018/EN.

5.15.1 Scope of delivery

- Vibration SmartCheck unit with integrated SmartWeb software

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- Vibration SmartCheck and SmartWeb documentation on CD-ROM
- SmartUtility Light software with user documentation on CD-ROM

5.15.2 Technical data

DUV40A (Diagnostic Unit Vibration)	
Housing	Glass fiber reinforced plastic
Mounting	Hexagon socket head screw M6 × 45 Contact surface on the machine: 25 mm Ø
Current consumption	< 200 mA at 24 V
Ambient temperature	-20 to +70 °C
Internal operating temperature	-20 to +85 °C
Voltage supply	DC 11 – 32 V or Power over Ethernet (PoE) based on 802.3af Mode A
Size	44 mm × 57 mm × 55 mm
Weight	Approx. 210 g
Degree of protection	IP 67
Operating system	Embedded Linux
Software	SmartWeb (Mozilla Firefox ESR 38 (recommended), Internet Explorer 11, Internet Explorer 9 is not recommended for performance reasons) Vibration SmartUtility Light or optionally Vibration SmartUtility Languages: German, English, Chinese, Spanish, and French

Internal sensor technology	
Vibration	Acceleration sensor (piezoelectric sensor) Frequency range 0.8 Hz to 10 kHz Measuring range ±50 g
Temperature	Measuring range -20 to +70 °C

Measurement	
Measurement functions	Acceleration Speed and distance by integration System temperature Process parameters (e.g. speed, load, pressure)
Diagnostic procedure	Time signal, envelope, spectrum and trend analysis, rotational speed and frequency tracking

Characteristic values (time and frequency range)	
Defined characteristic values	DIN/ISO 10816

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Characteristic values (time and frequency range)	
Calculated characteristic values	RMS, frequency-selective RMS, constant component, peak, peak-to-peak, crest factor, Wellhausen count, carpet level, condition guard Other user-defined characteristic values are possible.

Signal processing	
Frequency resolution	1600, 3200, 6400 or 12800 lines
Measurement resolution	24 bit (A/D converter)
Frequency range	0.8 Hz – 10 kHz
Low passes	50 Hz – 10 kHz (50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 2 kHz, 5 kHz, 10 kHz)
High passes (only envelope)	750 Hz, 1 kHz, 2 kHz (other filters on request)

Memory	
Program and data	64 MB RAM, 128 MB Flash

Inputs and outputs	
Inputs	**2 analog inputs** (0 – 10 V / 0 – 24 V / 0 – 20 mA / 4 – 20 mA), frequency range 0 – 500 Hz, 12 Bit **1 digital input** (0 – 30 V, 0.1 Hz – 1 kHz)
Outputs	**1 analog output** (0 – 10 V / -20 mA / 4 – 20 mA), 12 bit **1 switching output** (open collector, max. 1 A, 28 V)

Interfaces	
Control elements	2 capacitive pushbuttons (learning mode, alarm reset, restart, factory settings)
Display elements	1 LED to display status and alarm 1 LED to acknowledge the pushbuttons 2 LEDs to display communication
Communication	Ethernet 100 Mb/s OPC UA (server) available with additional license
Electrical connections	3 polarity reversal-protected M12 plug connectors for supply, inputs/outputs and Ethernet

5.15.3 Part numbers

	Description	Part number
Sensor	DUV40A (Diagnostic Unit Vibration)	19175892
Cable	Voltage supply cable 8-pin for SmartCheck 5 m; M12(B) <-> open end	19179596
Cable	Ethernet cable for SmartCheck 5 m; M12 <-> RJ45	19179618
Cable	I/O cable 8-pin for SmartCheck 5 m; M12(St) <-> open end	19179626
Cable	Power/Ethernet/I-O signals in 10 m and 20 m	

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	Description	Part number
Base for mounting on standard gear units (R, F, K, and S gear units)	Mounting base with sealing ring M10 × 1	20593422
	Mounting base with sealing ring M12 × 1.5	20593430
	Mounting base with sealing ring M22 × 1.5	20593449
	Mounting base with sealing ring M33 × 2	20593457
	Mounting base with sealing ring M42 × 2	20593465

	Description	Part number
Base for mounting on industrial gear units	Mounting base with sealing ring G3/4"	20593384
	Mounting base with sealing ring G1"	20593392
	Mounting base with sealing ring G1 1/4"	20593406
	Mounting base with sealing ring G1 1/2"	20593414

	Description	Part number
Base for mounting on standard motors	Mounting base M5	21014175
	Mounting base M6	21014167
	Mounting base M8	20593503
	Mounting base M10	21014248
	Mounting base M12	20593473
	Mounting base M16	20593481
	Mounting base M20	20593511

5.16 DUO10A diagnostic unit (oil aging)

If specified in the order, the gear unit can be equipped with a DUO10A diagnostic unit. The DUO10A diagnostic unit is used for planning oil change intervals.

The diagnostic unit consists of a Pt100 temperature sensor and an evaluation unit. The temperature sensor installed in the gear unit measures the present gear unit oil temperature. The diagnostic unit uses the oil temperature values to calculate the predicted remaining service life of the oil. This calculation value is continuously shown on the display of the evaluation unit. If necessary, the display can be changed to the current gear unit oil temperature.

INFORMATION

For more information on the evaluation unit, refer to the "Diagnostic Unit DUO10A" manual, part number 11473428/EN.

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5.17 DriveRadar®

The DriveRadar® Industrial Gear Units enables users to plan maintenance and service work on a predictive basis and to avoid undesirable downtime.

Selected condition monitoring processes are used to record all the operationally relevant mechanical parameters of our industrial gear units on a cyclical basis. The recorded data is evaluated and interpreted using state-of-the-art analytical processes.

Continuously monitoring measurement data in this way provides complete transparency regarding the condition of industrial gear units at all times. Furthermore, the analytical processes match irregularities directly to the affected components, reveal trends and make it possible to predict when critical conditions are likely to arise. If the condition of a component changes, users are notified immediately. They are given initial recommendations and can then use our service offerings to take action in plenty of time.

For information about the structure, function, and startup, refer to the separate operating instructions.

You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

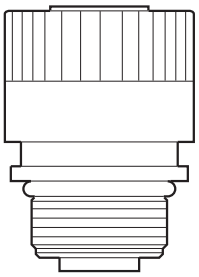
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5.18 Breather /BPG

The breather helps to prevent non-permitted pressures generated by heating or cooling during operation.

The following breathers can be used.

5.18.1 Standard

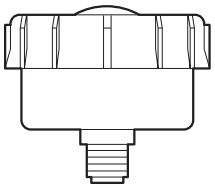


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Structure

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

5.18.2 Breather with filter insert /PI



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The breather has the following characteristics:

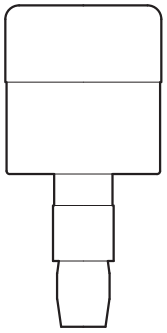
- Corrosion-resistant
- Robust filter housing
- High dirt-absorbing capacity

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"

5.18.3 Desiccant breather filter /DC



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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 and humidity. Saturation is indicated by the color changing from blue to pink. • Foam pad: Absorbs oil mist
Thread	3/8" or 1"

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6 Installation/assembly

6.1 Required tools/resources

The following tools/resources are needed for installation/assembly:

- Suitable, sufficiently rated, and undamaged handling equipment
- Set of wrenches and torque wrenches
- Mounting device
- Compensation elements (washers, spacing rings), if necessary
- Fasteners for input/output elements
- Assembly paste, e.g. NOCO-Paste from SEW-EURODRIVE → except for hollow-shaft gear units
- For hollow-shaft gear units:
  - 1 × end plate with 4 retaining screws
  - Aids for assembly/disassembly onto the machine shaft
- Fastening parts for the gear unit base

The tools/resources are not included in the scope of delivery.

6.2 Tolerances

6.2.1 Gear units

Refer to the dimension sheet for the tolerances of the interfaces for gear unit connection.

You can find it together with further documents in the overall documentation for the gear unit.

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6.3 Preliminary work for installation/assembly

6.3.1 Information

Read chapter "Creating a safe working environment" (→ 🗎 17) before starting any work.

Check that the following conditions have been met:

NOTICE

Improper installation and assembly may result in damage to the gear unit.

Possible damage to property.

- Make sure that the ambient temperature complies with the specifications in the order documents.
- Do not modify the gear unit or the mount-on components without prior consultation with SEW-EURODRIVE.
- Make sure that the oil level plugs and oil drain plugs, as well as the breather are freely accessible.
- When using an oil level glass to monitor the oil level, protect it against damage.
- The unit must not be exposed to direct sunlight when installed outdoors. Suitable protection devices are required, such as covers or roofs. Avoid heat build-up.
- Ensure that foreign objects do not impair the function of the gear unit (e.g. falling objects or coverings).
- Protect the gear unit from direct cold air currents. Condensation can cause water to accumulate in the oil.
- Protect the gear unit from falling objects or coverings.
- Do not perform welding work on the entire drive. Do not use the drives as a ground point for welding work. Welding may destroy gearing components and bearings.
- Use plastic inserts (2 to 3 mm thick) if there is a danger 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 screws with plastic washers. Always ground the gear unit housing.
- Repair any damage to the paintwork on the gear unit (e.g. on the breather).
- Make sure that the gear unit and mount-on components do not protrude into the walkway.

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6.3.2 Gear unit with long-term preservation

For gear units with long-term preservation, observe the following before installation/assembly.

Remove anti-corrosion agent

You must thoroughly remove anti-corrosion agents, dirt or similar from shafts, flange surfaces, mounting and foot surfaces on the housing. Use a commercially available 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.

Insert breather

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

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6.4 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 tightening the retaining screws.
- Correctly compensate for unevenness.
- Observe the weight information on the nameplate.

Tighten the retaining screws or nuts with the prescribed tightening torque. Use the screws and tightening torques specified in chapter "Tightening torques: Recommendations for gear unit mounting with foot-mounted design" (→ 🖹 85).

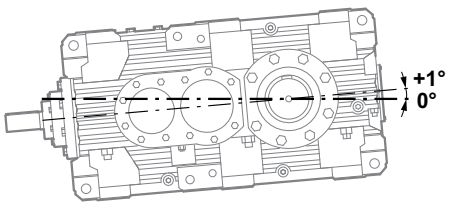
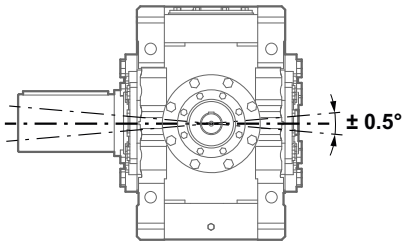
Do not change the mounting position of the gear unit without prior consultation with SEW-EURODRIVE. The warranty will become void without prior consultation.

6.4.1 Permitted deviation of the mounting position during installation

The following tolerances must be observed during gear unit installation.

The information relates to gear units without pivoted mounting position.

X.K..

Mounting position: M1 and M3	Mounting position: M1 and M3
	

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6.4.2 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 bores 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 coefficients.

Friction coefficient μ_{GK} for thread and head contact surface	Strength class of the screws
0.14 – 0.24	8.8
0.09 – 0.14	10.9

Do not lubricate the screw connections during assembly.

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

Size	Screw/nut	Tightening torque Nm Strength class 8.8 Strength class 10.9
X100 – 110	M20	460
X120 – 130	M24	795
X140 – 150	M30	1590
X160 – 170	M36	2760
X180 – 190	M36	2770
X200 – 230	M42	4410
X240 – 280	M48	6650

Use one of the following 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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6.4.3 Tightening torques: Recommendations for retaining screws of gear unit mount-on parts

Tighten the screws of gear unit mount-on components, safety covers and other covers with the following tightening torque. Do not lubricate the screw connections during installation.

The tightening torques do not apply to mounting types such as flange coupling, torque arm, mounting flange, hollow shaft with shrink disk, etc. These can be found in the respective chapters.

Screw/nut	Tightening torque Nm Strength class 8.8
M6	12
M8	28
M10	56
M12	96
M14	153
M16	235

6.4.4 Aligning the shaft axis



⚠ WARNING

Shaft breakage and vibration if the correct alignment of the shaft axis is not observed.

Severe or fatal injuries.

- Refer to the manufacturer documentation regarding the requirements of the coupling.

The service life of the shafts, bearings and couplings depends mainly on the alignment accuracy of the shaft axes to each other.

Therefore, the aim must always be zero deviation. For example, the requirements of the couplings can also be found in the operating instructions.

6.5 Speed monitoring

The speed monitor serves for monitoring the output speed of the auxiliary drive. After the speed monitor is installed, reference speed, switching hysteresis, and start bypass must be set at the speed monitor. Observe the operating instructions of the manufacturer.

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6.6 Filling the gear unit and auxiliary drive adapter with oil

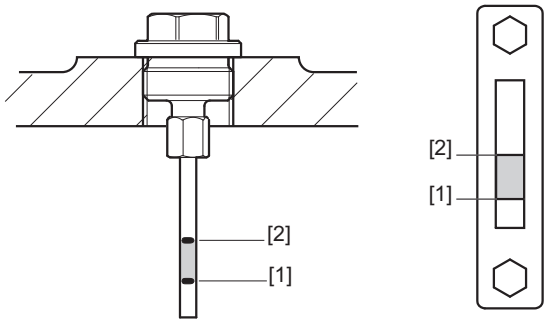
6.6.1 Notes

Observe the notes in chapter "Important information".

Information

- Use an oil from the current lubricant table:
  https://www.sew-eurodrive.de/products/gear_units/standard_gear_units/accessories_and_options/lubricants/lubricants.html
- Fill the oil only 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 through 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 markings [1] and [2] on the oil dipstick or oil level glass are the decisive indicators of the correct oil quantity to be filled in.
- Check the oil level only when the gear unit has cooled down in idle state. SEW-EURODRIVE recommends checking the oil level at an oil temperature of 20 °C to 40 °C. The oil level must be between the markings [1] and [2] and should ideally be in the middle. Observe the information in chapter "Checking the oil level" (→ 🗎 192).
- The overrunning clutch and the gear unit have a **shared oil chamber**.
- The gear unit and the auxiliary drive have a **separate oil chamber**.
- When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the oil fill quantity is higher. 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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6.6.2 Gear units with reduced oil level

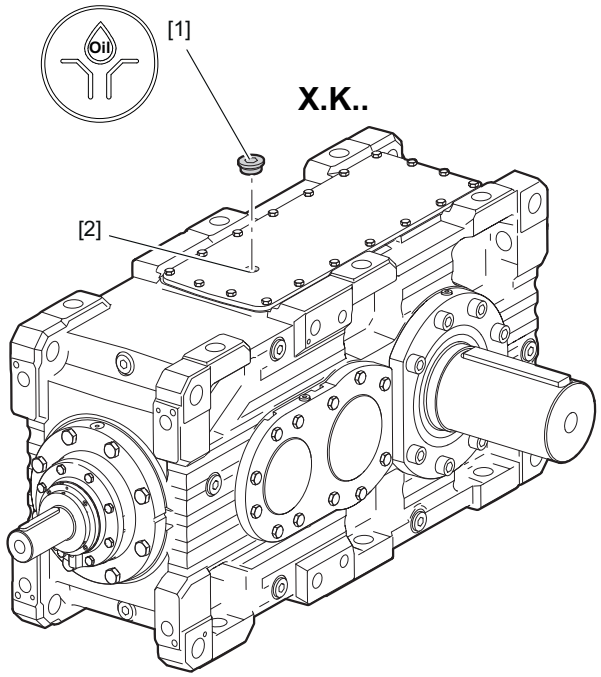
NOTICE

Faulty oil filling may result in damage to the gear unit.

Possible damage to the gear unit.

- The oil may only be filled into the gear unit at the marked screw plug [1]. This ensures that the bearings are lubricated during the initial startup and after an oil change.

Observe the following procedure for reduced oil level. For further Information, refer to chapter "Identifying features of a reduced oil level" (→ 🗎 64).



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1. Remove the oil fill plug [1].
2. Fill in the oil via the oil fill opening [2].

- The oil quantity specified on the nameplate is an approximate quantity. The markings on the oil dipstick are the decisive indicator of the correct oil quantity, see chapter "Checking the oil level" (→ 🗎 192).
- Use a clean filling aid without zinc coating (plastic funnel or similar).

3. ⚠ **CAUTION!** Danger due to leakage of lubricant. Possible risk of slipping. Immediately remove any oil that has escaped with oil binder.
4. Screw the oil fill plug [1] and the oil dipstick back into place.

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6.7 The gear unit is delivered with oil (optional)

The gear unit can optionally be delivered with oil filled at the factory. Observe the following procedure.

NOTICE

Faulty startup may result in damage to the gear unit.

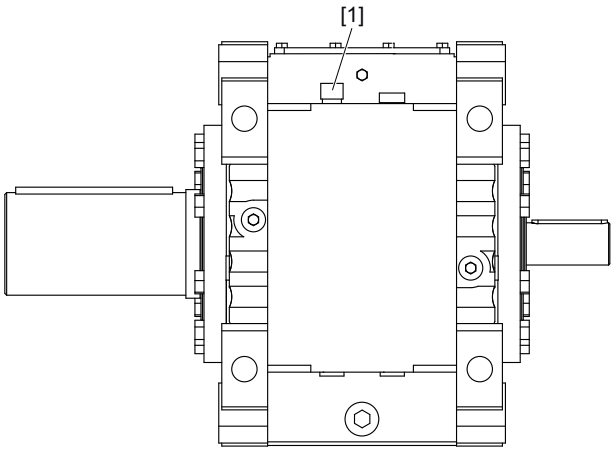
Possible damage to property.

- It is important that gear units with customer-installed cooling system are vented before taking them into operation.

The oil level may deviate during transport, or due to other ambient conditions at the destination. For this reason, the oil fill must be checked before startup and corrected if necessary.

Mount the breather prior to startup. It is enclosed with the delivery.

The following figure is an example. For the position of the breathe, refer to the order documents.



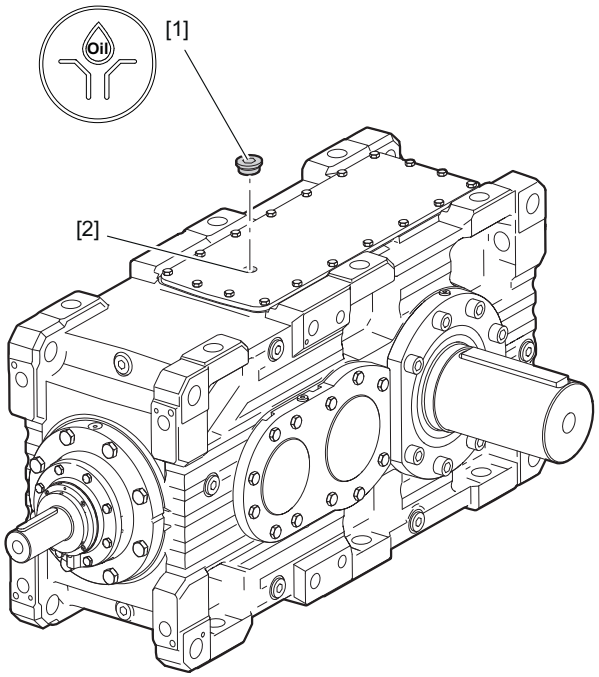
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1. Remove the closing plug.
2. Insert the breather [1].
3. Check the oil level, refer to chapter "Checking the oil level" (→ 192).

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6.7.1 Gear units with reduced oil level

Observe the following procedure for reduced oil level. For more information, refer to "Identifying features of a reduced oil level" (→ 🗎 64).



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1. Remove the oil fill plug [1].
2. Slowly open the oil drain valve and drain 5 liters of oil.
3. Fill the oil back in via the oil fill opening [2] before you start the gear unit.
4. Re-insert the oil fill plug [1].

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6.8 Gear units with solid shaft

6.8.1 Mounting input and output components

NOTICE

Improper assembly can damage the bearings, housings, or shafts.

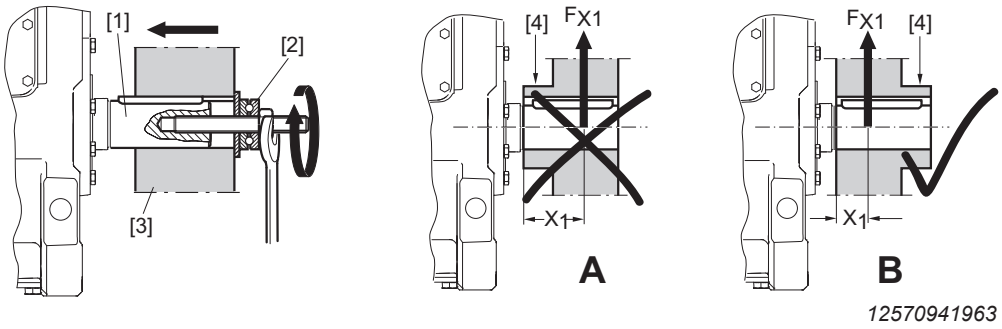
Possible damage to property.

- Mount the input and output elements only using the mounting device. Use the centering bore and the thread on the shaft end for positioning.
- Never force belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer.
- Make sure the belt of belt pulleys is tensioned correctly in accordance with the manufacturer's specifications.

The following figure shows a mounting device for installing couplings or hubs on gear unit or motor shaft ends. You can dispense with the axial bearing on the mounting device if necessary.

Mounting is easier if you first apply assembly paste to the input and output element and/or heat it up briefly (to 80 – 100 °C).

To avoid impermissibly high overhung load: Install gear wheels or sprockets according to figure **B**.



[1] Shaft end
[2] Thrust bearing
[3] Coupling hub
[4] Hub

A unfavorable
B correct

6.9 Dimensioning the customer hub of solid shaft gear units

The material of the customer hub should be dimensioned according to the loads that will occur.

6.10 Output shaft as a hollow shaft with keyed connection /..A

6.10.1 General information

The material and the keyed connection of the machine shaft (for design X..A) should be dimensioned by the customer according to the loads (e.g. impacts) that will occur.

Depending on the gear unit size, the material of the shaft must have the following minimum yield point for transferring the nominal torque:

- 320 N/mm^2 for sizes X..A100 – X..A280

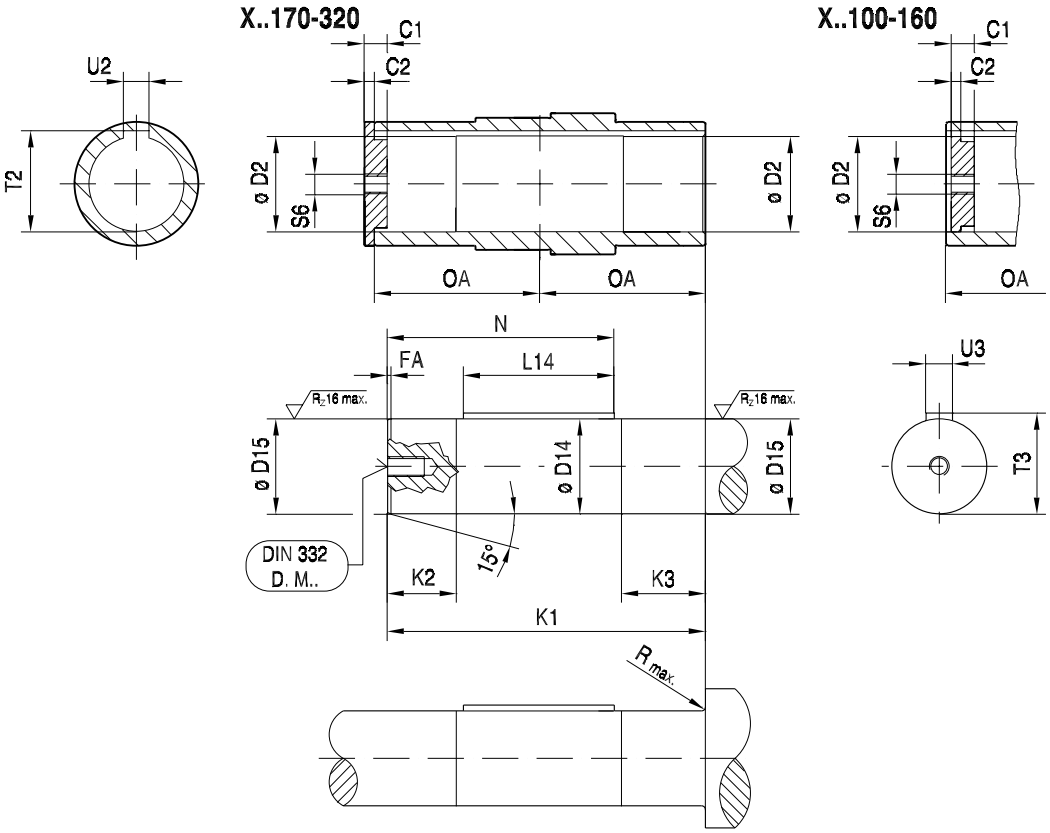
The material of the key must be selected according to the loads that will occur.

The minimum key length given in the dimension sheets must be observed. If a longer key is used, it should be aligned symmetrically to the hollow shaft.

With a continuous machine shaft or axial forces, SEW-EURODRIVE recommends that the machine shaft is designed with a contact shoulder. To prevent the retaining screw of the machine shaft from loosening upon a reversing load direction, it should be secured with a suitable threadlocker. If necessary, two eccentric retaining screws may be used.

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6.10.2 Dimensions of the machine shaft



X.K	C1	C2	ø D2	ø D14	ø D15	FA	K1	K2	K3	L14	N	OA	Rmax.	S6	T2	T3	U2	U3	DIN 332 DR.M..
X..A100	25	12	75^{H8}	75_{h11}	75_{js7}	2	312	47.5	81	90	205	173	1.6	M24	80.4	80	20^{JS9}	20_{h9}	M20
X..A110	30	14	85^{H8}	85_{h11}	85_{js7}	2	312.5	45	84	100	210	176	1.6	M24	90.4	90	22^{JS9}	22_{h9}	M20
X..A120	30	14	95^{H8}	95_{h11}	95_{js7}	2	342	53	92	140	244.5	190.5	1.6	M30	100.4	100	25^{JS9}	25_{h9}	M24
X..A130	30	14	105^{H8}	105_{h11}	105_{js7}	2	347	68	109	160	258	194	1.6	M30	111.4	111	28^{JS9}	28_{h9}	M24
X..A140	30	14	115^{H8}	115_{h11}	115_{js7}	2	403	61	102	200	306	222	1.6	M30	122.4	122	32^{JS9}	32_{h9}	M24
X..A150	30	14	125^{H8}	125_{h11}	125_{js7}	3	408	76	117	200	308.5	224.5	1.6	M30	132.4	132	32^{JS9}	32_{h9}	M24
X..A160	36	16	135^{H8}	135_{h11}	135_{js7}	3	465	80	127	250	361	256	1.6	M36	143.4	143	36^{JS9}	36_{h9}	M30
X..A170	36	17	150^{H8}	150_{h11}	150_{js7}	3	493	96	115	280	377	256	1.6	M36	158.4	158	36^{JS9}	36_{h9}	M30
X..A180	36	17	165^{H8}	165_{h11}	165_{js7}	3	565	109	128	300	423	292	2	M36	174.4	174	40^{JS9}	40_{h9}	M30
X..A190	36	17	165^{H8}	165_{h11}	165_{js7}	3	565	109	128	300	423	292	2	M36	174.4	174	40^{JS9}	40_{h9}	M30
X..A200	36	17	180^{H8}	180_{h11}	180_{js7}	3	620	130	149	320	460.5	319.5	2	M36	190.4	190	45^{JS9}	45_{h9}	M30
X..A210	36	17	190^{H8}	190_{h11}	190_{js7}	3	620	130	149	320	460.5	319.5	2	M36	200.4	200	45^{JS9}	45_{h9}	M30
X..A220	36	17	210^{H8}	210_{h11}	210_{js7}	3	686	133	152	370	518.5	352.5	2.5	M36	221.4	221	50^{JS9}	50_{h9}	M30
X2KA220	36	17	210^{H8}	210_{h11}	210_{js7}	3	756	133	152	370	554	388	2.5	M36	221.4	221	50^{JS9}	50_{h9}	M30
X..A230	36	17	210^{H8}	210_{h11}	210_{js7}	3	686	133	152	370	518.5	352.5	2.5	M36	221.4	221	50^{JS9}	50_{h9}	M30
X2KA230	36	17	210^{H8}	210_{h11}	210_{js7}	3	756	133	152	370	554	388	2.5	M36	221.4	221	50^{JS9}	50_{h9}	M30
X..A240	45	22	230^{H8}	230_{h11}	230_{js7}	3	778	147	170	370	562.5	400.5	2.5	M42	241.4	241	50^{JS9}	50_{h9}	M36
X2KA240	45	22	230^{H8}	230_{h11}	230_{js7}	3	853	147	170	370	600	438	2.5	M42	241.4	241	50^{JS9}	50_{h9}	M36
X..A250	45	22	240^{H8}	240_{h11}	240_{js7}	3	778	147	170	370	562.5	400.5	2.5	M42	252.4	252	56^{JS9}	56_{h9}	M36
X2KA250	45	22	240^{H8}	240_{h11}	240_{js7}	3	853	147	170	370	600	438	2.5	M42	252.4	252	56^{JS9}	56_{h9}	M36
X..A260	45	22	240^{H8}	240_{h11}	240_{js7}	3	851	143	166	450	639	437	2.5	M42	252.4	252	56^{JS9}	56_{h9}	M36
X..A270	45	22	275^{H8}	275_{h11}	275_{js7}	4	877	158	181	450	652	450	5	M42	287.4	287	63^{JS9}	63_{h9}	M36
X..A280	45	22	275^{H8}	275_{h11}	275_{js7}	4	877	158	181	500	677	450	5	M42	287.4	287	63^{JS9}	63_{h9}	M36

6.10.3 Mounting the gear unit onto the machine shaft

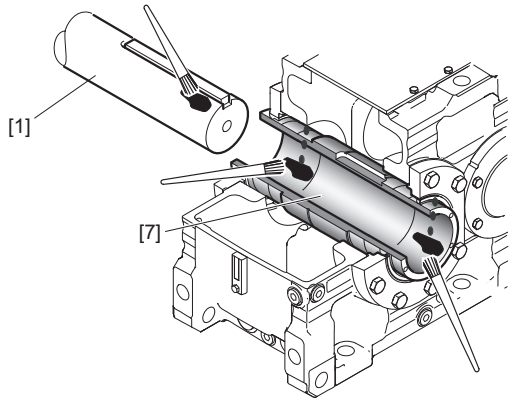
1. Make sure the dimensions of the machine shaft correspond to SEW specifications. Observe the dimensions of the machine shaft.
2. Loosen the retaining screws of the protection cover.
3. Remove the protection cover.

Size X100 – 160

INFORMATION

- Included in the scope of delivery:
  - 2 × retaining ring [8]/[9] and end plate [4]
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

1. Apply some assembly paste, such as NOCO-Paste, onto the hollow shaft [7] and onto the shaft end of the machine shaft [1].

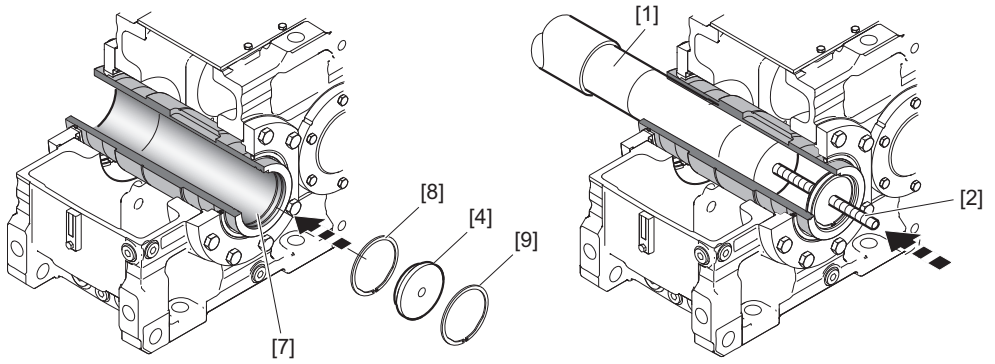


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[1] Machine shaft
[7] Hollow shaft

2. Attach the inner retaining ring [8] to the hollow shaft [7].
3. Secure the end plate [4] with the outer retaining ring [9].
4. Thread the threaded rod [2] into the machine shaft [1].

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[1] Machine shaft
[2] Threaded rod
[4] End plate
[7] Hollow shaft
[8] Retaining ring, inner
[9] Retaining ring, outer

Observe the following thread sizes of the threaded rods [2].

Size	Strength class 8.8
X..A100	M20
X..A110 – 150	M24
X..A160	M30

Observe the following information on the retaining rings [8][9].

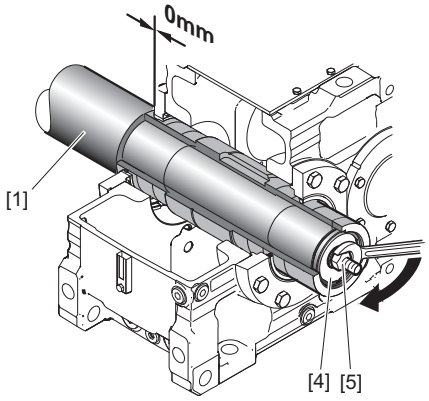
Size	2 × retaining ring (bore) DIN 472
X..A100	75 × 2.5
X..A110	85 × 2.5
X..A120	95 × 3
X..A130	105 × 4
X..A140	115 × 4
X..A150	125 × 4
X..A160	135 × 4

INFORMATION

Mounting is easier if you first apply assembly paste to the threaded rod and the nut.

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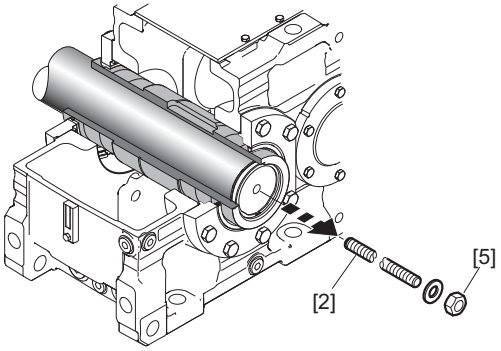
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



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[1] Machine shaft
[4] End plate
[5] Nut

6. Loosen the nut [5]. Remove the threaded rod [2].



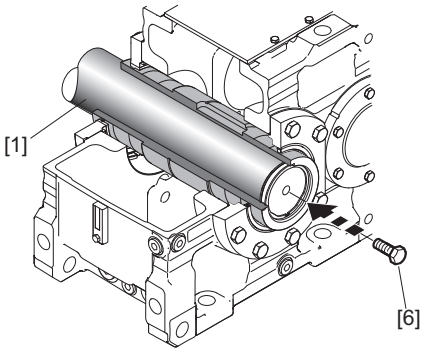
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[2] Threaded rod
[5] Nut

7. Secure the machine shaft [1] with the retaining screw [6]. The retaining screw is also to be locked with a suitable threadlocker. Observe the following information on the retaining screw [6].

Size	Retaining screw	Tightening torque in Nm Strength class 8.8
X..A120 – 150	M24	795
X..A160	M30	1590

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[1] Machine shaft
[6] Retaining screw

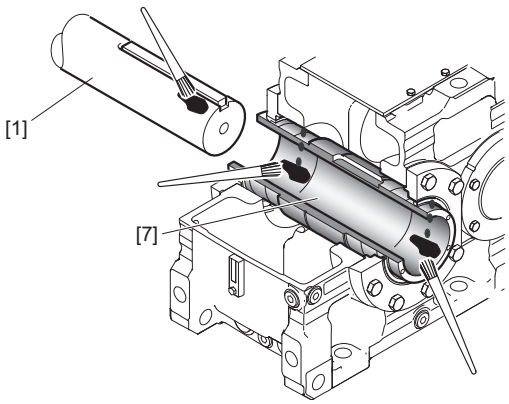
8. Mount the protection cover dust-tight to the gear unit.

Size X170 – 280

INFORMATION

- Included in the scope of delivery:
  - Retaining screws [3] and end plate [4]
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

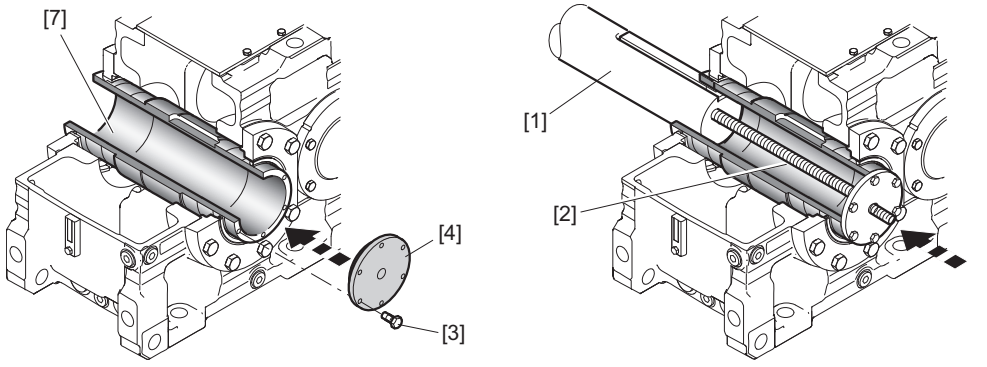
1. Apply some assembly paste, such as NOCO-Paste, onto the hollow shaft [7] and onto the shaft end of the machine shaft [1].



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[1] Machine shaft
[7] Hollow shaft

2. Use the retaining screws [3] to attach the end plate [4] centrically to the hollow shaft [7] and screw the threaded rod [2] into the machine shaft [1]. Observe the following thread sizes of the threaded rods [2].



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[1] Machine shaft
[2] Threaded rod
[3] Retaining screw
[4] End plate
[7] Hollow shaft

Size	Strength class 8.8
X..A170 – 230	M30
X..A240 – 280	M36

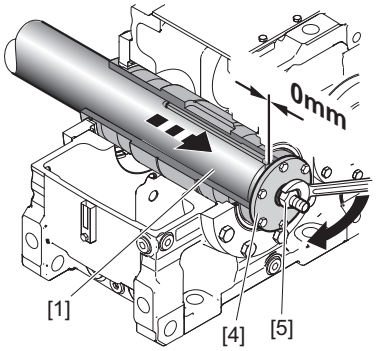
Observe the following information about the retaining screws [3].

Size	Thread size for 6 × retaining screws Strength class 10.9	Tightening torque	
		Assembly/ operating state Nm	Disassembly Nm
X..A170 – 190	M10x30	78	Tighten hand-tight
X..A200 – 230	M12x30	135	Tighten hand-tight
X..A240 – 280	M16x30	330	Tighten hand-tight

INFORMATION

Mounting is easier if you first apply lubricant to the threaded rod and the nut.

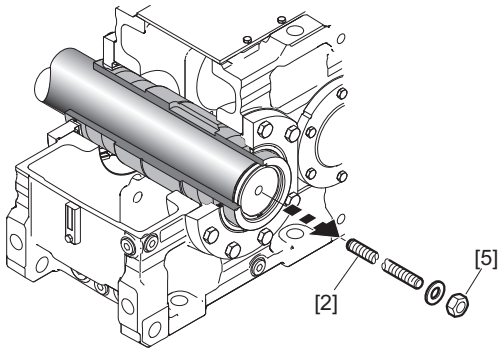
3. Tighten the machine shaft [1] with the nut [5] until the shaft end of the machine shaft [1] and the end plate [4] meet.



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[1] Machine shaft
[4] End plate
[5] Nut

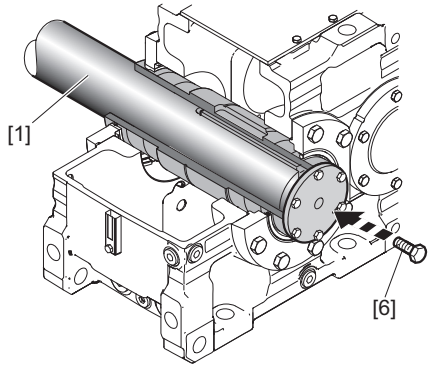
4. Loosen the nut [5]. Remove the threaded rod [2].



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[2] Threaded rod
[5] Nut

5. Secure the machine shaft [1] with the retaining screw [6]. The retaining screw must also be locked with a suitable threadlocker. Observe the following information about the retaining screw [6].



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[1] Machine shaft
[6] Retaining screw

Size	Retaining screw	Tightening torque in Nm Strength class 8.8
X..A170 – 230	M30	1590
X..A240 – 280	M36	2760

6. Mount the protection cover dust-tight to the gear unit.

6.10.4 Removing the gear unit from the machine shaft

NOTICE

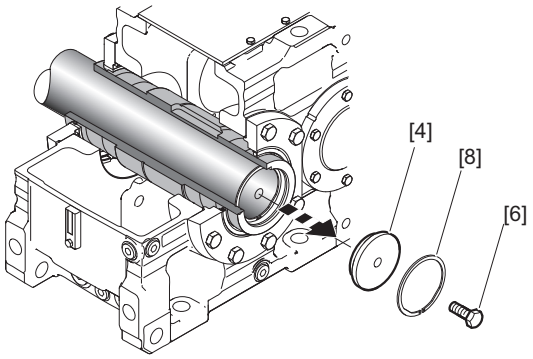
Incorrect disassembly of the gear unit from the machine shaft can damage bearings and other components.

Possible damage to property.

- During disassembly, you may only use the hollow shaft for support. Note that putting weight onto other gear unit parts can cause damage.

Sizes X100 – 160

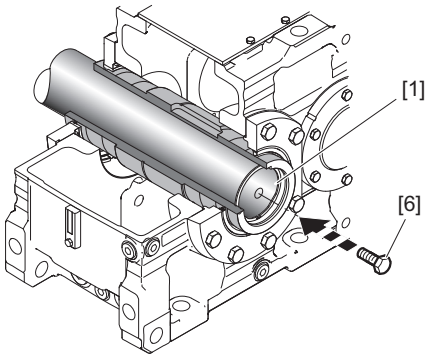
1. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].



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[4] End plate
[6] Retaining screw
[8] Retaining ring

2. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].

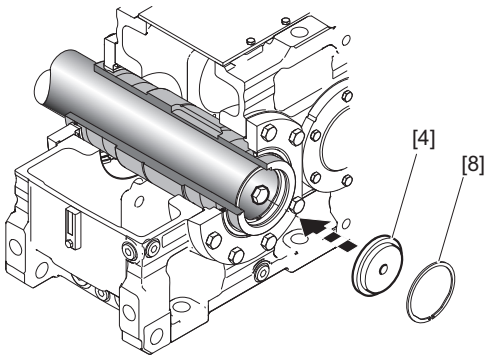


9007202105921291

[1] Machine shaft
[6] Retaining screw

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3. Turn over the end plate [4] and reinstall the end plate [4] and the outer retaining ring [8].



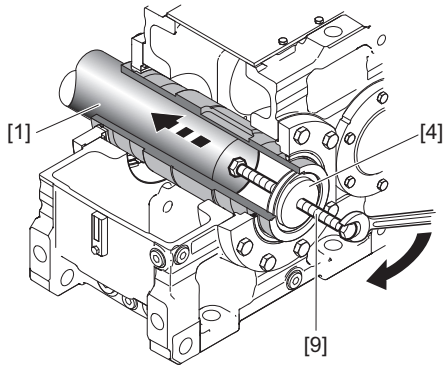
9007202105924619

[4] End plate
[8] Retaining ring

4. Thread the ejector screw [9] into the end plate [4] to remove the gear unit from the machine shaft [1].

INFORMATION

Disassembly is easier if you first apply lubricant to the ejector screw [9] and the thread in the end plate [4].

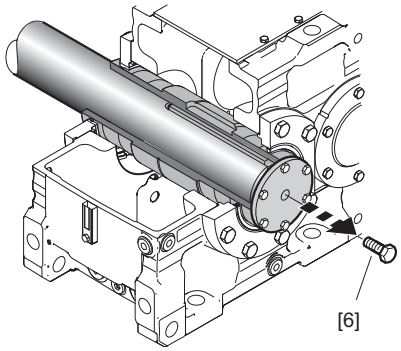


45035999124892555

[1] Machine shaft
[4] End plate
[9] Ejector screw

Size X170 – 280

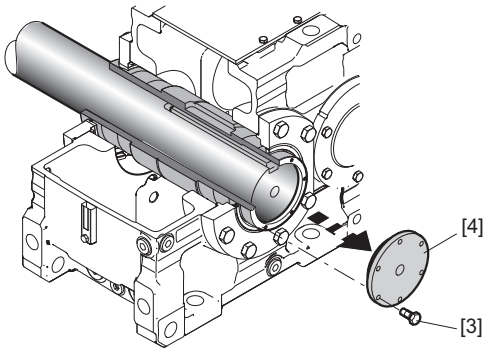
1. Loosen the retaining screw [6].



310460043

[6] Retaining screw

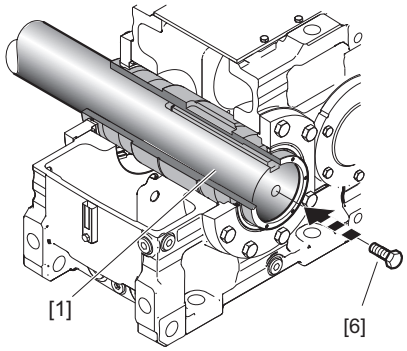
2. Remove the retaining screws [3] and remove the end plate [4].



310464523

[3] Retaining screw
[4] End plate

3. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1]. The screw head must rest on the shaft end face.

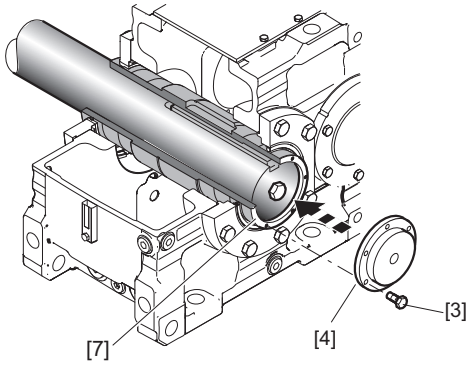


310470027

[1] Machine shaft
[6] Retaining screw

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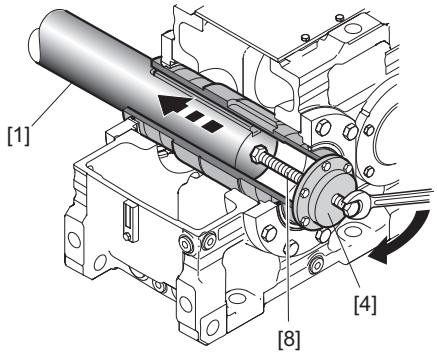
4. For disassembly of the gear unit, use the retaining screws [3] to attach the reversed end plate [4] centrically to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.



310474123

[3] Retaining screw
[4] End plate
[7] Hollow shaft

5. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [8] and the thread of the end plate [4].



310478219

[1] Machine shaft
[4] End plate
[8] Ejector screw

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6.11 Output shaft as a hollow shaft with shrink disk /..H

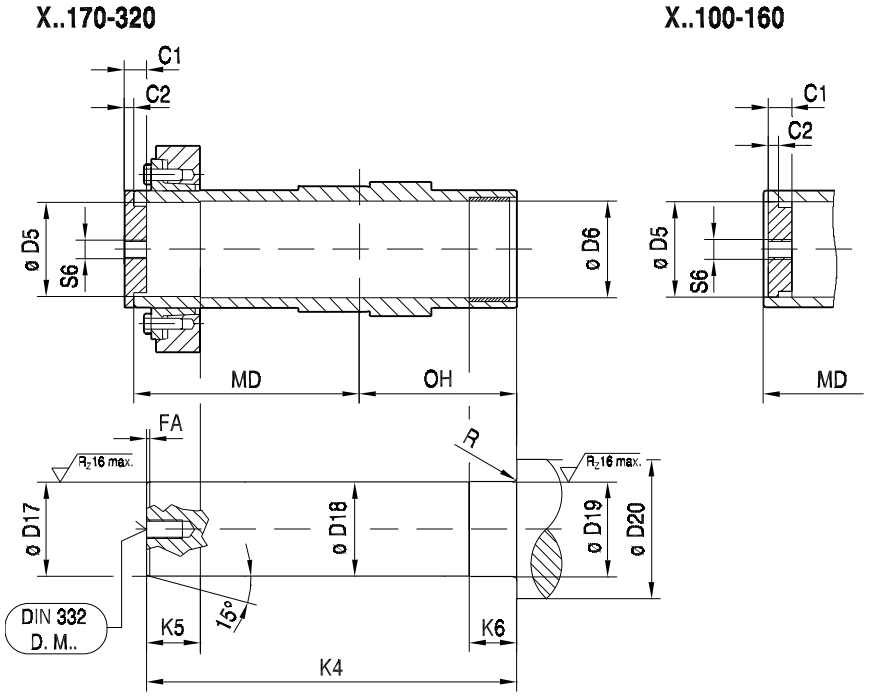
6.11.1 General information

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur (e.g. impact).

The shaft material must have the following minimum yield point for transferring the nominal torque.

- 360 N/mm^2 for sizes X..100 to X..280

6.11.2 Dimensions of the machine shaft



9007199906389771

X.F.. X.K.. X.T..	C1	C2	ø D5	ø D6	ø D17	ø D18	ø D19	ø D20	FA	K4	K5	K6	MD	OH	R	S6	DIN 332 DR.M..
X..H100	30	14	80^{H7}	81^{H9}	80_{h6}	80_{h11}	81_{m6}	95	2	394.5_{-1}	46	42_{-1}	261	173	3	M30	M24
X..H110	30	14	90^{H7}	91^{H9}	90_{h6}	90_{h11}	91_{m6}	105	2	400.5_{-1}	46	42_{-1}	265	176	3	M30	M24
X..H120	30	14	100^{H7}	101^{H9}	100_{h6}	100_{h11}	101_{m6}	115	2	437_{-1}	51	52_{-1}	286.5	190.5	3	M30	M24
X..H130	30	14	110^{H7}	111^{H9}	110_{h6}	110_{h11}	111_{m6}	125	2	449_{-1}	55	52_{-1}	297	194	3	M30	M24
X..H140	30	14	120^{H7}	121^{H9}	120_{h6}	120_{h11}	121_{m6}	135	2	509_{-1}	59	62_{-1}	329	222	3	M30	M24
X..H150	30	14	130^{H7}	131^{H9}	130_{h6}	130_{h11}	131_{m6}	145	3	520_{-1}	66	62_{-1}	337.5	224.5	3	M30	M24
X..H160	36	16	140^{H7}	141^{H9}	140_{h6}	140_{h11}	141_{m6}	155	3	583_{-1}	66	73_{-1}	375	256	4	M36	M30
X..H170	36	17	150^{H7}	151^{H9}	150_{h6}	150_{h11}	151_{m6}	165	3	600_{-1}	83	73_{-1}	364	256	4	M36	M30
X..H180	36	17	165^{H7}	166^{H9}	165_{g6}	165_{h11}	166_{m6}	180	3	672_{-1}	83	83_{-1}	400	292	4	M36	M30
X..H190	36	17	165^{H7}	166^{H9}	165_{g6}	165_{h11}	166_{m6}	180	3	672_{-1}	83	83_{-1}	400	292	4	M36	M30
X..H200	36	17	180^{H7}	181^{H9}	180_{g6}	180_{h11}	181_{m6}	195	3	750_{-1}	101	83_{-1}	450.5	319.5	4	M36	M30
X..H210	36	17	190^{H7}	191^{H9}	190_{g6}	190_{h11}	191_{m6}	205	3	753_{-1}	106	83_{-1}	453.5	319.5	4	M36	M30
X..H220	36	17	210^{H7}	211^{H9}	210_{g6}	210_{h11}	211_{m6}	230	3	830_{-1}	118	108_{-1}	497.5	352.5	5	M36	M30
X2KH220	36	17	210^{H7}	211^{H9}	210_{g6}	210_{h11}	211_{m6}	230	3	900_{-1}	118	108_{-1}	532.5	387.5	5	M36	M30
X..H230	36	17	210^{H7}	211^{H9}	210_{g6}	210_{h11}	211_{m6}	230	3	830_{-1}	118	108_{-1}	497.5	352.5	5	M36	M30
X2KH230	36	17	210^{H7}	211^{H9}	210_{g6}	210_{h11}	211_{m6}	230	3	900_{-1}	118	108_{-1}	532.5	387.5	5	M36	M30
X..H240	45	22	230^{H7}	231^{H9}	230_{g6}	230_{h11}	231_{m6}	250	3	948_{-1}	140	108_{-1}	571.5	400.5	5	M42	M36
X2KH240	45	22	230^{H7}	231^{H9}	230_{g6}	230_{h11}	231_{m6}	250	3	1023_{-1}	140	108_{-1}	609	438	5	M42	M36
X..H250	45	22	240^{H7}	241^{H9}	240_{g6}	240_{h11}	241_{m6}	260	3	948_{-1}	140	108_{-1}	571.5	400.5	5	M42	M36
X2KH250	45	22	240^{H7}	241^{H9}	240_{g6}	240_{h11}	241_{m6}	260	3	1023_{-1}	140	108_{-1}	609	438	5	M42	M36
X..H260	45	22	250^{H7}	255^{H9}	250_{g6}	250_{h11}	255_{m6}	280	4	1021_{-1}	140	108_{-1}	608	437	5	M42	M36
X..H270	45	22	280^{H7}	285^{H9}	280_{g6}	280_{h11}	285_{m6}	310	4	1056_{-1}	146	143_{-1}	630	450	5	M42	M36
X..H280	45	22	280^{H7}	285^{H9}	280_{g6}	280_{h11}	285_{m6}	310	4	1056_{-1}	146	143_{-1}	630	450	5	M42	M36

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6.11.3 Mounting the gear unit onto the machine shaft

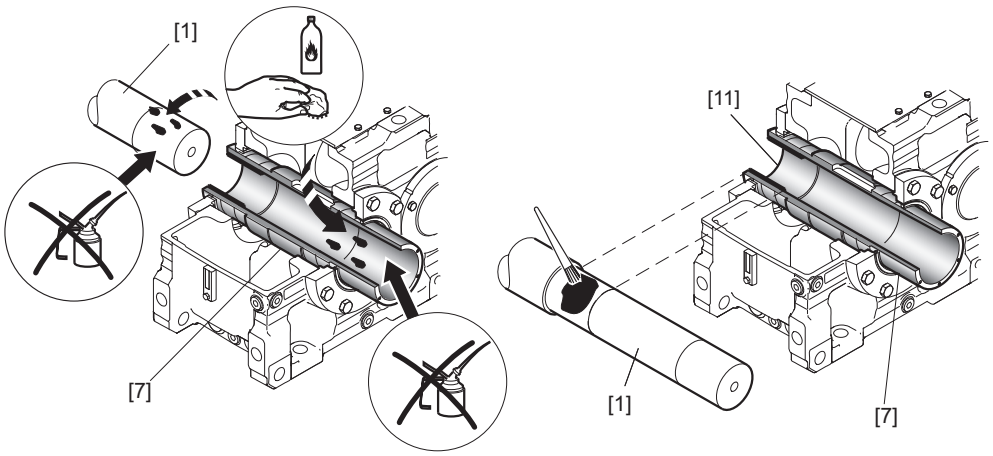
1. Make sure the dimensions of the machine shaft correspond to SEW specifications.
2. Loosen the retaining screws of the protection cover.
3. Remove the protection cover.

Size X100 – 160

INFORMATION

- Included in the scope of delivery:
  - 2× retaining rings [8][9] and end plate [4].
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8].

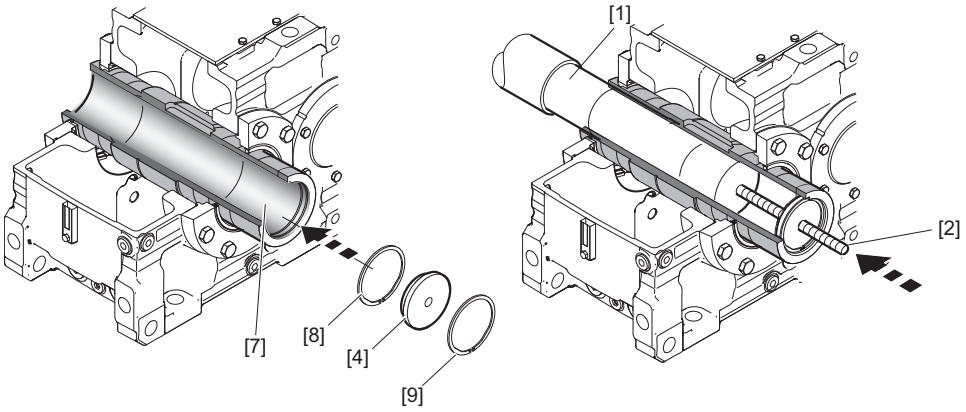
1. Before mounting the gear unit, degrease the hollow shaft [7] and the machine shaft [1]. Use a commercially available solvent. Do not let the solvent come into contact with the sealing lips of the oil seals.
2. **NOTICE!** Never apply assembly paste directly to the bushing [11] because the compound may get into the clamping area of the shrink disk when connecting the input shaft. Possible damage to property.
   It is essential that the clamping area of the shrink disk between the machine shaft [1] and the hollow shaft [7] remains free of grease.
3. Apply some assembly paste, such as NOCO-Paste to the machine shaft [1] in the area of the bushing [11].



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[1] Machine shaft
[7] Hollow shaft
[11] Bushing

4. Attach the inner retaining ring [8] to the hollow shaft [7]. Secure the end plate [4] with the outer retaining ring [9]. Thread the threaded rod [2] into the machine shaft [1].



9007202134039819

[1] Machine shaft
[2] Threaded rod
[4] End plate
[7] Hollow shaft
[8] Retaining ring, inner
[9] Retaining ring, outer

Observe the following thread sizes of the threaded rods [2].

Size	Strength class 8.8
X..H100 – 150	M24
X..H160	M30

Observe the following information on the retaining rings [8][9].

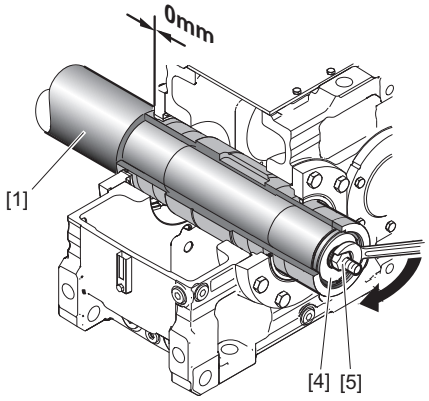
Size	2 × retaining ring (bore) DIN 472
X..H100	80 × 2.5
X..H110	90 × 2.5
X..H120	100 × 3
X..H130	110 × 4
X..H140	120 × 4
X..H150	130 × 4
X..H160	140 × 4

INFORMATION

Mounting is easier if you first apply assembly paste to the threaded rod and the nut.

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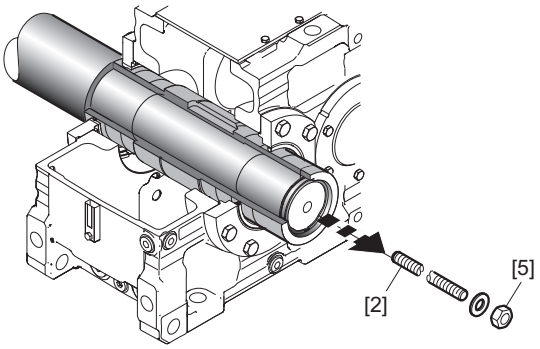
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



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[1] Machine shaft
[4] End plate
[5] Nut

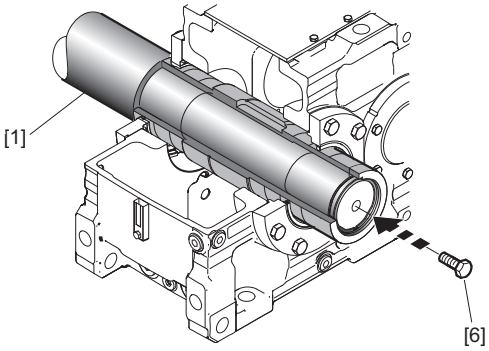
6. Loosen the nut [5]. Remove the threaded rod [2].



9007202134044427

[2] Threaded rod
[5] Nut

7. Secure the machine shaft [1] with the retaining screw [6]. The retaining screw [6] must also be locked with a suitable threadlocker. Observe the following information on the retaining screw [6].

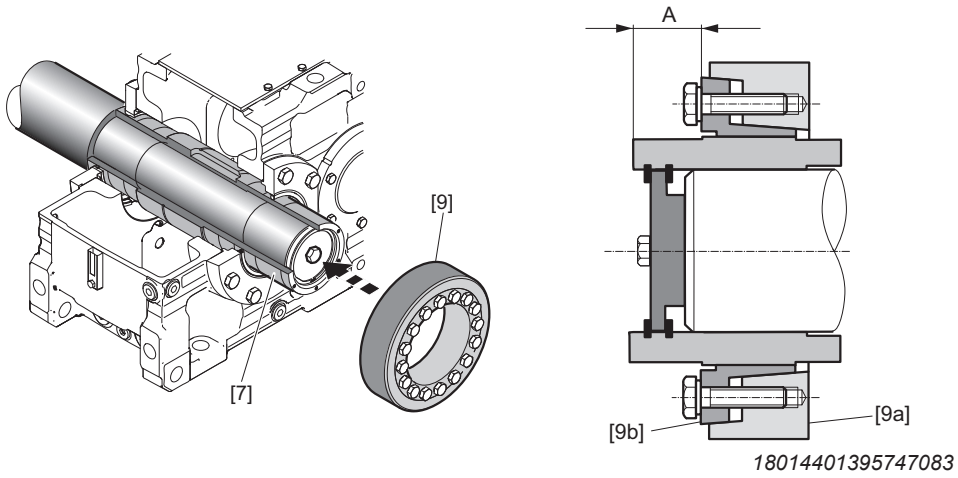


18014401397813131

[1] Machine shaft
[6] Retaining screw

Size	Retaining screw	Tightening torque in Nm Strength class 8.8
X..H100 – 150	M24	795
X..H160	M30	1590

8. Slide the shrink disk [9] with untightened screws onto the hollow shaft [7] and position the inner ring of the shrink disk [9b] at dimension A.
9. ⚠ **CAUTION!** The shrink disk can slip when not tightened. Potential risk of crushing due to falling parts.
   Secure the shrink disk against slipping.
10. **NOTICE!** Tightening the locking screws without installed shaft may lead to deformation of the hollow shaft. Possible damage to property.
    Never tighten the locking screws without the shaft installed.



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[7] Hollow shaft
[9] Shrink disk
[9a] Outer ring (stepped tapered ring)
[9b] Inner ring (stepped tapered bushing)

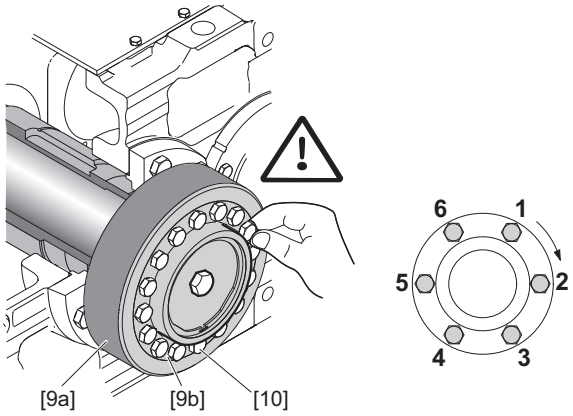
Size	A ±0.5 in mm
XH100	37.5
XH110	38
XH120	39
XH130 – 140	41
XH150	42
XH160	48

11. Tighten the locking screws [10] hand-tight. In doing so, align the outer ring (stepped tapered ring) [9a] parallel to the inner ring (stepped tapered bushing) [9b] of the shrink disk. Tighten the locking screws [10] one after the other in a clockwise direction (not in diametrically opposite sequence), each by a quarter turn. Do not tighten the locking screws [10] in a diametrically opposite sequence.

INFORMATION

For shrink disks with a slotted inner ring (stepped tapered bushing) [9b], tighten the locking screws [10] to the left and right of the slot one after another, and then, in several stages, tighten the remaining screws at evenly spaced intervals.

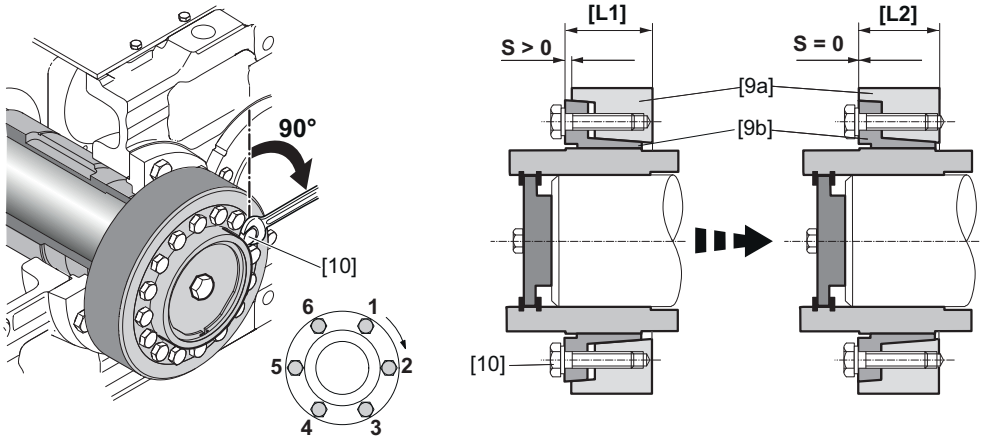
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18014401395749259

[9a] Outer ring (stepped tapered ring)
[9b] Inner ring (stepped tapered bushing)
[10] Locking screws

12. Work around the ring in several stages, evenly tightening the locking screws [10] by a quarter turn until the outer ring (stepped tapered ring) [9a] and the inner ring (stepped tapered bushing) [9b] align on the face that holds the screws.



27021600650492427

[9a] Outer ring (stepped tapered ring)
[9b] Inner ring (stepped tapered bushing)
[10] Locking screws
[L1] Condition at the time of shipment (pre-assembled)
[L2] Completely assembled (ready for operation)

If the outer ring (stepped tapered ring) and the inner ring (stepped tapered bushing) cannot be installed in alignment on the screw-side face, check the following tolerances for dimension S. These must not be exceeded while adhering to the maximum tightening torques (e.g. using a torque wrench) of the clamping screws [10].

Dimension S:

Outer diameter of the shrink disk	Dimension S
≤Ø 100	+0.1
≤Ø 300	+0.2
above	+0.25

Maximum tightening torques of the clamping screws [10]:

Clamping screws [10]	Maximum tightening torque in Nm
M10	62
M12	108
M14	171
M16	262
M18	367
M20	513
M22	696
M24	882
M27	1287
M30	1755

If the tolerance values are not adhered to, remove the shrink disk again and clean/lubricate it carefully according to the following chapter.

13. Mount the protection cover dust-tight to the gear unit.

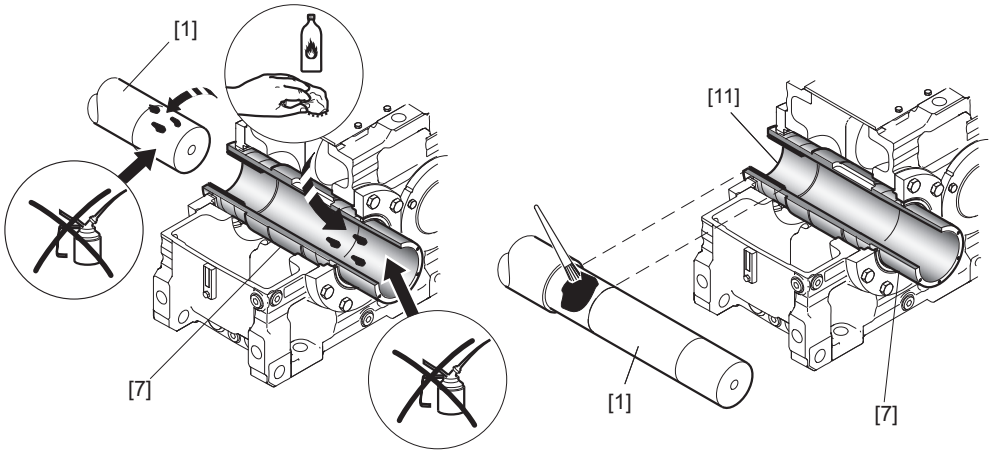
31960243/EN – 05/2024

Size X170 – 280

INFORMATION

- Included in the scope of delivery:
  - Retaining screws [3] and end plate [4].
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8].

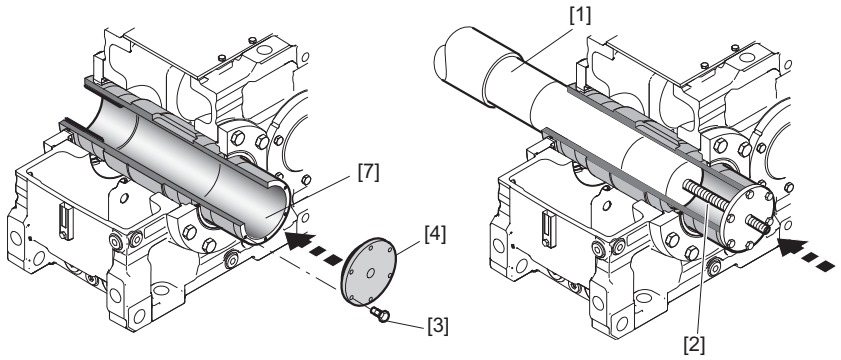
1. Before mounting the gear unit, degrease the hollow shaft [7] and the machine shaft [1].
2. **NOTICE!** Never apply assembly paste directly to the bushing [11] because the compound may get into the clamping area of the shrink disk when connecting the input shaft. Possible damage to property.
   It is essential that the clamping area of the shrink disk between the machine shaft [1] and the hollow shaft [7] remains free of grease.
3. Apply some assembly paste, such as NOCO-Paste, to the machine shaft [1] in the area of the bushing [11].



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[1] Machine shaft
[7] Hollow shaft
[11] Bushing

4. Use the retaining screws [3] to attach the end plate [4] centrically to the hollow shaft [7]. Screw the threaded rod [2] into the machine shaft [1].



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[1] Machine shaft
[2] Threaded rod
[3] Retaining screws
[4] End plate
[7] Hollow shaft

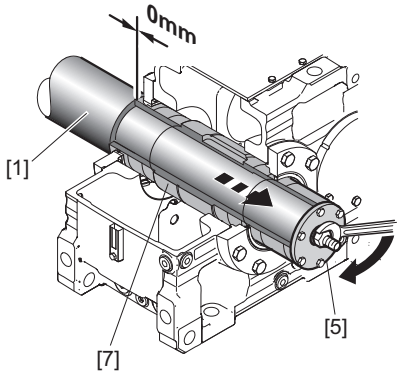
Observe the following thread sizes of the threaded rods [2].

Size	Strength class 8.8
X..H170 – 230	M30
X..H240 – 280	M36

Observe the following information about the retaining screws [3].

Size	Thread size for 6 × retaining screws Strength class 10.9	Tightening torque	
		Assembly/operating state Nm	Disassembly Nm
X..H170 – 190	M10 x 30	78	Tighten hand-tight
X..H200 – 230	M12x30	135	Tighten hand-tight
X..H240 – 280	M16x40	330	Tighten hand-tight

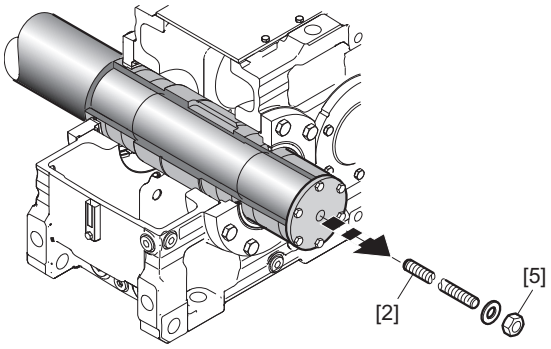
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulder of the machine shaft [1] and the hollow shaft meet.



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[1] Machine shaft
[5] Nut
[7] Hollow shaft

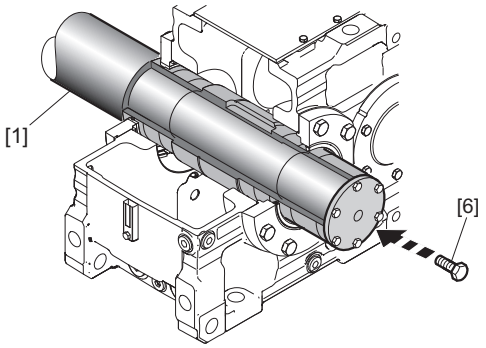
6. Loosen the nut [5]. Remove the threaded rod [2].



310506251

[2] Threaded rod [5] Nut

7. Secure the machine shaft [1] with the retaining screw [6]. The retaining screw must also be locked with a suitable threadlocker. Observe the following information about the retaining screw [6].



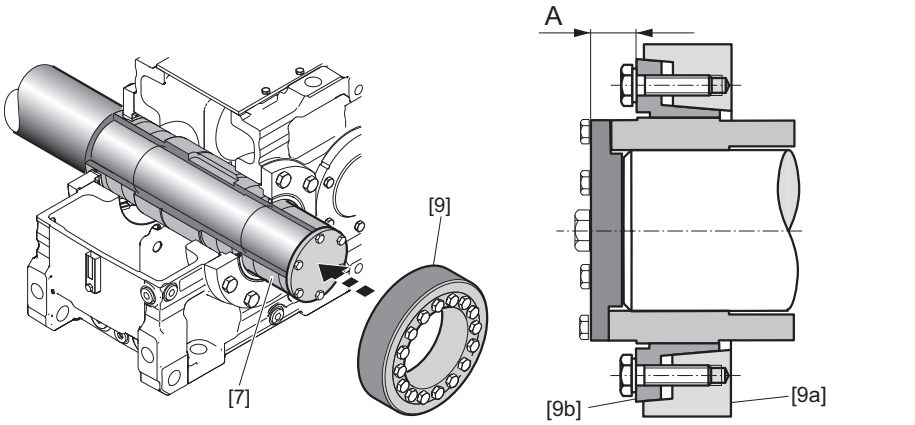
310510731

[1] Machine shaft [6] Retaining screw

Size	Strength class 8.8	Tightening torque in Nm Strength class 8.8
X..H170 – 230	M30	1590
X..H240 – 280	M36	2760

8. Slide the untightened shrink disk [9] onto the hollow shaft [7] and position the inner ring of the shrink disk [9b] at dimension A.
9. ⚠ **CAUTION!** The shrink disk can slip when not tightened. Potential risk of crushing due to falling parts.
   Secure the shrink disk against slipping.

10. **NOTICE!** Tightening the locking screws without installed shaft may lead to deformation of the hollow shaft. Possible damage to property.
    Never tighten the locking screws without the shaft installed.



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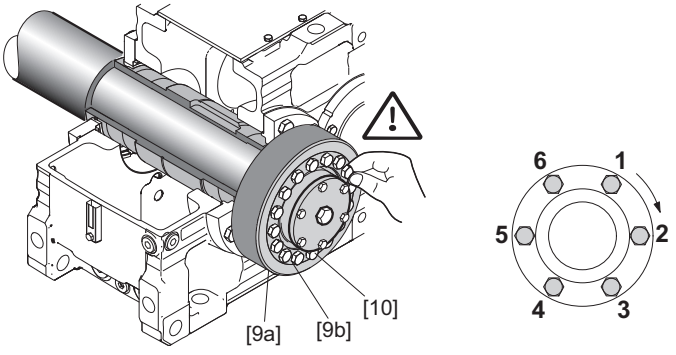
[7] Hollow shaft
[9] Shrink disk
[9a] Taper (outer ring)
[9b] Taper bushing (inner ring)

Size	A ±0.5 in mm
XH170 – 190	37
XH200 – 210	38
XH220 – 230	39
XH240 – 260	48
XH270 – 280	49

11. Tighten the locking screws [10] hand-tight. In doing so, align the taper (outer ring) [9a] parallel to the taper bushing (inner ring) [9b] of the shrink disk. Tighten the locking screws [10] one after the other in a clockwise direction (not in diametrically opposite sequence), each by a quarter turn. Do not tighten the locking screws [10] in a diametrically opposite sequence.

INFORMATION

For shrink disks with a slotted taper bushing (inner ring) [9b], tighten the locking screws [10] to the left and right of the slot one after another, and then, in several stages, tighten the remaining screws at evenly spaced intervals.

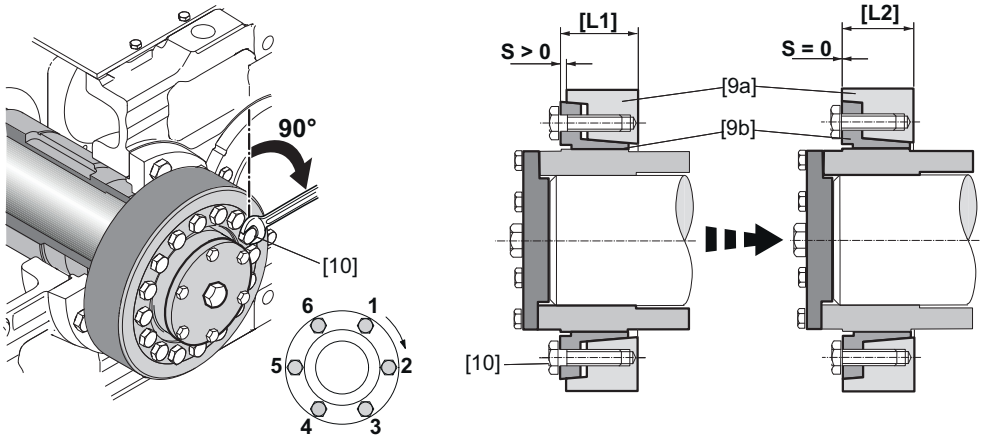


9007199565278219

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

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12. Work around the ring in several stages, evenly tightening the locking screws [10] by a quarter turn until the taper (outer ring) [9a] and the taper bushing (inner ring) [9b] align on the face that holds the screws as is shown in the illustration below.



27021598074764299

[9a]	Outer ring (stepped tapered ring)	[L1]	Condition at the time of shipment (pre-assembled)
[9b]	Inner ring (stepped tapered bushing)	[L2]	Completely assembled (ready for operation)
[10]	Locking screws		

If the outer ring (stepped tapered ring) and the inner ring (stepped tapered bushing) cannot be installed in alignment on the screw-side face, check the following tolerances for dimension S. These must not be exceeded while adhering to the maximum tightening torques of the locking screws [10] (e.g. using a torque wrench).

Dimension S:

Outer diameter of the shrink disk	Dimension S
≤ Ø 100	+0.1
≤ Ø 300	+0.2
Above	+0.25

Maximum tightening torques of the locking screws [10]:

Locking screws [10]	Maximum tightening torque in Nm
M10	62
M12	108
M14	171
M16	262
M18	367
M20	513
M22	696
M24	882
M27	1287
M30	1755

If the tolerance values are not adhered to, remove the shrink disk again and clean/lubricate it carefully according to the following chapter.

13. Mount the protection cover dust-tight to the gear unit.

6.11.4 Disassembling the gear unit from the machine shaft

NOTICE

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

Possible damage to property.

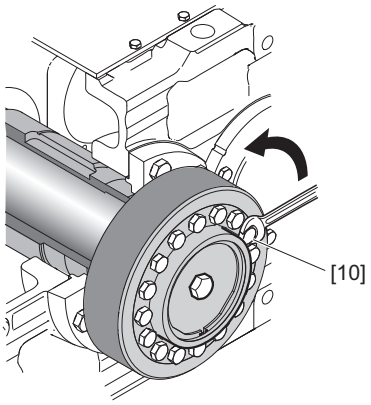
- You may only support yourself on the hollow shaft during disassembly. Note that supporting on any other parts of the gear unit may damage the material.
- Remove the shrink disk properly. Never completely unscrew the retaining screws because the shrink disk might jump off and cause an injury.
- Shrink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

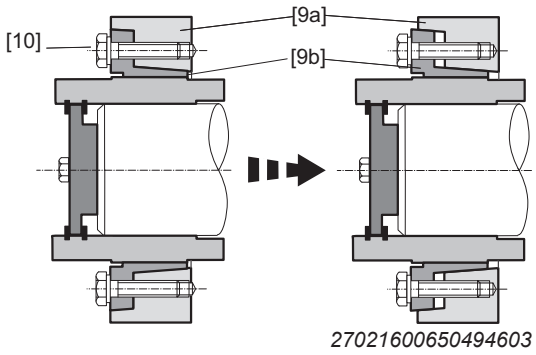
Sizes X100 – 160

1. Loosen the locking screws [10] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION

If the outer ring (stepped tapered ring) [9a] and the inner ring (stepped tapered bushing) [9b] do not loosen by themselves: Take the necessary number of 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.





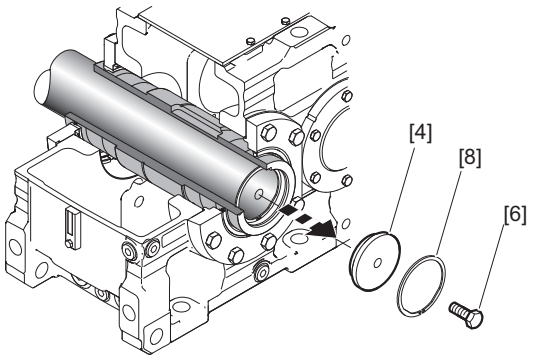
27021600650494603

[9a] Outer ring (stepped tapered ring)
[9b] Taper bushing (inner ring)
[10] Locking screws

2. Remove the shrink disk from the hollow shaft.

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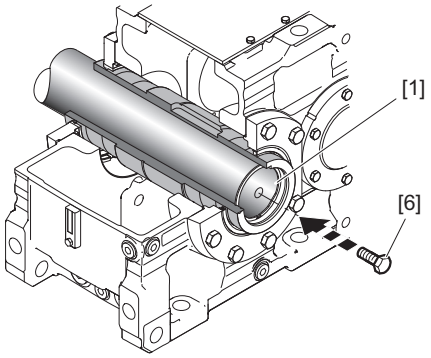
3. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].



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[4] End plate
[6] Retaining screws
[8] Retaining ring

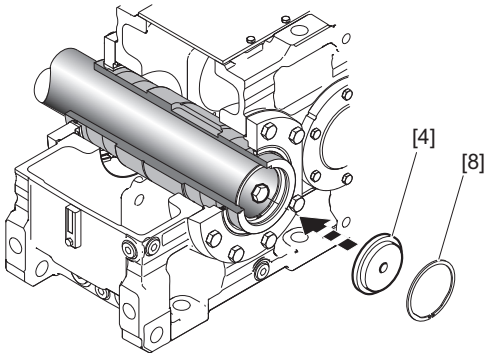
4. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



9007202105921291

[1] Machine shaft
[6] Retaining screws

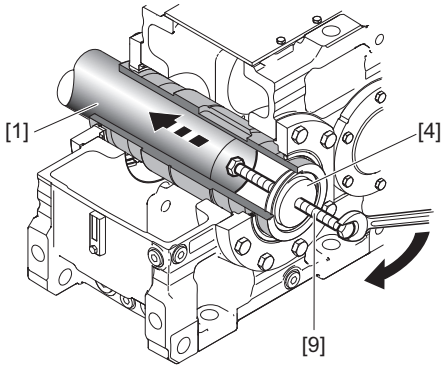
5. Turn the end plate [4] and reinstall the end plate [4] and the outer retaining ring [8].



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[4] End plate
[8] Retaining ring

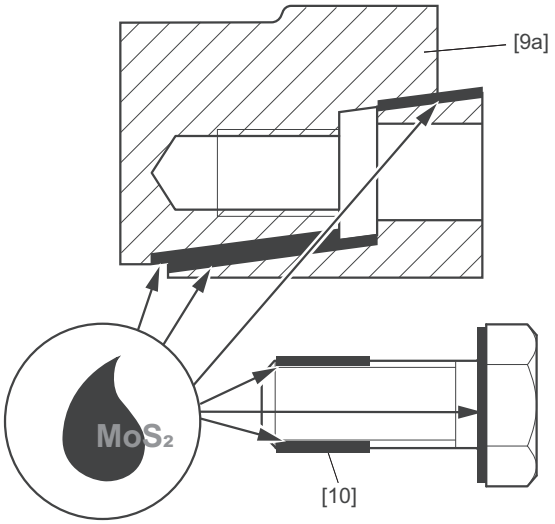
6. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [8] and the thread in the end plate [4].



45035999124892555

[1] Machine shaft
[4] End plate
[8] Retaining ring

7. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.
8. Apply an MoS_2 compound onto the threads and under the screw heads of the locking screws [10], for example "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.com).
9. Apply a thin layer of an MoS_2 compound onto the tapered surface, as shown in the following figure, for example "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.com).



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INFORMATION

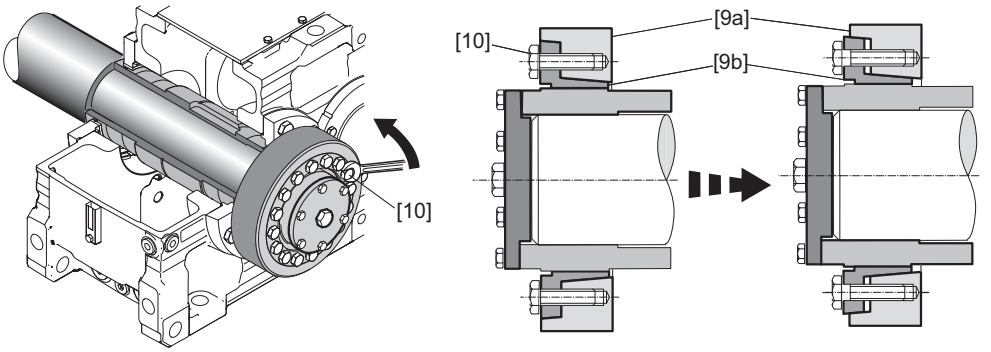
If the tapered surfaces of the shrink disk are damaged, the shrink disk must no longer be used. Replace the shrink disk.

Size X170 – 280

1. Loosen the locking screws [10] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION

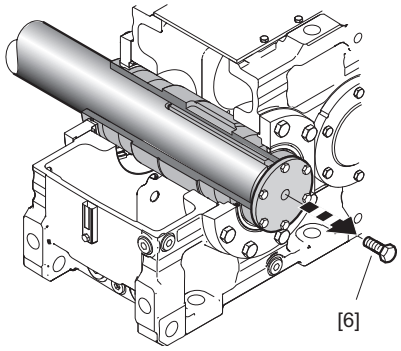
If the taper (outer ring) [9a] and the taper bushing (inner ring) [9b] do not loosen by themselves: Take the necessary number of locking screws and screw them evenly into the disassembly bores. Tighten the locking screws in several steps until the taper bushing separates from the tapered ring.



18014398928502539

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

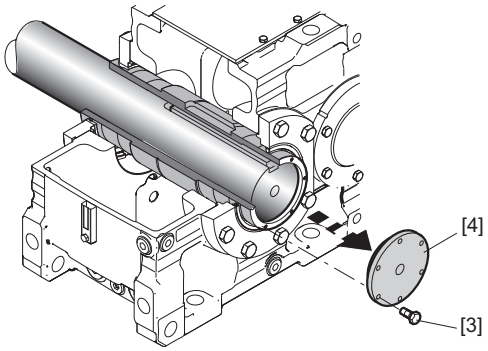
2. Loosen the retaining screw [6].



310460043

[6] Retaining screw

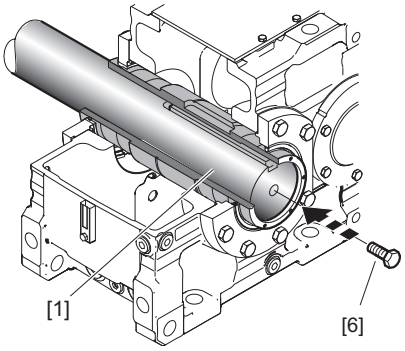
3. Remove the retaining screws [3] and remove the end plate [4].



310464523

[3] Retaining screw
[4] End plate

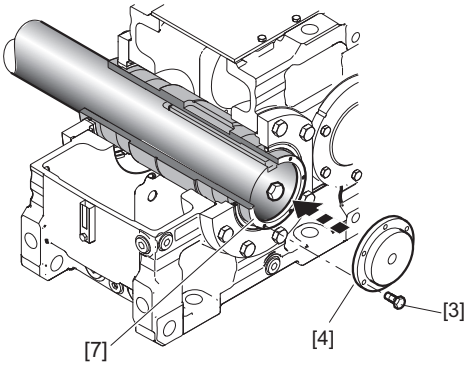
4. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



310470027

[1] Machine shaft
[6] Retaining screw

5. For disassembly of the gear unit, use the retaining screws [3] to attach the reversed end plate [4] centrically to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.

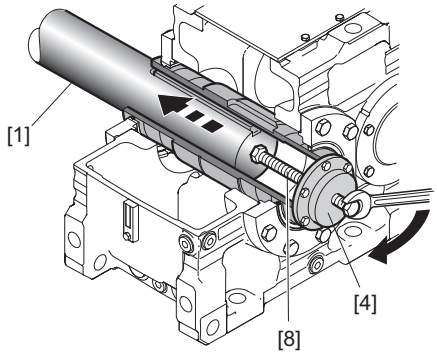


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[3] Retaining screw
[4] End plate
[7] Hollow shaft

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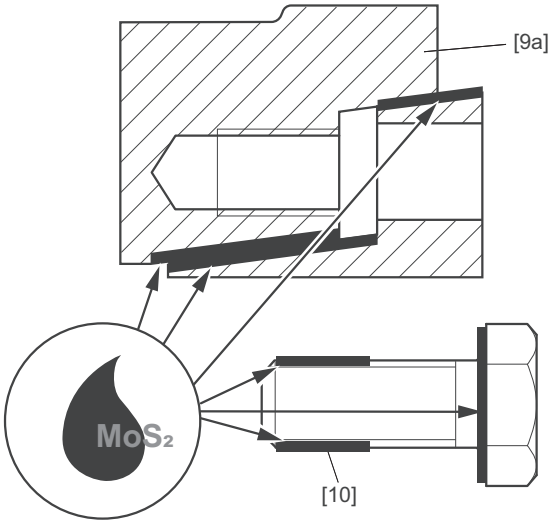
6. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [8] and the thread of the end plate [4].



310478219

[1] Machine shaft
[4] End plate
[8] Ejector screw

7. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.
8. Apply an MoS_2 compound onto the threads and under the screw heads of the locking screws [10], for example "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.com).
9. Apply a thin layer of an MoS_2 compound onto the tapered surface, as shown in the following figure, for example "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.com).



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INFORMATION

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

6.12 Output shaft as a splined hollow shaft /..V

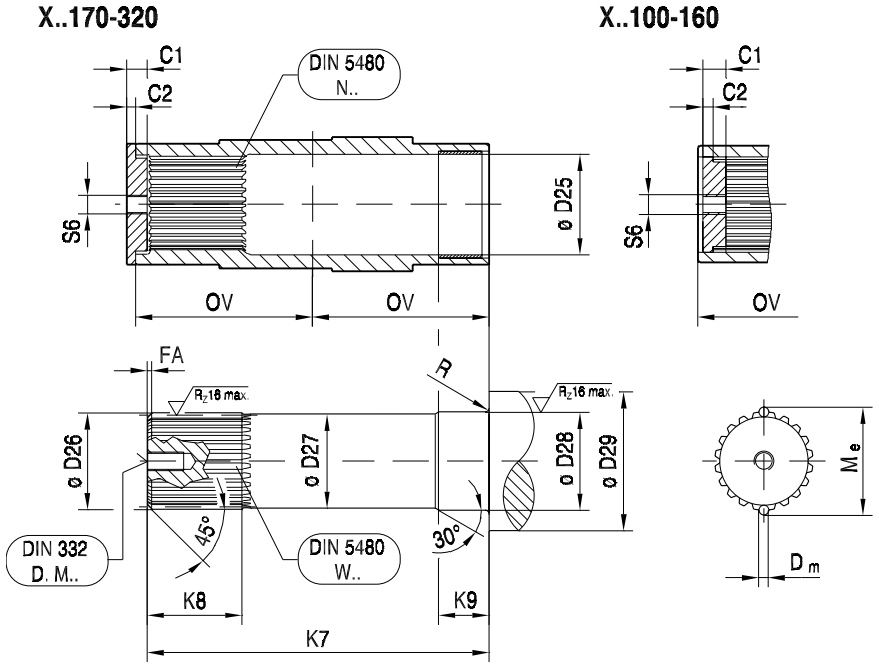
6.12.1 General information

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur (e.g. impact).

The shaft material must have the following minimum yield point for transferring the nominal torque.

- 320 N/mm^2 for sizes X..100 to X..280

6.12.2 Dimensions of the machine shaft



	C1	C2	ø D25	ø D26	ø D27	ø D28	ø D29	Dm	FA	K7	K8	K9	Me	OV	R	S6	DIN 332 DR.M..	DIN 5480
X..100	30	14	81^{H9}	74.4_{h10}	73	81_{m6}	95	6	3	306_{-1}	81	42_{-1}	$81.326^{-0.069}_{-0.125}$	173	3	M24	M20	W 75x3x30x24x8f N 75x3x30x24x9H
X..110	30	14	91^{H9}	84.4_{h10}	83	91_{m6}	105	6	3	311.5_{-1}	81	42_{-1}	$91.092^{-0.068}_{-0.123}$	176	3	M24	M20	W 85x3x30x27x8f N 85x3x30x27x9H
X..120	30	14	101^{H9}	94.4_{h10}	93	101_{m6}	115	6	3	341_{-1}	91	52_{-1}	$101.141^{-0.068}_{-0.122}$	190.5	3	M30	M24	W 95x3x30x30x8f N 95x3x30x30x9H
X..130	30	14	111^{H9}	109.4_{h10}	108	111_{m6}	125	6	3	346_{-1}	86	52_{-1}	$116.076^{-0.078}_{-0.139}$	194	3	M30	M24	W 110x3x30x35x8f N 110x3x30x35x9H
X..V140	30	14	121^{H9}	119.4_{h10}	118	121_{m6}	135	6	3	402_{-1}	101	62_{-1}	$126.095^{-0.078}_{-0.138}$	222	3	M30	M24	W 120x3x30x38x8f N 120x3x30x38x9H
X..150	30	14	131^{H9}	129.4_{h10}	128	131_{m6}	145	6	3	407_{-1}	101	62_{-1}	$136.329^{-0.081}_{-0.144}$	224.5	3	M30	M24	W 130x3x30x42x8f N 130x3x30x42x9H
X..160	36	16	141^{H9}	139.4_{h10}	138	141_{m6}	155	6	3	464_{-1}	111	73_{-1}	$146.167^{-0.080}_{-0.143}$	256	4	M36	M30	W 140x3x30x45x8f N 140x3x30x45x9H
X..170	36	17	151^{H9}	149.4_{h10}	148	151_{m6}	165	6	3	492_{-1}	121	73_{-1}	$156.172^{-0.079}_{-0.141}$	256	4	M36	M30	W 150x3x30x48x8f N 150x3x30x48x9H
X..180	36	17	166^{H9}	159_{h10}	158	166_{m6}	180	10	5	564_{-1}	166	83_{-1}	$170.009^{-0.086}_{-0.152}$	292	4	M36	M30	W 160x5x30x30x8f N 160x5x30x30x9H
X..190	36	17	166^{H9}	159_{h10}	158	166_{m6}	180	10	5	564_{-1}	166	83_{-1}	$170.009^{-0.086}_{-0.152}$	292	4	M36	M30	W 160x5x30x30x8f N 160x5x30x30x9H
X..200	36	17	191^{H9}	179_{h10}	178	191_{m6}	205	10	5	619_{-1}	176	83_{-1}	$190.090^{-0.087}_{-0.155}$	319.5	4	M36	M30	W 180x5x30x34x8f N 180x5x30x34x9H
X..210	36	17	191^{H9}	179_{h10}	178	191_{m6}	205	10	5	619_{-1}	176	83_{-1}	$190.090^{-0.087}_{-0.155}$	319.5	4	M36	M30	W 180x5x30x34x8f N 180x5x30x34x9H
X..220	36	17	211^{H9}	199_{h10}	198	211_{m6}	230	10	5	685_{-1}	201	108_{-1}	$210.158^{-0.088}_{-0.157}$	352.5	5	M36	M30	W 200x5x30x38x8f N 200x5x30x38x9H
X2K220	36	17	211^{H9}	199_{h10}	198	211_{m6}	230	10	5	755_{-1}	201	108_{-1}	$210.158^{-0.088}_{-0.157}$	387.5	5	M36	M30	W 200x5x30x38x8f N 200x5x30x38x9H
X..230	36	17	211^{H9}	199_{h10}	198	211_{m6}	230	10	5	685_{-1}	201	108_{-1}	$210.158^{-0.088}_{-0.157}$	352.5	5	M36	M30	W 200x5x30x38x8f N 200x5x30x38x9H

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	C1	C2	ø D25	ø D26	ø D27	ø D28	ø D29	Dm	FA	K7	K8	K9	Me	OV	R	S6	DIN 332 DR.M..	DIN 5480
X2K230	36	17	211^{H9}	199_{h10}	198	211_{m6}	230	10	5	755_{-1}	201	108_{-1}	$210.158^{-0.088}_{-0.157}$	387.5	5	M36	M30	W 200x5x30x38x8f N 200x5x30x38x9H
X..240	45	22	231^{H9}	219_{h10}	218	231_{m6}	250	10	5	777_{-1}	216	108_{-1}	$230.215^{-0.102}_{-0.179}$	400.5	5	M36	M30	W 220x5x30x42x8f N 220x5x30x42x9H
X2K240	45	22	231^{H9}	219_{h10}	218	231_{m6}	250	10	5	852_{-1}	216	108_{-1}	$230.215^{-0.102}_{-0.179}$	438	5	M36	M30	W 220x5x30x42x8f N 220x5x30x42x9H
X..250	45	22	241^{H9}	219_{h10}	218	241_{m6}	260	10	5	777_{-1}	216	108_{-1}	$230.215^{-0.102}_{-0.179}$	400.5	5	M36	M30	W 220x5x30x42x8f N 220x5x30x42x9H
X2K250	45	22	241^{H9}	219_{h10}	218	241_{m6}	260	10	5	852_{-1}	216	108_{-1}	$230.215^{-0.102}_{-0.179}$	438	5	M36	M30	W 220x5x30x42x8f N 220x5x30x42x9H
X..260	45	22	255^{H9}	239_{h10}	238	255_{m6}	275	10	5	850_{-1}	216	108_{-1}	$250.264^{-0.102}_{-0.180}$	437	5	M42	M36	W 240x5x30x46x8f N 240x5x30x46x9H
X..270	45	22	285^{H9}	258.4_{h10}	258	285_{m6}	305	16	8	876_{-1}	248	143_{-1}	$276.230^{-0.101}_{-0.177}$	450	5	M42	M36	W 260x8x30x31x8f N 260x8x30x31x9H
X..280	45	22	285^{H9}	258.4_{h10}	258	285_{m6}	305	16	8	876_{-1}	248	143_{-1}	$276.230^{-0.101}_{-0.177}$	450	5	M42	M36	W 260x8x30x31x8f N 260x8x30x31x9H

6.12.3 Mounting the gear unit onto the machine shaft

1. Make sure the dimensions of the machine shaft correspond to SEW specifications. Observe chapter "Dimensions of the machine shaft" (→ 🗎 122).
2. Loosen the retaining screws of the protection cover.
3. Remove the protection cover.

Size X100 – 160

INFORMATION

- Included in the scope of delivery:
  - 2 × retaining ring [8][9] and end plate [4]
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8]

1. Apply some assembly paste, such as NOCO-Paste, to the machine shaft in the area of the bushing and the splining.
2. Mount the gear unit to the machine shaft as described in chapter "Mounting the gear unit to the machine shaft" (→ 🗎 94).

Observe the following information about the retaining rings.

Size	2 x retaining ring (bore) DIN 472
X..V100	80x2.5
X..V110	90x2.5
X..V120	100x3
X..V130	110x4
X..V140	125x4
X..V150	130x4
X..V160	140x4

Observe the following information.

Size	Recommended thread size		Tightening torque in Nm Retaining screw [6] Strength class 8.8
	Ejector screw [8] (thread in the end plate)	Threaded rod [2] Nut (DIN 934) [5] Retaining screw [6] Strength class 8.8	
X..V100 – 150	M30	M24	795
X..V160	M36	M30	1590

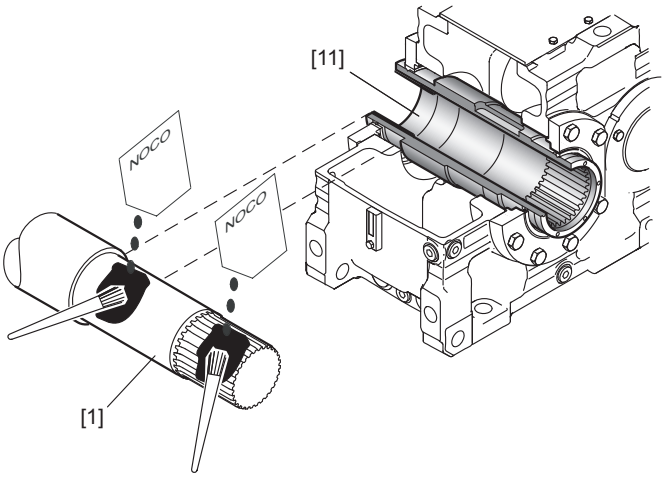
31960243/EN – 05/2024

Size X170 – 280

INFORMATION

- Included in the scope of delivery:
  - Retaining screws [3] and end plate [4].
- **Not** included in the scope of delivery:
  - Threaded rod [2], nut [5], retaining screw [6], ejector screw [8].

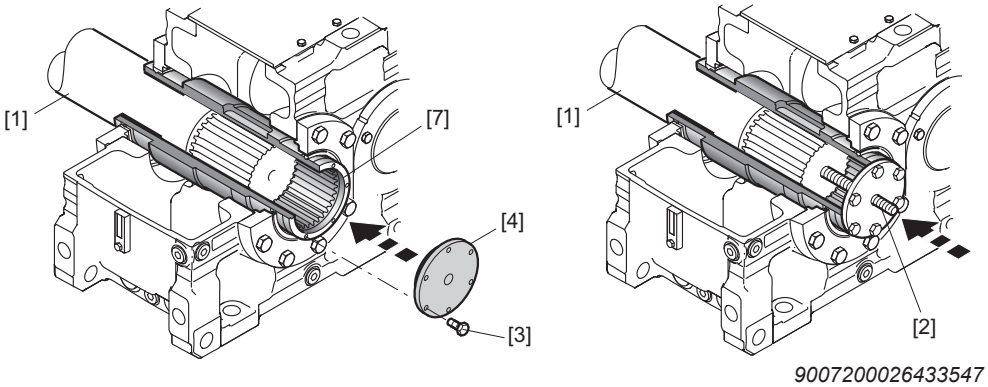
1. Apply some assembly paste, such as NOCO-Paste, to the machine shaft [1] in the area of the bushing [11] and the splining.



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[1] Machine shaft
[11] Bushing

2. Push the gear unit onto the machine shaft. The splining of the hollow shaft must mesh with the splining of the machine shaft.
3. Tighten the retaining screws [3] and screw the threaded rod [2] into the machine shaft [1]. Observe the following thread size of the threaded rod [2].



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[1] Machine shaft
[2] Threaded rod
[3] Retaining screws
[4] End plate
[7] Hollow shaft

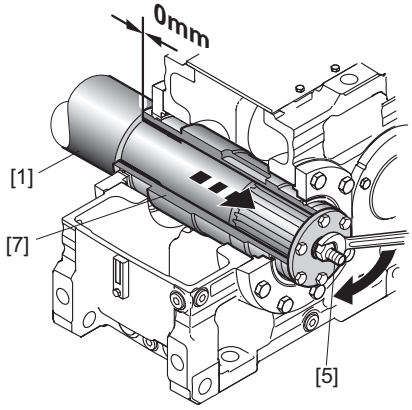
Size	Strength class 8.8
X..V170 – 230	M30
X..V240 – 280	M36

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Observe the following information about the retaining screws [3].

Size	Thread size for 6 × retaining screws [3] Strength class 10.9	Tightening torque	
		Assembly/ operating state Nm	Disassembly Nm
X..V170 – 190	M10x30	78	Tighten hand-tight
X..V200 – 230	M12x30	135	Tighten hand-tight
X..V240 – 280	M16x40	330	Tighten hand-tight

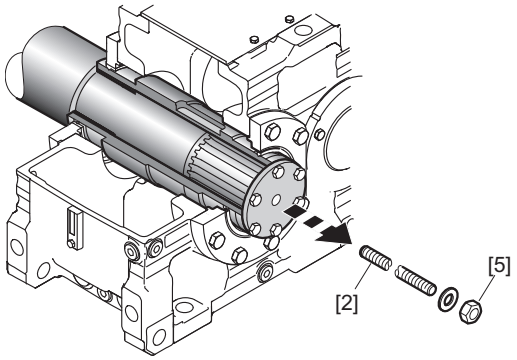
4. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulder of the machine shaft [1] and the hollow shaft meet.



771696651

[1] Machine shaft
[5] Nut
[7] Hollow shaft

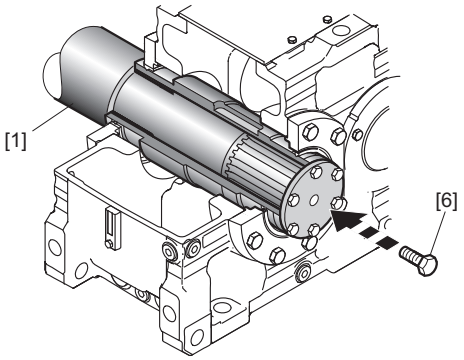
5. Loosen the nut [5]. Remove the threaded rod [2].



771752587

[2] Threaded rod
[5] Nut

6. Secure the machine shaft [1] with the retaining screw [6]. The retaining screw must also be locked with a suitable threadlocker. Observe the following information about the retaining screw [6].



771756683

[1] Machine shaft
[6] Retaining screw

Size	Strength class 8.8	Tightening torque in Nm Strength class 8.8
X..V170 – 230	M30	1590
X..V240 – 280	M36	2760

7. Mount the protection cover dust-tight to the gear unit.

6.12.4 Disassembling the gear unit from the machine shaft

NOTICE

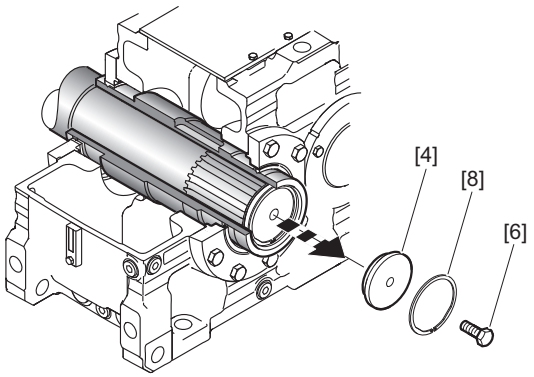
Incorrect disassembly of the gear unit from the machine shaft can damage bearings and other components.

Possible damage to property.

- During disassembly, you may only use the hollow shaft for support. Note that putting weight onto other gear unit parts can cause damage.

Sizes X100 – 160

1. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].

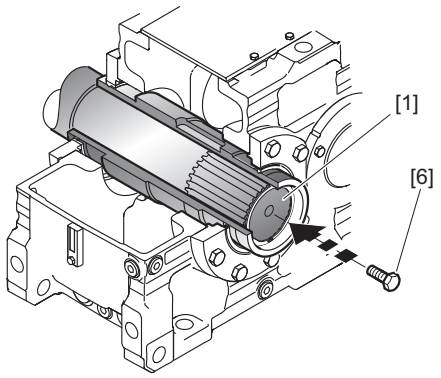


3053726603

[4] End plate
[6] Retaining screw
[8] Retaining ring

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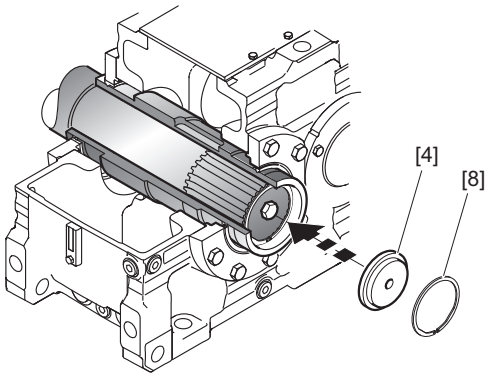
2. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



3240994059

[1] Machine shaft
[6] Retaining screw

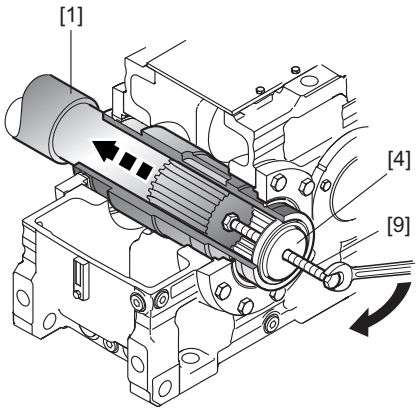
3. Turn the end plate [4] and reinstall the end plate [4] and the outer retaining ring [8].



3241265291

[4] End plate
[8] Retaining ring

4. Thread the ejector screw [9] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [9] and the thread in the end plate [4].

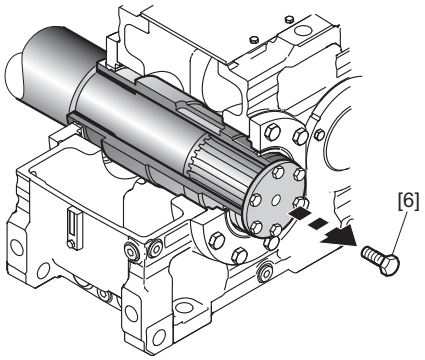


3241268107

[1] Machine shaft
[4] End plate
[9] Ejector screw

Size X170 – 280

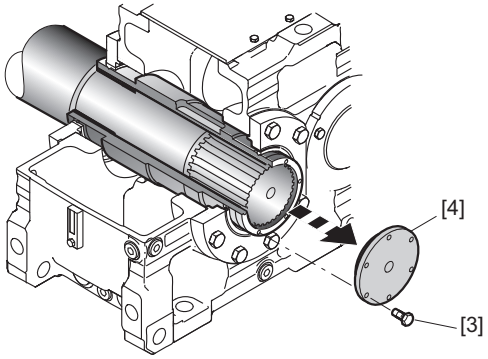
1. Loosen the retaining screw [6].



3241268619

[6] Retaining screw

2. Remove the retaining screws [3] and remove the end plate [4].

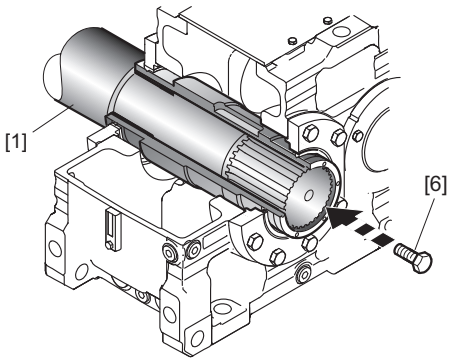


3241279627

[3] Retaining screw
[4] End plate

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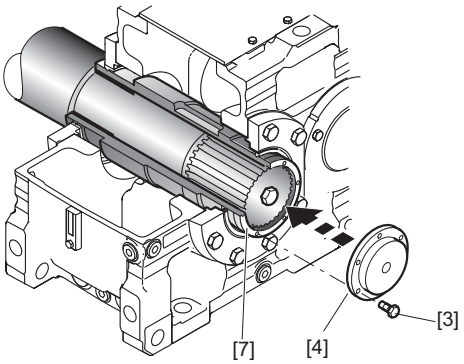
3. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



3241280139

[1] Machine shaft
[6] Retaining screw

4. For disassembly of the gear unit, use the retaining screws [3] to attach the end plate [4] centrically to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.

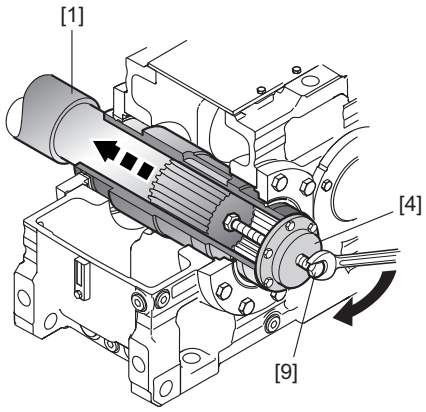


3241286923

[3] Retaining screw
[4] End plate
[7] Hollow shaft

31960243/EN – 05/2024

5. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [8] and the thread in the end plate [4].



3241365131

[1] Machine shaft
[4] End plate
[8] Ejector screw

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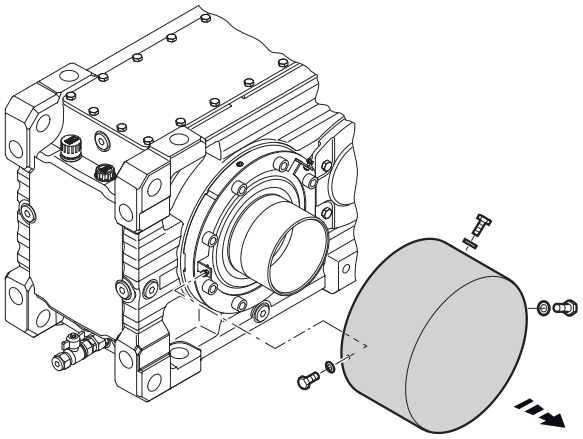
6.13 Output shaft with TorqLOC® /..T

6.13.1 General information

The material of the machine shaft should be dimensioned by the customer according to the loads that will occur (e.g. impact). The shaft material must have the following minimum yield point for transferring the nominal torque:

- 360 N/mm^2 for the sizes X..100 – X..210

6.13.2 Removing the protection cover



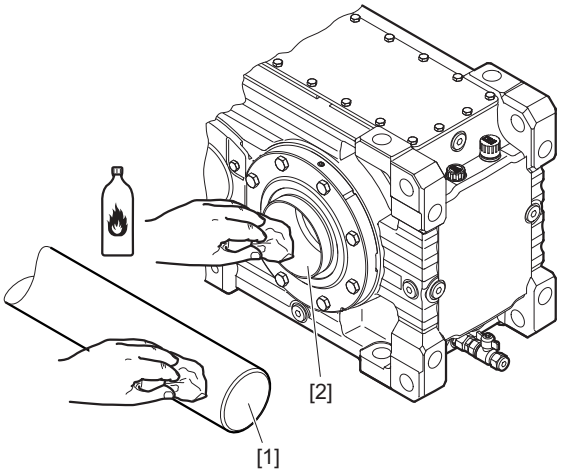
9007213490564363

Proceed as follows to disassemble the protection cover:

1. Remove the retaining screws holding the protection cover.
2. Remove the protection cover.

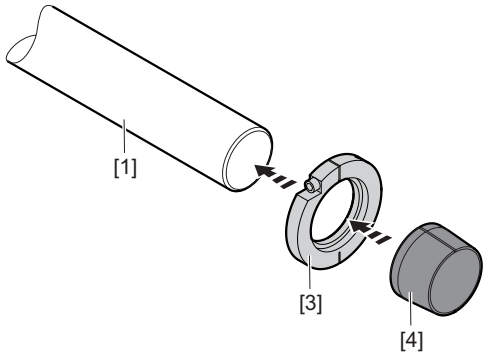
6.13.3 Mounting to customer shaft without shaft shoulder

1. Clean the customer shaft [1] and the inside of the hollow shaft [2]. Make sure that all grease and oil residues are removed.



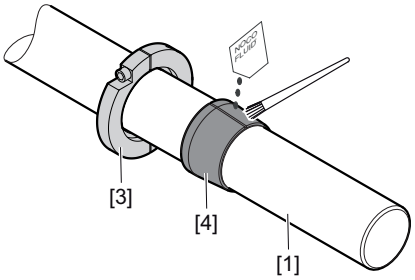
14226920971

2. Mount the stop ring [3] and the bushing [4] on the customer shaft.



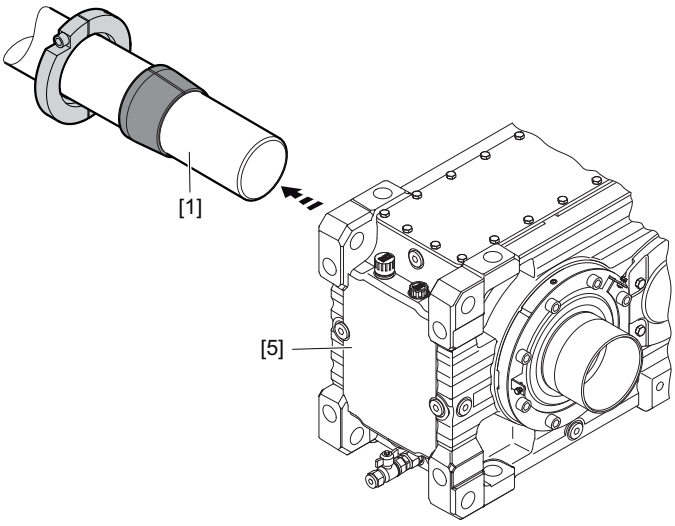
14226361483

3. Apply NOCO-Paste onto the bushing [4] and spread it thoroughly.



14226911243

4. Push the gear unit [5] onto the customer shaft.

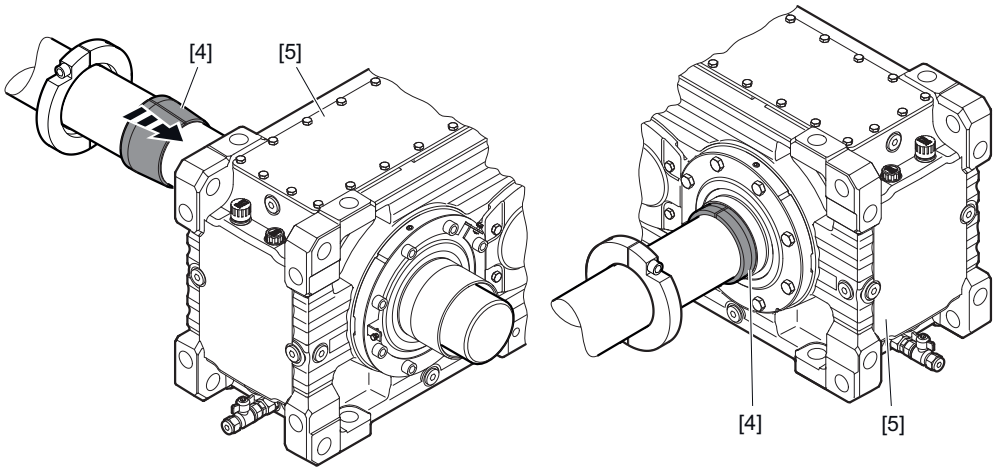


14226906379

5. Fasten the gear unit on the mounting surface (do not tighten the screws).

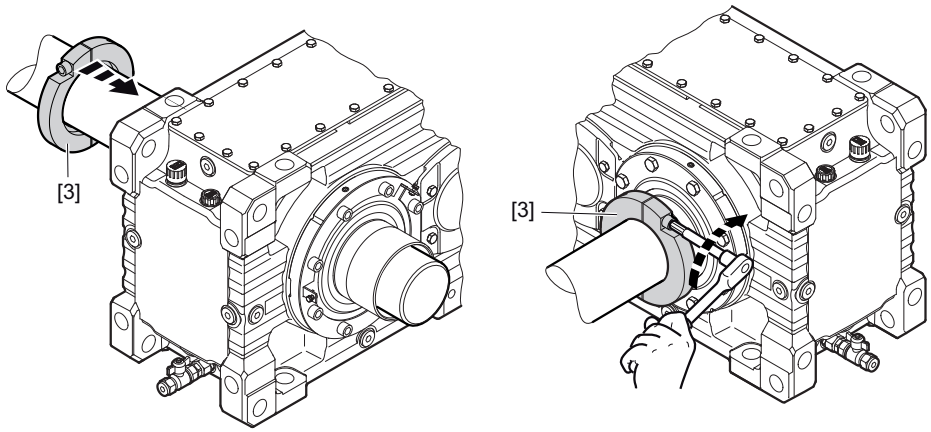
31960243/EN – 05/2024

6. Slide the bushing [4} into the gear unit [5] up to the stop.



14226908811

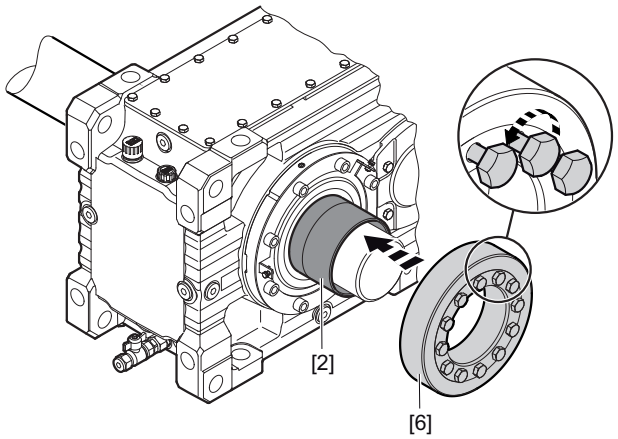
7. Secure the bushing with the stop ring [3]. Tighten the stop ring [3] to the bushing with the tightening torque listed in the following table.



14226363915

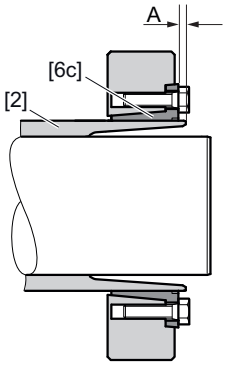
Size	Screw	Tightening torque Nm
XT100	M10	79
XT110	M10	79
XT120	M10	79
XT130	M12	116
XT140	M12	116
XT150	M16	285
XT160	M16	285
XT170	M16	285

8. ⚠ **CAUTION!** The shrink disk can slip when not tightened. Potential risk of crushing due to falling parts. Secure the shrink disk against slipping.
NOTICE! Tightening the locking screws without first installing a shaft may result in the hollow shaft being deformed. Possible damage to property. Never tighten the screws without the shaft installed.
Make sure that all locking screws are loosened and slide the shrink disk [6] onto the hollow shaft [2].



14226916107

9. Position the inner ring [6c] of the shrink disk to dimension A.

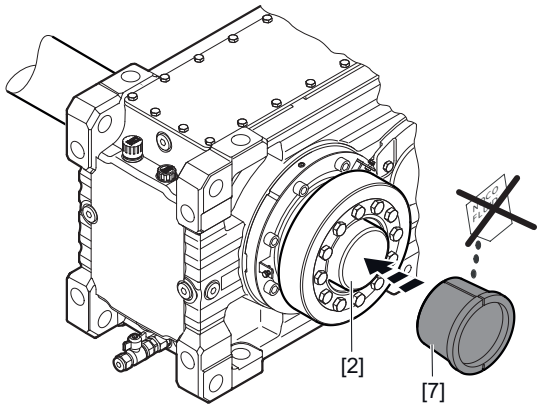


14382672779

Size	Dimension A in mm
X100	2.5
X110	4
X120	7
X130	7
X140	3
X150	5
X160	5
X170	10
X180	10
X190	10
X200	3
X210	3

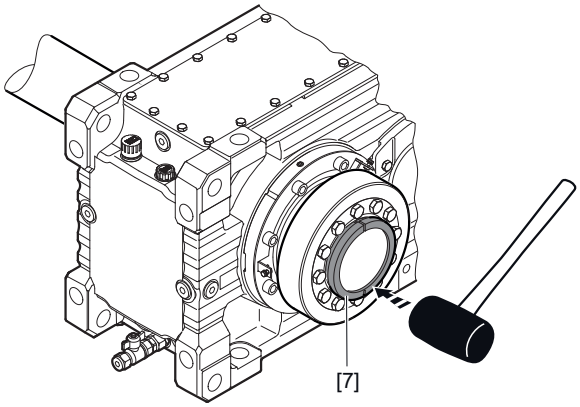
31960243/EN – 05/2024

10. Slide the counter bushing [7] onto the customer shaft and into the hollow shaft [2].



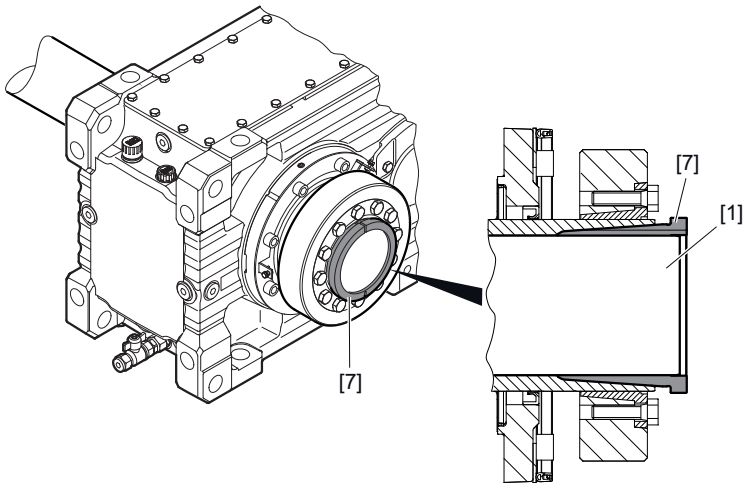
14226923403

11. Tap lightly on the flange of the counter bushing [7] to ensure that the bushing is fitted securely in the hollow shaft.



14226925835

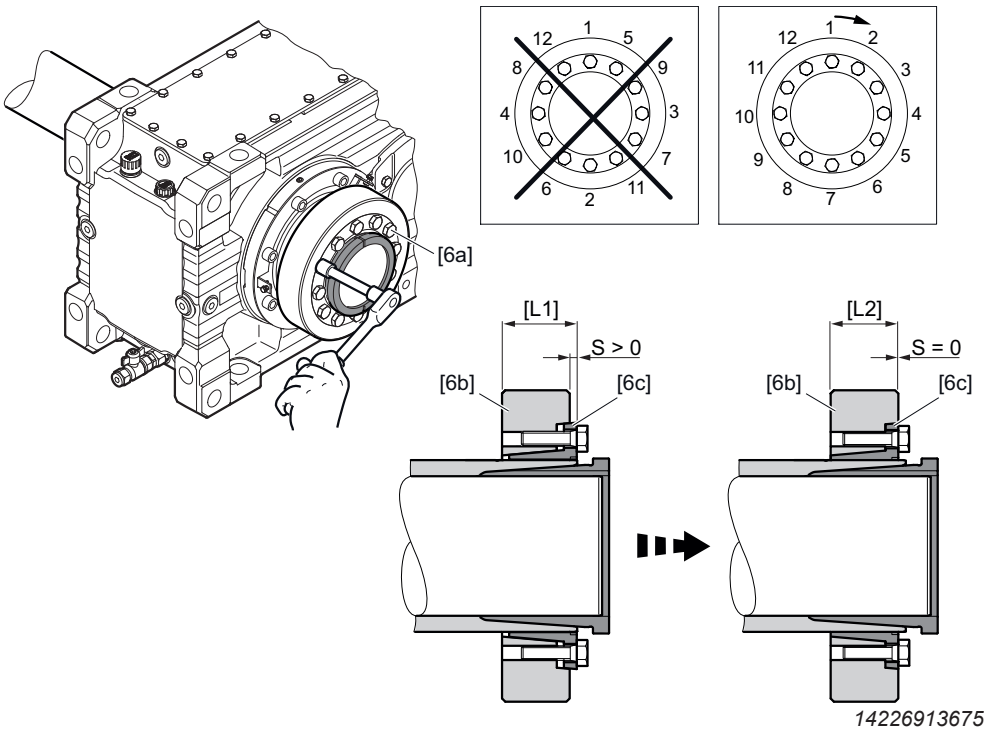
12. Make sure that the customer shaft is seated in the counter bushing.



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13. Tighten the locking screws [6a] of the shrink disk only manually. Align the taper (outer ring) [6b] parallel to the taper bushing (inner ring) [6c].



[6a] Locking screws
[6b] Outer ring
[6c] Inner ring
[L1] Delivery state (pre-assembled)
[L2] Completely assembled (ready for operation)

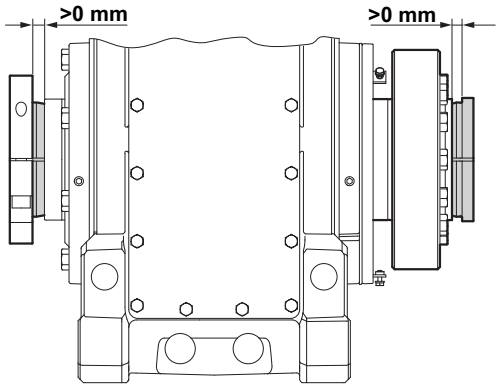
INFORMATION

If the taper (outer ring) and the taper bushing (inner ring) cannot be aligned on the face that holds the screws, disassemble the shrink disk again and carefully "clean/lubricate it sufficiently" (→ 🗎 145).

14. Tighten the locking screws clockwise (not in diametrically opposite sequence) by 1/4 revolution. Work around the ring in several stages, evenly tightening the locking screws by a quarter turn each until the taper (outer ring) [6b] and the taper bushing (inner ring) [6c] align on the face that holds the screws.

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15. The remaining gap between stop ring and hollow shaft end, as well as mating bushing and hollow shaft end must be > 0 mm.



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16. Tighten the retaining screws of the gear unit with the specified tightening torque. Refer to the operating instructions of the gear unit for the tightening torques.

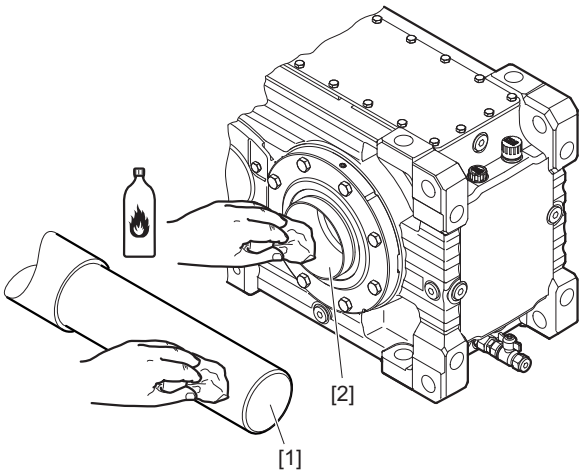
6.13.4 Mounting to customer shaft with shaft shoulder

If a shaft with shaft shoulder is used, the shaft shoulder must have a minimum height. For the dimensions for the shaft diameter at the shaft shoulder and at the shaft at the area of hollow shaft, refer to the following table.

Size	Ø shaft shoulder in mm	Ø area of hollow shaft in mm
X100	90	75
X110	95	80
X110	100	85
X120	105	90
X120	110	95
X130	115	100
X130	120	105
X140	125	110
X140	130	115
X150	130	115
X150	135	120
X150	140	125
X160	140	125
X160	145	130
X160	150	135
X170	145	130
X170	150	135
X170	155	140
X170	160	145
X180	155	140
X180	160	145
X180	165	150
X180	170	155
X180	175	160
X190	165	150
X190	170	155
X190	175	160
X200	170	155
X200	175	160
X200	180	165
X200	185	170

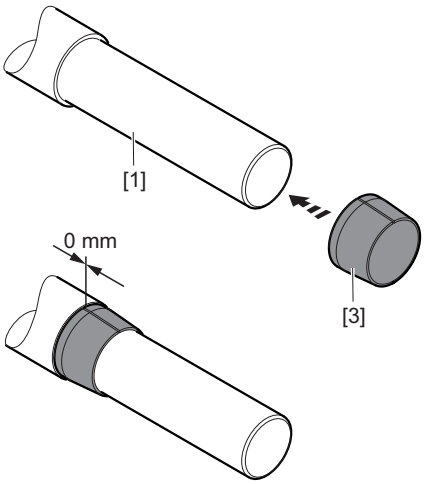
Size	Ø shaft shoulder in mm	Ø area of hollow shaft in mm
X200	190	175
X210	180	165
X210	185	170
X210	190	175
X210	195	180
X210	200	185

1. Clean the customer shaft and the inside of the hollow shaft. Make sure that all grease and oil residues are removed.



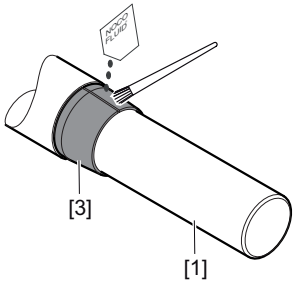
14227827083

2. Push the bushing onto the customer shaft up to the shaft shoulder.



14227829515

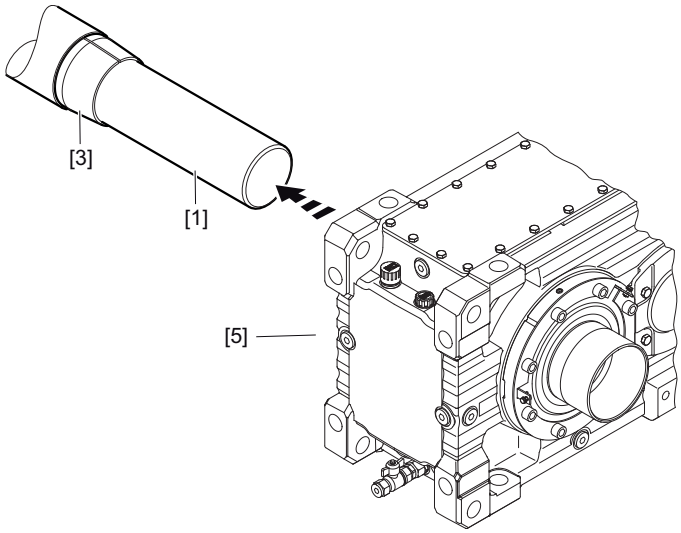
3. Apply NOCO-Paste onto the bushing and spread it thoroughly.



14227831947

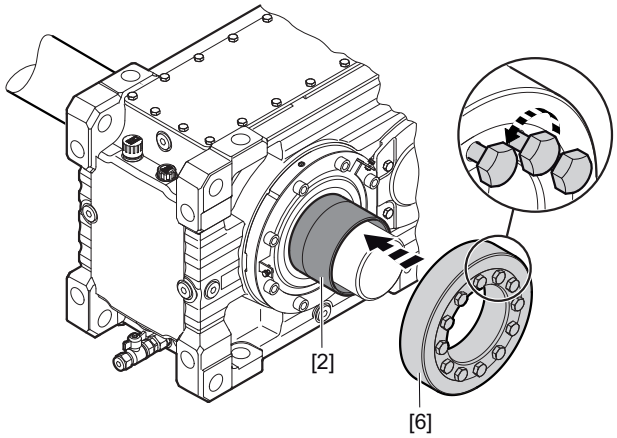
31960243/EN – 05/2024

4. Push the gear unit [5] onto the customer shaft up to the stop.



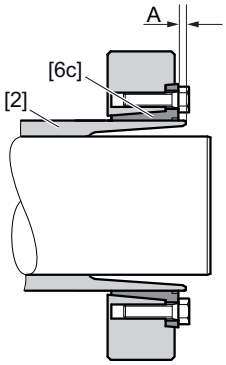
14227834379

5. Fasten the gear unit on the mounting surface (do not tighten the screws).
6. ⚠ **CAUTION!** The shrink disk can slip when not tightened. Potential risk of crushing due to falling parts. Secure the shrink disk against slipping.
NOTICE! Tightening the locking screws without first installing a shaft may result in the hollow shaft being deformed. Possible damage to property. Never tighten the screws without the shaft installed.
Make sure that all locking screws are loosened and slide the shrink disk [6] onto the hollow shaft [2].



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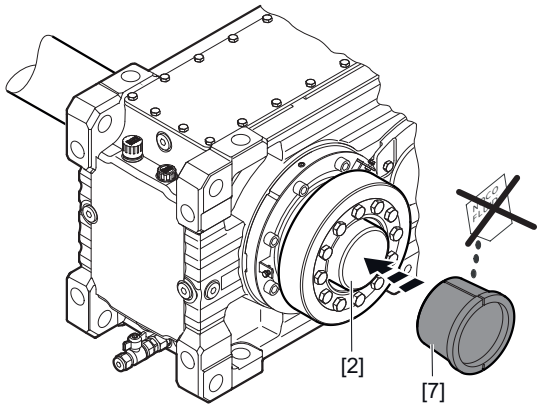
7. Position the inner ring [6c] of the shrink disk to dimension A.



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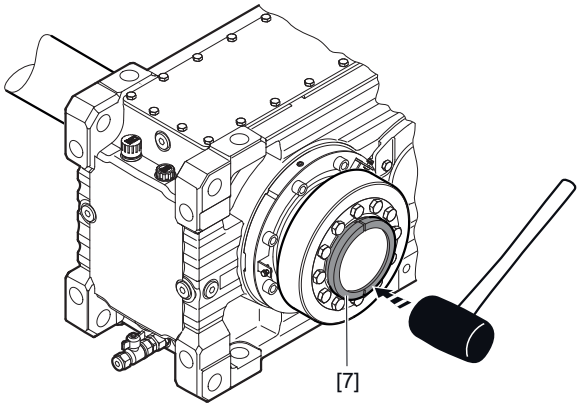
Size	Dimension A in mm
X100	2.5
X110	4
X120	7
X130	7
X140	3
X150	5
X160	5
X170	10
X180	10
X190	10
X200	3
X210	3

8. Slide the counter bushing [7] onto the customer shaft and into the hollow shaft [2].



14226923403

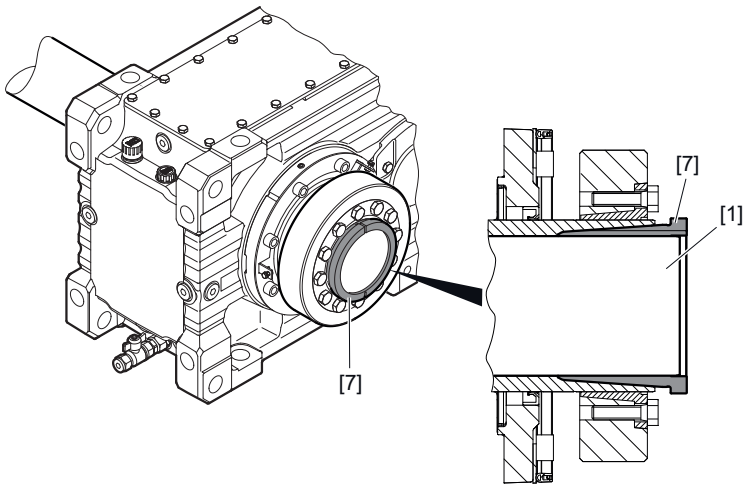
9. Tap lightly on the flange of the counter bushing [7] to ensure that the bushing is fitted securely in the hollow shaft.



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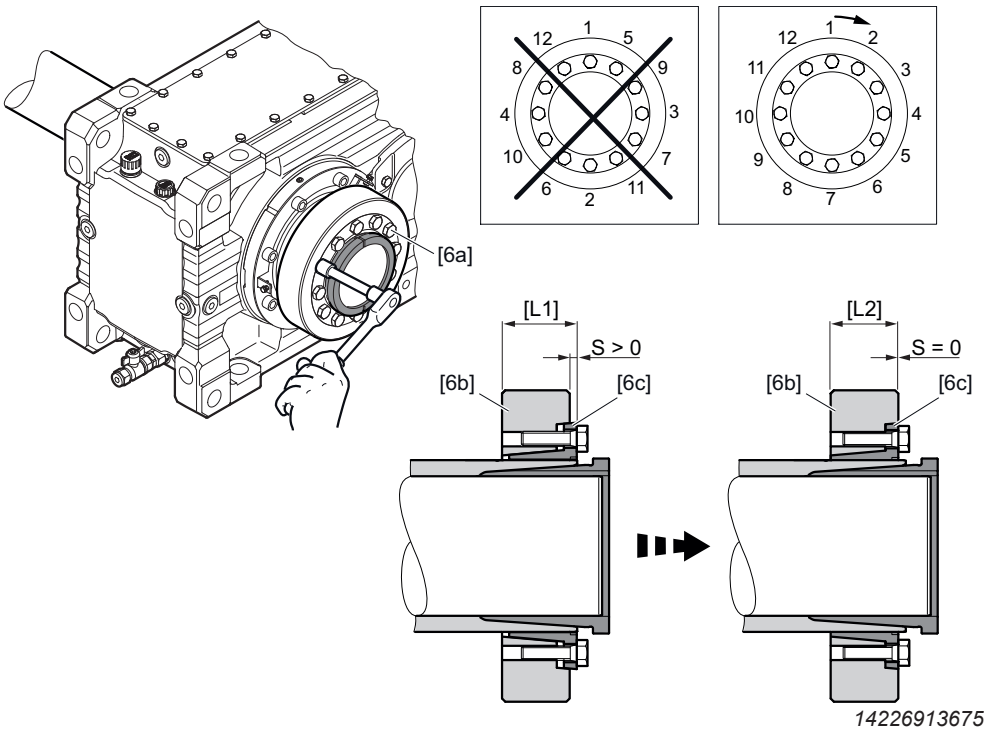
31960243/EN – 05/2024

10. Make sure that the conical bushing [7] is pushed into the shaft until there is no play between the customer's shaft [1], bushing [7], and hollow shaft.



14226918539

11. Tighten the locking screws [6a] of the shrink disk only manually. Align the taper (outer ring) [6b] parallel to the taper bushing (inner ring) [6c].



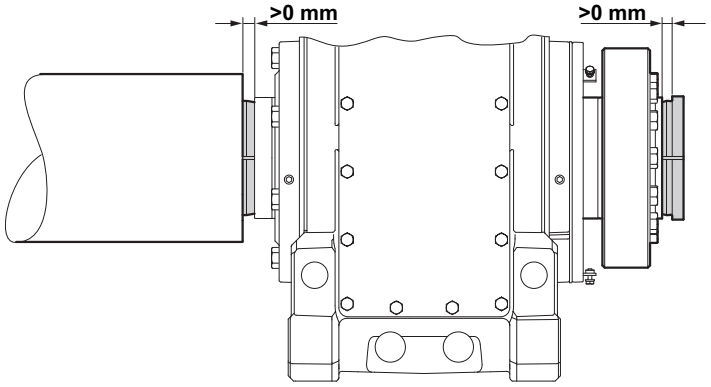
14226913675

[6a] Locking screws
[6b] Outer ring
[6c] Inner ring
[L1] Delivery state (pre-assembled)
[L2] Completely assembled (ready for operation)

INFORMATION

If the taper (outer ring) and the taper bushing (inner ring) cannot be aligned on the face that holds the screws, disassemble the shrink disk again and carefully "clean/lubricate it sufficiently" (→ 🗎 145).

12. Tighten the locking screws clockwise (not in diametrically opposite sequence) by a quarter turn each. Work around the ring in several stages, evenly tightening the locking screws [10] by a quarter turn until the taper (outer ring) [9a] and the taper bushing (inner ring) [6c] align on the face that holds the screws as is shown in the illustration below.
13. The remaining gap between bushing and hollow shaft end, as well as mating bushing and hollow shaft end must be > 0 mm.



14299101579

14. Tighten the retaining screws of the gear unit with the specified tightening torque. For the tightening torque, refer to the operating instructions of the gear unit.

6.13.5 Disassembling the customer shaft

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.

Proceed as follows:

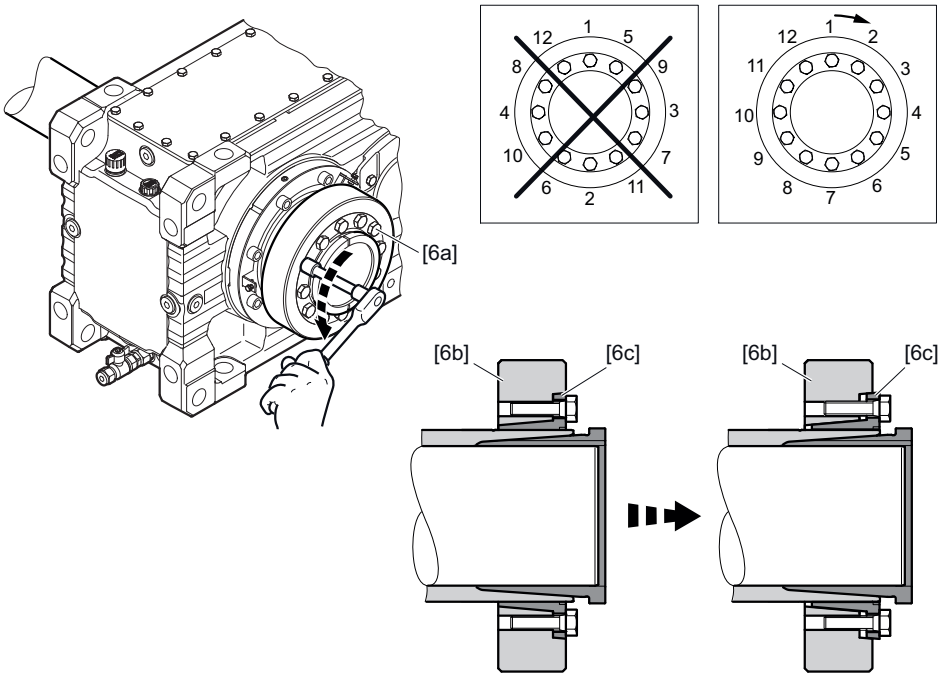
1. Loosen the locking screws [6a] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION

If the taper (outer ring) [6b] and the taper bushing (inner ring) [6c] do not loosen by themselves:

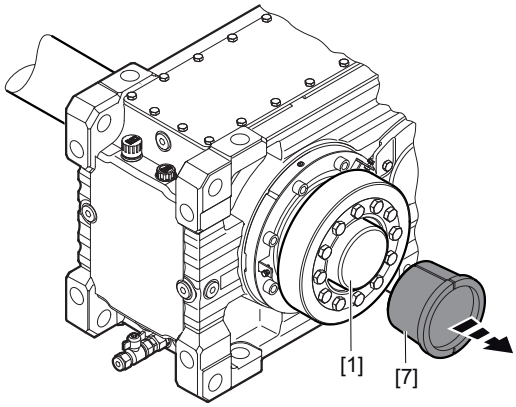
Take the necessary number of screws and screw them evenly into the disassembly bores. Tighten the clamping screws in several steps until the tapered bushing separates from the tapered ring.

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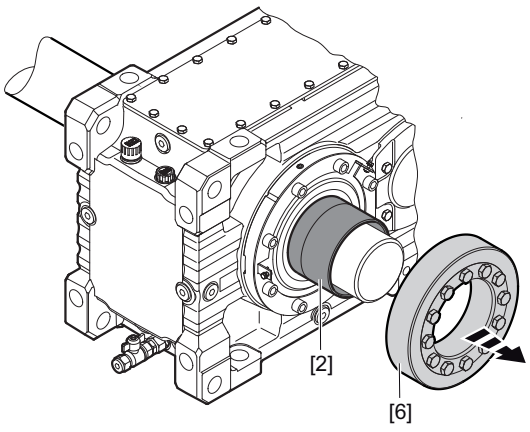
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2. Remove the conical steel bushing [7]. If the steel bushing is locked, use a puller for the disassembly.



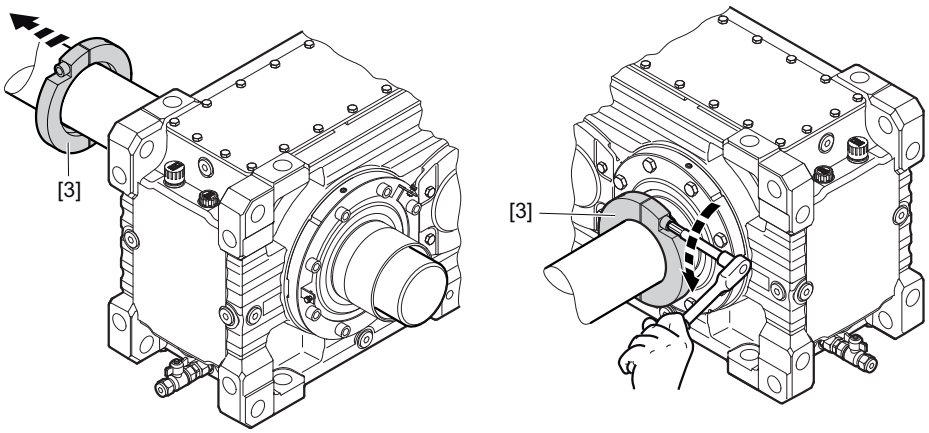
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3. Remove the shrink disk [6] from the hollow shaft [2].



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4. Loosen the retaining screw of the stop ring [3] and remove the stop ring [3] from the gear unit.

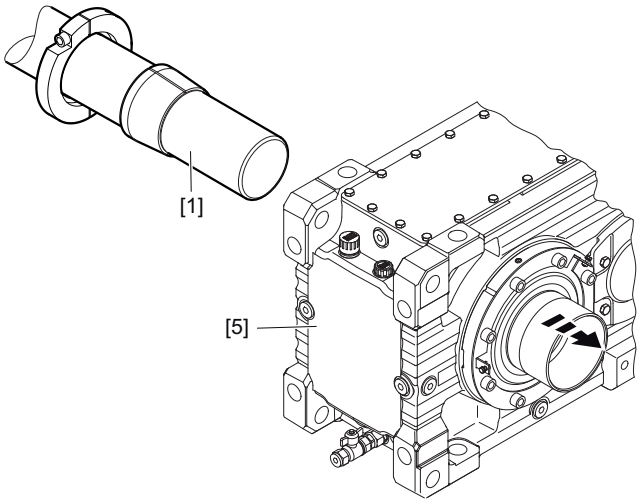


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INFORMATION

The removal of the stop ring is not necessary for customer shafts with shaft shoulder.

5. Remove the retaining screws of the gear unit.
6. Remove the gear unit [5] from the customer shaft [1].



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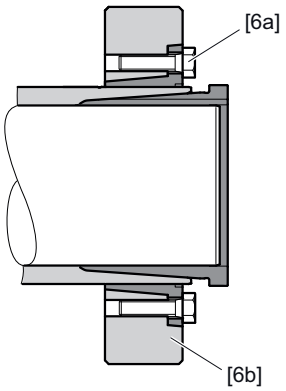
6.13.6 Cleaning and lubricating the shrink disk

Before reassembly, clean and lubricate the shrink disk.

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

INFORMATION

- If the tapered surfaces of the shrink disk are damaged, the shrink disk can no longer be used. Replace the shrink disk.

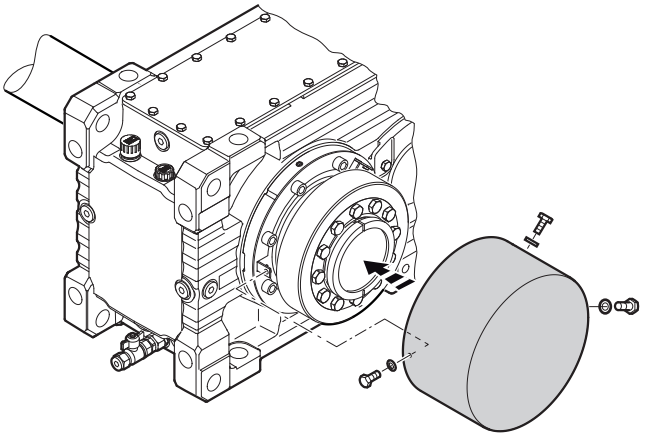


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[6a] Locking screws
[6b] Taper (outer ring)

1. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.
2. Apply an MoS_2 compound onto the threads and under the screw heads of the locking screws [6a], for example "gleitmo 100" from FUCHS LUBRITECH (www.fuchs-lubritech.com).
3. Also evenly lubricate the tapered surface of the taper (outer ring) [6b] with a thin layer of an MoS2 compound.

6.13.7 Installing the protection cover



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Proceed as follows to mount the protection cover:

1. Push the protection cover onto the gear unit.
2. Align the protection cover. The bolt holes of the protection cover must be in alignment with the retaining nuts.
3. Insert the retaining screws with washers and tighten the screws.
4. Check whether the protection cover is dust-tight and properly mounted to the gear unit.

6.14 Torque arm /T



⚠ WARNING

Insufficiently secured gear units can fall down during disassembly and assembly to the customer machine.

Severe or fatal injuries.

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

NOTICE

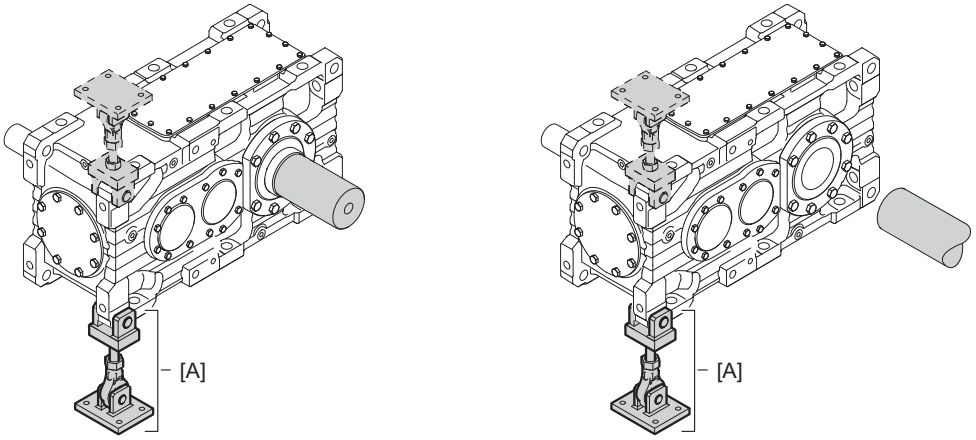
Danger due to overhung loads acting on the torque arm.

Possible damage to the gear unit.

- The torque arm can only transfer tensile/compressive forces in the direction of support. Overhung loads can damage the gear unit.

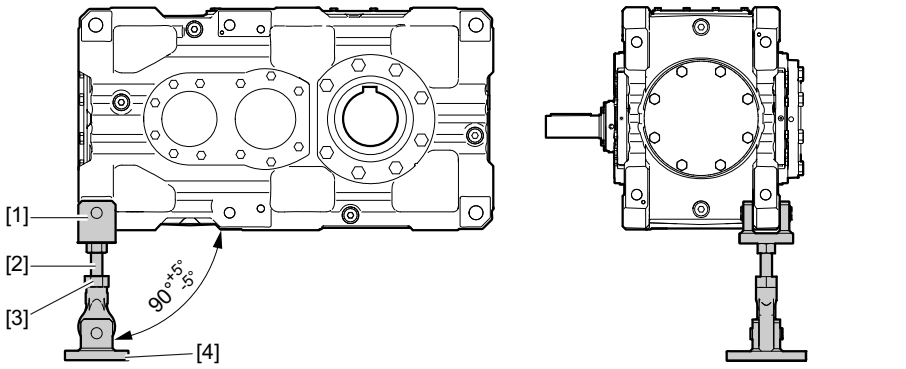
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To keep the bending moments on the machine shaft as low as possible, always mount the torque arm [A] on the side of the driven machine. The torque arm can be mounted on the top or bottom of the gear unit.



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1. Lift the gear unit with a suitable lifting device.
2. Mount the gear unit output shaft to the customer machine.
3. Mount the torque arm on the gear unit.
4. **NOTICE!** Make sure that the stud bolt [2] is simultaneously screwed into the yoke head [1] and joint head [3]. Possible damage to property. The stud bolt [2] must be screwed evenly into the yoke head [1] and joint head [3] by at least once the length of the thread diameter.

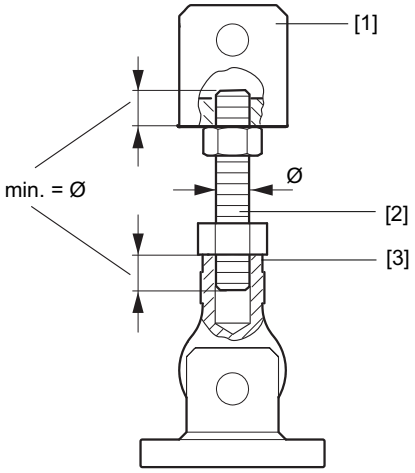


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[1] Yoke head with bolt
[2] Stud bolt with nuts
[3] Joint head
[4] Yoke plate with bolt

5. Use the lifting device to position the gear unit horizontally above the customer's mounting position.

6. Adjust the length of the stud bolt by turning the yoke plate in such a way that the base plate rests on the ground without play. Also observe the tolerances in chapter "Permitted deviation of the mounting position during installation" (→ 🗎 84).



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[1] Yoke head with bolt
[2] Stud bolt with nuts
[3] Joint head

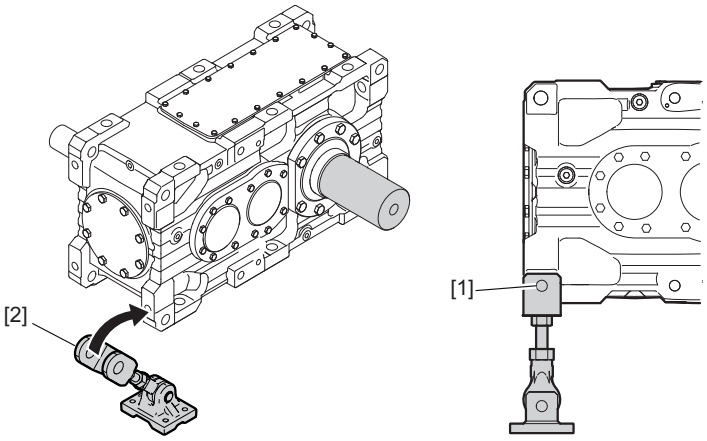
7. Use this position of the yoke plate to define the fastening points.
8. After the alignment process, tighten the nuts with the tightening torques listed in the following table.

Size	Screw/nut	Tightening torque
		Nm
X100 – 110	M20	140
X120 – 130	M24	140
X140 – 150	M24	140
X160 – 190	M36	200
X200 – 230	M42	350
X240 – 280	M48	500

9. The yoke plate can be mounted on the customer's mounting surface using suitable fasteners.

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10. To ensure that only tensile and compressive forces are transmitted, it is recommended to check this. For checking, you can detach the torque arm from the gear unit (remove bolt from [2]) and tilt it outwards and back inwards. The torque arm is adjusted correctly if the bolt [1] can be mounted without the yoke head [2] touching the gear unit.



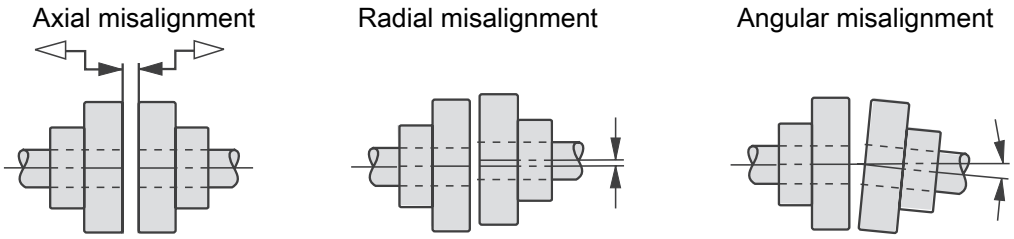
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11. Fasten the yoke head [2] with the bolt [1].
12. Remove the lifting device from the gear unit.

6.15 Aligning couplings/assembly tolerances

6.15.1 Aligning the coupling

Adjust the following misalignments when mounting couplings.



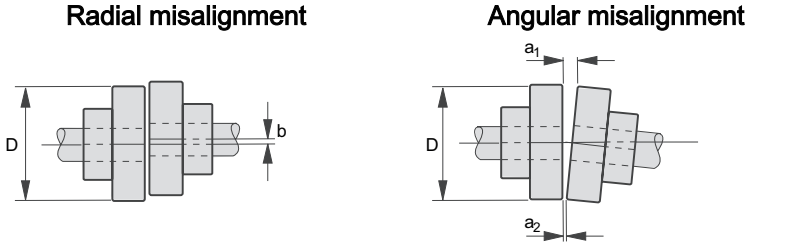
Use a laser-optical alignment system to align the coupling as accurately as possible.

6.15.2 Mounting tolerances

Observe the following points.

- The table values for radial misalignment and angular misalignment apply to common mechanical couplings, such as elastic claw couplings or couplings with a 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.



b = Max. radial misalignment
D = Outer diameter

a_1 - a_2 = Max. angular misalignment

The installation tolerances stated in the 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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6.16 Motor mounting on a gear unit

The gear unit with motor adapter must be installed in such a way that no liquids can enter the motor adapter (HSS end) and accumulate there. Otherwise there is a risk that the respective oil seal can be damaged and subsequent damage could create a potential ignition source.

An elastic claw coupling is included in the scope of delivery.

6.16.1 Maximum permitted motor weight

Check the following 2 criteria when mounting a motor to the gear unit:

1. Maximum motor weight depending on gear unit design and mounting type
2. Maximum motor weight depends on motor adapter size

→ The motor weight must not exceed either of the two criteria.

1. Maximum motor weight depends on gear unit design and mounting type



INFORMATION

- The following tables apply only to stationary applications. For mobile applications (e.g. travel drives), contact SEW-EURODRIVE.
- Contact SEW-EURODRIVE in case of deviating mounting positions/mounting surfaces.

The following applies to all tables:

G_M = Motor weight

G_G = Gear unit weight

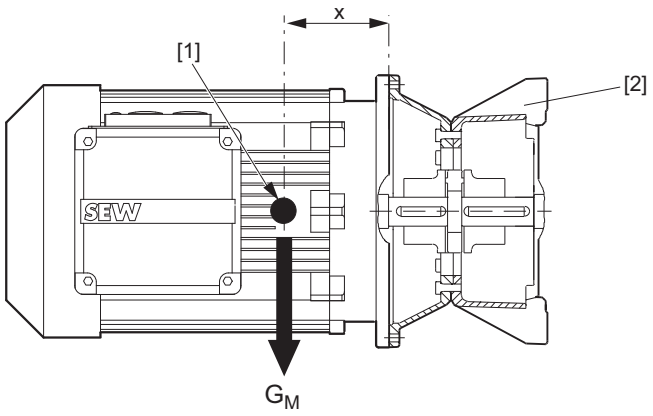
Gear units in mounting position M1/M3

Type of mounting	
Foot-mounted X../ B	$G_M \leq 1.75\ G_G$
Shaft-mounted X../ T	$G_M \leq 1.5\ G_G$
Flange-mounted X../ F	$G_M \leq 0.5\ G_G$

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2nd Maximum motor weight depends on motor adapter size

The following maximum loads on the motor adapter must not be exceeded.



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[1] Center of gravity of the motor
[2] Motor adapter
X = Center of gravity distance
G_M = Weight of the mounted motor

INFORMATION

The table only applies to stationary applications. For mobile applications (e.g. travel drives), contact SEW-EURODRIVE.

Motor adapter		G_M	X
IEC	NEMA	kg	mm
100/112	182/184	60	190
132	213/215	110	230
160/180	254/286	220	310
200	324	280	340
225	326	400	420
250/280	364 – 405	820	480
315S-L	444 – 449	1450	680
315		2000	740
355		2500	740

If the center of gravity distance **X** is increased, the maximum permitted weight G_M must be reduced linearly. G_M cannot be increased if the center of gravity distance is reduced.

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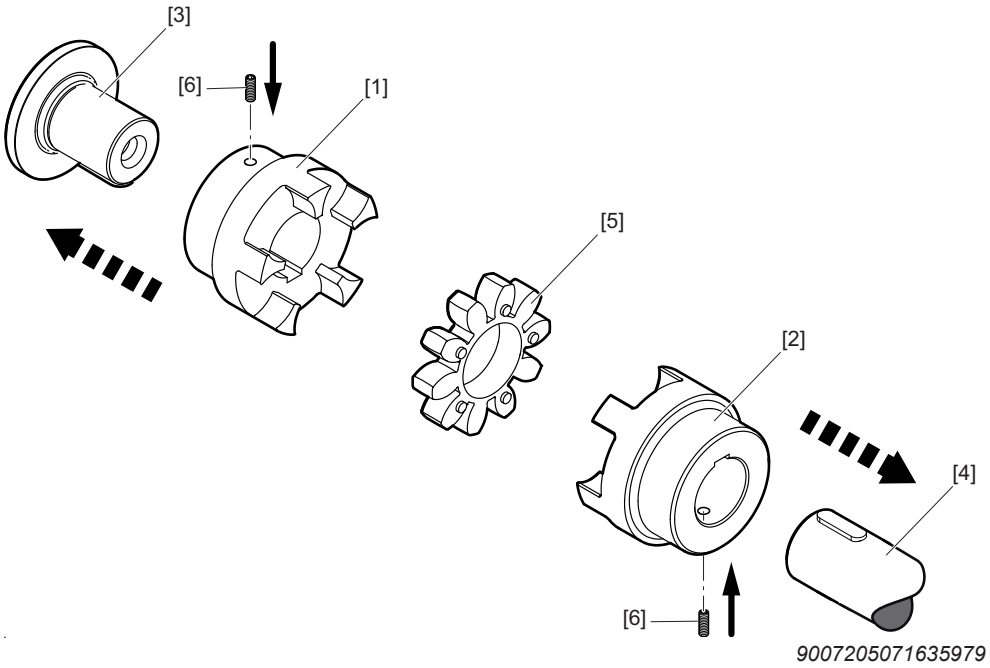
6.16.2 Claw coupling

Observe the operating instructions of the respective coupling manufacturer.

You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

Torsionally flexible jaw-type coupling

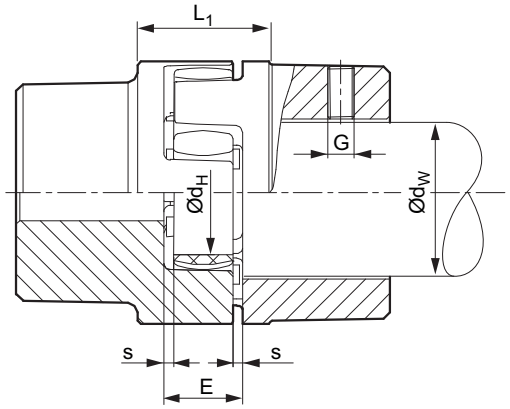
Mounting the coupling



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1. **NOTICE!** Improper assembly may damage the hubs [1][2]. Possible damage to property. Heat the hub to about 80 °C to facilitate mounting.
   Mount the hubs [1][2] onto the input and output shafts [3][4].
2. Insert the spider [5] or DZ elements into the cam section of the input and output hubs [1][2].

3. **NOTICE!** Improper mounting can damage the coupling. Possible damage to property. During assembly, it is essential to observe dimension E so that the spider remains axially flexible during operation. The dimension E is listed in the following table.
   Move the gear unit/motor in axial direction until dimension **E** is reached. If the gear unit and motor have already been installed permanently, set dimension **E** by moving the hubs [1][2] axially on the input and output shafts [3][4].



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4. Secure the hubs by tightening the set screws [6].

Coupling size	Mounting dimensions			Retaining screw	
	E mm	s mm	d_H mm	G	Tightening torque Nm
14	13	1.5	10	M4	1.5
19	16	2	18	M5	2
24	18	2	27	M5	2
28	20	2.5	30	M8	10
38	24	3	38	M8	10
42	26	3	46	M8	10
48	28	3.5	51	M8	10
55	30	4	60	M10	17
65	35	4.5	68	M10	17
75	40	5	80	M10	17
90	45	5.5	100	M12	40
100	50	6	113	M12	40
110	55	6.5	127	M16	80
125	60	7	147	M16	80
140	65	7.5	165	M20	140
160	75	9	190	M20	140
180	85	10.5	220	M20	140

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Misalignment – Aligning the coupling

NOTICE

Improper mounting of the coupling may result in damage.

Possible damage to property.

- The shaft ends must be aligned accurately to ensure a long service life of the coupling. It is essential that you adhere to the specified displacement values, see manufacturer documentation. Exceeding these values will damage the coupling. Exact coupling alignment increases its service life.

Displacement values

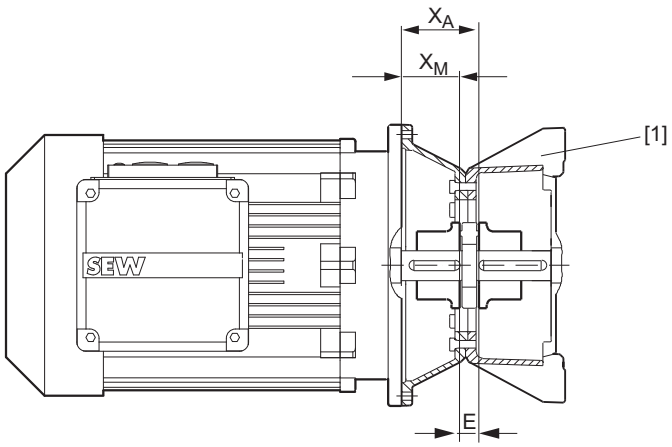
The following table shows the displacement values:

Coupling size	Max. axial displacement ΔK_a in mm		Max. radial misalignment ΔK_r in mm		Angular displacement ΔK_w for n = 1500 min^{-1}		Angular displacement ΔK_w for n = 3000 min^{-1}	
	(-)	(+)	1500 min^{-1}	3000 min^{-1}	Degree	mm	Degree	mm
14	-0.5	1.0	0.17	0.11	1.2	0.67	1.1	0.60
19	-0.5	1.2	0.20	0.13	1.2	0.82	1.1	0.70
24	-0.5	1.4	0.22	0.15	0.9	0.85	0.8	0.75
28	-0.7	1.5	0.25	0.17	0.9	1.05	0.8	0.85
38	-0.7	1.8	0.28	0.19	1.0	1.35	0.9	1.1
42	-1.0	2.0	0.32	0.21	1.0	1.7	0.9	1.4
48	-1.0	2.1	0.36	0.25	1.1	2.0	1.0	1.6
55	-1.0	2.2	0.38	0.26	1.1	2.3	1.0	2.0
65	-1.0	2.6	0.42	0.28	1.2	2.7	1.1	2.3
75	-1.5	3.0	0.48	0.32	1.2	3.3	1.1	2.9
90	-1.5	3.4	0.5	0.34	1.2	4.3	1.1	3.8
100	-1.5	3.8	0.52	0.36	1.2	4.8	1.1	4.2
110	-2.0	4.2	0.55	0.38	1.3	5.6	1.2	5.0
125	-2.0	4.6	0.6	–	1.3	6.5	–	–
140	-2.0	5.0	0.62	–	1.2	6.6	–	–
160	-2.5	5.7	0.64	–	1.2	7.6	–	–
180	-3.0	6.4	0.68	–	1.2	9.0	–	–

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6.16.3 Attaching the motor to the motor adapter

1. Clean the motor shaft and flange surfaces of the motor and the motor adapter. These must be dry and free of grease!
2. To avoid contact corrosion, apply some assembly paste, for example NOCO®-Paste to the motor shaft.
3. Push the coupling half onto the motor shaft and position it. When doing this, observe the information in chapter "Claw coupling" (→ 🗎 153) and the figure below. The coupling size and the type are noted on the coupling.



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[1]	Motor adapter	XA	Distance of the coupling to the flange surface of the motor adapter
E	Mounting dimension → XM = XA - E	XM	Distance of the coupling to the flange surface of the motor

4. Secure the coupling half using the set screw.
5. Mount the motor onto the motor adapter, making sure that the claws of the coupling engage each other.

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6.17 Fan /FAN

Ensure that the following requirements have been met:

- Never operate the gear unit if the fan guard is not installed.
- Protect the fan guard against damage from the outside.
- Keep the air inlet of the fan clear.
- Check that the air intake is kept free and that it is within the specified angle. For further information, refer to chapter "Fan /FAN".
- If protective devices for couplings or similar are installed on gear units equipped with a fan, sufficient clearance must be provided for the intake of cooling air. Refer to the order-specific dimension sheet for the required distance. Refer to the overall documentation for the gear unit.

Note the following tightening torques when installing the fan guard:

Screws/nuts	Tightening torque Strength class 8.8 Nm
M6	12
M8	28
M10	56
M12	96

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6.18 Water cooling cartridge /CCT

6.18.1 Notes on connection/installation

NOTICE

Improper mounting of the water cooling cover may result in damage to the gear unit.

Possible damage to property.

- Using thread seal tape on the pipe threads increases the resistance between the connection parts as well as the risk of cracking in the casting parts of the water cooling cartridge. Do not tighten the threads so tightly.
- For connecting the water cooling cartridge, use only piping and mounting parts of the same or compatible material.
- Make sure the cooling water pressure does not exceed 10 bar.
- In the event of frost or longer idle states, drain the cooling water from the cooling circuit. Use compressed air to remove any remaining water.
- Check the water cooling cartridge for soiling and foreign objects in the pipe connection to ensure unobstructed flow of the media.
- Avoid stresses on the connection points when connecting the piping system. Support the pipes properly, if necessary.

The following measures are recommended by SEW-EURODRIVE to ensure proper functioning in different systems:

- Install a safety valve in the cooling water supply pipe for protection against severe deviations in the flow rate or pressure.
- Install a filter into the cooling water supply pipe, especially if the cooling water is obtained from sources other than the municipal water supply system.
- Install an automatic throttle valve in the respective inlet to compensate for overpressure.
- Filtering to 100 µm is recommended.

6.18.2 Technical data

Adhere to the following values in the table. Do not exceed these values. Lower values are permitted. Also observe the information in the order-specific documents.

The cooling water quantity has to be dimensioned individually for each cooling cartridge.

Twice the cooling water flow rate is required when using 2 cooling cartridges

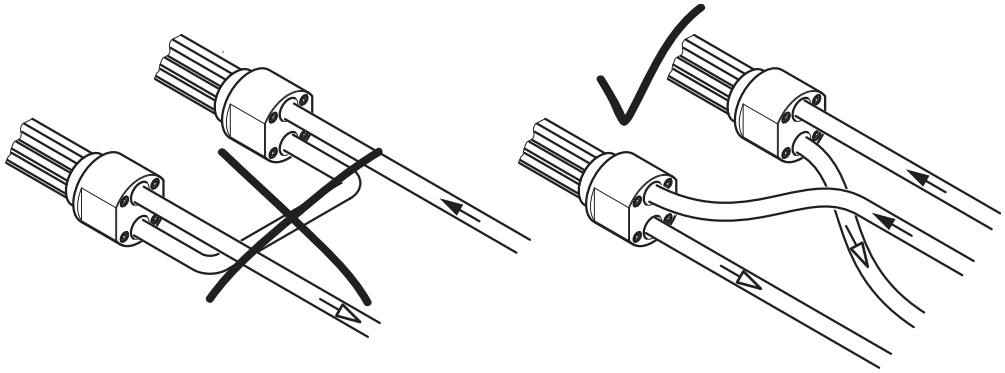
Size	Max. cooling water volume flow l/min	Max. water pressure bar
X100 – 110	11	10
X120 – 130	11	10
X140 – 150	15	10
X140 – 150	15	10
X140 – 150	15	10
X160 – 170	15	10
X180 – 190	28	10
X200 – 210	28	10
X220 – 230	28	10
X240 – 250	28	10

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Size	Max. cooling water volume flow l/min	Max. water pressure bar
X260 – 280	25	10

6.18.3 Procedure

1. Observe the information about cooling water temperature and flow rate. You can find it in the order documents.
2. Install the cooling water outlet pipe in such a way that the water cooling cartridge is permanently flooded by cooling water.
3. The water cooling cartridge is not equipped with a water drain. Install a drain on the cooling water outlet to ensure proper draining of the cooling water in the event of repair work.
4. Connect the water cooling cartridge to the existing cooling circuit. With 2 water cooling cartridges, connect the water cooling cartridges parallel to the cooling circuit, see the following figure.



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← Supply (cold water inflow)

→ Return (warm water outflow)

5. The flow direction of the cooling water is arbitrary. Two bores with pipe threads are available for connection to the cooling circuit.

Size	Pipe thread
X100 – 130	1"
X140 – 170	1 1/4"
X180 – 250	1 1/2"
X260 – 280	2"

6.18.4 Requirements on the water quality

INFORMATION

Contact SEW-EURODRIVE if fully desalinated or demineralized water is used as cooling medium.

The following requirements on the water quality are recommendations. In exceptional cases, certain concentrations of substances of content might cause unforeseen reactions.

The quality of the water as well as its substances are important factors for assessing the cooling water available for water cooling cartridges. The water quality is determined by the water hardness and the pH value of the water.

Water hardness

Water hardness is defined by the amount of hardeners (carbonates and bicarbonates) in the water. Particularly at higher temperatures, the hardeners accumulate to the surface of the water cooling cartridge and lead to a reduction in performance. In case of very hard water, these deposits must be taken into account when designing the water cooling cartridge.

The following table shows the classification of German degrees of hardness to water quality °dH:

Degree of hardness[1)]	Water quality
0 – 5 °dH	Very soft water
5 – 10 °dH	Soft water
10 – 20 °dH	Medium hard water
20 – 30 °dH	Hard water
> 30 °dH	Very hard water

1) 10 mg/l of hardener corresponds to 1 °dH

pH value

The water cooling cartridge partially consists of a copper and nickel alloy, to which the following applies:

- Corrosion issues when **pH value is < 6**
- The following applies to alkaline water:

  → Corrosion problems when **water hardness is < 6°dH**.

  Lower values can lead to corrosion due to free carbon dioxide.

  The following table describes the classification of the water quality based on the pH value:

pH value	Water quality
4.5	Strongly acidic
4.5 – 6.0	Acidic
6.0 – 6.8	Slightly acidic
7.0	Neutral
7.2 – 7.7	Slightly alkaline
7.7 – 8.2	Alkaline
8.2	Strongly alkaline

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Cooling water assessment based on water substances

The following table provides an overview of the resistance of copper-nickel pipes to water content in non-drinking water.

Evaluation criterion	Approximate concentration mg/l	Evaluation CuNi10Fe1Mn
pH value	< 6	0
	6 to 9	+
	> 9	0
Chloride	to 1000	+
	> 1000	+ (< 25000 mg/l)
Sulfate	Up to 70	+
	70 to 300	+
	> 300	+ (< 25000 mg/l)
Nitrate	Up to 100	+
	> 100	0
Free (aggressive) carbon dioxide	Up to 20	+
	20 to 50	0
	> 50	–
Oxygen	Up to 2	+
	> 2	+
Ammonium	Up to 2	+
	2 to 20	+
	> 20	–
Iron (dissolved)	Up to 10	0
	> 10	–
Manganese (dissolved)	Up to 1	0
	> 1	–
Free chlorine	Up to 5	Permanently < 0.5 mg/l
	> 5	Intermittently < 3.0 mg/l
Sulfide		0
Ammonia		+ (< 15 mg/l)

\+ = Usually good resistance

0 = Corrosion problems can occur, particularly if multiple factors are valued at 0

– = Use is not recommended

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Types of cooling water/characteristics

As standard, water cooling cartridges are made of copper nickel pipes. Observe the following special features.

Industrial water

Industrial water is usually untreated water (not drinking water), which is often strongly contaminated. A water analysis is required to assess the use.

For industrial water, water cooling cartridges made of copper, brass and steel have a good resistance. Contact SEW-EURODRIVE.

Stream water and river water

Stream and river water is usually untreated water (not drinking water), which is often strongly contaminated. A water analysis is required to assess the use.

For stream and river water, water cooling cartridges made of stainless steel and titanium have a good resistance. Contact SEW-EURODRIVE.

Cast iron parts must be protected against corrosion by a suitable coating.

Salt water

For salt water, water cooling cartridges made of stainless steel and titanium have a good resistance. Contact SEW-EURODRIVE.

Brackish water

Brackish water is usually a mixture of sea and river water.

For brackish water, water cooling cartridges made of stainless steel and titanium have a good resistance. Contact SEW-EURODRIVE.

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6.19 Water cooling cover /CCV

6.19.1 Notes on connection / installation

NOTICE

Improper mounting of the water cooling cover may result in damage to the gear unit.

Possible damage to property.

- Using thread seal tape on the pipe threads increases the resistance between the connection parts as well as the risk of cracking in the water cooling cover. Do not tighten the threads too tightly.
- Use only piping and mounting parts of the same or of compatible material for the connection.
- Make sure the cooling water pressure does not exceed 6 bar.
- In the event of frost or longer idle states, drain the cooling water from the cooling circuit. Use compressed air to remove any remaining water.

The following measures are recommended by SEW-EURODRIVE to ensure proper functioning in different systems:

- Install a safety valve in the cooling water supply pipe for protection against severe deviations in the flow rate or pressure.
- Install a filter into the cooling water supply pipe, especially if the cooling water is obtained from sources other than the municipal water supply system.
- Install an automatic throttle valve in the respective inlet to compensate for over-pressure.

6.19.2 Technical data

Adhere to the following values in the table. Do not exceed these values. Lower values are permitted. Also observe the information in the order-specific documents.

Size	Max. cooling water volume flow l/min	Max. water pressure bar
X100 – 110	15	6
X120 – 130	15	6
X140 – 150	15	6
X160 – 170	20	6
X180 – 190	28	6
X200 – 210	28	6

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6.19.3 Procedure

1. Observe the information on cooling water temperature and flow rate. You can find it in the order documents.
2. The water cooling cover is not equipped with a water drain. In the event of repair work, install a drain on the cooling water outlet to ensure proper draining of the cooling water.
3. Connect the water cooling cover to the existing cooling circuit. The direction of flow is user-defined. Two bores with pipe threads are available to connect to the cooling circuit.
   - Sizes X100 – 170: G3/8"
   - Sizes X180 – 210: G1/2"

6.19.4 Cooling media

INFORMATION

- Note that the service life, efficiency and maintenance intervals of the heat exchanger depend to a large extent on the quality and the ingredients of the cooling medium.
- Contact SEW-EURODRIVE if fully desalinated or demineralized water is used as cooling medium.

Permitted cooling media

- The permitted cooling media is pure water. The use of cooling water additives, such as antifreeze or corrosion inhibitor, might negatively influence the cooling capacity and compatibility of materials. Contact SEW-EURODRIVE.
- Cooling water temperature and flow rate of cooling water according to order documents.

Dirt

The content of suspended solids (spherical, particle size < 0.25 mm) must be less than 10 mg/l. Thread-shaped contaminants increase the risk of pressure losses.

Corrosion

Limit values: Free chlorine < 0.5 ppm, chlorine ions < 200 ppm, sulfate < 100 ppm, ammonia < 10 ppm, free CO < 10 ppm, pH value 7 – 9.

The following ions do not corrode under normal conditions: Phosphate, nitrate, nitrite, iron, manganese, sodium and potassium.

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6.20 Oil heater /OH



⚠ WARNING

Danger of electric shock.

Severe or fatal injuries.

- Before you start working on the unit, de-energize the oil heater and the thermostat.
- Secure the oil heater and thermostat against accidental activation.

NOTICE

Improper operation of the oil heater may result in damage to the gear unit.

Possible damage to property.

- It is important that the heating elements are completely immersed in the oil bath.

NOTICE

Improper changes to the mounting position of the gear unit can lead to malfunctions of the gear unit heater.

Possible damage to property.

- Do not change the mounting position without prior consultation with SEW-EURODRIVE. The warranty will become void without prior consultation.

6.20.1 Information on the function of the oil heater

- The heater is screwed into the gear unit housing at the factory and is controlled by a thermostat. The set limit temperature on the thermostat below which the oil must be heated is set at the factory depending on the used lubricant.
- The switching point of the oil heater thermostat is factory-set to a temperature of about 5 K above the respective limit temperature for gear unit startup, see chapter "Limit temperature for gear unit startup" (→ 🗎 183).

  At this temperature, the thermostat switches off the oil heater, see chapter "Limit temperature for gear unit startup" (→ 🗎 183). Only then may the gear unit be started up. The thermostat activates the oil heater again once the temperature is approximately 5 K below the switching point.
- To prevent the oil from burning, the heating elements of the heater have a maximum surface load. This is why the heating process for cold gear unit oil can take between one and several hours. The exact duration of the heating process before the start varies depending on the gear unit size, design, mounting position, oil quantity, and ambient temperature.

  This is why the thermostat must be permanently supplied with power even if the drive is at standstill for a short time.

  If the drive is at standstill over a longer period and the thermostat is not energized, you have to make sure that the thermostat is energized in due time before the drive is started up.
- The thermostat and oil heater are installed in the gear unit and ready for operation. Prior to startup, wire and connect them properly to the current supply.

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- Contact SEW-EURODRIVE in the event of different viscosity classes or if ambient temperatures fall below the specified limit temperature.
- During installation, check the thermostat setting according to chapter "Thermostat" (→ 🗎 166).

6.20.2 Thermostat

Electrical connection



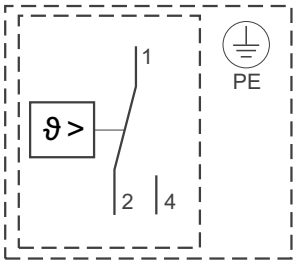
⚠ WARNING

Risk of injury due to electric shock.

Severe or fatal injuries.

- Disconnect the unit from the supply system if live parts can be touched during work on the unit.

The following figure shows the electrical connection.



36028797469957003

- Connect to the terminals (1, 2 and 4) according to wiring diagram
- Connect the protective earth to terminal "PE"



INFORMATION

- Observe the manufacturer's documentation.

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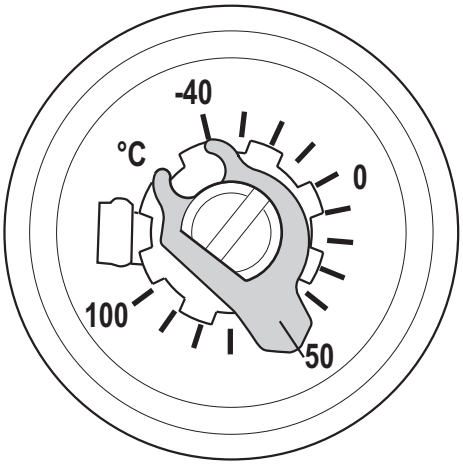
Technical data

Maximum switching capacity:		
AMTHs-SW-2	Voltage	Current
		Terminal 2/4
	AC 230 + 10% cosφ = 1 (0.6)	10 A
	DC 230 + 10%	0.25 A

Contact reliability:	
To ensure greatest possible contact reliability, the manufacturer recommends a minimum load of AC/DC 24 V, 100 mA for silver contacts.	
Nominal impulse voltage:	2500 V
Overvoltage category II	(via the switching contacts 400 V)
Required fusing:	See maximum switching current

- Permitted ambient temperature: -40 °C to +80 °C
- Permitted storage temperature: min. -50° C, max. +50° C
- Scale value: -40 °C to +100 °C
- Cable bushing: M20 ×1.5 for cable cross sections 6 to 13 mm
- Degree of protection IP65 according to EN 60529

The following figure shows the possible setting range of the thermostat. The pointer is set to 50 °C as an example



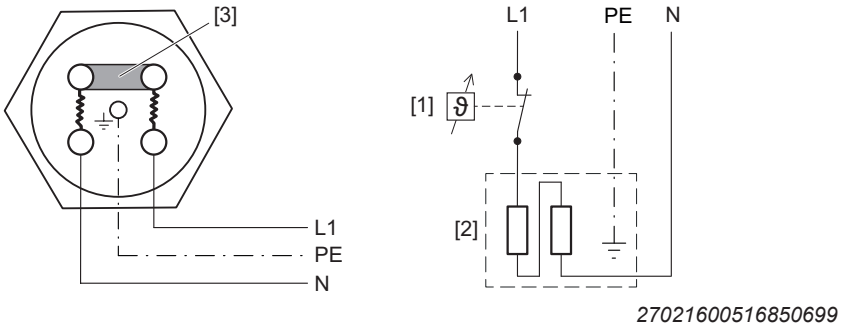
16834938379

6.20.3 Connection power and electrical connection of resistor element

The gear unit heater comes equipped with cable glands and jumpers. They are included in the scope of delivery of the screw-in heaters and are already preassembled. The gear unit heater is connected to the current supply via terminal studs. They do not depend on the size of the heater and always have an M4 thread. We recommend using RKS4 ring cable lugs with small grommets.

Alternating current/1-phase/230 V/series connection

The following figure shows the wiring ex works (view of the connection space):



27021600516850699

[1] Thermostat
[2] Heater
[3] Jumper

The table below shows the connected load of the heaters that can be installed.

		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X100	X3K	1 × 0.4	6	2 × 0.4	11

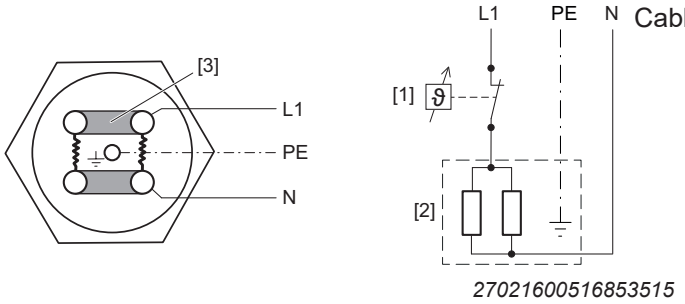
K/h = Heating power [Kelvin/hour]

P_{inst} = Power of the installed heater

31960243/EN – 05/2024

Alternating current/1-phase/230 V/parallel connection

The following figure shows the wiring ex works (view of the connection space):



27021600516853515

Observe the electrical characteristics of the control range

[1] Thermostat

[2] Heater

[3] Jumper

The table below shows the connected load of the heaters that can be installed.

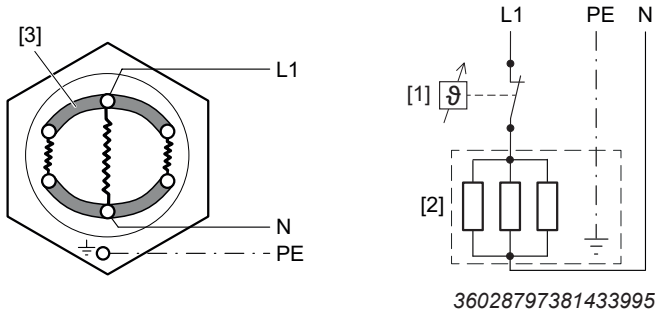
Gear unit		P_{inst} 1 heating element		P_{inst} 2 heating elements	
Size	**Design**		**K/h**		**K/h**
X110	X3K	1 × 0.6	6	-	-
X120	X3K/X4K	1 × 0.7	6	2 × 0.7	11
X130	X3K/X4K	1 × 0.7	5	-	-
X140	X3K/X4K	1 × 0.8	5	2 × 0.8	10
X150	X3K /X4K	1 × 0.9	5	-	-
X160	X3K/X4K	1 × 1.1	4	2 × 1.1	8
X170	X3KX4K	1 × 1.1	4	-	-

K/h = Heating power [Kelvin/hour]

P_{inst} = Power of the installed heater

Alternating current/1-phase/230 V/parallel connection/I ≤ 10 A

The following figure shows the wiring ex works (view of the connection space):



Cable entry: 1xPg16

36028797381433995

Observe the electrical characteristics of the control range

[1] Thermostat

[2] Heater

[3] Jumper

The table below shows the connected load of the heaters that can be installed.

Gear unit		P_{inst}		P_{inst}	
		1 heating element		2 heating elements	
Size	**Design**		**K/h**		**K/h**
X180	X3K/X4K	1 × 1.6	5	-	-
X190	X3K/X4K	1 × 1.6	5	-	-
X200	X3K/X4K	1 × 1.8	4	-	-
X210	X3K/X4K	1 × 1.8	4	-	-
X220	X3K/X4K	1 × 2.2	4	-	-
X230	X3K/X4K	1 × 2.2	4	-	-
X240	X3K/X4K	1 × 2.2	3	-	-

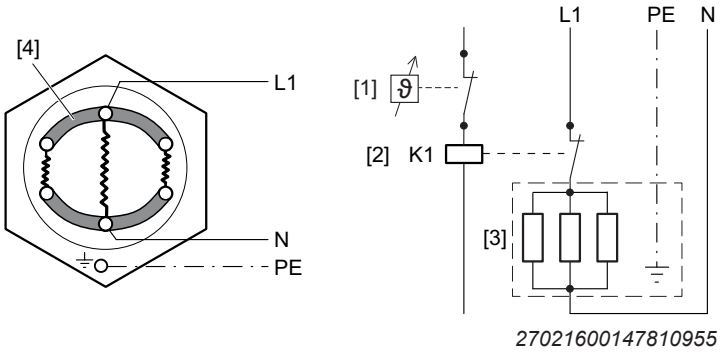
K/h = Heating power [Kelvin/hour]

P_{inst} = Power of the installed heater

31960243/EN – 05/2024

Alternating current/1-phase/230 V/parallel connection/I ≥ 10 A

The following figure shows the wiring ex works (view of the connection space):



Cable entry: 1xPg16

Observe the electrical characteristics of the control range

[1] Thermostat

[2] Contactor (not included in the delivery)

[3] Heater

[4] Jumper

The table below shows the connected load of the heaters that can be installed.

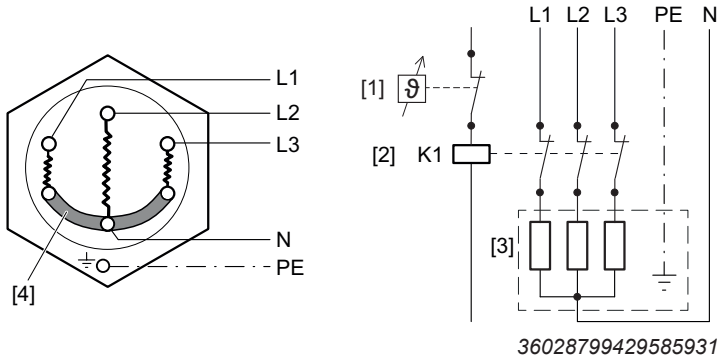
Gear unit		P_{inst} 1 heating element		P_{inst} 2 heating elements	
Size	**Design**		**K/h**		**K/h**
X180	X3K/X4K	-	-	2 × 1.6	10
X200	X3K/X4K	-	-	2 × 1.8	8
X220	X3K/X4K	-	-	2 × 2.2	8
X240	X3K	-	-	2 × 2.2	6
X250	X3K/X4K	1 × 2.6	3	-	-

K/h = Heating power [Kelvin/hour]

P_{inst} = Power of the installed heater

AC current/3-phase/230/400 V/star connection

The following figure shows the connection that results from removing the jumpers that are plugged in upon delivery (as viewed into the connection space):



Cable entry:
1xPg16

36028799429585931

Observe the electrical characteristics of the control range

[1] Thermostat

[2] Contactor (not included in the delivery)

[3] Heater

[4] Jumper (modified delivery condition)

The table below shows the connected load of the heaters that can be installed.

Gear unit		P_{inst} 1 heating element		P_{inst} 2 heating elements	
Size	**Design**		**K/h**		**K/h**
X180	X3K/X4K	1 × 1.6	5	2 × 1.6	10
X190	X3K/X4K	1 × 1.6	5	-	-
X200	X3K/X4K	1 × 1.8	5	2 × 1.8	8
X210	X3K7X4K	1 × 1.8	4	-	-
X220	X3K/X4K	1 × 2.2	4	2 × 2.2	8
X230	X3K/X4K	1 × 2.2	4	-	-
X240	X3K	1 × 2.2	3	2 × 2.2	6
X250	X3K	1 × 2.6	3	-	-

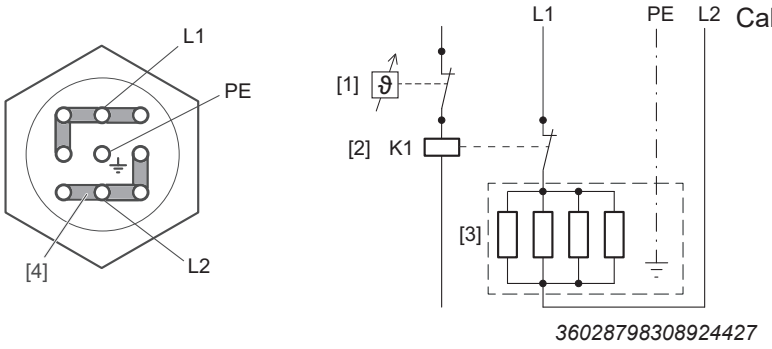
K/h = Heating power [Kelvin/hour]

P_{inst} = Power of the installed heater

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Alternating current/2-phase/400 V/parallel connection

The following figure shows the wiring ex works (view of the connection space):



36028798308924427

Observe the electrical characteristics of the control range

[1] Thermostat

[2] Contactor (not included in the delivery)

[3] Heater

[4] Jumper

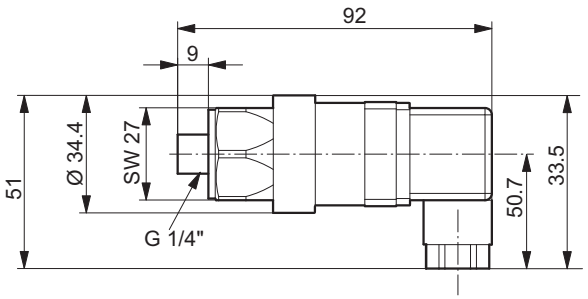
The table below shows the connected load of the heaters that can be installed.

		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X260	X3K/X4K	1 × 3.8	4	2 × 3.8	8
X270	X3K/X4K	1 × 3.8	4	-	-
X280	X3K/X4K	1 × 4.2	4	-	-

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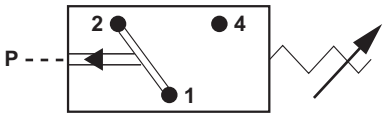
6.21 Pressure switch /PS

6.21.1 Dimensions



721994635

6.21.2 Electrical connection



722003723

[1] [2] NC contact
[1] [4] NO contact

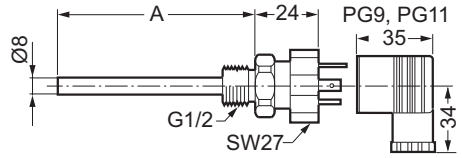
6.21.3 Technical data

- Switching pressure: 0.5 ± 0.2 bar
- Maximum switching capacity: 4 A – AC 250 V; 4 A – DC 24 V
- Plug connector: DIN EN 175301-803
- The tightening torque for the retaining screw on the back of the plug connector for electrical connection is 0.25 Nm.

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6.22 Temperature sensor /Pt100

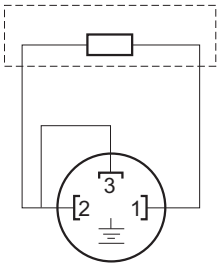
6.22.1 Dimensions



27021598123377419

A in mm
50
150

6.22.2 Electrical connection



9007199613899531

[1] [2] Resistor element connection

6.22.3 Technical data

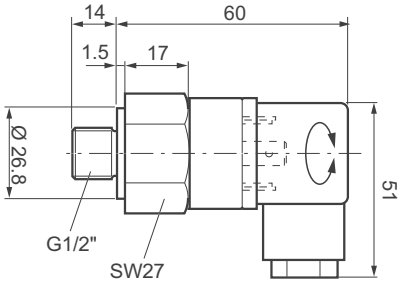
- Design with thermowell and changeable measuring insert
- Sensor tolerance K ± (0.3 + 0.005 × T), (corresponds to DIN IEC 751 class B)

  T = Oil temperature in °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.

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6.23 Temperature switch /NTB

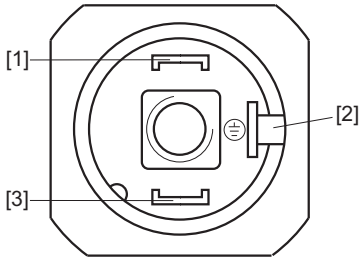
6.23.1 Dimensions



36028797385488907

6.23.2 Electrical connection

To guarantee a long service life and trouble-free functioning, we recommend that you use a relay in the power circuit instead of a direct connection through the temperature switch.



366532491

[1] [3] NC contact
[2] Grounding terminal 6.3 × 0.8

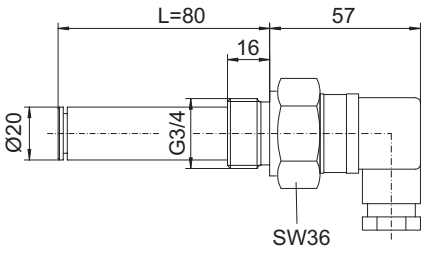
6.23.3 Technical data

- Trip temperature: 70 °C, 80 °C, 90 °C, 100 °C ± 5 °C
- Contact capacity: 10 A – AC 240 V
- 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.

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6.24 Temperature switch /TSK

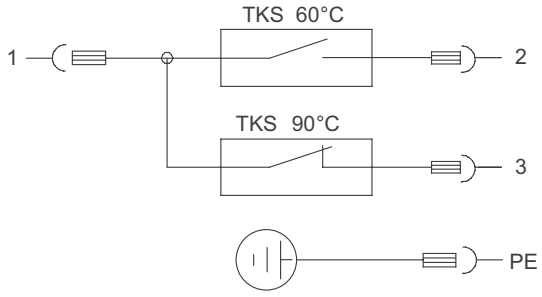
6.24.1 Dimensions



9007200148613771

6.24.2 Electrical connection

To guarantee a long service life and trouble-free functioning, we recommend that you use a relay in the power circuit instead of a direct connection through the temperature switch.



45035997167583115

[1][2] Switch 60 °C NO contact
[1][3] Switch 90 °C NC contact
PE Grounding terminal

6.24.3 Technical data

- Switching temperatures: 60 °C and 90 °C
- Contact capacity: 2 A – AC 240 V
- Plug connector: DIN EN 175301-803 PG11 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 0.25 Nm.

6.25 Brake

The Brake not set at the factory!

Observe the information on the structure, function, startup, maintenance, etc. in the operating instructions by the brake manufacturer. You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit.

7 Startup

7.1 Before startup

Ensure that the following requirements have been met:

NOTICE

Improper startup may result in damage to the gear unit.

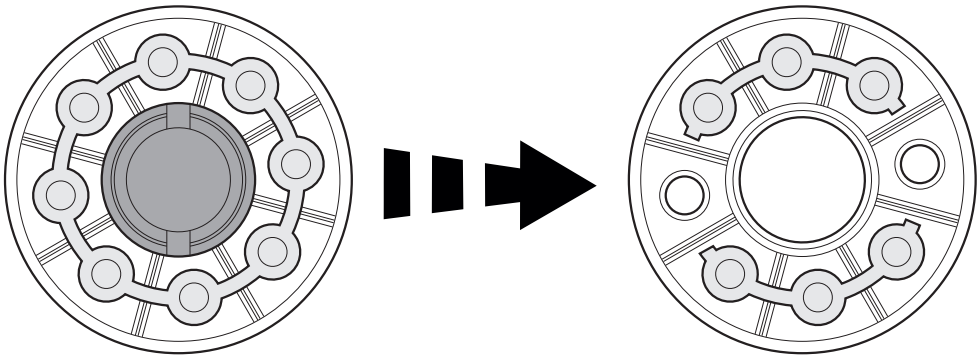
Possible damage to property.

- For gear units with extended storage option, observe the information in chapter "Gear unit with long-term preservation" (→ 🗎 83).
- Remove present transport protection.
- Secure the existing oil drain valves against unintended opening.
- For operation at low ambient temperatures, ensure that the limit temperature is adhered to, see chapter "Limit temperature for gear unit startup" (→ 🗎 183). Ensure that the heating time is sufficient.

7.1.1 Desiccant breather filter /DC

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, attach a suitable adapter to the filter before installing the filter at the gear unit.



9007230754548107

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7.2 Startup sequence

NOTICE

Improper startup may result in damage to the gear unit.

Possible damage to property.

- Observe the following sequence for startup.

1. Startup of the auxiliary drive
2. Startup of the speed monitor
3. Startup of the main drive

7.2.1 Starting up the auxiliary drive

Make sure that the rotary motion of the input shaft of the main gear unit is not obstructed during auxiliary drive operation. A brake on the input end of the main drive must be released for auxiliary drive operation.

7.2.2 Starting up speed monitoring

The speed monitor can be included in the delivery.

Check if the speed monitor is programmed correctly before startup.

Speed monitor settings

Only qualified personnel is permitted to program or change the speed monitoring.

NOTICE

Improper startup may result in damage to the gear unit.

Possible damage to property.

- Integrate the speed monitor into the system circuit in such a way that the current supply of the main and auxiliary drive is interrupted if the set switching speed is exceeded.

Observe the startup sequence in the manufacturer documentation, which you can find in chapter "Supplier documentation" (→ 🗎 231).

To ensure a safe operation using 1 trip cam, observe the following settings:

- Size X3K..: Set a switching speed of 70 pulses/min.
- Size X4K..: Set a switching speed of 200 pulses/min.
- Set the hysteresis to ≤ 5%.
- Set the startup bypass time to 0.5 s.

INFORMATION

If the overrunning clutch is equipped with several trip cams for speed monitoring, you must adjust the number of pulses accordingly.

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Functional test of the speed monitoring

1. Switch on the auxiliary drive.
2. Briefly set the switching speed to a lower value than the output speed of the auxiliary drive.
3. The speed monitor detects overspeed and the output relay becomes operative. The functional test is successful when the current supply to the main and auxiliary drives is interrupted.
4. After the functional test has been successfully completed, set the switching speed back to the initial value.

7.2.3 Starting up the main drive



⚠ WARNING

Overspeed can destroy the auxiliary drive

Severe or fatal injuries.

- Check the correct direction of rotation of the main drive during startup.

Before starting up the main drive, determine the rotating field of the three-phase system using a phase-sequence indicator. If a backstop is installed at the main gear unit, make sure that it is not possible to operate the main drive motor against the blocking direction of the main gear unit. Observe the direction arrow on the main gear unit without fail.

If there is no backstop at the main gear unit, make sure that the main drive motor does not run in the driving direction of the auxiliary drive. Otherwise, the auxiliary drive is rotated by the main drive and can be destroyed due to overspeed.

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7.3 Backstop /BS

NOTICE

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

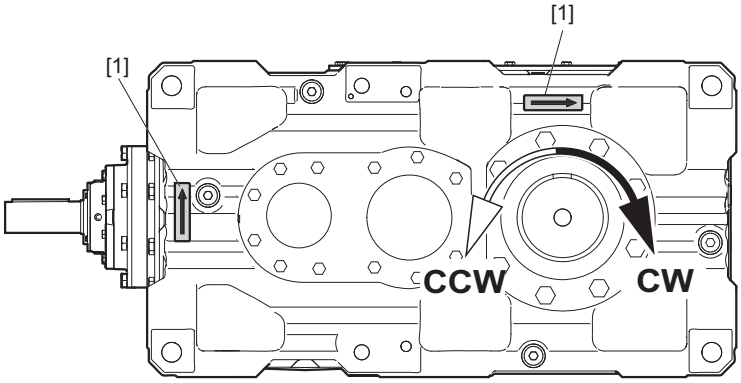
Possible damage to property.

- The motor must not start up in the blocking direction. Ensure that the motor is supplied with the correct power supply to achieve the required direction of rotation. Operating the motor in the blocking direction could destroy the backstop.

The gear unit's direction of rotation is defined with a view to the output shaft (LSS):

- Clockwise rotation (CW)
- Counterclockwise rotation (CCW)

The direction of rotation of the backstop is indicated on the gear unit by a label [1].



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7.4 Torque-limited backstop

NOTICE

The slipping torque may not be changed by any means for safety reasons.

Possible damage to property.

- There is a risk that the load cannot be kept safely in its position after the motor is switched off and that it can accelerate in the opposite direction.

NOTICE

Operating the motor in blocking direction could destroy the backstop.

Possible damage to property.

- Do not start up the motor in blocking direction. Ensure a correct current supply to the motor, so that it rotates in the required direction.

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7.5 Water cooling cover /CCV

NOTICE

Risk of power loss due to contamination.

Possible damage to property.

- A loss of power can be caused by scale deposits on the inside of the pipe. Proceed as described in chapter "Cleaning the water cooling cover / CCV" (→ 🗎 206).

After having installed the water-cooling cover in the system, it can be taken into operation and operated without taking further preparatory measures.

Perform the following checks:

- Check the connection points for leaks.
- If necessary, check the valves, fittings, and filters for unrestricted flow and proper functioning.
- Observe the required temperature specifications of the cooling media given in your order documents.

7.6 Water cooling cartridge /CCT

NOTICE

Risk of power loss due to contamination.

Possible damage to property.

- A loss of power can be caused by scale deposits on the inside of the pipe. Proceed as described in chapter "Cleaning the water cooling cartridge / CCT" (→ 🗎 207).

After having installed the water cooling cartridge in the system, it can be taken into operation and operated without taking further preparatory measures.

Perform the following checks:

- Check the connection points for leaks.
- If necessary, check the valves, fittings, and filters for unrestricted flow and proper functioning.
- Observe the required temperature specifications of the cooling media given in your order documents.

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7.7 Limit temperature for gear unit startup

The minimum permitted ambient temperature/oil temperature for gear unit startup depends on the viscosity of the oil used and the lubrication type of the gear unit.

Before startup, the oil may have to be heated to the specified "starting temperature" by an oil heater. Observe the lubricant table in chapter "Permitted lubricants" (→ 🗎 212).

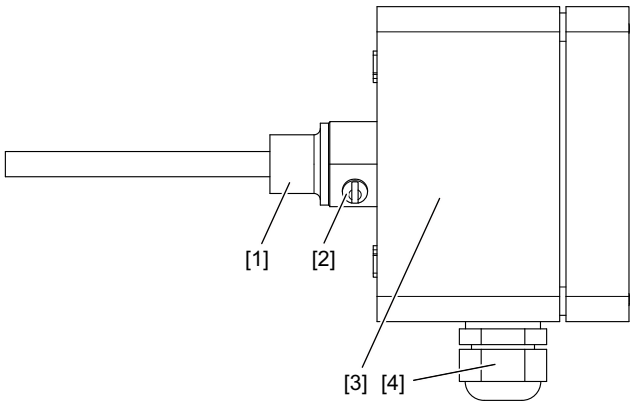
7.8 Oil heater /OH

7.8.1 Positioning the thermostat

Depending on the installation situation of the drive, it might be necessary to change the position of the thermostat.

To position the thermostat, proceed as follows:

1. Loosen the clamping screws [2].
2. **NOTICE!** Ensure that the cable gland is properly positioned during installation. Possible damage to property.
   Mount it in such a way that no moisture can enter. Turn the thermostat to the required position.
3. Tighten the clamping screws [2] again.



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[1] Threaded jacket
[2] Clamping screw
[3] Thermostat
[4] Cable gland

The screw-in sleeve [1] prevents oil from escaping. The sensor of the thermostat is located in the threaded jacket [1] and held in place by 2 clamping screws [2]. Observe the additional manufacturer's documentation.

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7.9 Speed limits with reduced oil level

INFORMATION

If the oil level of the gear unit is reduced, the gear unit must not be operated below the following speed limits to ensure that the gear unit components are lubricated sufficiently.

The speed limits also apply to maintenance operation and startup.

For inverter operation, set the startup ramp in such a way that the motor reaches the minimum input speed within 30 seconds.

Observe the order-specific information about the minimum speed on the nameplate.

7.9.1 X3K...

Size	i	Min. speed input min^{-1}
X3K.180e	12.57	610
X3K.180e	14.08	610
X3K.180e	16.17	780
X3K.180e	18.11	780
X3K.180e	19.74	910
X3K.180e	22.1	910
X3K.180e	25.55	1120
X3K.180e	28.61	1120
X3K.180e	32.36	1420
X3K.180e	36.24	1420
X3K.180e	38.93	1650
X3K.180e	43.6	1650
X3K.180e	47.57	2010
X3K.180e	53.27	2010
X3K.180e	60.9	2200
X3K.180e	68.2	2200
X3K.200e	61.95	2200
X3K.200e	70.26	2200
X3K.190e	14.04	610
X3K.190e	15.77	610
X3K.190e	18.05	780
X3K.190e	20.29	780
X3K.190e	22.04	910
X3K.190e	24.77	910
X3K.190e	28.53	1120
X3K.190e	32.06	1120
X3K.190e	36.14	1420
X3K.190e	40.61	1420
X3K.190e	43.48	1650
X3K.190e	48.85	1650
X3K.190e	53.11	2010
X3K.190e	59.68	2010
X3K.190e	68	2200
X3K.190e	76.41	2200
X3K.200e	12.45	530
X3K.200e	14.12	530
X3K.200e	16.32	690

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Size	i	Min. speed input min^{-1}
X3K.200e	18.5	690
X3K.200e	20.56	820
X3K.200e	23.31	820
X3K.200e	25.72	980
X3K.200e	29.17	980
X3K.200e	31.97	1220
X3K.200e	36.26	1220
X3K.200e	39.61	1460
X3K.200e	44.92	1460
X3K.200e	48.39	1780
X3K.200e	54.88	1780
X3K.200e	61.95	2200
X3K.200e	70.26	2200
X3K.210e	14.1	530
X3K.210e	15.96	530
X3K.210e	18.48	690
X3K.210e	20.92	690
X3K.210e	23.28	820
X3K.210e	26.36	820
X3K.210e	29.13	980
X3K.210e	32.97	980
X3K.210e	36.2	1220
X3K.210e	40.99	1220
X3K.210e	44.85	1460
X3K.210e	50.78	1460
X3K.210e	54.79	1780
X3K.210e	62.03	1780
X3K.210e	70.15	2200
X3K.210e	79.42	2200
X3K.220e	12.56	500
X3K.220e	13.86	500
X3K.220e	16.15	600
X3K.220e	17.82	600
X3K.220e	20.64	730
X3K.220e	22.78	730
X3K.220e	25.28	850
X3K.220e	27.9	850
X3K.220e	32.02	1090
X3K.220e	35.34	1090
X3K.220e	39.55	1290
X3K.220e	43.65	1290
X3K.220e	48.32	1570
X3K.220e	53.33	1570
X3K.220e	61.86	2010
X3K.220e	68.27	2010
X3K.230e	14.22	500
X3K.230e	15.61	500
X3K.230e	18.29	600
X3K.230e	20.08	600
X3K.230e	23.37	730
X3K.230e	25.66	730
X3K.230e	28.63	850
X3K.230e	31.43	850
X3K.230e	36.26	1080

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Size	i	Min. speed input min^{-1}
X3K.230e	39.82	1080
X3K.230e	44.78	1290
X3K.230e	49.17	1290
X3K.230e	54.71	1570
X3K.230e	60.08	1570
X3K.230e	70.05	2010
X3K.230e	76.91	2010
X3K.240e	11.92	500
X3K.240e	13.71	500
X3K.240e	15.32	510
X3K.240e	17.64	510
X3K.240e	20.36	630
X3K.240e	23.44	630
X3K.240e	25.64	760
X3K.240e	29.51	760
X3K.240e	32.47	960
X3K.240e	37.38	960
X3K.240e	39.96	1150
X3K.240e	46	1150
X3K.240e	48.83	1410
X3K.240e	56.2	1410
X3K.240e	62.51	1800
X3K.240e	71.95	1800
X3K.250e	12.8	500
X3K.250e	14.71	500
X3K.250e	16.47	510
X3K.250e	18.92	510
X3K.250e	21.88	630
X3K.250e	25.14	630
X3K.250e	27.55	760
X3K.250e	31.64	760
X3K.250e	34.89	960
X3K.250e	40.08	960
X3K.250e	42.95	1150
X3K.250e	49.33	1150
X3K.250e	52.47	1410
X3K.250e	60.27	1410
X3K.250e	67.18	1800
X3K.250e	77.17	1800
X3K.260e	12.5	734
X3K.260e	14	734
X3K.260e	16	945
X3K.260e	18	945
X3K.260e	20	1153
X3K.260e	22.4	1153
X3K.260e	25	1367
X3K.260e	28	1367
X3K.260e	31.5	1570
X3K.260e	35.5	1570
X3K.260e	40	1989
X3K.260e	45	1989
X3K.260e	50	2430
X3K.260e	56	2430
X3K.260e	63	3111

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Size	i	Min. speed input min^{-1}
X3K.260e	71	3111
X3K.270e	12.5	630
X3K.270e	14	630
X3K.270e	16	810
X3K.270e	18	810
X3K.270e	20	981
X3K.270e	22.4	981
X3K.270e	25	1214
X3K.270e	28	1214
X3K.270e	31.5	1410
X3K.270e	35.5	1410
X3K.270e	40	1766
X3K.270e	45	1766
X3K.270e	50	2158
X3K.270e	56	2158
X3K.270e	63	2762
X3K.270e	71	2762
X3K.280e	16	734
X3K.280e	18	734
X3K.280e	20	945
X3K.280e	22.4	945
X3K.280e	25	1153
X3K.280e	28	1153
X3K.280e	31.5	1367
X3K.280e	35.5	1367
X3K.280e	40	1570
X3K.280e	45	1570
X3K.280e	50	1989
X3K.280e	56	1989
X3K.280e	63	2430
X3K.280e	71	2430
X3K.280e	80	3111
X3K.280e	90	3111

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8 Inspection/maintenance

8.1 Information

Ensure that the following requirements have been met.



⚠ WARNING

An operator's 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 loosening the shaft connections, make sure that the system is no longer strained.

NOTICE

Improper inspection/maintenance may result in damage to the gear unit.

Possible damage to property.

- Prevent foreign particles from entering into the gear unit during maintenance and inspection work.
- If you remove the gear unit cover, you must apply new sealing compound to the sealing surface. Otherwise, the tightness of the gear unit is not guaranteed! Contact SEW-EURODRIVE in this case.
- Do not clean the gear unit with a high-pressure cleaning device.

When using primary gearmotors, also observe the maintenance notes for the motor and primary gear unit in the accompanying operating instructions.

Use only original spare parts according to the supplied spare and wearing parts list.

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8.2 Inspection and maintenance intervals

Adhere to the following inspection and maintenance intervals:

Time interval	Required steps
Daily	• Check the housing temperature: – Mineral oil: max 90 °C – Synthetic oil: max. 100 °C • Check the 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 6 months	• Check all the screw fittings and piping for leakage.
Every 3000 operating hours, at least every 6 months	• Check the oil consistency. • Fill regreasable sealing systems with grease. In dusty environments, regrease every 3 months.
Depending on the operating conditions, at least every 12 months	• Check whether the retaining screws are tightly secured. • Check whether the gear unit surface is free of dust and dirt to ensure optimal cooling of the gear unit. • Clean the oil filter. If required, replace the filter element. • Check the breather. Replace if necessary. • Check the alignment of the input shaft and output shaft. • Check the condition and leak tightness of all rubber tubes (aging effects). • Check the condition of the motor pump (ONP1/ONP1L). Observe the separate operating instructions. You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit. • Check the condition of the water cooling cartridge /CCT. Perform the work together with the oil change. • Check the condition of the water cooling cover /CCV. Perform the work together with the oil change.
Depending on the operating conditions (see figure on next page), at least every 3 years	• Change the mineral oil.
Depending on the operating conditions (see figure in next chapter), at least every 5 years	• Change the synthetic oil.

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Time interval	Required steps
Varies (depending on external factors)	• Check the installed hose pipes. • Clean the gear unit housing surface and the fan. • Touch up or renew the surface/corrosion protection paint. • Replace the backstop. Wear may occur in the backstop, especially when operated below lift-off speed. This is why you should consult SEW-EURODRIVE for defining the maintenance intervals. • Check the condition of the motor pump (ONP1/ONP1L). Observe the separate operating instructions. You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit. • Check the condition of the oil-air cooler (OAP1/OAC1). Observe the separate operating instructions. You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit. • Check the condition of the oil-water cooler (OWP1/ OWC1). Observe the separate operating instructions. You can find these together with the dimension sheet and further documents in the overall documentation for the gear unit. • Check the built-in cooler (such as the water cooling cover /CCT and the water cooling cartridge /CCV) for deposits. • Check the oil heater /OH (at same time as the oil change): – Check whether all connection cables and terminals are securely fixed and free from corrosion. – Clean encrusted heating elements. Replace if necessary.

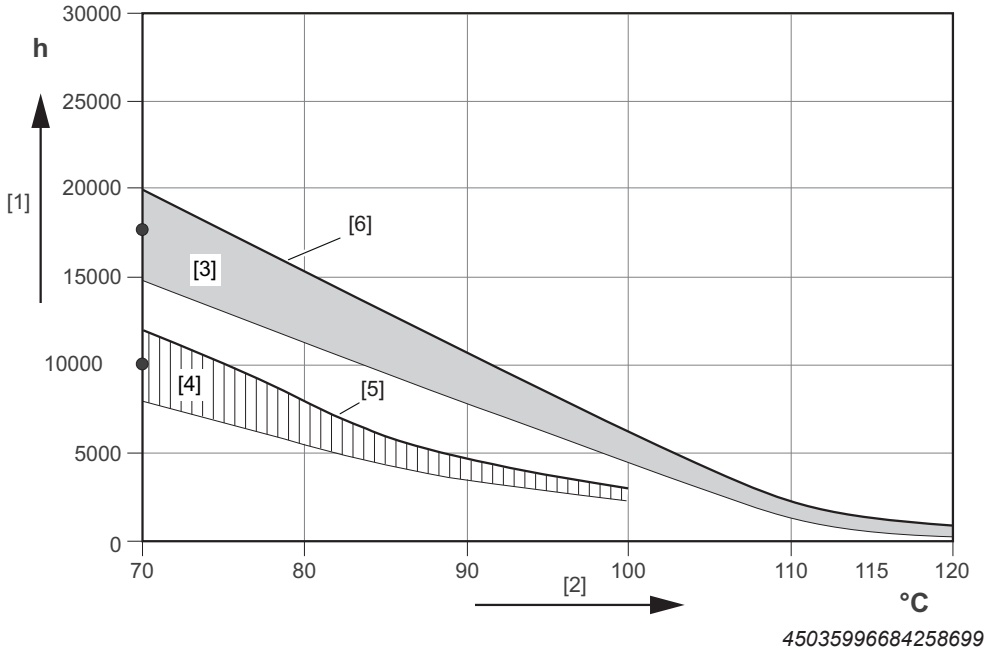
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8.3 Lubricant change intervals

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" (→ 🗎 199)) to optimize the lubricant change intervals.

8.4 Checking the oil level

8.4.1 General information

Note the following when checking the oil level:

NOTICE

Improper check 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 has cooled down in idle state. SEW-EURODRIVE recommends checking the oil level at an oil temperature of 20 °C to 40 °C. The oil level must be between the markings [1] and [2] at the oil dipstick or oil level glass and should ideally be in the middle.
- For gear units in fixed and variable pivoted mounting position, observe the notes on the following pages.
- When the gear unit is equipped with an oil dipstick and an oil sight glass, the oil level on the oil dipstick is decisive. The oil level on the oil sight glass is only an approximate value.
- Elements for checking the oil level, the oil drain, and oil fill openings are indicated on the gear unit by safety symbols.
- Check the oil level again after the first few operating hours when the gear unit is at standstill.
- For the auxiliary drive, observe the notes and procedures in the operating instructions: Gear unit series R..7, F..7, K..7, S..7, SPIROPLAN®.

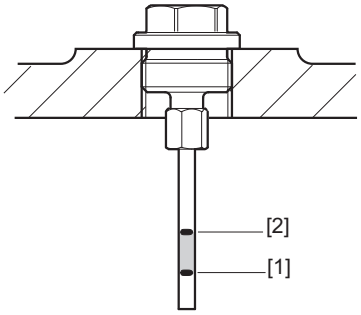
8.4.2 Standard procedure

Video instructions

Deutsch	English

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Oil dipstick



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1. Clean the area around the oil dipstick. Unscrew the oil dipstick and remove it.
2. Clean the oil dipstick with a clean cloth and screw it back into the gear unit hand-tight to the stop.
3. Remove the oil dipstick and check the oil level. The oil level must be between the markings [1] and [2].
4. If the oil level is too low, proceed as follows:

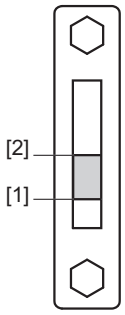
- Open the oil fill plug.
- Fill in oil of the same oil grade until the oil level is in the middle between marking [1] and marking [2].

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

- Adjust the oil level. The oil level must be between the markings [1] and [2].

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

Oil level glass



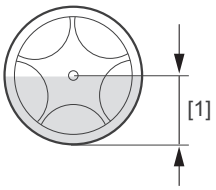
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1. The oil level must be in the middle between marking [1] and marking [2].
2. If the oil level is too low, proceed as follows:
   - Open the oil fill plug.
   - Fill in oil of the same oil grade until the oil level is in the middle between marking [1] and marking [2].
3. If you filled in too much oil, proceed as follows:
   - Adjust the oil level. The oil level must be between the markings [1] and [2].
4. Screw in the oil fill plug.

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Oil sight glass

The oil sight glass only shows the approximate oil level. Use the oil dipstick to read the exact oil level.



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8.4.3 Notes on the procedure for fixed and variabel pivoted mounting positions

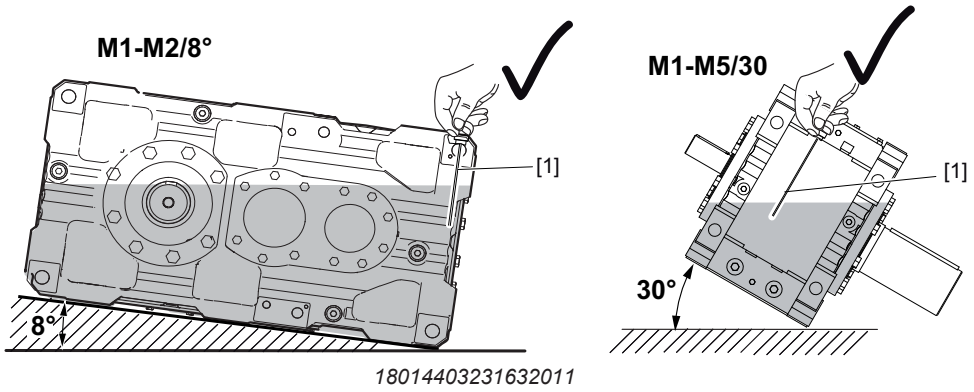
Observe the information on the nameplate and in the order documents.

Fixed pivoted mounting positions

Procedure

Check the oil level in the fixed, intended position. Observe the notes in chapter "Standard procedure" (→ 🗎 192).

The following figure shows an example of how to check the oil level.



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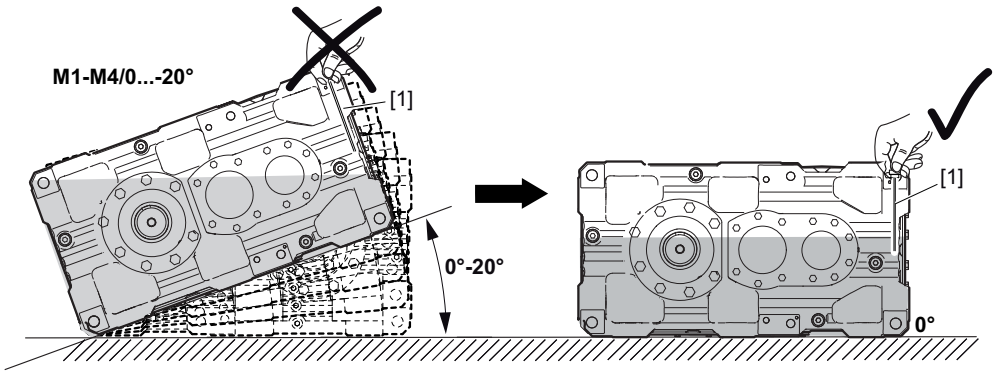
[1] Oil dipstick
Oil

Variable pivoted mounting positions

Procedure

Before checking the oil level, position the gear unit in the mounting position defined in the order documents. Observe the notes in chapter "Standard procedure" (→ 🗎 192).

The following figure shows an example of how to check the oil level.



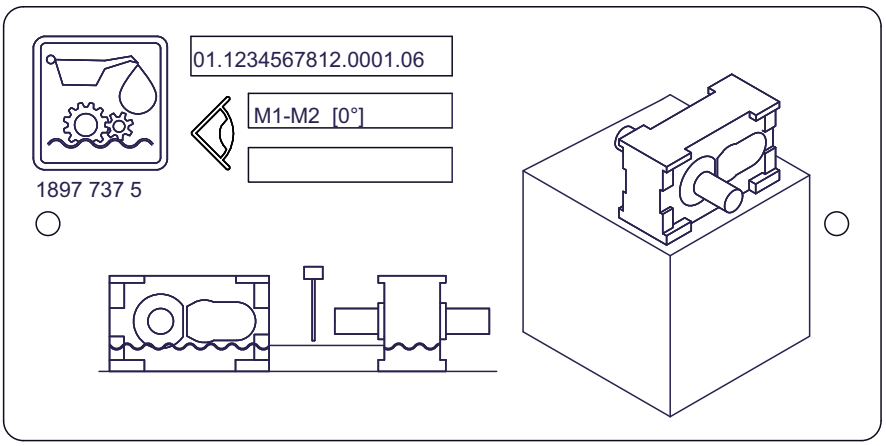
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[1] Oil dipstick
▯ Oil

Information sign

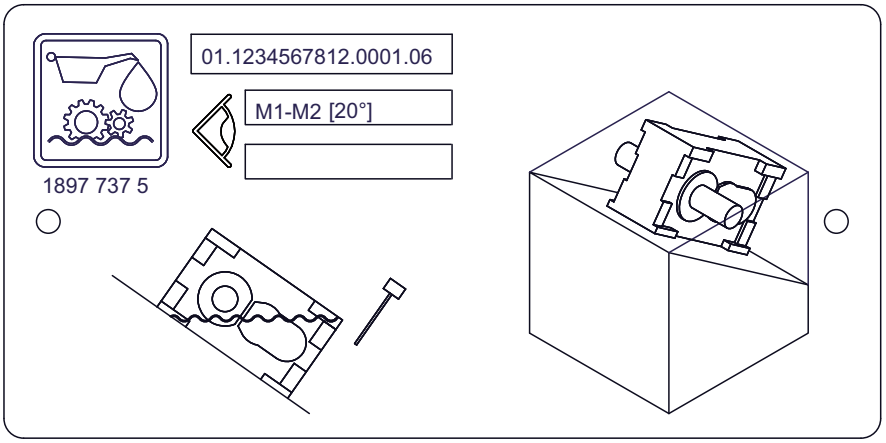
Observe the additional **information sign on the gear unit**. Check the oil level in the test mounting position specified on the information sign.

The following figure shows an example of the information sign for check mounting position 0°.



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The following figure shows an example of the information sign for check mounting position 20°.



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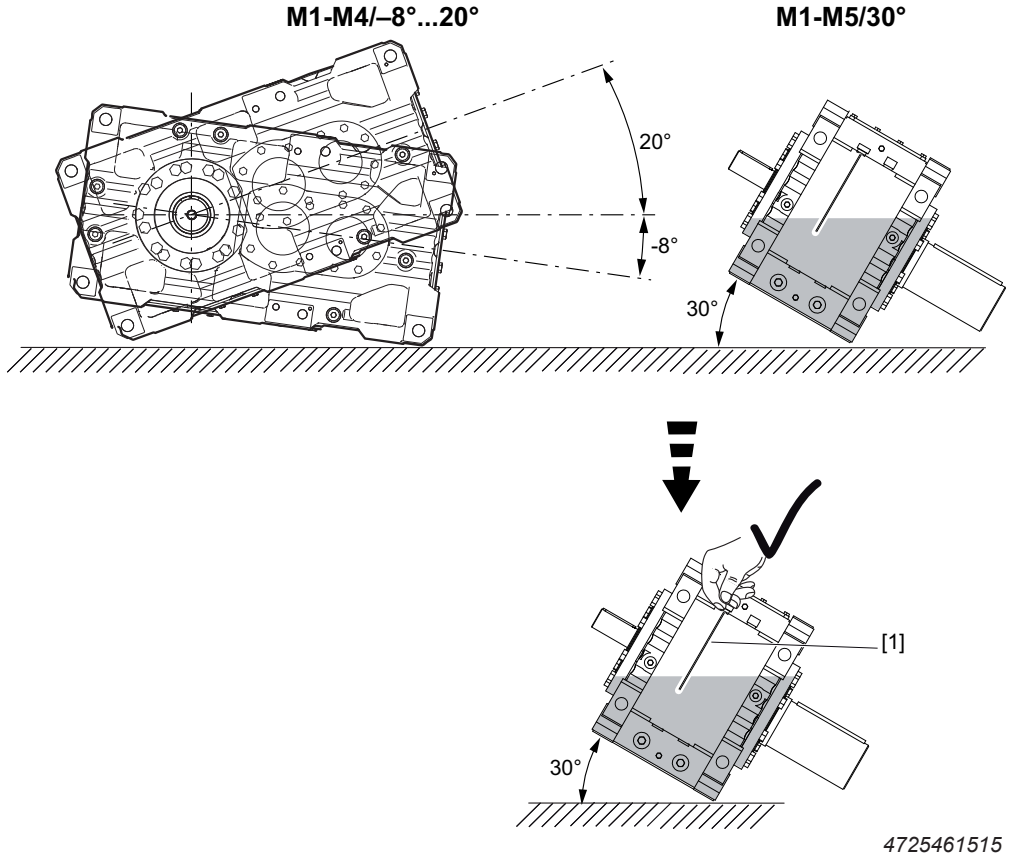
Combination of fixed and variable pivoted mounting positions

Procedure

Before checking the oil level of gear units with variable/fixed pivoted mounting position, position the gear unit in the mounting position defined in the order documents. Observe the notes in chapter "Standard procedure" (→ 🗎 192).

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The following figure shows an example of how to check the oil level.

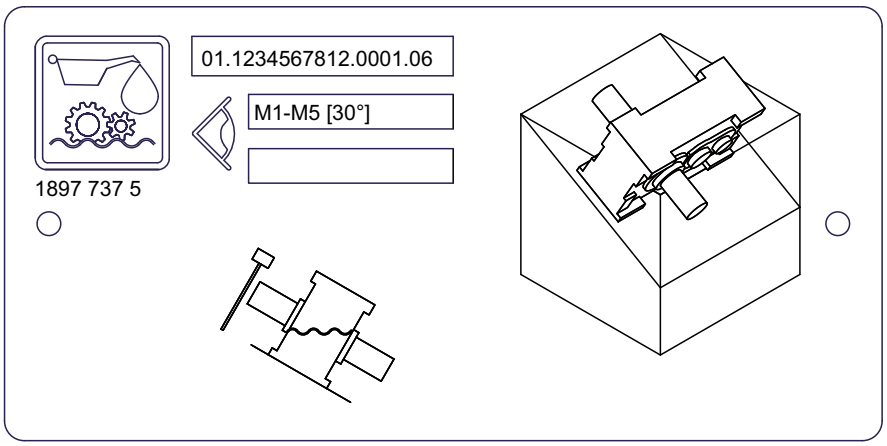


[1] Oil dipstick
Oil

Information sign

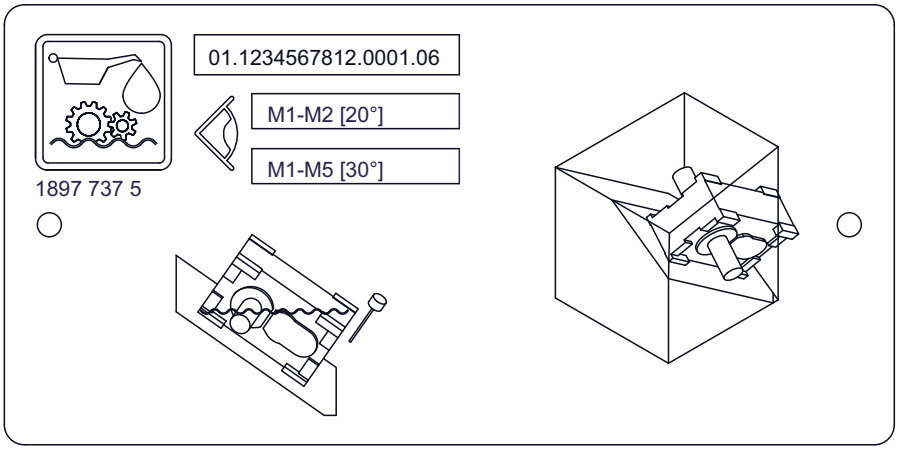
Observe the additional information sign on the gear unit. Check the oil level in the test mounting position specified on the nameplate.

Following an example of the information sign for checking the mounting position at 30°.



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Following an example of the information sign for checking the mounting position at 30°.



9007204944188555

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8.5 Checking the oil consistency

INFORMATION

A detailed and reliable examination of the oil consistency is not possible with the naked eye. If you are unsure whether the oil is in good condition or whether an oil change is required, we recommend performing a laboratory analysis of the oil.

SEW-EURODRIVE offers a laboratory analysis in which the oil is checked for wear, water and contamination. Furthermore, the viscosity, acid value and additive content of the oil is checked. For this purpose, contact SEW-EURODRIVE.

Proceed as follows to check the oil consistency:

1. ⚠ **WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Severe injuries.
   Allow the gear unit to cool down below 50 °C before you start working on it.
2. Start the gear unit for a short time for the oil to mix with suspended particles.
3. Determine the oil drain and place a clean and dry container underneath.
4. Slowly open the oil drain and drain some oil.
5. Close the oil drain valve.
6. Check the oil consistency:

- Check the drained oil for appearance, color, and contamination.
- If the oil sample is severely contaminated, e.g. water, cloudiness, change in color, dirt, consult a specialist to find out the cause.

8.6 Changing the oil

8.6.1 Notes

Observe the following information when changing the oil:

- Perform the oil change immediately after you have switched off the gear unit to prevent solids from settling. If possible, you should drain the oil while it is still warm. Avoid oil temperatures well above 50 °C.
- The oil grade and oil viscosity are listed on the nameplate of the gear unit. The oil quantity specified on the nameplate is an approximate quantity. The markings on the oil dipstick or the oil level glass are the decisive indicators of the correct oil quantity.

  When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the oil fill quantity is higher. Observe the operating instructions of the oil supply system.
- Always fill the gear unit with the same oil grade that was used before. Mixing oils of different grades and/or manufacturers is not permitted. In particular, synthetic oils must not be mixed with mineral oils or other synthetic oils. When switching from mineral oil to synthetic oil and/or from synthetic oil of a certain basis to synthetic oil of a different basis, you must flush the gear unit thoroughly with the new oil grade.

  Refer to the lubricant table for information about the permitted oils of the various lubricant manufacturers.

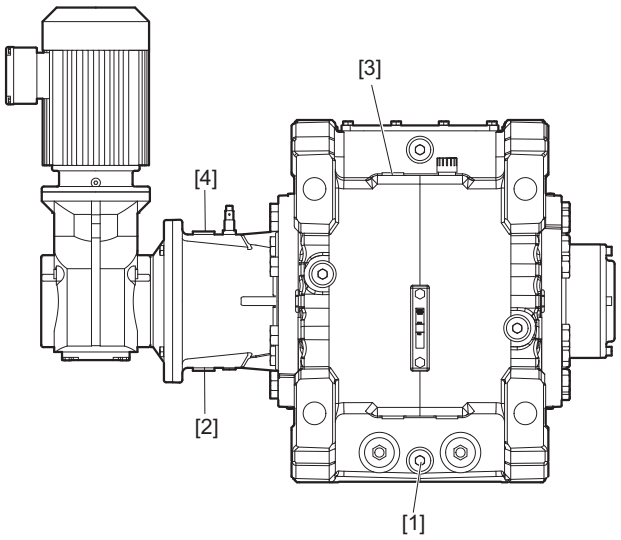
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- When changing the oil, flush the interior of the gear unit thoroughly with oil to remove oil sludge, wear debris, and oil residues. Use the same oil grade that is used for operating the gear unit. Fill in the fresh oil only after all residues have been removed.
- 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. Ascertain and eliminate the cause before filling in new oil.
- If required, empty accessories, e.g. filters and pipes.
- Replace any damaged gaskets of the oil drain plug.
- Empty the oil-bearing system of gear units with oil circulation lubrication and oil supply systems according to the manufacturer's maintenance instructions.
- Use a filling filter (max. filter mesh 25 µm) to fill in the oil.
- Remove any leaking oil immediately with an oil binding agent. Dispose of the used oil in accordance with the applicable regulations.
- For the auxiliary drive, observe the notes and procedures in the operating instructions: Gear unit series R..7, F..7, K..7, S..7, SPIROPLAN®.

Video instructions

German	English

8.6.2 Procedure



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[1] Oil drain plug of the bevel-helical gear unit
[2] Oil drain plug of the auxiliary drive adapter
[3] Oil fill plug of the bevel-helical gear unit
[4] Oil fill plug of the auxiliary drive adapter

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1. ⚠ **WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Severe injuries.
   Allow the gear unit to cool down below 50 °C before you start working on it.
2. Place a container underneath the oil drain plugs [1/2].
3. Remove the screw plugs [3/4] and the oil drain plugs [1/2]. Drain all the oil into the container.
4. Clean the magnetic oil drain plugs, if applicable.
5. Close the oil drain [1].
6. Screw in the oil drain plugs [1/2].
7. Fill the prescribed oil quantity (see the following tables) into the auxiliary drive adapter via the oil fill plug [4].

- Use a filling filter (max. filter mesh 25 µm) to fill in the oil.

Size		Oil quantity in liters	
		"Empty buckets"	"Full buckets"
X3K..	100 – 110	1	1
	120 – 130	1	2
	140 – 150	1	2
	160 – 170	1	3
	180 – 190	1	4
	200 – 210	2	5
	220 – 230	1	7
	240 – 250	1	9
	260 – 270	2	12
	280	2	12

Size		Oil quantity in liters	
		"Empty buckets"	"Full buckets"
X4K..	100 – 110	–	1
	120 – 130	–	1
	140 – 150	–	1
	160 – 170	–	2
	180 – 190	–	2
	200 – 210	–	3
	220 – 230	–	4
	240 – 250	–	5
	260 – 270	–	5

8. Fill the prescribed oil quantity (see the following tables) into the gear unit via the oil fill plug [4].

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Size		Oil quantity in liters	Size	Oil quantity in liters
X3K..	**100**	12	**200**	105
	110	14	**210**	105
	120	20	**220**	135
	130	22	**230**	139
	140	34	**240**	175
	150	34	**250**	175
	160	59	**260**	279
	170	59	**270**	279
	180	74	**280**	330
	190	77		

Size		Oil quantity in liters	Size	Oil quantity in liters
X4K..	**120**	25	**210**	109
	130	23	**220**	145
	140	36	**230**	145
	150	39	**240**	181
	160	67	**250**	181
	170	67	**260**	275
	180	81	**270**	275
	190	84	**280**	335
	200	107		

- The oil quantity specified on the nameplate is an approximate quantity. The markings on the oil dipstick or the oil level glass are the decisive indicators of the correct oil quantity, see chapter "Checking the oil level" (→ 🗎 192).

9. If present, screw the oil fill plugs [3/4] and the oil dipstick back into place.
10. ⚠ **CAUTION!** Danger due to leakage of lubricant. Possible risk of slipping. Immediately remove any oil that has escaped with oil binder.

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8.7 Checking and cleaning the breather

1. **NOTICE!** Improper cleaning of the venting may result in damage to the gear unit. Possible damage to property.
   Remove any deposits near the breather. Prevent foreign particles from entering into the gear unit.
2. If the breather is clogged, replace it.

8.8 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.

8.8.1 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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8.9 Cleaning the fan /FAN



⚠ CAUTION

The protection cover can slip during assembly and disassembly.

Potential risk of crushing due to falling parts.

- Secure the protection cover against slipping during assembly and disassembly.

NOTICE

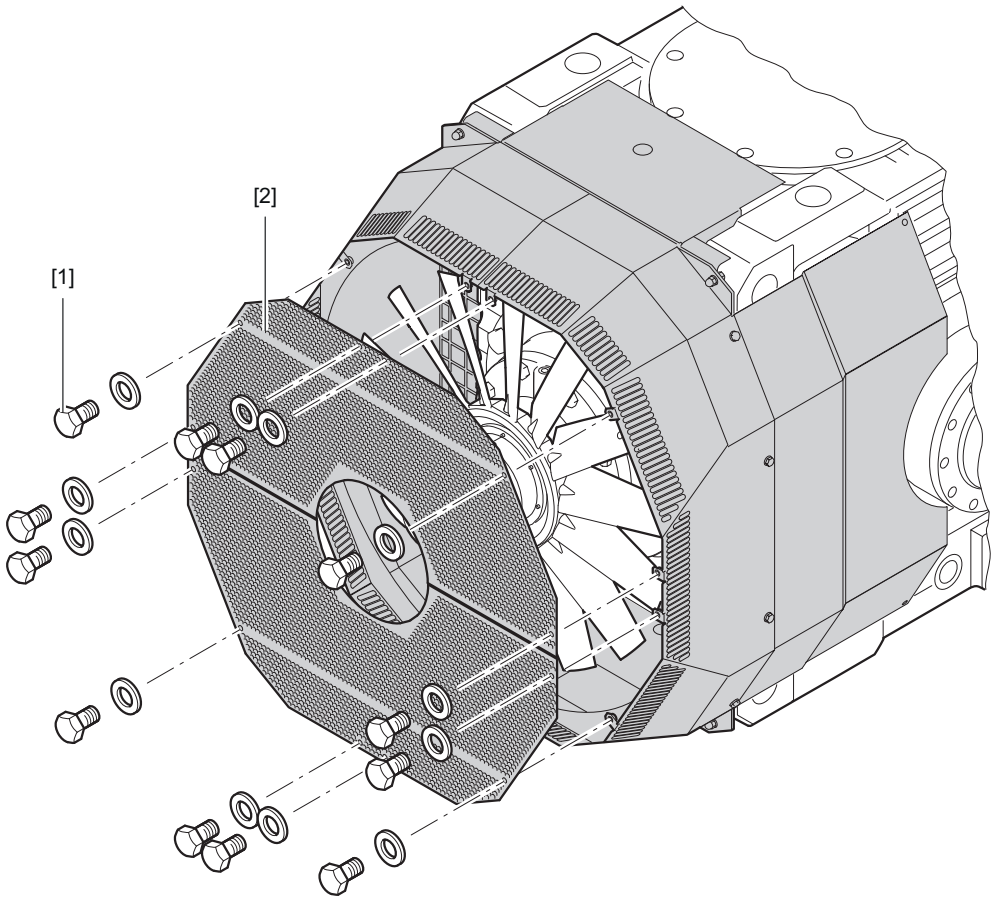
Improper assembly of the fan guard after disassembly (e.g. for inspection purposes) may result in damage to the fan.

Possible damage to property.

- The reassembly of the protection cover may only be performed with original parts from SEW-EURODRIVE and with sufficient distance to the fan. If the distance is not observed, the fan may touch the protection cover. Do not disconnect the fan from the fan hub. This may only be performed by qualified personnel.

8.9.1 X.K.. with universal fan guard

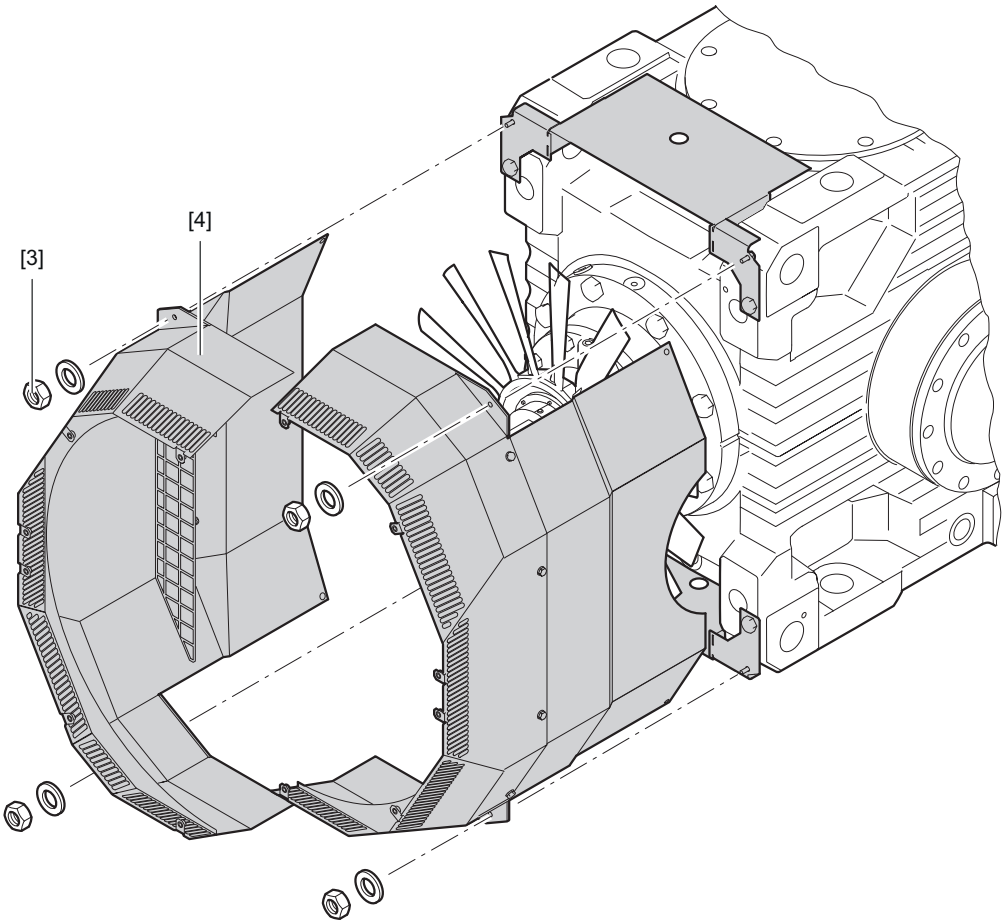
1. Loosen the screws [1].
2. Remove the 2 protective grids [2].



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3. Loosen the 4 nuts [3] and remove the 2 fan guards [4].



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4. Remove any dirt from the fan wheel, fan guard and protective grid using a hard brush, for example.
5. Assemble the fan guard in reverse order.
6. Before restarting the fan again, make sure the fan guard is mounted properly. The fan must not touch the fan guard.

8.10 Cleaning the water cooling cover /CCV

8.10.1 Information before you start

NOTICE

Risk of damage to components of the water cooling cover.

Possible damage to property.

- Properly vent the water cooling cover and the connected systems before taking them into operation again.
- For information on suitable cleaning agents, contact SEW-EURODRIVE.
- To prevent damage resulting from improper handling of the functional components, always contact SEW-EURODRIVE before you use comparable, aggressive cleaning agents.

NOTICE

Risk of contamination of the medium.

Possible damage to property.

- Experience has shown that the cleaning agent cannot be removed without residue. For this reason, when selecting cleaning agents, make sure they are compatible to cleaning agents and the medium.

8.10.2 Procedure

1. Let the components cool down before you start working on the unit.
2. Depressurize all systems before carrying out any disassembly work on the water cooling cover. Shut them off with the corresponding valve.
3. **NOTICE!** Risk of contamination due to drained media. Possible environmental damage.
   When draining the media, they must not get into the soil or the sewer system. They must be collected and disposed of in secured containers in accordance with the applicable environmental regulations.
4. Disconnect the cooling water supply and return from the water cooling cover. Drain all the cooling medium.
5. Open the inspection cover.
6. Remove the water cooling cover and the gasket.
7. Check the water cooling cover for deposits. Clean slight contamination on the water cooling cover with suitable cleaning agent. Replace the water cooling cover with a new one if the contamination is particularly heavy. Contact SEW-EURODRIVE.
8. Apply Loctite® 5188 to the contact surfaces of the cooling cover rim.
9. Insert the water cooling cover into the gear unit housing.
10. Clean and insert the gasket.
11. Attach the inspection cover.
12. Screw in the screws and tighten them in two steps from the inside to the outside. Observe chapter "Tightening torques" (→ 🗎 86).

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13. Re-connect the water cooling inflow and return pipes to the water cooling cover.
14. Properly vent the water cooling cover and the connected systems before taking them into operation again.
15. Check the tightness.

8.11 Cleaning the water cooling cartridge /CCT

INFORMATION

Do not carry out any repair work on the pipe bundle of the water cooling cartridge unless in case of an emergency. Contact SEW-EURODRIVE to do so. Analyze and report failure symptoms.

8.11.1 Maintenance intervals

The service life of the water cooling cartridge depends to a large degree on the quality of the media and their substances. The operator is responsible for specifying the maintenance intervals. Use the performance parameters and power rating determined during operation to define the maintenance intervals.

Specify the maintenance intervals in such a way that a power loss of the water cooling cartridge does not pose a hazard to the operation of the system.

8.11.2 Cleaning

Use the performance parameters and power rating determined during operation to define the cleaning intervals. Specify the intervals in such a way that a power loss of the water cooling cartridge does not pose a hazard to the operation of the system.

Information before you start

NOTICE

Risk of destroying components of the water cooling cartridge.

Possible damage to property.

- To prevent damage resulting from improper handling of the water cooling cartridge, always contact SEW-EURODRIVE before you use other comparably aggressive cleaning agents.

NOTICE

Risk of contamination of the medium.

Possible damage to property.

- Experience has shown that the cleaning agent cannot be removed without residue. For this reason, when selecting cleaning agents, make sure they are compatible to cleaning agents and the medium.

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NOTICE

Risk of damage to components of the water cooling cartridge.

Possible damage to property.

- Properly vent the water cooling cartridge and the connected systems before taking them into operation again.

Procedure

1. Let the components cool down before you start working on the unit.
2. Depressurize the water cooling cartridge and the connected system pipes. Shut them off with the corresponding valve.
3. Completely drain the gear unit oil prior to disassembly.
4. **NOTICE!** Risk of contamination due to drained media. Possible environmental damage.
   When draining the media, they must not get into the soil or the sewer system. They must be collected and disposed of in secured containers in accordance with the applicable environmental regulations.
5. Disconnect the cooling water supply and return from the water cooling cartridge. Drain all the cooling medium.
6. Only loosen the water cooling cartridge via the hexagon on the tube bottom and remove it.
7. **NOTICE!** The sealing surfaces must not be damaged. Possible damage to property.
   Damage to the sealing surfaces can result in leakage.
8. Remove the flat gasket. Remove any gasket residues from the sealing surfaces.
9. Clean the water cooling cartridge.
   NOTICE! Risk of corrosion due to scratches. Possible damage to property.
   Use a brush with soft bristles for cleaning the inside.
   The following measures are recommended for cleaning:
   - A mixture of 50% hydrochloric acid with inhibitors and 50% water can be used to remove lime deposits on the inside of the pipe.
   - The inner cleaning of the tube bundle can be done with a brush at a Ø of the pipes of > 5 mm. Make sure that you use a brush with soft bristles so that the surface of the pipe walls is not scratched.
   - Contact SEW-EURODRIVE if you plan to remove scale deposits using other cleaning agents.
   - After cleaning, make sure all cleaning agents have been removed completely from the pipes before taking the water cooling cartridge into operation again.
10. Coat 2 threads with LOCTITE® 577 and screw the water cooling cartridge only via the hexagon to the tube bottom.

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11. Re-connect the water cooling inflow and return pipes to the water cooling cartridge.
12. Pour 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 dipstick or the oil level glass is the decisive indicator of the correct oil quantity, see chapter "Checking the oil level" (→ 🗎 192).
- Use a clean filling aid without zinc coating (plastic funnel or similar).

13. Before restarting the system, vent the pipes.
14. Check the tightness.

8.12 Cleaning the oil heater /OH



⚠ WARNING

Danger of electric shock.

Severe or fatal injuries.

- De-energize the oil heater before you start working on the unit.
- Secure the oil heater against unintended power-up.

1. Remove the cabling of the heating element.
2. Before disassembling the heating element, drain the oil (→ 🗎 199).
3. **NOTICE!** Improper cleaning may damage the heating elements. Possible damage to property.
   Clean the tubular heating elements with solvent. Replace the defective heating elements.
4. Screw the heating element out of the gear unit housing.
5. Apply LOCTITE® 577 to the 2 threads of the heating element.
6. Fasten the heating element by applying torque only to the head of the hex screw.
7. Close the oil drain valve.
8. Fill new oil of the same type as the old oil through the oil filling hole (if you want to change the oil type, contact SEW-EURODRIVE Service).

- Fill in the oil quantity according to the information on the nameplate. The oil quantity specified on the nameplate is a guide value.
- Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.
- Check to see that the oil level is correct, refer to chapter "Checking the oil level".

9. Connect the heating element.

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8.13 Torque-limited backstop

INFORMATION

Observe the operating instructions of the respective backstop manufacturer. The following chapter describes the procedure for backstops from the company RINGSPANN GmbH.

8.13.1 Checking the wear of the lining

⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- Shut down the drives when the conveyor belt is empty so that there is no backdriving torque at the backstop caused by material on the conveyor belt. Make sure that no torque is applied to the backstop.

⚠ WARNING

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

Severe injuries.

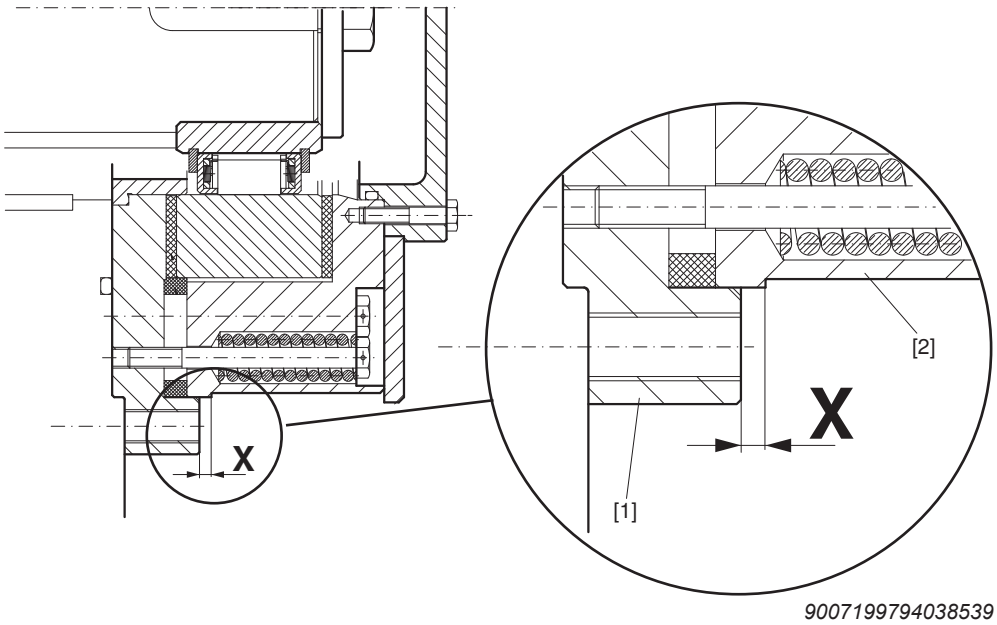
- Allow the gear unit to cool down before starting work.

NOTICE

Improper backstop maintenance may result in damage to the gear unit.

Possible damage to property.

- RINGSPANN GmbH stipulates that the torque limiter will not function properly if distance "X" is equal to or smaller than 0.8 mm. Contact SEW-EURODRIVE.



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[1] Backstop flange

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[2] Housing

Check the brake lining wear by measuring the **control dimension "X"** between the fixed backstop flange [1] and the lower edge of the screwed-in groove of the housing [2] of the backstop. The distance must not be less than 0.8 mm.

8.14 Split housing

If the split gear unit housing is divided during maintenance, be sure that:

- The parting lines are sealed again carefully, and
- The screw connections are re-tightened using the tightening torques specified in chapter "Tightening torques" (→ 🗎 86).

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9 Permitted lubricants

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

9.1 Lubricant selection

Note the following when selecting the lubricants.

NOTICE

Improper lubricant selection can damage the gear unit.

Possible damage to property.

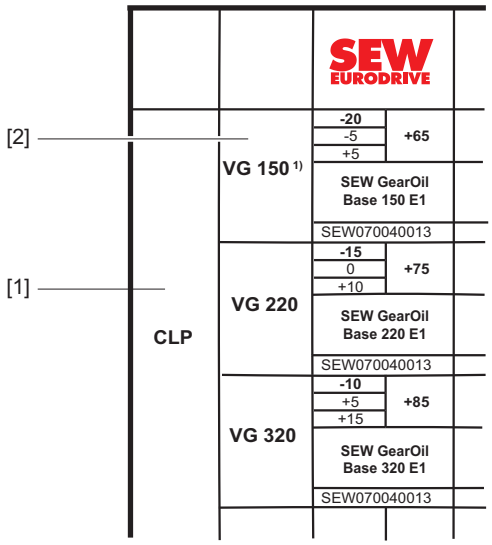
- The oil viscosity and type (mineral/synthetic) to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate. If other lubricants are used in the gear units and/or in other temperature ranges than those recommended, 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. This lubricant recommendation in the lubricant table does not imply approval in the sense of a guarantee for the quality of the lubricant supplied by the respective supplier. Lubricant manufacturers are responsible for the quality of their own products.
- 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 permitted viscosity of the individual lubricants.
- Do not mix different synthetic lubricants and do not mix synthetic lubricants with mineral lubricants.
- Check the compatibility of the greases and oils used.

The values specified in the lubricant tables apply as of the time of printing of this document. The data of the lubricants is subject to dynamic change by the lubricant manufacturers. For the latest information on lubricants, refer to:

https://www.sew-eurodrive.de/products/gear_units/standard_gear_units/accessories_and_options/lubricants/lubricants.html

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9.2 Structure of the tables and abbreviations



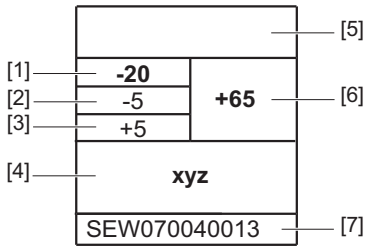
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[1] Lubricant type
[2] Viscosity class

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 $F_s \geq 1.3$

9.3 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 lower 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 chapter "Explanations on the oil supply system / oil cooling systems and oil viscosity".
2) Service life is significantly reduced when exceeded. Observe chapter "Lubricant change intervals".

9.4 Explanations on the oil supply system / oil cooling systems and oil viscosity

Adhere to the following oil viscosity: For up-to-date information about the lubricants, visit:

www.sew-eurodrive.de/lubricants

Pressure lubrication	Oil viscosity
Motor pump for pressure lubrication /ONP1	5000 cSt.
Motor pump for pressure lubrication /ONP1L	5000 cSt.
Motor pump incl. air cooler for pressure lubrication /OAP1	5000 cSt.
Shaft end pump /SEP	5000 cSt.
Motor pump incl. water cooler for pressure lubrication /OWP1	5000 cSt.

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9.5 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.

Permitted 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 from Freudenberg 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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9.6 Lubricant tables

This lubricant table is valid when the document is published. Refer to www.sew-eurodrive.de/lubricants 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	SEW GearOil Base 150 E1 / US1 / CN1 / BR1	-20 -5 +5	+65	Optigear BM 150	-20 -5 +5	+65	Renolin CLP 150 Plus	-20 -5 +5	+65	Renolin HighGear 150	-20 -5 +5	+65	Mobilgear 600 XP 150	-20 -5 +5	+65	Klüberoil GEM 1-150 N	-20 -5 +5	+65	AP-SGO 150	
		SEW070040013						SEW070030013									SEW070030013					
	VG 220	-15 0 +10	+75	SEW GearOil Base 220 E1 / US1 / CN1 / BR1	-15 0 +10	+75	Optigear BM 220	-15 0 +10	+75	Renolin CLP 220 Plus	-15 0 +10	+75	Renolin HighGear 220	-15 0 +10	+75	Mobilgear 600 XP 220	-15 0 +10	+75	Klüberoil GEM 1-220 N	-15 0 +10	+75	AP-SGO 220	Carter EP 220
		SEW070040013						SEW070030013									SEW070030013					
	VG 320	-10 +5 +15	+85	SEW GearOil Base 320 E1 / US1 / CN1 / BR1	-10 +5 +15	+80	Optigear BM 320	-10 +5 +15	+80	Renolin CLP 320 Plus	-10 +5 +15	+80	Renolin HighGear 320	-10 +5 +15	+80	Mobilgear 600 XP 320	-10 +5 +15	+80	Klüberoil GEM 1-320 N	-10 +5 +15	+80	AP-SGO 320	Carter EP 320
		SEW070040013						SEW070030013									SEW070030013					
	VG 460	-5 +10 +20	+90	SEW GearOil Base 460 E1 / US1 / CN1 / BR1	-5 +10 +20	+90	Optigear BM 460	-5 +10 +20	+90	Renolin CLP 460 Plus	-5 +10 +20	+90	Renolin HighGear 460	-5 +10 +20	+90	Mobilgear 600 XP 460	-5 +10 +20	+90	Klüberoil GEM 1-460 N	-5 +10 +20	+90	AP-SGO 460	Carter EP 460
		SEW070040013						SEW070030013									SEW070030013					
	VG 680	0 +15 +25	+90	SEW GearOil Base 680 E1 / US1 / CN1 / BR1	0 +15 +25	+90	Optigear BM 680	0 +15 +25	+90	Renolin CLP 680 Plus	0 +15 +25	+90	Renolin HighGear 680	0 +15 +25	+90	Mobilgear 600 XP 680	0 +15 +25	+90	Klüberoil GEM 1-680 N	0 +15 +25	+90	AP-SGO 460	Carter EP 680
		SEW070040013						SEW070030013									SEW070030013					
	VG 1000	+5 +20 +30	+90	Optigear BM 1000																		

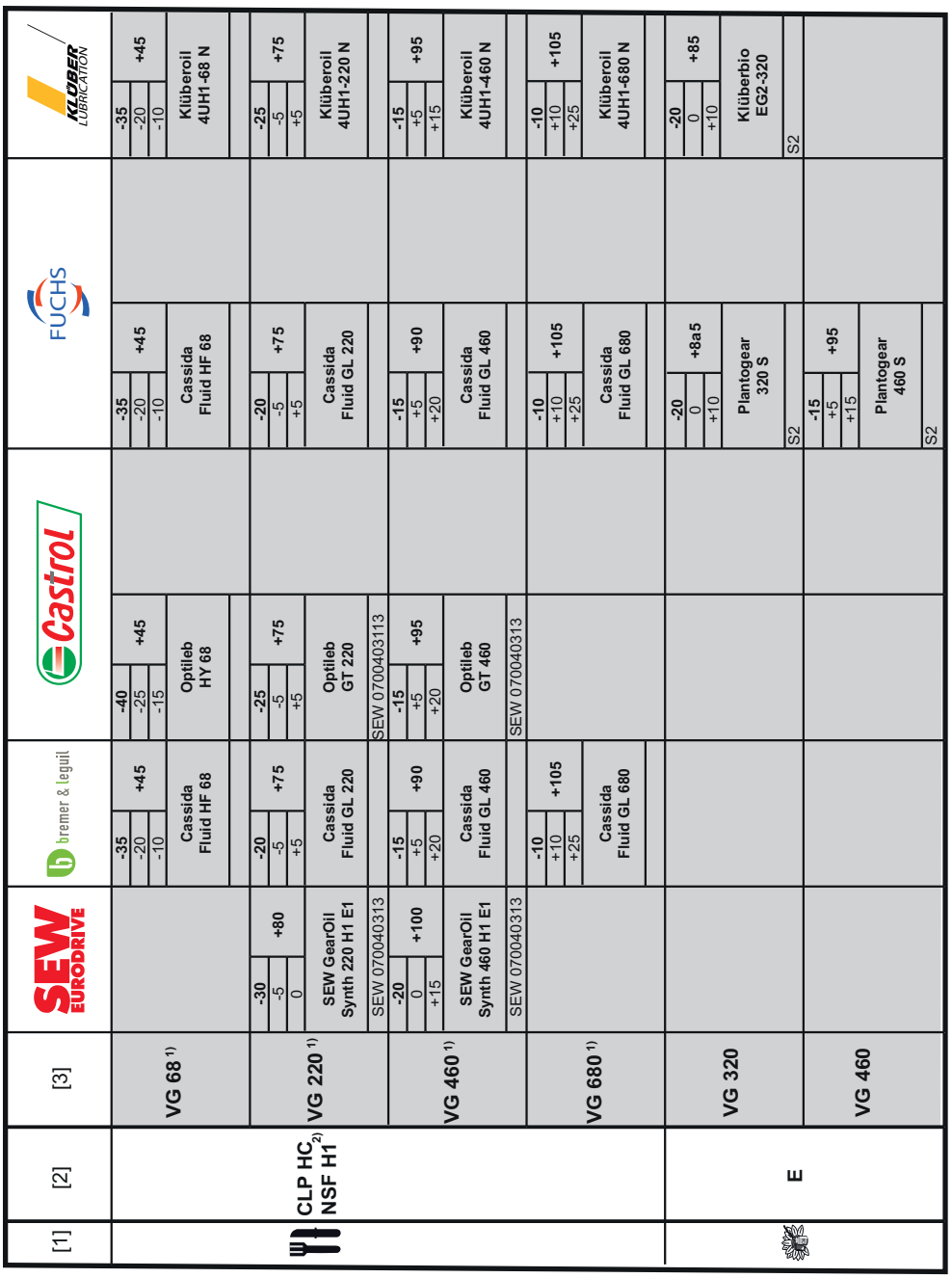
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This lubricant table is valid when the document is published. Refer to www.sew-eurodrive.de/lubricants for the latest version of the table.

[1]	[2]	SEW EURODRIVE	Castrol	FUCHS	Mobil®	KLÜBER LUBRICATION	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	-25 -10 0 +70 Alphasyn EP 150	-30 -10 +0 +70 Renolin Unisyn CLP 150	-30 -10 0 +75 SHC 629	-25 -10 0 70 Klübersynth GEM 4-150 N	-35 -15 -5 +75 Carter SH 150
		SEW 070040313					
	VG 220	-30 -10 0 +85 GearOil Synth 220 E1	-25 -5 +5 +80 Alphasyn EP 220	-25 -5 +5 +80 Renolin Unisyn CLP 220	-25 -5 +5 +85 SHC 630	-25 -5 +5 +80 Klübersynth GEM 4-220 N	-25 -5 +5 +80 Carter SH 220
		SEW 070040313					
	VG 320	-25 -5 +5 +100 GearOil Synth 320 E1	-20 0 +10 +90 Alphasyn EP 320	-20 0 +10 +90 Renolin Unisyn CLP 320	-20 0 +10 +95 SHC 632	-20 0 +10 +95 Klübersynth GEM 4-320 N	-20 0 +10 +90 Carter SH 320
		SEW 070040313					
	VG 460	-20 0 +15 +110 GearOil Synth 460 E1	-15 +5 +15 +100 Alphasyn EP 460	-15 +5 +15 +100 Renolin Unisyn CLP 460	-15 +5 +15 +105 SHC 634	-15 +5 +20 +105 Klübersynth GEM 4-460 N	-15 +5 +15 +100 Carter SH 460
		SEW 070040313					
	VG 680	-15 +5 +20 +110 GearOil Synth 680 E1	-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 Carter SH 680
		SEW 070040313					
	VG 1000				-10 +15 +30 +110 SHC 639	0 +20 +30 +110 Klübersynth EG4-1000	
					-10 +15 +30 +110 SHC Gear 1000		

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This lubricant table is valid when the document is published. Refer to www.sew-eurodrive.de/lubricants 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)		-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)	-30 -5 0 +80 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: $F_F \geq 1.6 \rightarrow M_{K2per} \leq 1.25 \times MN2$ (nominal torque) $\rightarrow M_{K2per} \leq 2 \times M_{N2}/F_F = 2/1.6 \times M_{N2}$.
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:
Also observe the thermal application limits of the oil seal materials, see chapter "Lubricant compatibility with oil seal" (→ 🗎 215).

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9.7 Sealing greases/rolling bearing greases

INFORMATION

- Do not mix permitted greases from different areas of application.
- If users want to use a grease that is not listed, it is their responsibility to ensure that the grease is suitable for the intended application.

The table shows the greases recommended by SEW-EURODRIVE with the "lower operating temperature".

The permitted operating temperature of the lubricant used must be taken into account for the lower and upper operating temperature. For further information, refer to chapter "Lubricant table" (→ 🗎 216).

Area of application	Manufacturer	Grease	Lower service temperature
Standard	SEW-EURODRIVE	**SEW Grease HL 2 E1**[1)]	-40 °C
	Fuchs	Renolit CX TOM 15 OEM	-40 °C
	BP	Energrease LS EP-2	-30 °C
	Castrol	Longtime PD 2/ Tribol GR 100-1 PD	-35 °C
		Spheerol EPL 2	-20 °C
	Klüber	Centoplex EP 2	-20 °C
		Petamo GHY 133 N	-40 °C
	Mobil	Mobilux EP 2	-20 °C
	Shell	Gadus S2 V220 2	-20 °C
	Total	Multis EP 2	-20 °C
	SEW	**SEW Grease HL 2 H1 E1**[1)]	-40 °C
	Bremer & Leguil	Cassida Grease GTS2	-40 °C
	Fuchs	**Plantogel 2 S**[1)]	-40 °C

1) Use the greases used at the factory if possible.

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9.8 Lubricant fill quantities

INFORMATION

- Different oil quantities are required for the auxiliary drive adapter in **"empty bucket"** design and in **"full bucket"** design. Observe the information specified in the following table.
- The specified fill quantities are guide values. The exact values vary depending on the number of gear stages and gear ratio.
- The mark on the oil dipstick or the oil level glass is the decisive indicator of the correct oil quantity.
- For pivoted mounting positions, the lubricant fill quantity on the nameplate may vary from the standard. The fill quantity specified on the nameplate is a guide value. The mark on the oil dipstick or the oil level glass is the decisive indicator of the correct oil quantity.

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9.8.1 Universal gear unit housing with auxiliary drive adapter

The following table shows the lubricant fill quantities for splash and pressure lubrication.

X3K..

Size	Oil quantity in liters		
	Gear unit	"Empty buckets" 	"Full buckets" 
X3K.100	12	1	2
X3K.110	14	1	2
X3K.120	20	1	2
X3K.130	22	1	2
X3K.140	34	1	2
X3K.150	34	1	2
X3K.160	59	1	3
X3K.170	59	1	3
X3K.180	74	1	4
X3K.190	77	1	4
X3K.200	105	2	5
X3K.210	105	2	5
X3K.220	135	1	7
X3K.230	139	1	7
X3K.240	175	1	9
X3K.250	175	1	9
X3K.260	279	2	12
X3K.270	279	2	12
X3K.280	330	2	12

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X4K..

Size	Oil quantity in liters		
	Gear unit	"Empty buckets" 	"Full buckets" 
X4K.120	25	-	1
X4K.130	23	-	1
X4K.140	36	-	1
X4K.150	39	-	1
X4K.160	67	-	1
X4K.170	67	-	1
X4K.180	81	-	2
X4K.190	84	-	2
X4K.200	107	-	2
X4K.210	109	-	2
X4K.220	145	-	3
X4K.230	145	-	3
X4K.240	181	-	4
X4K.250	181	-	4
X4K.260	275	-	5
X4K.270	275	-	5
X4K.280	335	-	5

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9.8.2 Reduced oil level

The following tables show the lubricant fill quantity for the gear unit with a reduced oil level.

X3K.. with splash lubrication

Size	Oil quantity in liters		
	Gear unit	"Empty buckets" 	"Full buckets" 
X3K.180	58	1	4
X3K.190	58	1	4
X3K.200	78	2	5
X3K.210	79	2	5
X3K.220	108	1	7
X3K.230	108	1	7
X3K.240	128	1	9
X3K.250	128	1	9
X3K.260	214	2	12
X3K.270	205	2	12
X3K.280	267	2	12

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X3K.. with pressure lubrication

Size	Oil quantity in liters		
	Gear unit	"Empty buckets" 	"Full buckets" 
X3K.160	50	1	3
X3K.170	50	1	3
X3K.180	60	1	4
X3K.190	60	1	4
X3K.200	80	2	5
X3K.210	80	2	5
X3K.220	113	1	7
X3K.230	113	1	7
X3K.240	133	1	9
X3K.250	133	1	9
X3K.260	279	2	12
X3K.270	279	2	12
X3K.280	272	2	12

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9.8.3 Auxiliary drive

The table below shows the lubricant fill quantities for the auxiliary drive.

X3K..

Size	"Empty buckets" auxiliary drive 		"Full buckets" auxiliary drive 	
	Type	Oil quantity in liters	Type	Oil quantity in liters
X3K.100	KF37	1.5	KF57	3.15
X3K.110	KF37	1.5	KF57	3.15
X3K.120	KF47	2.2	KF77	5.9
X3K.130	KF47	2.2	KF77	5.9
X3K.140	KF57	3.15	KF77	5.9
X3K.150	KF57	3.15	KF77	5.9
X3K.160	KF67	3.7	KF87	11.9
X3K.170	KF67	3.7	KF87	11.9
X3K.180	KF77	5.9	KF97	21.5
X3K.190	KF77	5.9	KF97	21.5
X3K.200	KF77	5.9	KF97	21.5
X3K.210	KF77	5.9	KF97	21.5
X3K.220	KF87	11.9	KF107	35.1
X3K.230	KF87	11.9	KF107	35.1
X3K.240	KF87	11.9	KF127	55
X3K.250	KF87	11.9	KF127	55
X3K.260	KF87	11.9	KF127	55
X3K.270	KF87	11.9	KF127	55
X3K.280	KF87	11.9	KF127	55

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X4K..

Size	"Empty buckets" auxiliary drive 		"Full buckets" auxiliary drive 	
	Type	Oil quantity in liters	Type	Oil quantity in liters
X4K.120	-	-	KF37	1.5
X4K.130	-	-	KF37	1.5
X4K.140	-	-	KF47	2.2
X4K.150	-	-	KF47	2.2
X4K.160	-	-	KF67	3.7
X4K.170	-	-	KF67	3.7
X4K.180	-	-	KF77	5.9
X4K.190	-	-	KF77	5.9
X4K.200	-	-	KF77	5.9
X4K.210	-	-	KF77	5.9
X4K.220	-	-	KF87	11.9
X4K.230	-	-	KF87	11.9
X4K.240	-	-	KF97	21.5
X4K.250	-	-	KF97	21.5
X4K.260	-	-	KF97	21.5
X4K.270	-	-	KF97	21.5
X4K.280	-	-	KF97	21.5

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10 Malfunctions/remedy

Before you begin, read the following notes in chapter "Creating a safe working environment" (→ 🗎 17).

10.1 Possible malfunctions/remedy

Fault	Possible cause	Measure
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 the oil level; correct if necessary
	• Oil too old	• Check when the oil was last changed; change the oil, if necessary
	• 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)
	• Gear units with fan: Air intake opening/gear unit housing contaminated	• Check air intake openings, clean them if necessary; clean the gear unit housing
	• Malfunction of the oil-air or oil-water cooling system	• Observe the separate operating instructions for the oil-water or oil-air cooling system
	• For gear units with built-in cooling: Cooling liquid flow rate too low; cooling liquid temperature too high; deposits in cooling system	• Check the cooling liquid flow rate; check the entry temperature of the cooling liquid; clean the cooling system
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 • 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

Fault	Possible cause	Measure
Oil leaking[1)] • From oil seal	• Too much oil	• Check the oil level and correct, if necessary
	• Venting sealed	• Check the venting and replace the breather if necessary
	• Oil seal damaged/worn	• Check the oil seals and replace if necessary
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	• Gasket not tight • Fittings loosened	• Retighten screw • Retighten the fitting and screw. Secure screw fitting with Loctite®
No oil pump suction	• Air in the suction line of the oil pump	• Fill oil into the suction line and the oil pump, vent the pump at the pressure side
	• Oil pump defective	• Consult SEW-EURODRIVE
Pressure switch not switching	• Air in the suction line of the oil pump	• Fill suction pipe and oil pump with oil • Vent the pump at the pressure side
	• Pressure switch connected incorrectly	• Check the connection
	• Pressure switch defective	• Replace pressure switch
	• Oil pump defective	• Contact SEW-EURODRIVE
Malfunction in the oil-water or oil-air cooling system	• Malfunction of the oil-water or oil-air cooling system	• Observe the separate operating instructions for the oil-water or oil-air cooling system
Gear unit does not reach cold start temperature	• Thermostat set incorrectly	• Check the setting of the thermostat
	• Oil heater faulty or connected incorrectly	• Check the oil heater is connected and working correctly and replace it if necessary
	• Heat dissipation too great due to unfavorable climatic conditions	• Prevent the gear unit from cooling off during the warm-up phase
Operating temperature at backstop too high, no blocking function	• Damaged/defective backstop	• Check the backstop, replace it if necessary • Contact SEW-EURODRIVE

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Fault	Possible cause	Measure
Main drive does not start	• Speed monitor of the overrunning clutch not set correctly	• Check the speed monitoring setting
	• Wrong direction of rotation, motor rotates in blocking direction of the overrunning clutch	• Change the direction of rotation of the motor (switch 2 phases)
	• Main drive and auxiliary drive not interlocked correctly	• Check wiring, correct if necessary
	• Overload at the output side	• Reduce load
	• Overrunning clutch blocked (cage with sprags of the overrunning clutch not installed correctly or overrunning clutch defective)	• Install cage of the overrunning clutch the other way around (180°) or replace it
	• Main drive defective	• Repair motor in a specialist workshop
Auxiliary drive does not start	• Overload at the output side	• Reduce load
	• Auxiliary drive rotates against blocking direction of the overrunning clutch	• Determine correct direction of rotation. Based on the result either turn the cage of the overrunning clutch by 180° or change the direction of rotation of the motor (switch 2 phases)
	• Overrunning clutch defective	• Replace overrunning clutch
	• Auxiliary drive is defective	• Repair motor in a specialist workshop
Worn brake lining, wear marker "X" below 0.8 mm	• Constantly switching the system on and off or driving it in blocking direction always leads to frequent engaging and disengaging of the backstops and torque limiting. This can cause exceptional heat generation and lining wear in the torque limiting. The generated heat can destroy the lining. In normal operation, the torque limiting distributes a too high torque through relatively small rotational movements. This causes only very little wear on the lining	• Send the torque limiting to the manufacturer for overhaul

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).

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10.2 Service

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

- Complete nameplate data
- Type and extent of the failure
- Time the failure occurred and any accompanying circumstances
- Assumed cause
- Video and audio recordings, if possible

10.3 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Aluminum
- Copper
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

- Oil and grease

  Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.

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11 Supplier documentation

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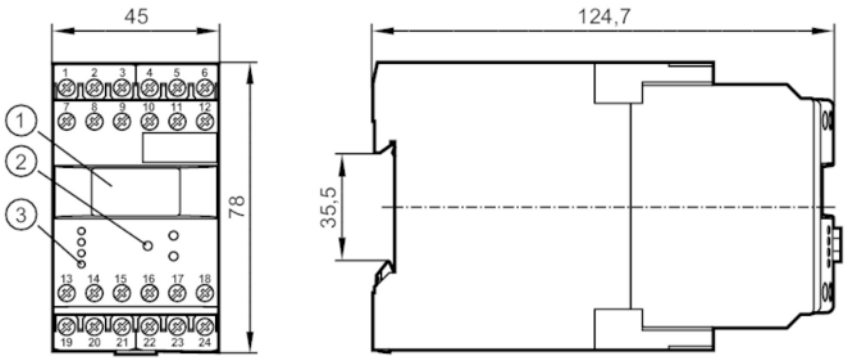
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DD2503

Evaluation unit for speed monitoring

MONITOR/FR-1 /110-240VAC/DC



1 OLED display
2 programming buttons
3 LEDs

Product characteristics		
Housing		housing for DIN rail mounting
Dimensions	[mm]	78 x 45 x 124.7
Application		
Application		pulse evaluation system with microprocessor for frequency; rotational speed; speed; pulses and machine cycles
Electrical data		
Nominal voltage AC	[V]	110...240
Nominal voltage DC	[V]	27
Nominal voltage tolerance	[%]	< 10
Nominal voltage tolerance 2	[%]	20...10
Nominal frequency AC	[Hz]	50...60
Power consumption	[W]	3
Auxiliary energy for sensors DC	[V]	19.6...27.7; (SELV, ≤ 15 mA)
Inputs / outputs		
Number of inputs and outputs		Number of analogue outputs: 1; Number of relay outputs: 2
Outputs		
Number of relay outputs		2
Contact rating		6 A (250 V AC); B300, R300
Number of analogue outputs		1
Analogue current output	[mA]	4...20
Max. load	[Ω]	500
Measuring/setting range		
Setting range Hz	[Hz]	0.1...1000
Setting range	[Imp/min]	1...60000

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DD2503

Evaluation unit for speed monitoring

MONITOR/FR-1 /110-240VAC/DC

Operating conditions			
Ambient temperature	[°C]	-40...60	
Storage temperature	[°C]	-40...85	
Max. relative air humidity	[%]	80; (40 °C: 50 %)	
Protection		IP 50	
Protection rating terminals		IP 20	
Tests / approvals			
EMC		EN 61010	2011
		EMV 89/336/EWG	
		EN 61000-6-2	2005
		EN 61000-6-4	2007
MTTF	[years]	152	
Mechanical data			
Weight	[g]	381.5	
Housing		housing for DIN rail mounting	
Dimensions	[mm]	78 x 45 x 124.7	
Materials		plastics	
Displays / operating elements			
Display			OLED display, 128 x 64 pixels luminous
		switching status	LED, green
Remarks			
Remarks		The unit complies with overvoltage category II; pollution degree 2	
Electrical connection			

dual-chamber terminals: 2 x ...2.5 mm²; AWG 14

1	DC supply voltage (L-)
2	DC supply voltage (L+)
3	current supply transistor outputs (L+)
4	sensor signal pnp
5	DC Sensor supply (L+)
6	DC Sensor supply (L-)
7	AC supply voltage (L)
8	AC supply voltage (N)
9	not used
10	sensor signal npn
11	not used
12	not used
13	relay 1 common
14	relay 1 normally open
15	relay 1 normally closed
16	transistor output 1 pnp
17	reset 1 pnp
18	reset 2 pnp
19	relay 2 common
20	relay 2 normally open
21	relay 2 normally closed
22	analogue output (+)
23	analogue output (-)
24	transistor output 2 pnp

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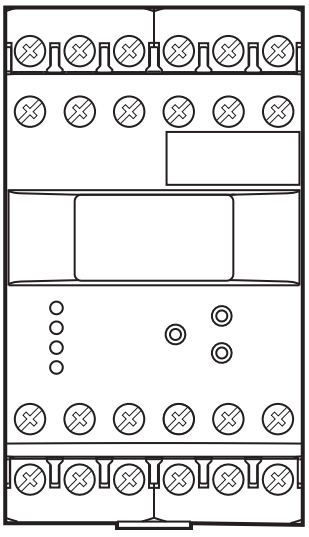
Operating instructions

ecomat200

Monitor

FR-1 / FR-1N

UK



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This document is the original instructions.

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SEW EURODRIVE

1 Preliminary note

This document is part of the device and contains information about the correct handling of the product.

This document is intended for specialists. These specialists are people who are qualified by their training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the warning notes and safety instructions.

1.1 Symbols used

▶ Instruction

> Reaction, result

[…] Designation of pushbuttons, buttons or indications

→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

Information
Supplementary note.

1.2 Warning signs used

⚠ WARNING

Warning of serious personal injury.
Death or serious irreversible injuries may result.

⚠ CAUTION

Warning of personal injury.
Slight reversible injuries may result.

NOTE

Warning of damage to property.

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2 Safety instructions

2.1 General

Follow the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can affect the safety of operators and machinery.

The installation and connection must comply with the applicable national and international standards. Responsibility lies with the person installing the device.

2.2 Target group

UK

The device must only be installed, connected and put into operation by a qualified electrician.

2.3 Electrical connection

Disconnect the unit externally before handling it. Also disconnect any independently supplied relay load circuits.

Make sure that the external voltage is generated and supplied according to the requirements for safe extra-low voltage (SELV) since this voltage is supplied without further measures near the operating elements and at the terminals for the supply of connected sensors.

The wiring of all signals in connection with the SELV circuit of the device must also comply with the SELV criteria (safety extra-low voltage, safe electrical isolation from other electric circuits).

If the externally supplied or internally generated SELV voltage is externally grounded, the responsibility lies with the user in accordance with the applicable national installation regulations. All statements in this manual refer to the unit the SELV voltage of which is not grounded.

It is not allowed to supply external voltage to the terminals for the pulse pick-up supply. The consumption of current which exceeds the value given in the technical data is not allowed.

An external main switch must be installed for the unit which can switch off the unit and all related circuits. This main switch must be clearly assigned to the unit.

2.4 Operation

Be careful when handling the unit once power is applied. This is only allowed by qualified personnel due to the protection rating IP 20.

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The design of the unit corresponds to the protection class II except for the terminal blocks. Protection against accidental contact (finger protection to IP 20) for qualified personnel is only guaranteed if the terminal screw has been completely screwed in.

2.5 Installation location

For the correct operation the unit must be mounted in a housing (protection rating IP 40 or higher) which can only be opened using a tool or in a locked control cabinet.

The device has been tested for an impact energy of 1 joule according to EN61010.

2.6 Housing temperature

As described in the technical specifications below the device can be operated in a wide ambient temperature range. Because of the additional internal heating the operating elements and the housing walls can have high perceptible temperatures when touched in hot environments.

2.7 Tampering with the device

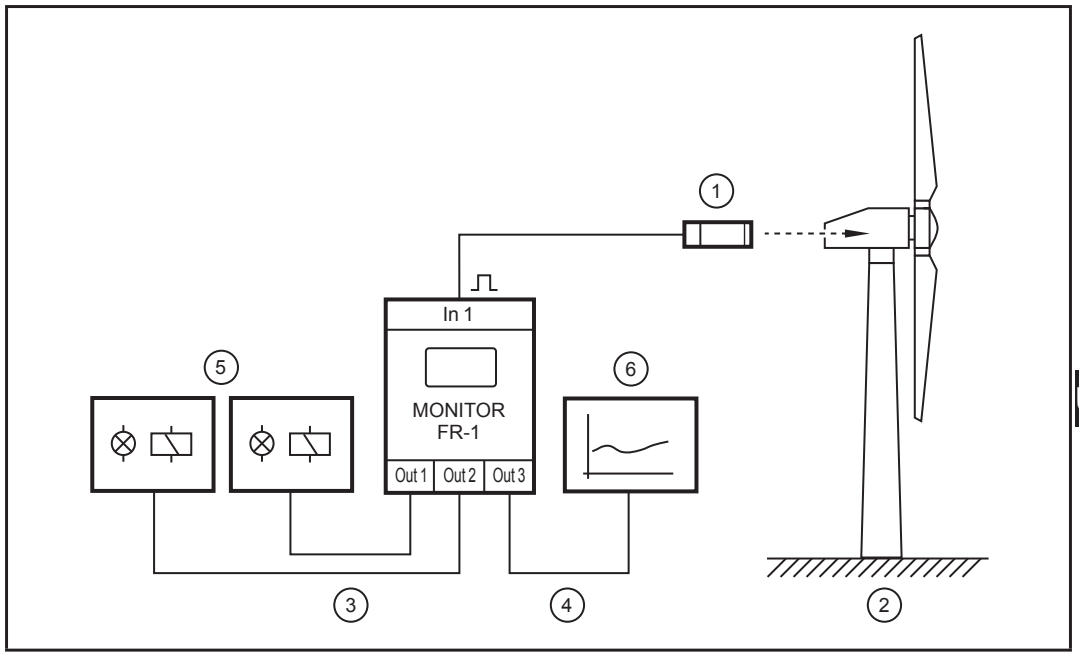
In case of malfunction of the unit or queries please contact the manufacturer. Any tampering with the device can seriously affect the safety of operators and machinery. This is not permitted and leads to the exclusion of any liability and warranty claims.

3 Functions and features

The monitor FR-1/FR-1N is a pulse evaluation system. It monitors rotating, linear, vibrating or oscillating movements.

It receives the pulses from external sensors, measures the pulse interval and calculates the input frequency. This value is compared with the set switch points; the outputs are switched in accordance with the set parameters. The integrated frequency-to-current converter converts the input frequency into an analogue output signal.

6



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Example: speed monitoring in a wind power station

1: sensor at the rotor or generator shaft
2: wind power station
3: switching outputs
4: analogue output
5: signals depending on the selected switching functions
6: recording or display

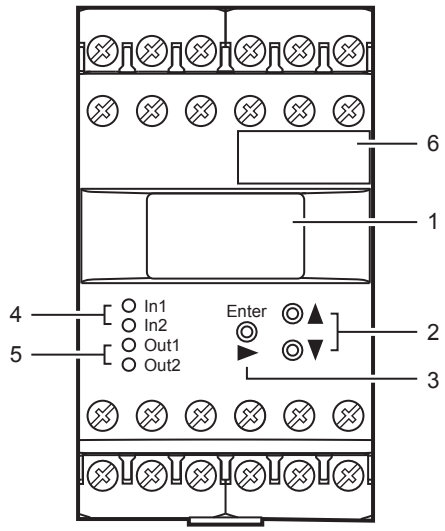
⚠ WARNING

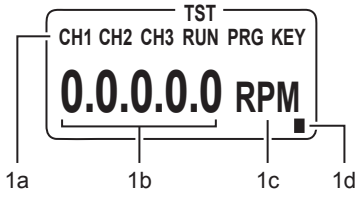
The device is not approved for safety-related tasks in the field of operator protection.
Using an electrical connection of the outputs from two or more units to achieve a redundant circuit, they can also be used for safety-related tasks. All applicable technical standards must be followed.

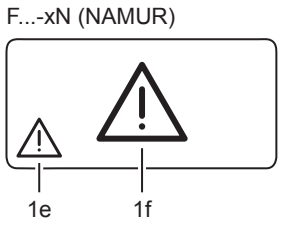
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4 Operating and display elements







1	OLED display	
1a	Indicators for input channels and operating modes	
	CH...	Input channels
	RUN	Run mode (normal operating mode)
	TST	Test mode (check of the switching characteristics without pulse pick-up connected)
	PRG	Programming mode (setting of the parameter values)
	KEY	Locking
1b	Actual values and parameter values (5-digit, numerical)	
	Rotational speed	0...60,000 RPM
	Pulses	0.1...1,000.0 Hz
	Analogue value	0/4...20.5 mA
	Outside the value ranges the display shows "----".	
1c	Parameter abbreviation and units (3-digit, alphanumeric)	
1d	Display is in stand-by mode, no values visible (→ 4.1)	
1e	Display in display mode Symbol for wire break/ short circuit on the cable of the pulse pick-up (only F...-xN)	
1f	Display in standby mode Symbol for wire break/ short circuit on the cable of the pulse pick-up (only F...-xN)	

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2	[▲] and [▼] buttons	
	Selection of the actual value display, parameter selection, setting of the parameter values	
3	[Enter/▶] button	
	Selection of the operating mode, acknowledgement of the parameter value, front reset	
4	LEDs In1/2 (yellow)	Input pulse
5	LEDs Out1/2 (green)	Switching status of the outputs 1 and 2
	Off	Output is not switched. (Relay deenergised, transistor blocked)
	On	Output is switched. (Relay energised, transistor switched)
	Flashing quickly	Output is kept latched. (Parameter SOx, Store Output)
	Flashing slowly	The delay time has an effect on the output. The output switches when the delay time has elapsed and the trigger event is still present (parameter DTx, Delay Time)
6	Panel for labelling	

F...-xN = device with NAMUR input

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4.1 Display stand-by mode

If no button is pressed for more than 10 minutes, the display changes to the stand-by mode. Values and units are no longer visible.
The stand-by mode can be identified by a flashing rectangle.

Even if no values and units are visible, the device continues its monitoring function on the basis of the set parameters and switches the relay and transistor outputs accordingly.

Press any button to switch the display on again.

5 Installation

5.1 Installation of the device

- ▶ Install the device on a 35 mm DIN rail.
- ▶ Leave enough space between the unit and the top and bottom of the control cabinet to enable air circulation and to avoid excessive heating.
- ▶ Take into account the internal heating of all units when mounting several units side by side. The environmental conditions must be observed for every unit.

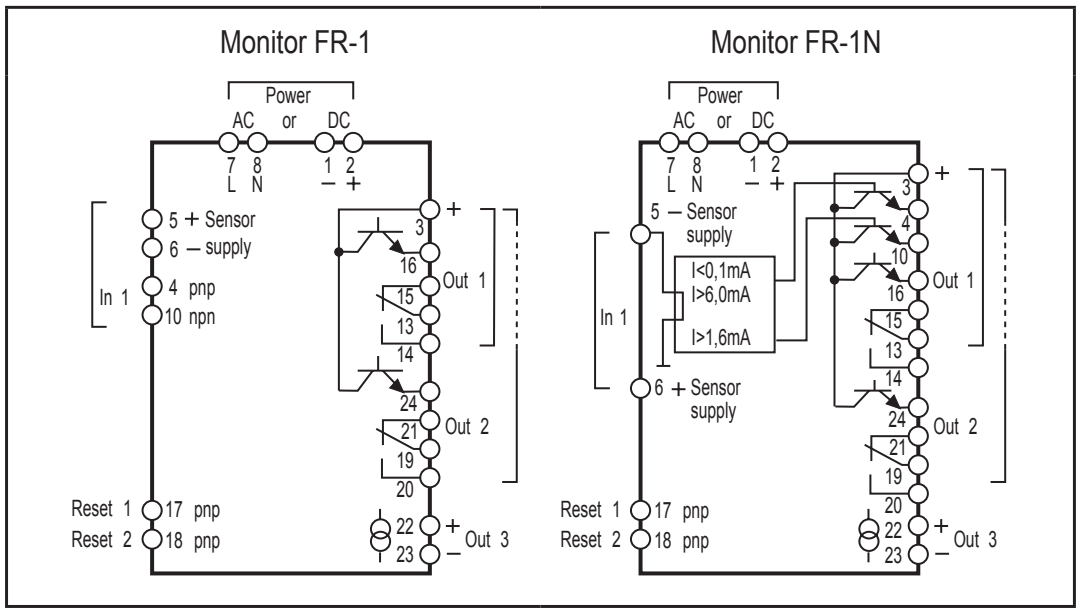
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5.2 Installation of the sensors

▶ Follow the manufacturer's installation instructions.

6 Electrical connection

6.1 Terminal connection



Terminal connection

⚠ WARNING

Do not use unconnected terminals such as terminal 9 as support point terminal.

6.2 Voltage supply (power)

- ▶ Voltage supply see type label.
- ▶ The device may only be operated using one of the possible voltage connections, i.e. either terminals 7/8 (AC) or terminals 1/2 (24 V DC).
- ▶ All supply and signal cables must be laid separately. Use a screened cable if required in the application.

6.2.1 AC supplies

- ▶ The AC supply cable must be protected according to the cross-section used (max. 16 A).

If the unit is supplied on AC, the low voltage provided for the sensor supply meets the SELV criteria according to EN 61010, overvoltage category II, soiling degree 2.
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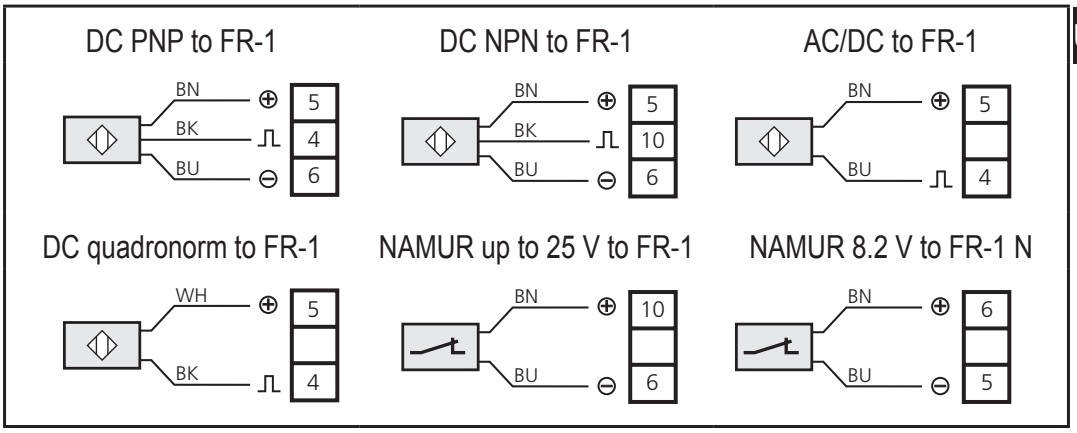
6.2.2 DC supplies

- The SELV criteria (safety extra-low voltage) must be met for the DC supply.
- The DC supply cable L+ (terminal 2) must be protected externally with a 315 mA time-lag fuse (5 x 20 mm or similar).

The DC supply terminals are directly connected to the sensor supply terminals.

6.3 Inputs

6.3.1 Connection of the sensors (In1)



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Connection of the sensors

The connection of mechanical switch contacts is not recommended since they tend to bounce and produce faulty pulses.

The terminals 5/6 can be used for the sensor supply or for the reset inputs (only F...-x).

6.3.2 Reset inputs (reset 1 and 2)

The start-up delay can be started or a saved error can be reset via the reset inputs (terminals 17/18).

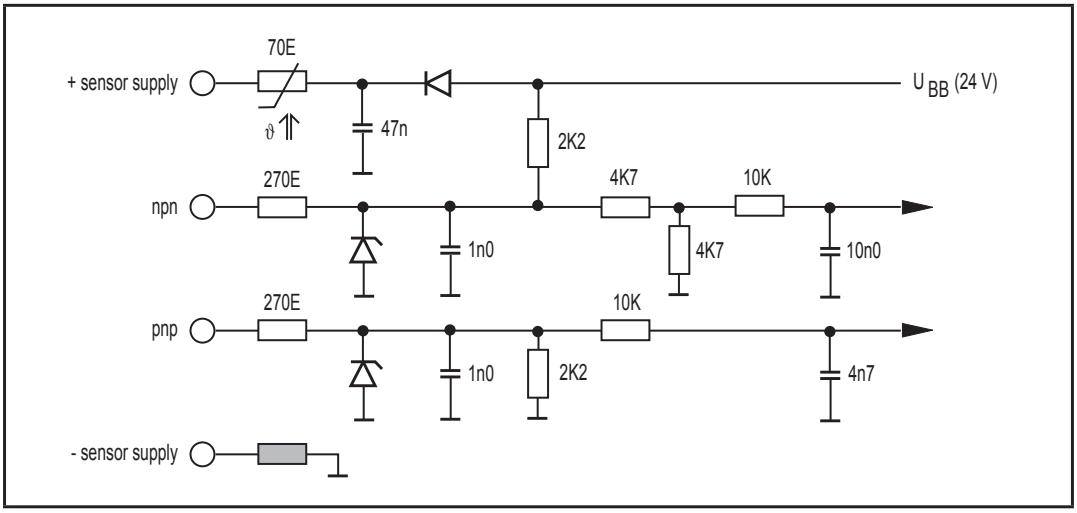
- The internal +24 V DC voltage (terminal 5) or an external +24 V DC voltage is connected with terminal 17 or 18 via a closing contact.
- If an external voltage is used, the negative reference point of this voltage must be connected to terminal 1 of the monitor.

When the contact is opened (+ 24 V DC no longer applied), the start-up delay or the memory reset starts.

A +24 V DC continuous signal leads to a permanent bridging of the monitoring, i.e. the same state as during the start-up delay is indicated. When the voltage is no longer applied and the set start-up delay has elapsed, monitoring starts.

Note on F...-xN:
The +24 V DC signal voltage required for the reset inputs is not available to the F...-xN. This must be taken from an external voltage source. The reference point (GND) of the external power supply must be connected to terminal 1 of the monitor; otherwise no switching operation is possible.

6.3.3 Typical input circuit F...-x



6.4 Outputs

6.4.1 Relay outputs (Out1, 2)

▶ To prevent excessive wear and to comply with the EMC standards, interference suppression of the contacts is required for switching inductive loads.

⚠ WARNING

If the device is operated on an AC supply (terminals 7/8) this must use the same supply cable as the voltage supply to switch an AC voltage via the relay outputs.

If the relay outputs are used for switching very small currents (e.g. PLC inputs), considerable contact resistance can arise. In this case use the transistor outputs.

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6.4.2 Transistor outputs (Out1, 2)

- The transistor outputs need an external voltage of +24 V DC on terminal 3.
- Connect the reference point (GND) of the external power supply to terminal 1 of the monitor. Otherwise no switching operation is possible.
- The SELV criteria (safety extra-low voltage) must be met for the DC supply of the transistor outputs.
- The DC supply cable L+ (terminal 3) must be protected externally with a 315 mA time-lag fuse (5 x 20 mm or similar).

6.4.3 Analogue output (Out 3)

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The analogue output is not electrically separated from the pulse pick-up supply and the 24 V DC supply voltage.
No dangerous contact circuits must be connected to the analogue output.

6.5 Additional outputs for NAMUR devices (F...-xN)

6.5.1 Fault output

The fault output (terminal 4) indicates a wire fault between monitor and sensor (wire break/short circuit). In case of a fault the respective output is blocked.

6.5.2 Stepping output

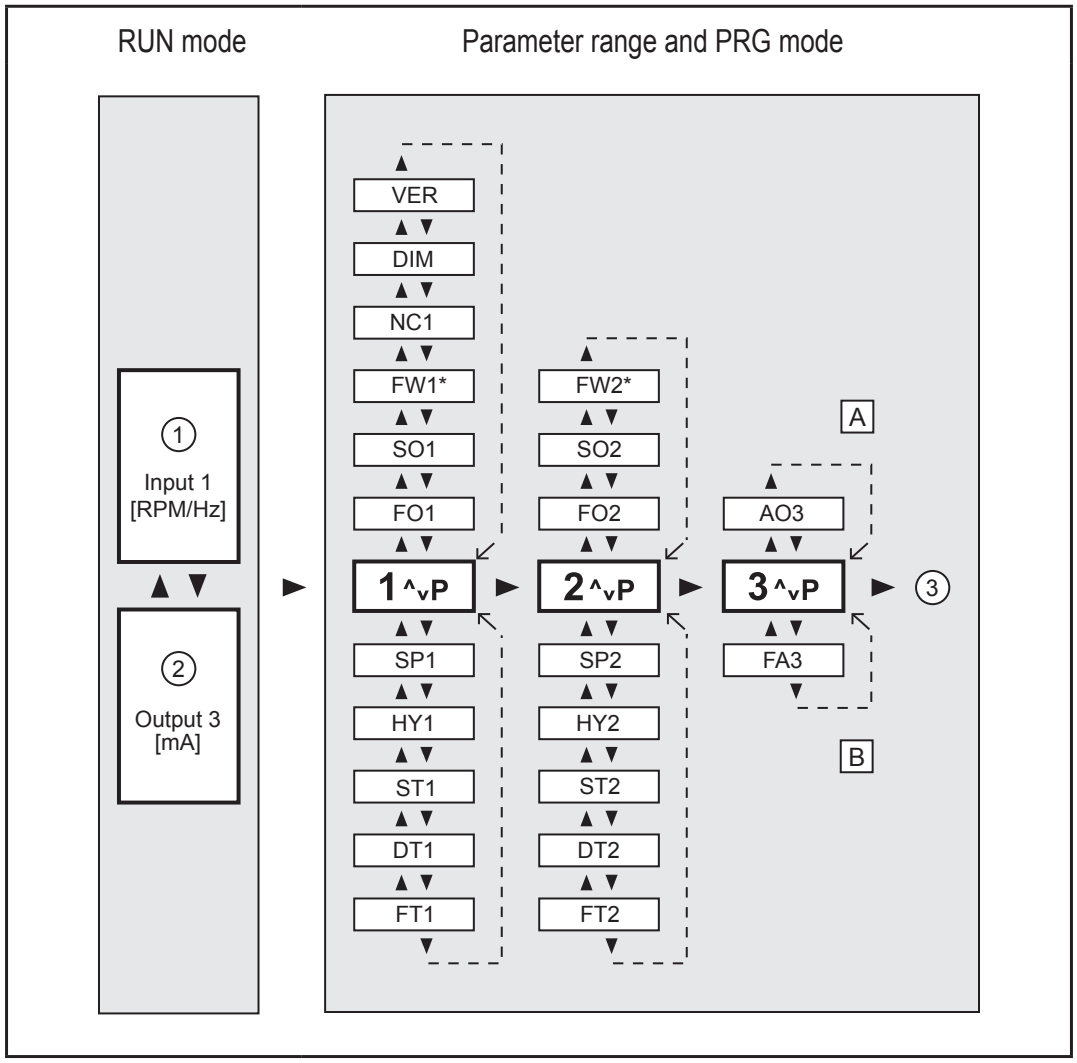
Signals from NAMUR sensors cannot be transferred to the inputs of other systems by simple cable links. To use the signals for other inputs, the F...-xN monitor provides a copy of the input pulses at the stepping output (terminal 10, ratio 1:1).

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7 Navigation and parameter overview

The pushbuttons [▲] / [▼] and [Enter/►] are used for the navigation, entry of values and acknowledgement within the parameters arranged in columns.



1: Indication: actual value input 1
2: Indication: actual value output 3
3: Back to the RUN mode

A: System parameters
B: Application parameters

*) only F...-xN

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7.1 System parameters

7.1.1 FOx

Function Output (switching function of the outputs 1/2)

1	Relay energised (transistor output switched) when the current value is below the switch point SPx (signalled state: "minimum speed"/"blocked").	
2	Relay de-energised (transistor output blocked) when the current value is below the switch point SPx (signalled fault: "underspeed "/"blocked").	
3	Relay energised (transistor output switched) when the current value is above the switch point SPx (signalled state: "rotational speed reached").	
4	Relay de-energised (transistor output blocked) when the current value is above the switch point SPx (signalled fault: "overspeed").	
5	Relay is energised (transistor output switched) within a frequency range (acceptable range).	
6	Relay is de-energised (transistor output blocked) within the frequency range. With the functions 5 and 6 a frequency range above and below the switch point SPx is defined in connection with the parameter **HYx** (hysteresis).	
	SPx = $(f_{max} + f_{min}) \div 2$	
	HY = $((SP - SP_{min}) \div SP) \times 100$ [%]	
	Values	1...6
	Default settings	FO1 = 2
		FO2 = 3

UK

7.1.2 SOx

Store Output (latching function outputs 1/2)

When this parameter is active, the respective output does not switch back automatically but must be reset.	
Values	0 = inactive
	1 = front reset ([Enter/▶] > 3 s)
	2 = front reset and external reset
Default value	0 (inactive)

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7.1.3 FWx

Function Wire Break Monitoring (only F...-xN)

Relay characteristics for wire fault or short circuit, i.e. input frequency = 0		
Frequency > SPx	FWx = inactive (0)	FWx = active (1)
FOx = 1 or 4	relay energised	relay de-energised
FOx = 2 or 3	relay de-energised	relay remains de-energised
Frequency < SPx	FWx = inactive (0)	FWx = active (1)
FOx = 1 or 4	relay energised	relay de-energised
FOx = 2 or 3	relay de-energised	relay remains de-energised
Frequency in the range	FWx = inactive (0)	FWx = active (1)
FOx = 5	relay deenergised	relay remains de-energised
FOx = 6	relay energised	relay deenergised

In case of fault the preset analogue initial value AO3 is available at the analogue output.	
Values	0 = inactive
	1 = active
Default value	0

7.1.4 NC1

Number of Cams (input 1)

Number of cams detected per revolution. On the basis of this value the monitor calculates the rotational speed (measured frequency ÷ NC1 = displayed speed in RPM). For frequency measurements NC1 = 1 should remain set.	
Values	1...999
Default value	1

7.1.5 DIM

Dimension (display format)

Indication in Hz or RPM (revolutions per minute). When a new unit is selected, the monitor converts all existing values into the new unit!	
Values	0 = RPM
	1 = Hz
Default value	0 = RPM

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7.1.6 VER

Software version

The installed software version is displayed (5-digit number with abbreviation VCO).

7.1.7 AO3

Analogue Offset (for analogue output 3)

Current value displayed and provided for an input value of 0 Hz/RPM.	
Value range	0.0...20 mA (typical setting: 0.0 or 4.0 mA)
Default value	4.0 mA

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7.2 Application parameters

7.2.1 SPx

Switch Point (outputs 1/2)

Value at which the output 1/2 changes its switching state according to switching function FOx.	
Values	0.1 ... 1000.0 Hz or 1 ... 60000 RPM (unit depends on DIM)
Default value	SP1 = 100 RPM, SP2 = 1000 RPM

7.2.2 HYx

Hysteresis (for switch points SP1/SP2)

The hysteresis value determines the distance between the switch-off point and the switch point SPx. Prevents a possible chattering of the switching output. In connection with the switching functions 5 and 6 (FOx) an acceptable range or an error range can be defined.	
Values	0.0...1000.0 % of the value for SPx
Default value	5.0

7.2.3 STx

Start-Up Delay Time (for outputs 1/2)

Enables the suppression of error messages when a plant is started. When the device is switched on or when the 24 V signal is removed from the reset input, the respective output for the time set here is in the "good" state (= no fault).	
Values	0.0...1000.0 s

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Default value	0.0 (no start-up delay)

7.2.4 DTx

Delay Time (for outputs 1/2)

Enables a delayed switching of the outputs 1/2. The respective output switches only if the current value is above or below the switch point for more than the time set here.	
Values	0.0...1000.0 s
Default value	0.0 (no delay time)

7.2.5 FTx

Fleeting Time (for outputs 1/2)

If an event occurs, the output changes its state during the set time and then switches back to the initial state.	
Values	0.0...1000.0 s
Default value	0.0 (fleeting time not active)

7.2.6 FA3

Final Value Analogue (for analogue output 3)

Input value in Hz or RPM at which the final value 20 mA is displayed or provided. The output signal is limited to 20.5 mA.	
Value range	0.1 ... 1000.0 Hz or 1 ... 60000 RPM (unit depends on DIM)
Default value	1000 RPM

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8 Programming

⚠ WARNING

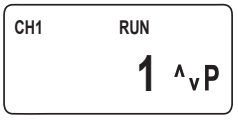
If programming takes place during operation, dangerous contact voltage may occur. Therefore ensure that programming is done by a qualified electrician.

Parameter changes during operation, especially changes to the switching function and the switch points can lead to malfunction in the plant. Therefore disconnect it during the change and then check the function.

UK

Programming consists of 6 steps:	
1. Change from the RUN mode to the parameter range 1 or 2 or 3	[Enter/▶]
2. Selection of the requested parameter (FOx, SOx, NCx, etc.)	[▲] / [▼]
3. Change to the PRG mode	[Enter/▶]
4. Setting or changing the parameter value	[▲] / [▼]
5. Acknowledgement of the set parameter value	[Enter/▶] > 3 s
6. Return to the RUN mode	[Enter/▶] > 3 s

8.1 Programming example DT1 (Delay Time, output 1)

Operation	Display
Change from the RUN mode to the parameter range (here 1)	
▶ Briefly press [Enter/▶] once. > The 1st parameter range is displayed.	
Selection of the requested parameter (here DT1)	
▶ Press the [▼] button until the parameter DT1 is displayed with the currently set value (here default value 0.0).	
Change to the PRG mode	
▶ Briefly press [Enter/▶] once. > The unit is in the programming mode. > PRG indicator visible, parameter abbreviation flashes.	

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Setting or changing the parameter value	
▶ Press [▲] / [▼] until the requested parameter value is displayed (→ 8.2.3 Numerical entries).	
Acknowledgement of the set parameter value	
▶ Press [Enter/▶] until the parameter abbreviation no longer flashes and the indicator PRG has disappeared. > The new parameter value is indicated and effective.	
Return to the RUN mode	
▶ Press [Enter/▶] for about 3 s or wait for the time-out function (approx. 15 s). > The unit is again in the RUN mode, the current value is indicated.	

8.2 Notes on programming

8.2.1 RUN mode

During programming the unit internally remains in the RUN mode (RUN indicator visible).
This means that until a new value is acknowledged with [Enter/▶], the unit carries out its monitoring function on the basis of the previously set parameters and switches the relay and transistor outputs accordingly.

The monitoring function of the monitor is deactivated by continuously pressing [Enter/▶] in the RUN mode. The deactivation is effective as long as the button is pressed.

8.2.2 Time Out Function

If during programming no pushbutton is pressed for approx. 15 s, this is seen as a cancellation.
Parameter changes which are not acknowledged with [Enter/▶] are rejected.
The previously set parameter value is restored and remains effective for the monitoring functions.

8.2.3 Numerical entries

▶ Press [▲] or [▼] and hold it.

The smallest decade becomes active and is counted up or down depending on the selected pushbutton (e.g. 1, 2, 3,...0). Then comes the next decade, etc.
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As soon as the pushbutton is released, the active decade flashes. It is set by pressing [▲] or [▼] several times. The preceding decade then flashes and can be set.

8.2.4 Factory Reset

The factory default values can be restored by pressing [▲] and [▼] simultaneously during power on. All previously entered parameter values are lost.

8.2.5 KEY function (locking)

The unit can be locked to prevent incorrect entries.
After locking, only the actual value indication can be switched with the [▲] and [▼] buttons. Parameter range and PRG mode can no longer be selected. UK

Locking	Unlocking
▶ Press [▲] and [▼] simultaneously and hold them pressed. > The KEY indicator flashes. ▶ Release the pushbuttons when the KEY indicator is continuously indicated.	▶ Press [▲] and [▼] simultaneously and hold them pressed. > The KEY indicator flashes. ▶ Release the pushbuttons when the KEY indicator is no longer indicated.

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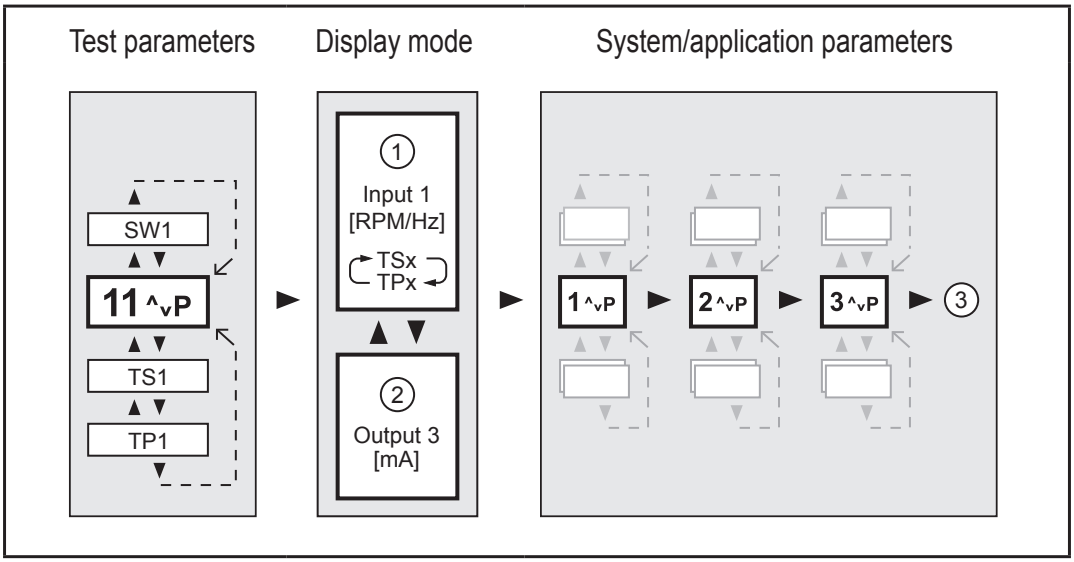
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9 Test mode

In the test mode the switching behaviour of the monitor can be checked, set and stored without any connected pulse pick-up. The monitor runs through a freely definable frequency range and switches the outputs according to the selected switching function and switch points.

9.1 Activate the test mode

► Apply the operating voltage and press [Enter/►] simultaneously.
> The display indicates the parameter range 11 and "TST".
> In addition to the system and application parameters, the parameters for the test frequency are available.



1: Test frequency
2: Analogue output
3: Back to the test parameters

9.2 Terminate the test mode

► Switch off the unit.

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9.3 Test parameters

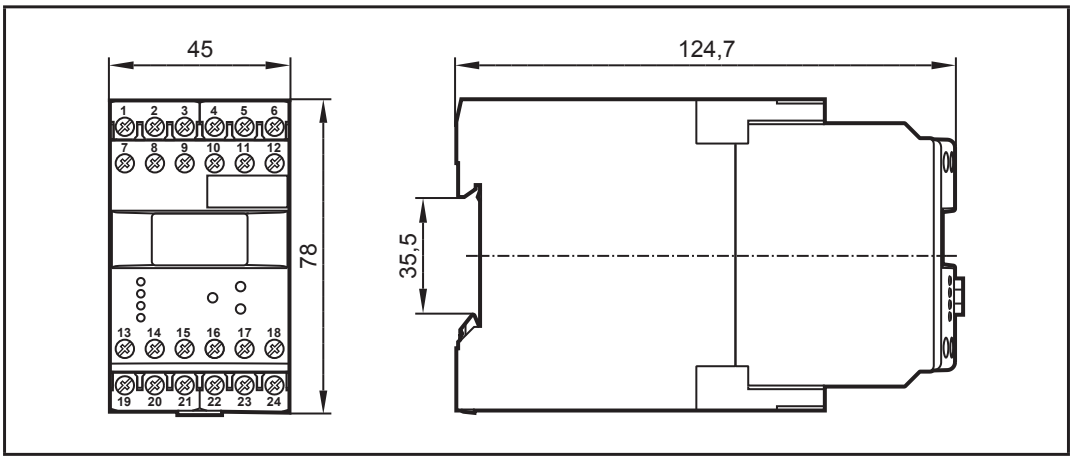
SW1	Sweep on input 1	
	Change of speed of the test frequency	
	Values	1...5 (1 = fast, 5 = slow)
	Default value	1
TS1	Test Start on input 1	
	Initial value of the test frequency	
	Values	1...60,000 RPM or 0.1...1000.0 Hz
	Default value	50 RPM
TP1	Test Stop on input 1	
	Final value of the test frequency	
	Values	1...60,000 RPM or 0.1...1000.0 Hz
	Default value	1500 RPM

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10 Scale drawing



11 Technical data

11.1 Overview

Art. no.	DD2503	DD2510	DD2603
Monitor type	FR-1	FR-1	FR-1N
Supply voltage Frequency range Power consumption	see type label		
Sensor types	PNP/NPN; NAMUR		NAMUR (to EN 50227)
Sensor supply	24 V DC		8.2 V DC
Input frequency	≤ 5 kHz	≤ 3 kHz	≤ 5 kHz
Relay outputs	2 changeover contacts potential free		
Switching current	≤ 6 A	≤ 4 A	≤ 6 A
Switching voltage	≤ 250 V AC; B300, R300		
Transistor outputs	PNP switched; externally supplied		
Switching current	≤ 15 mA; short-circuit proof		
Switching voltage	24 V DC (± 20%)		
Analogue output	0/4...20 mA, short-circuit proof, no feedback		
Load	≤ 500 ohms		
Protection housing / terminals	IP 50 / IP 20		
Ambient temperature	-40...60 °C	–10...60 °C	-40...60 °C

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Art. no.	DD2503	DD2510	DD2603
Storage temperature	-40...85° C	-25…80°C	-40...85° C
Max. relative air humidity	80 % (31 °C) linearly decreasing to 50 % (40 °C)		
Maximum operating altitude	2000 m above sea level		
Connection	21 dual-chamber terminals; 2 x 2.5 mm² (AWG 14)		
cULus test conditions	housing dimensions for temperature rise test: 200 x 200 x 150 mm		

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Data sheets can be found at:
www.ifm.com → Data sheet search → article number.

11.2 Approvals/standards

EC declarations of conformity, approvals etc. can be downloaded at:
www.ifm.com → Data sheet search → Article number → More information

12 Maintenance, repair, disposal

The device is maintenance-free.

- ▶ Do not open the housing as the device does not contain any components which can be repaired by the user. The device must only be repaired by the manufacturer.
- ▶ Dispose of the device in accordance with the national environmental regulations.

12 Contacting SEW-EURODRIVE

You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

https://www.sew-eurodrive.de/contacts-worldwide



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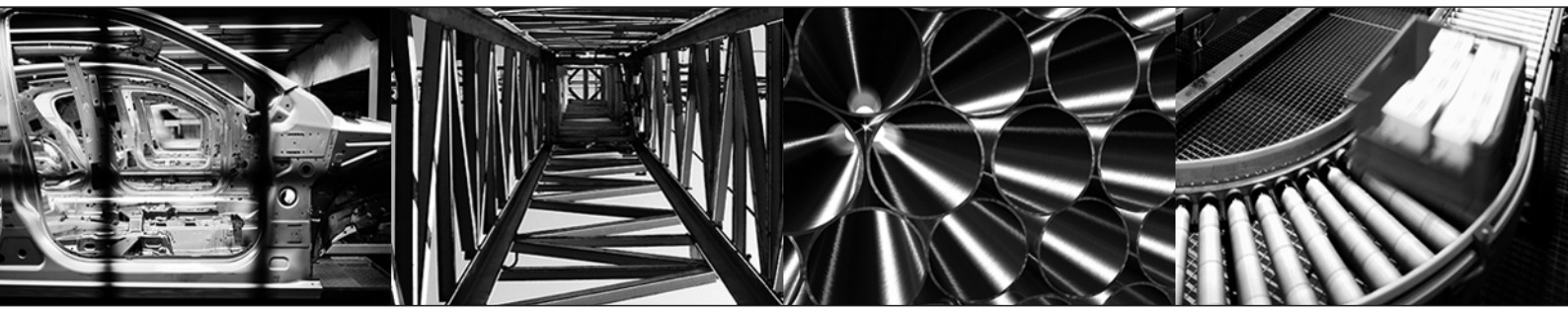
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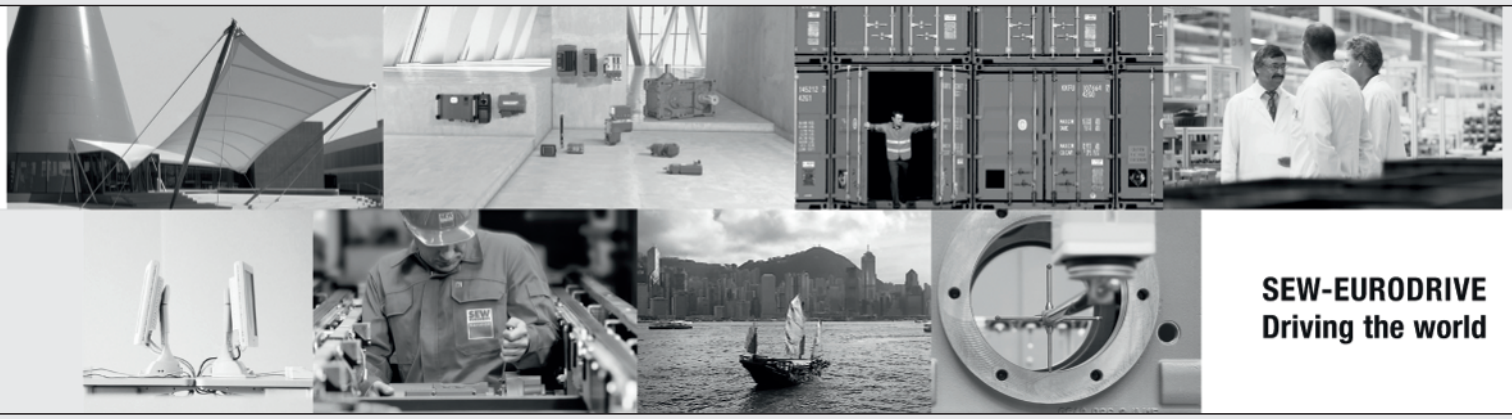
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