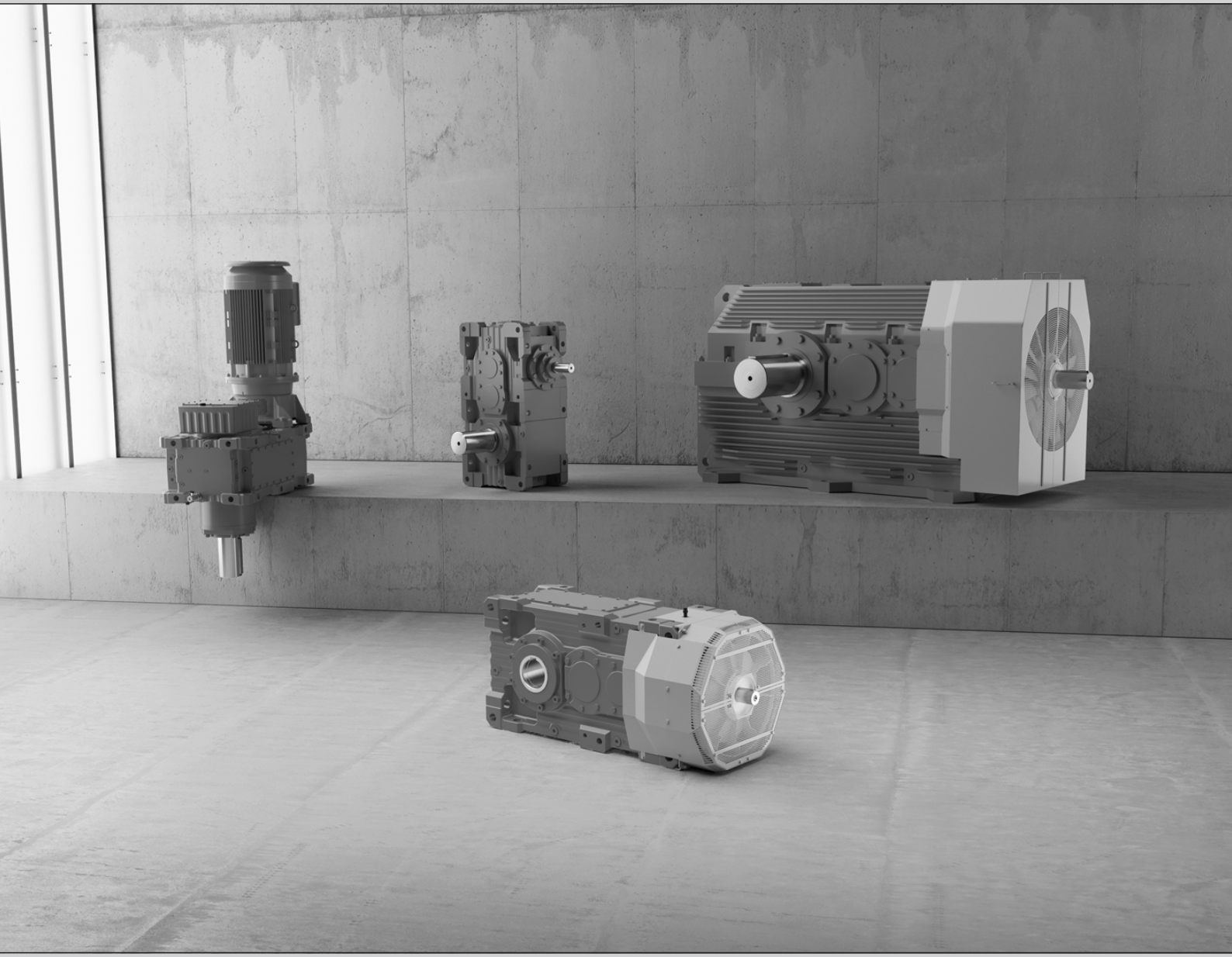
SEW EURODRIVE

Assembly and operating instructions



Industrial gear units

X..e series helical and bevel-helical gear units

Torque classes from 7.2 to 500 kNm

Edition 04/2026

31981259/EN



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1 General information

1.1 Structure of the safety notes

1.1.1 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

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1.2 Symbols on the gear unit

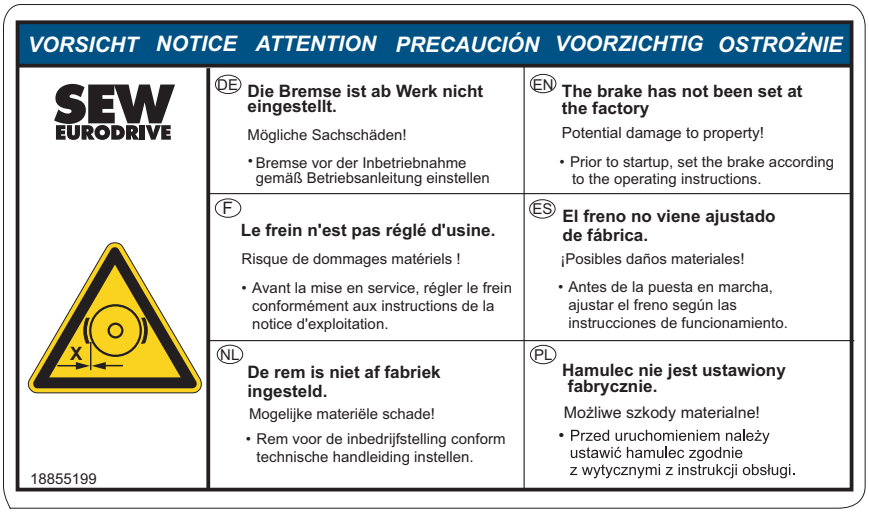
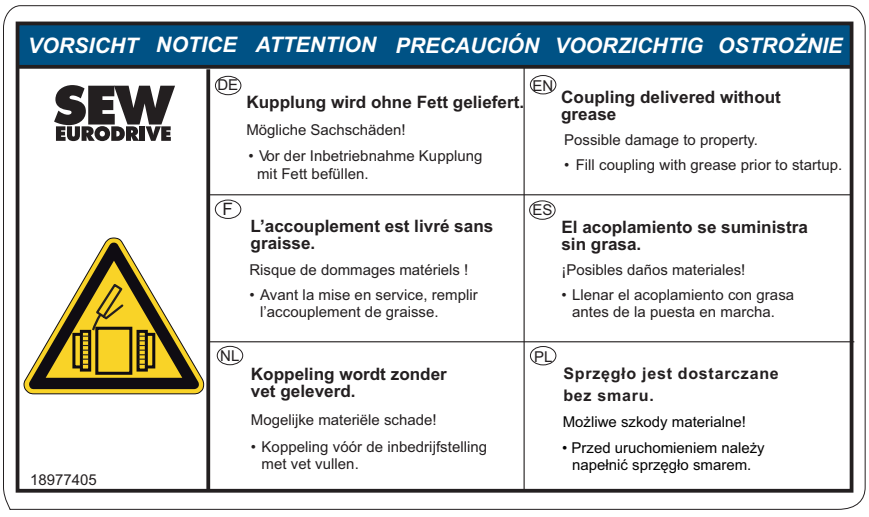
The symbols attached on the gear unit must be observed. They have the following meanings:

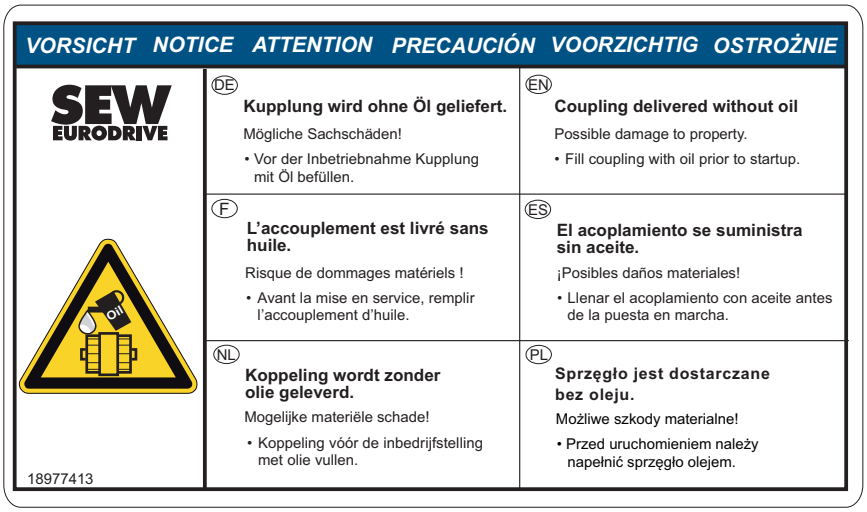
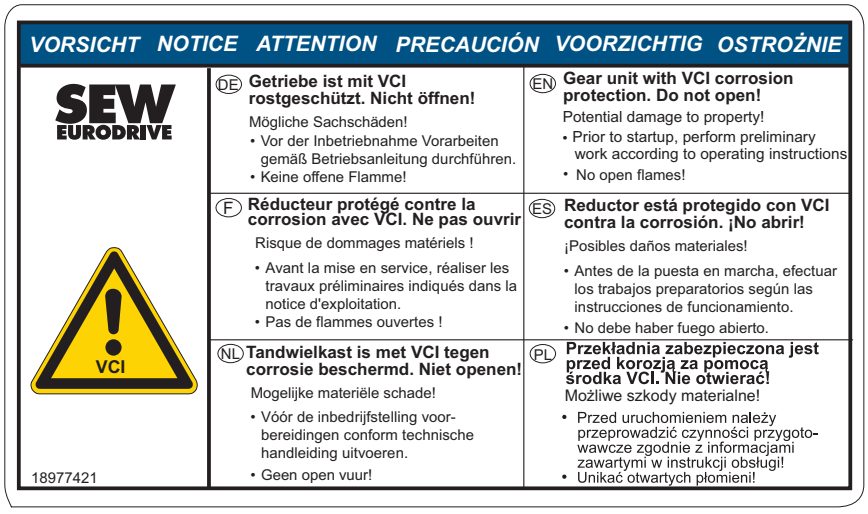
Symbols	Meaning
	Indicates the **oil filling point**. Also serves as proper ventilation when changing the oil.
	Indicates the **oil drain**.
	Indicates the position of the **breather**. Serves to avoid mistaking the oil measuring position for the venting position.
	Serves to avoid faults due to lack 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 serves to locate the connection option.
	Indicates the **water return** and serves to locate the connection option.
	Indicates the **oil supply** and serves to locate the connection option.
	Indicates the **oil return** and serves to locate the connection option.
	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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Symbols	Meaning
	Indicates the **grease drain screw** and serves to locate the grease drain option.
	Indicates the **air outlet screw**.

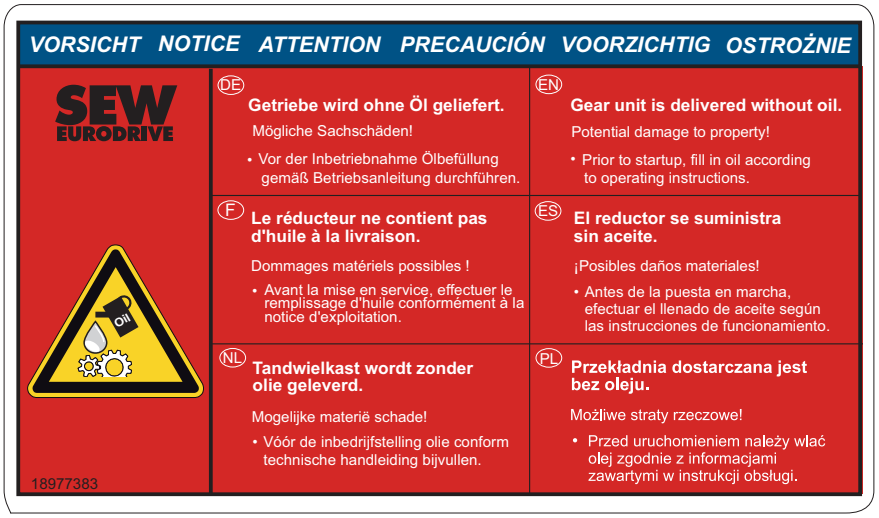
The following gear unit labels can be removed from the gear unit after startup.

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

Meaning
Coupling is delivered without oil.  *9007204571876363*
Gear unit is protected against corrosion using VCI.  *9007204570575499*

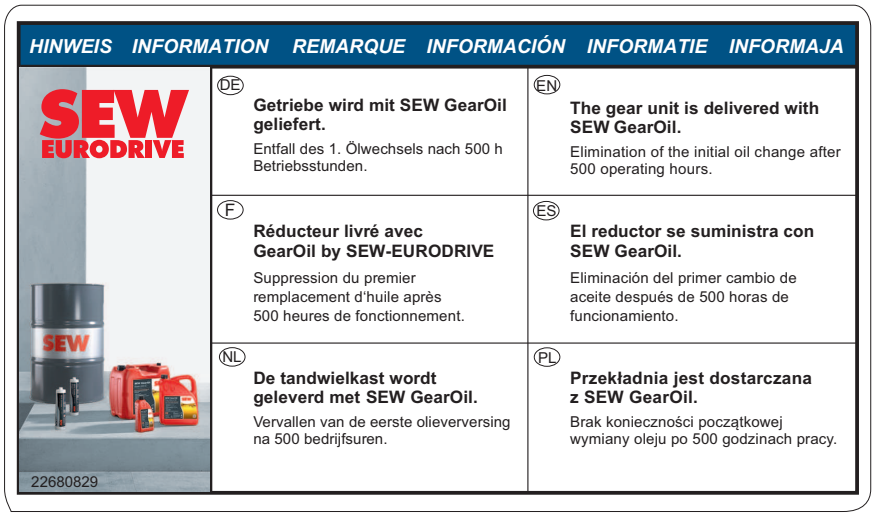
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Meaning
Gear unit is delivered without oil.



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Gear unit is delivered with GearOil by SEW-EURODRIVE.



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2 Safety notes

2.1 Preliminary information

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

2.2 Duties of the user

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

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

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

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

- 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 connection and wiring diagrams
- 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.

2.3 Target group

Specialist for mechanical work

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

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

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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

Instructed persons

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

2.4 Designated use

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.

Any violation of the contents of this operating instructions constitutes improper use. In such cases, SEW-EURODRIVE reserves the right to refuse warranty claims or claims for damages.

2.5 Creating a safe working environment

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

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.

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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.

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.
- Observe the information signs and product safety labels on the product.

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.

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.

Sharp edges

Observe the following information to avoid cuts caused by sharp or non-deburred cutting edges:

- Wear safety gloves.

Toxic vapors due to heating of fluorocarbon rubber

Fluorocarbon rubber is very stable and safe under normal operating conditions and temperatures < 200 °C. However, if fluorocarbon rubber is heated to more than 300 °C, e.g. by fire or the flame of a cutting torch, harmful gases, vapors, and residues can form. The following components can contain elastomers made of fluorocarbon rubber: Oil seals, breather valves, screw plugs. Observe the following information:

- Make sure that components made of fluorocarbon rubber are not exposed to thermal loads > 200 °C. Remove the components, if necessary.
- Observe the temperature ranges specified in the operating instructions when heating components with fluorocarbon rubber.
- Avoid inhaling fluorocarbon rubber gases and vapors, as well as contact with cooled fluorocarbon rubber, as hazardous residues form during thermal load.

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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.

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.

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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 transportation.
- Secure mount-on components, such as keys.
- When selecting the lifting equipment and crane, consider the dimensions of the gear unit, the center of gravity, and the mass to be moved. The mass of the gear unit is indicated on the nameplate. The specifications are without oil. The mass to be moved equals the total weight of the drive package including all 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 mount-on components is avoided.
- Make sure that the oil level in the gear unit is not too high. 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 and assembly and during inspection and 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 fall down.
- Protect the user's machine against unintentional movement when installing or removing the gear unit.
- The seals must not come into 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 from different manufacturers and of different types.
- Check whether lubricant is leaking from the gear unit or the mount-on components.
- Immediately remove any leaked lubricant with a binding agent.

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2.8 Startup

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

- Starting up the gear unit at temperatures below the permitted ambient temperature can cause damage to the gear unit.
- After installing the gear unit, check that all retaining screws are fastened tightly 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 all monitoring devices (such as pressure switches and temperature switches) are functioning properly.

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:

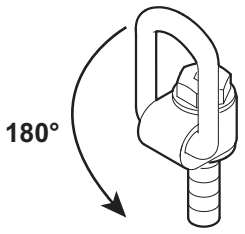
Product safety label	Meaning
	Caution: Risk of burns due to hot surface. The safety symbol is located on the top side of the gear unit.
	Caution: Gear unit damage when unscrewing the oil dipstick during operation. The safety symbol is located directly next to the oil dipstick.
	Caution: Risk of burns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

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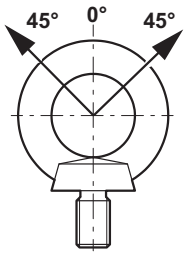
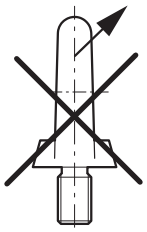
3 Transportation/storage

Before transporting the gear unit, observe the safety notes in chapter "Transportation" (→ 🗎 14) and the following information.

- The weight of the gear unit (without oil) is indicated on the nameplate or on the dimension sheet. Observe the loads and regulations specified there.
- If possible, transport the gear unit while it contains no oil. If this is not possible, note that the weight information on the nameplate specifies only the no-load weight of the gear unit.
- For gear units with non-contact gasket and oil filling prior to 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 the order documents. The load handling devices 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 with the contact surface. Tighten the lifting eyebolts at least hand-tight. Observe the following information.



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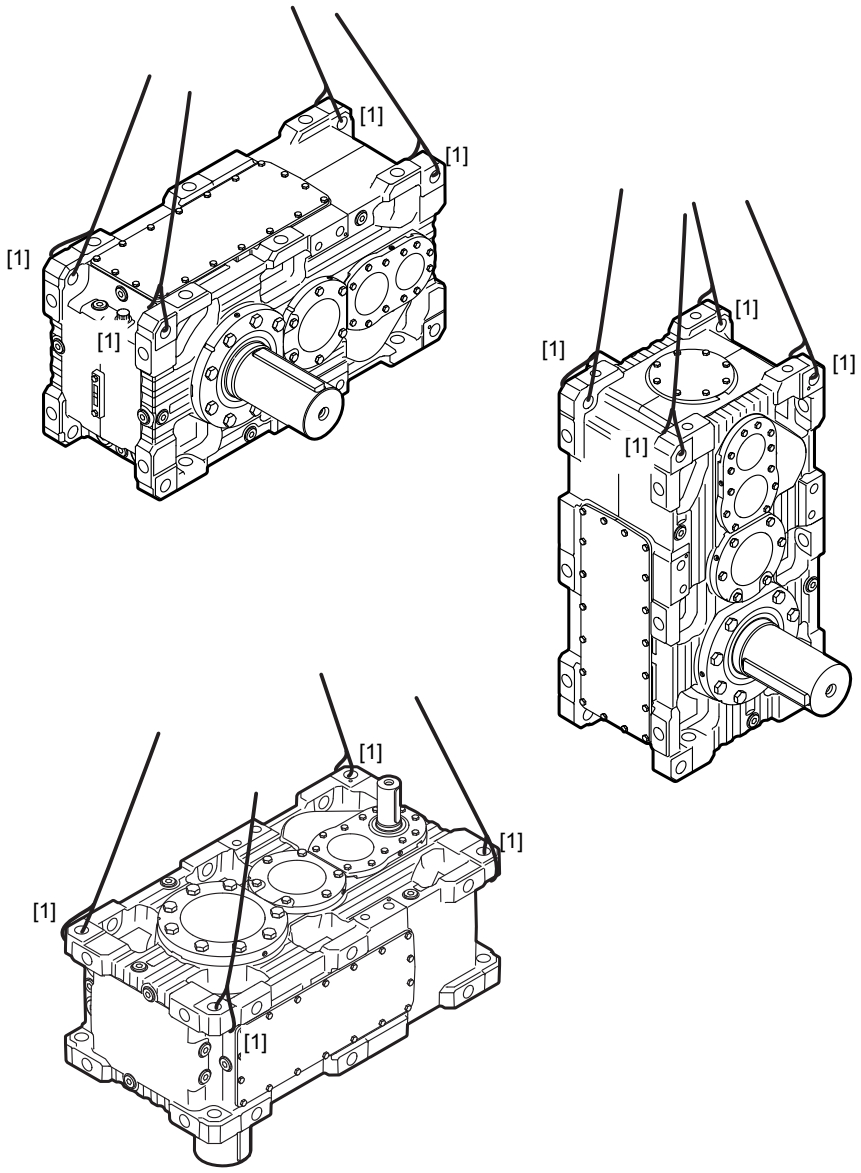
Lifting eyebolts DIN 580/DIN 582	
Correct: **Angle of tension force vector towards the eye plane, max. 45°**	**Incorrect:** **Tension away from the eye plane**
	

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3.1 Gear unit with universal housing /HU

The following figures illustrate how to transport the gear unit.

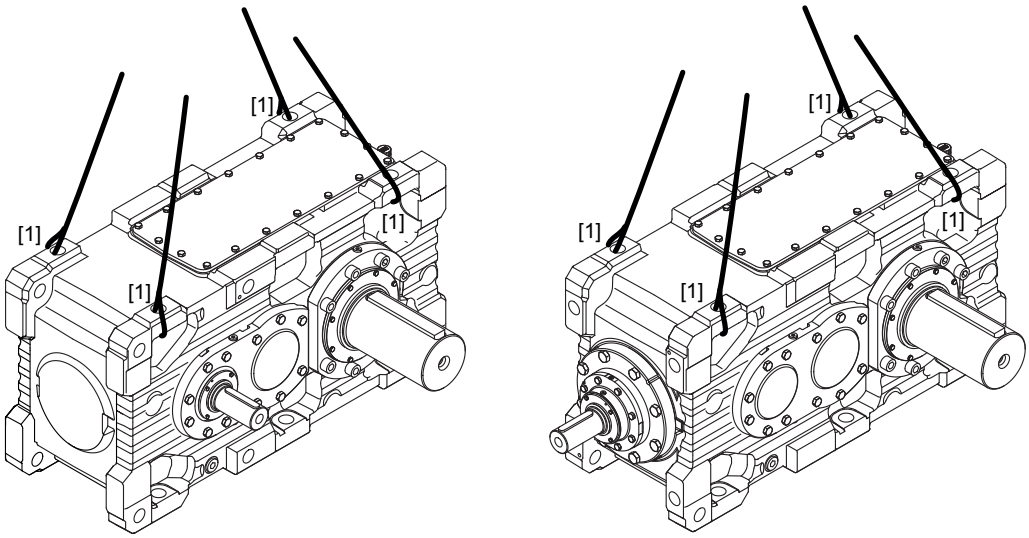


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3.2 Gear unit with horizontal housing /HH

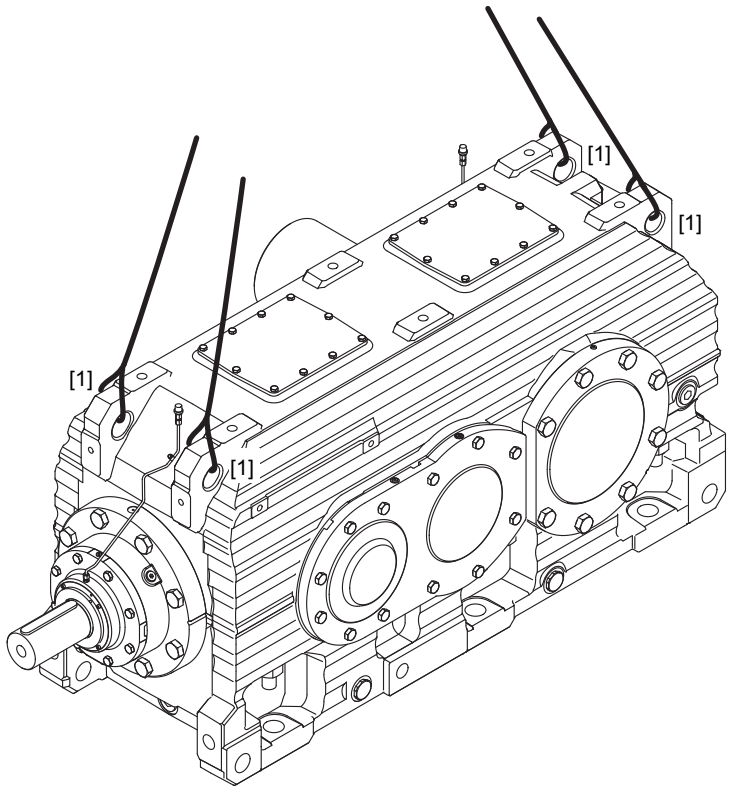
The following figures illustrate how to transport the gear unit.

3.2.1 Sizes X100 – 210



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3.2.2 Sizes X220 – 320



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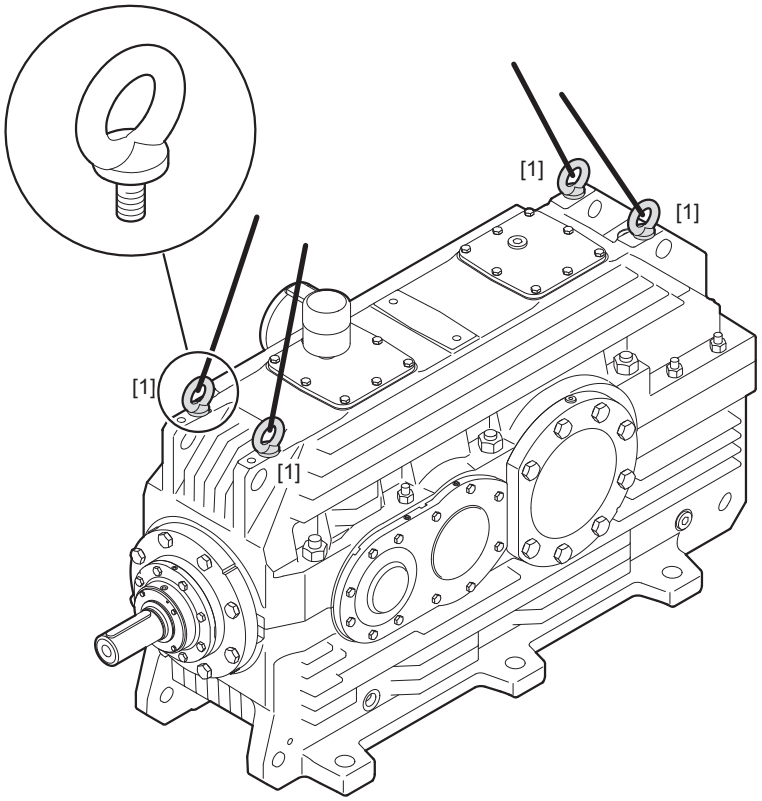
3.3 Gear unit with thermal housing /HT

The values in the table are only valid for transport with **4** attachment points [1] and without mount-on components, such as swing base, base frame or external cooling systems.

Transport using **2** attachment points with lifting eyebolts (DIN 580/DIN 582) is not permitted.

Size	Thread
X220 – 230	4 × M24
X240 – 250	4 × M30
X260 – 280	4 × M30
X290 – 300	4 × M36
X310 – 320	4 × M36

The following figure shows an example of how to transport the gear unit.



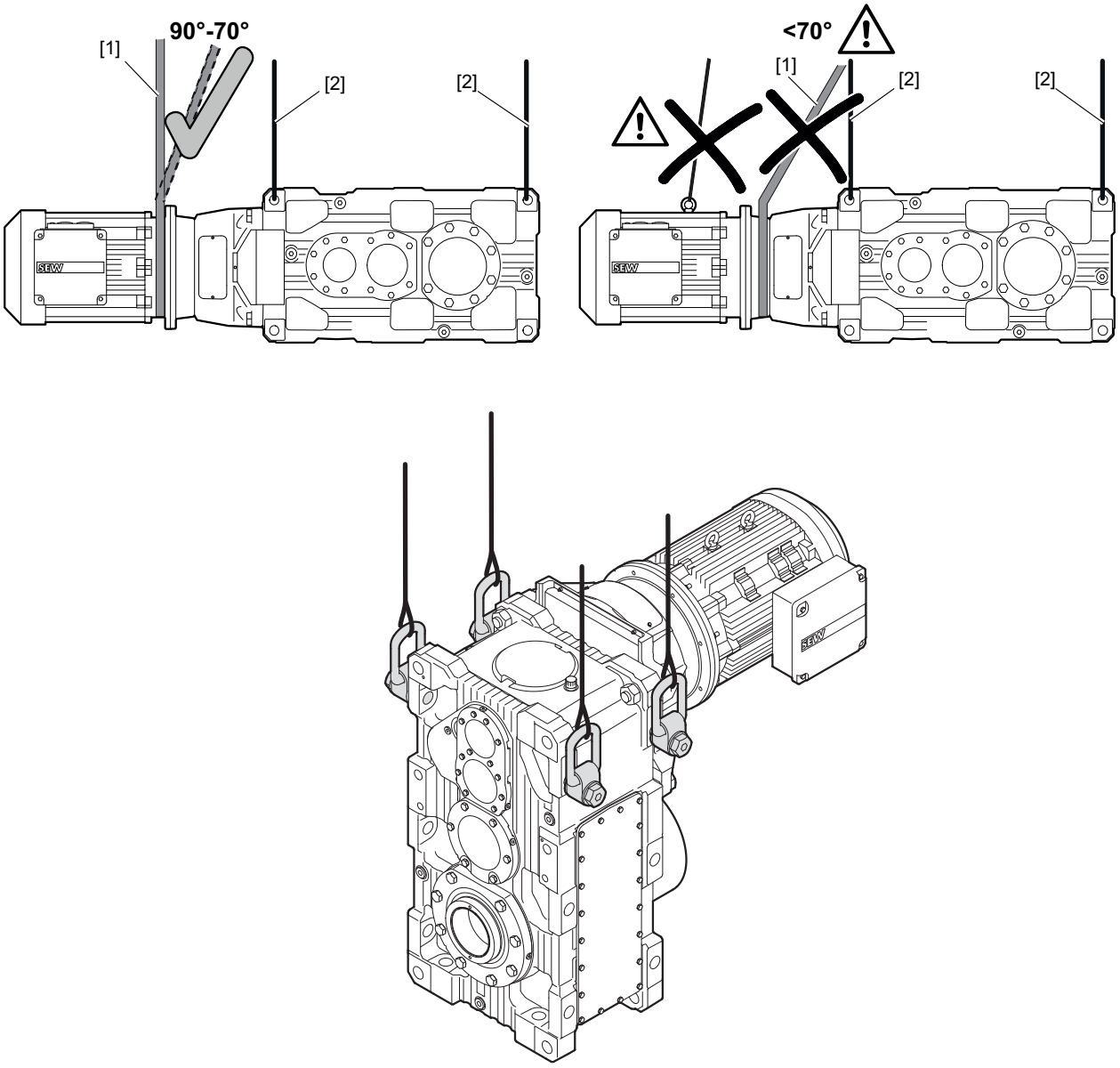
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3.4 Gear unit with motor adapter

3.4.1 Universal and horizontal housing /HU/HH

The gear unit with motor adapter may only be transported using lifting cables/chains [2] or lifting straps [1] at an angle of 90° (vertical) up to 70° from the horizontal. The lifting eyes on the motor must not be used for transport.

The following figures illustrate how to transport the gear unit.



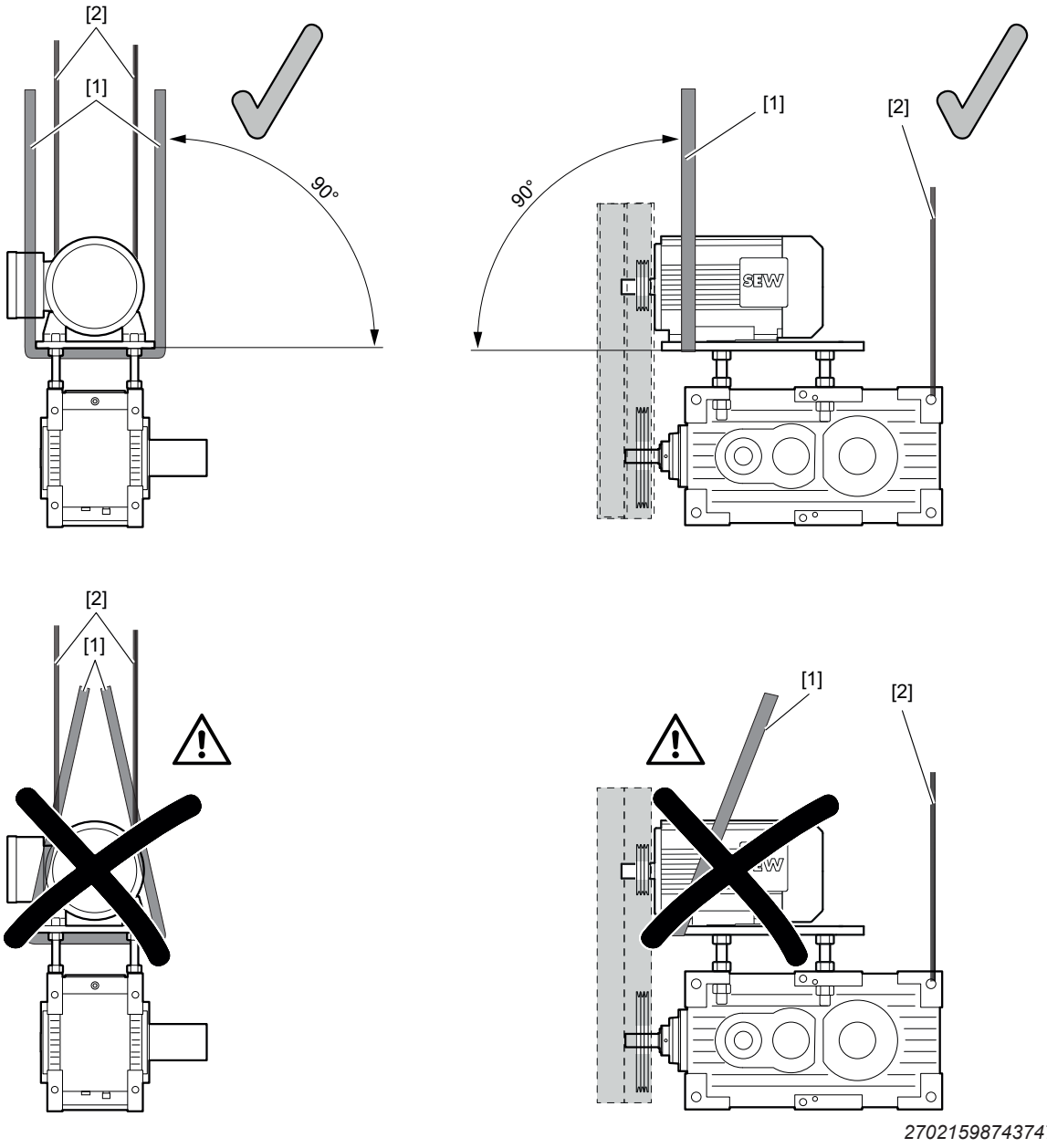
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3.5 Gear units with V-belt drive

The gear units must only be transported at an angle of 90° (vertical) using lifting belts [1] and lifting ropes [2]. The lifting eyes on the motor must not be used for transport.

The following figures illustrate how to transport the gear unit.



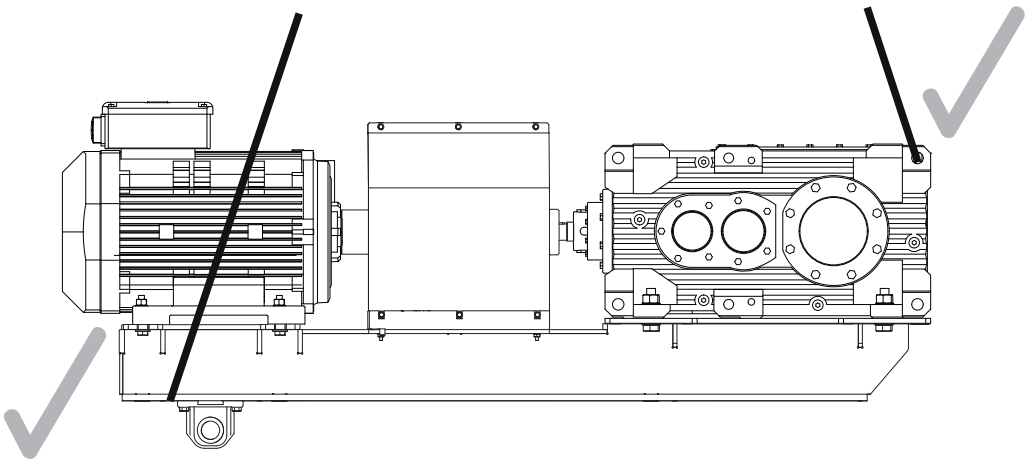
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3.6 On swing base/base frame

3.6.1 Swing base

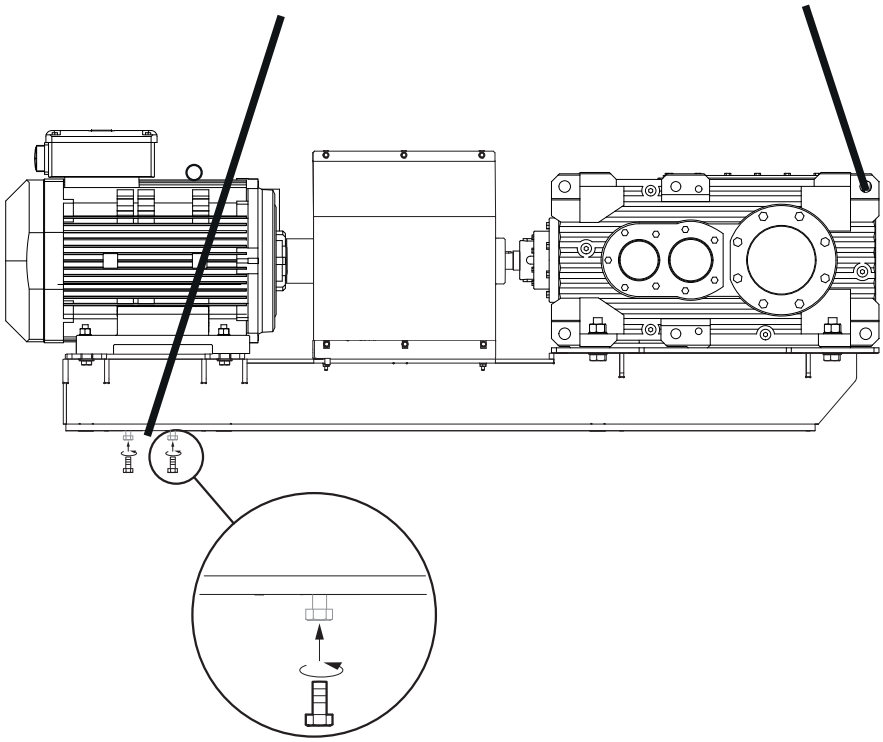
Standard transport

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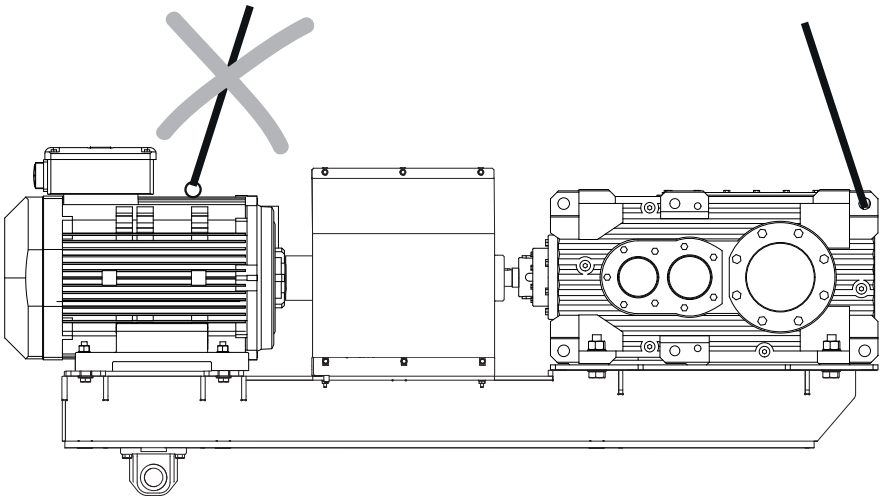
If the support frame is not part of the delivery, you must secure the load handling device with a screw on the steel support construction to prevent it from slipping. Securing with 2 screws prevents the load sling from slipping away. The load handling device must be positioned between the screws.



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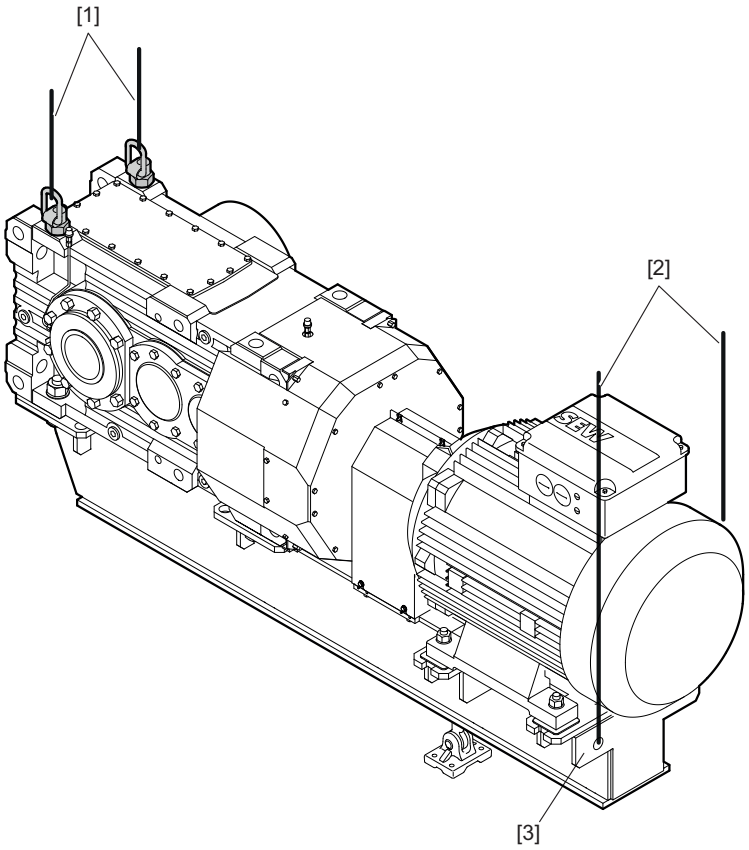
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Do not use the lifting eyebolts on the motor as a transport attachment.



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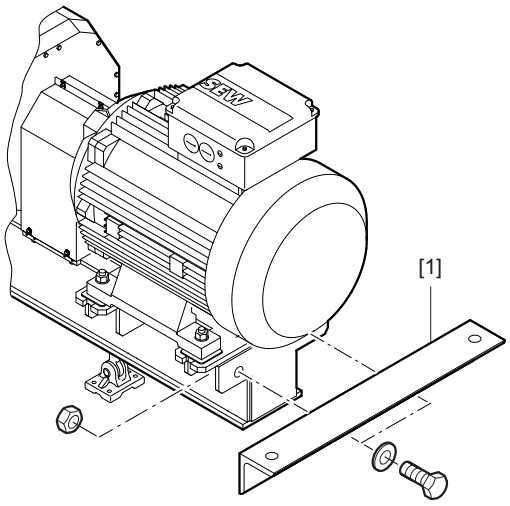
As an option, you can also attach the load handling device to the gear unit housing [1] and to the swing base [2].



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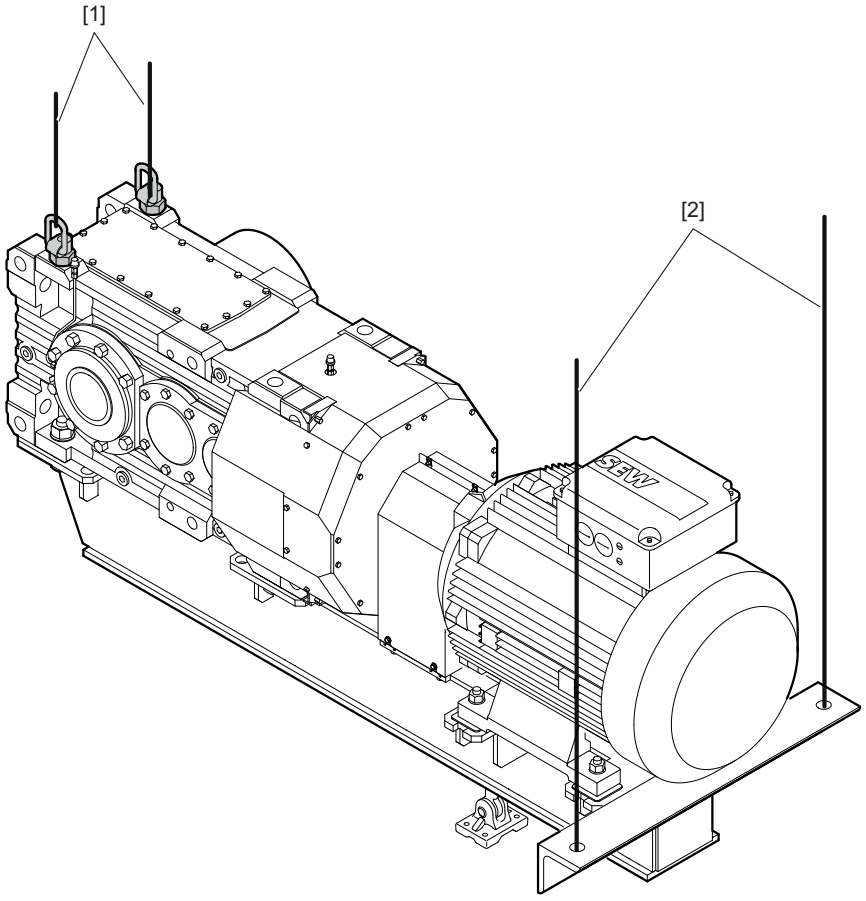
Optional, transport with lateral slinging aid

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].



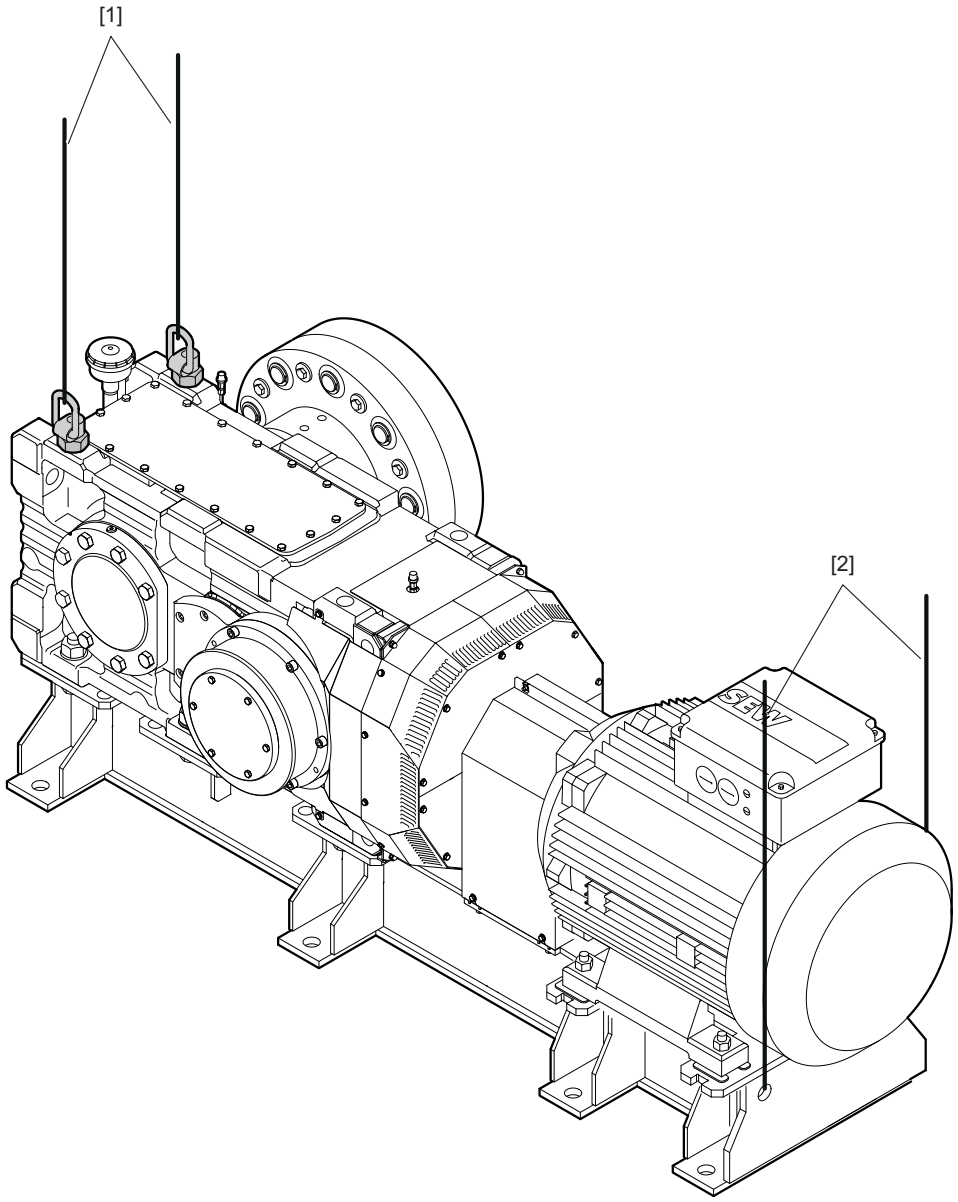
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3.6.2 Base frame

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

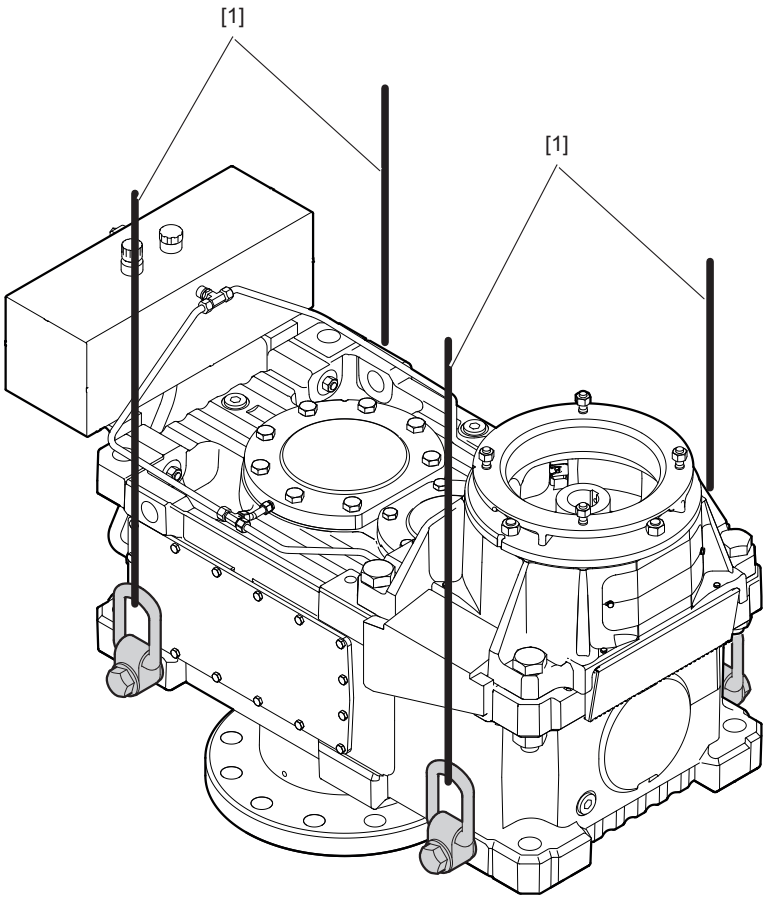
The slinging aid, as described in chapter "Swing base" (→ 🗎 22), can also be ordered for the base frame.



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3.7 Gear unit with oil expansion tank in mounting position M5

Use only the provided attachment points [1] to transport the gear unit.



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3.8 Storage and transport conditions

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

3.8.1 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.

3.8.2 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.

3.8.3 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

3.8.4 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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3.9 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.

3.9.1 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" 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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3.9.2 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.

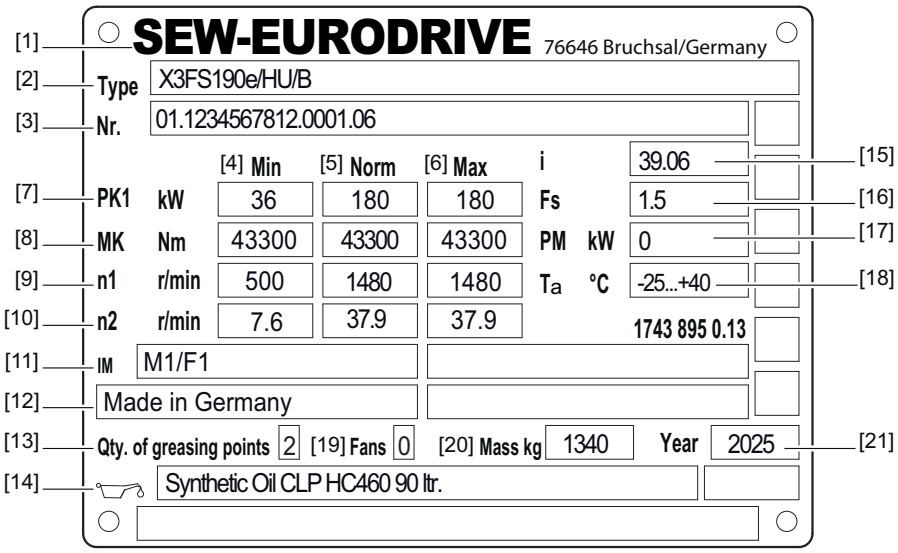
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4 Gear unit structure

4.1 Nameplate and product label

4.1.1 Nameplate

The following example shows the structure of the nameplate.



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Line	Information
[1]	• Manufacturer, address
[2]	• Type designation
[3]	• Serial number
[4]	• Minimum operating point
[5]	• Normal operating point
[6]	• Maximum operating point
[7]	• Operating power at the input shaft (HSS)
[8]	• Gear unit output torque
[9]	• Input speed (HSS)
[10]	• Output speed (LSS)
[11]	• Mounting position and mounting surface
[12]	• Country of manufacture
[13]	• Number of greasing points
[14]	• Oil grade and viscosity class/oil quantity
[15]	• Exact gear unit ratio
[16]	• Service factor
[17]	• Nominal motor power
[18]	• Deviation from the standard temperature range (−20 °C to +40 °C)
[19]	• Number of mounted fans
[20]	• Gear unit weight

Line	Information
[21]	• Year of manufacture

4.1.2 Product label

The QR code on the product gives you quick access to the Digital Services from **SEW-EURODRIVE**.

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

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

The following figure shows an example of a product label:



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4.2 Type designation

The following example shows the structure of the type designation:

X3KS250e /HU /B	
X	Industrial gear unit series
3	Number of gear unit stages • 2 = 2-stage • 3 = 3-stage • 4 = 4-stage
K	Gear unit design • F = Helical gear unit • K = Bevel-helical gear unit • T = 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 • C = Reinforced solid shaft with key
	Application • B = Bucket elevator gear unit • C = Hoist gear unit
250	Gear unit sizes • 100 – 320
HU	Housing design • HU = Universal housing • HH = Horizontal housing • HA = Agitator housing • HT = Thermal housing • HC = Hoist housing • HW = Welded housing
e	Generation X.e
B	Gear unit mounting • /B = Foot • /T = Torque arm • /F = Flange

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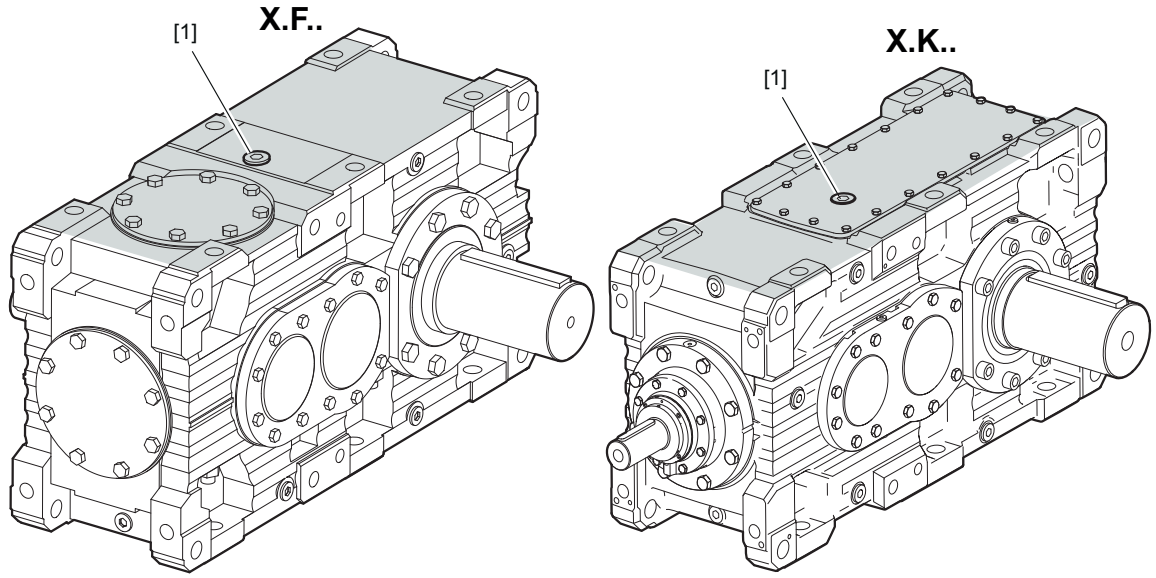
4.3 Distinguishing feature: Reduced oil level

In the splash-lubricated versions,, sizes X180e to X320e may have a reduced oil level.

The reduced oil level enables 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.

The following features must be met simultaneously as the distinguishing feature:

- 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.



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For further information, refer to the following chapters:

- Gear unit filled with oil upon delivery, see chapter "Upon delivery the gear unit is filled with oil at the factory." (→ 🗎 51).
- Operation, see chapter "Speed limits with reduced oil level" (→ 🗎 168).

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5 Installation/assembly

5.1 Before you start

Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Check that no voltage is applied. Ground and short-circuit. Cover or isolate neighboring live parts.

Check that the following conditions have been met:

- 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, the oil drain plugs, and the breather are freely accessible.
- When installing the gear unit, make sure that the customer's mounting structure leaves enough room for the breather and the oil dipstick.
- 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. Provide suitable safeguards, such as covers, roofing, or similar. Avoid heat build-up.
- Ensure that no foreign objects, e.g. falling objects, interfere with the function of the gear unit.
- Protect the gear unit from direct cold air currents. Condensation can cause water to accumulate in the oil.
- Do not perform welding work anywhere on the drive. Do not use the drives as a ground point for welding work. Welding may destroy gearing components and bearings.
- Repair any paint damage to the gear unit, for instance on the breather.
- Make sure that the gear unit and the mounted components do not protrude into the walkway.

5.1.1 Gear unit with long-term preservation

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

Removing 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.

Inserting a breather

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

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5.2 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" (→ 🗎 38).

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

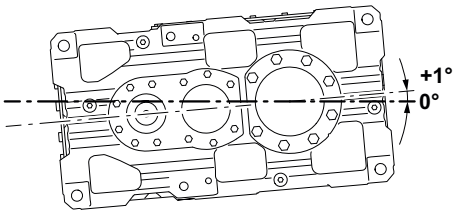
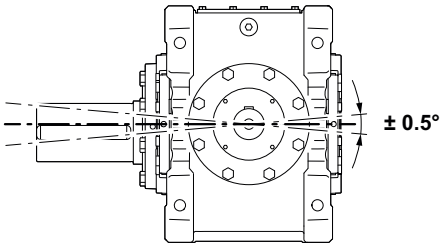
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5.2.1 Permitted deviation of the mounting position during installation

The following tolerances must be observed during gear unit installation.

The information relates to gear units without pivoted mounting position.

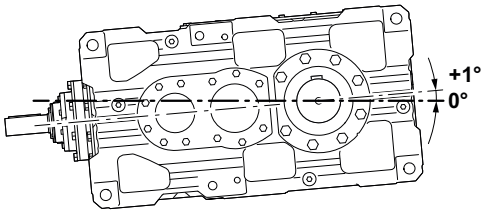
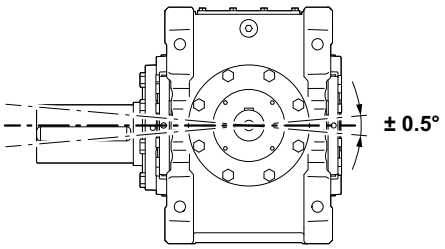
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Mounting position: M1 and M3	Mounting position: M1 and M3
	

INFORMATION

Deviations in the mounting position of **±1°** are permitted for gear units in mounting positions M2, M4, M5, M6.

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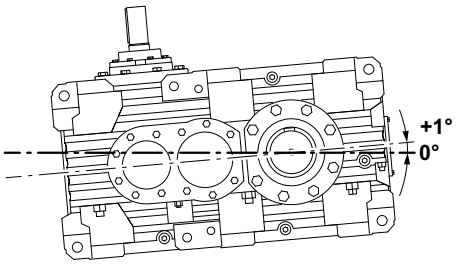
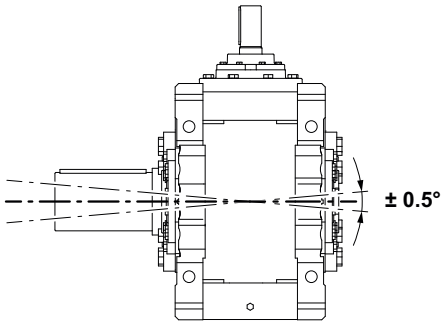
Mounting position: M1 and M3	Mounting position: M1 and M3
	

INFORMATION

Deviations in the mounting position of **±1°** are permitted for gear units in mounting positions M2, M4, M5, M6.

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

INFORMATION

Deviations in the mounting position of **±1°** are permitted for gear units in mounting positions M2, M4, M5, M6.

5.2.2 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 fittings.

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 installation.

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
X290 – 320	M56	10600

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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

5.2.3 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.

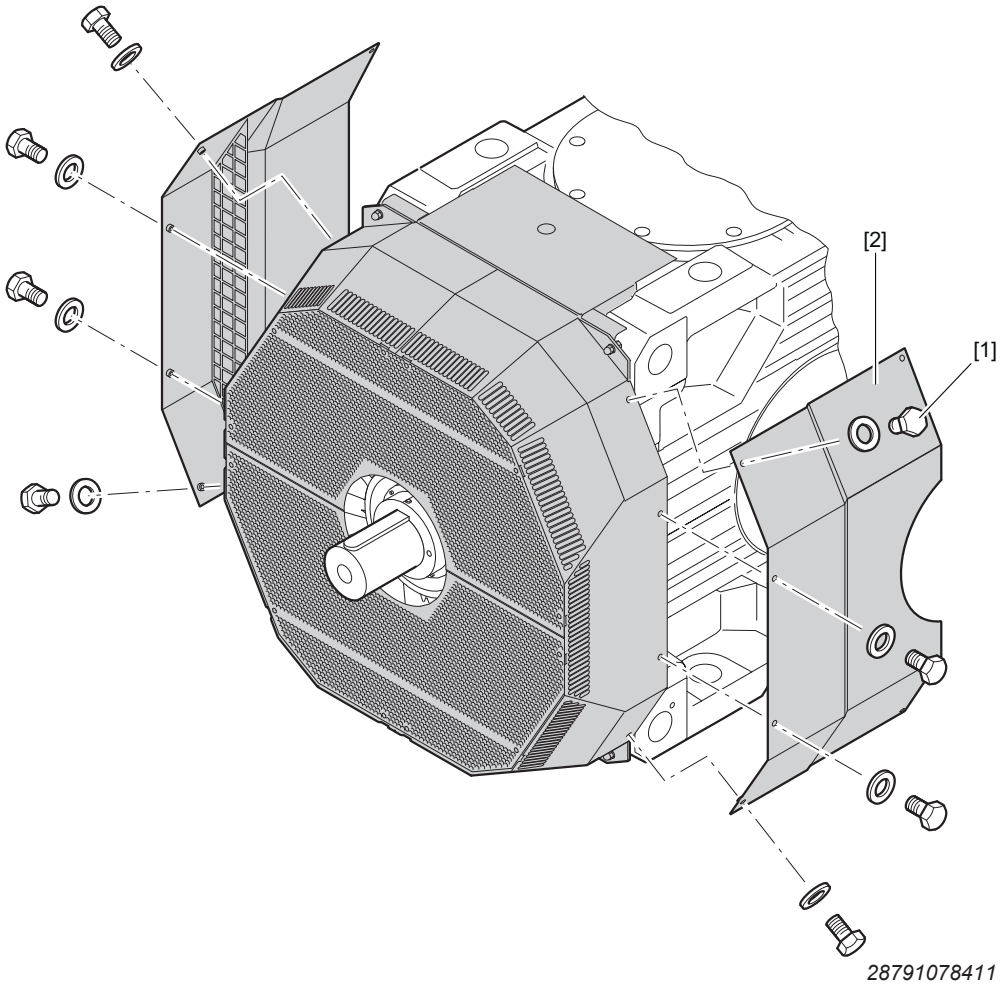
The tightening torques do not apply to mounting types such as flange coupling, torque arm, mounting flange, hollow shaft with shrink disk, etc. These can be found in the respective chapters.

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

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5.2.4 Gear unit mounting with foot-mounted design and fan with universal fan guard

When using gear units with foot mounting, parts of the protective cover of the universal fan guard must be removed so that the gear unit can be fastened.



1. Loosen the screws [1].
2. Remove the sheet metal covers [2].
3. Fasten the gear unit using all the bores provided for the foot screw fitting.
4. Assemble the fan guard in reverse order.

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5.2.5 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.

5.3 Filling the gear unit with oil

The gear unit is delivered without oil filling ex works as standard.

Check that the following conditions have been met:

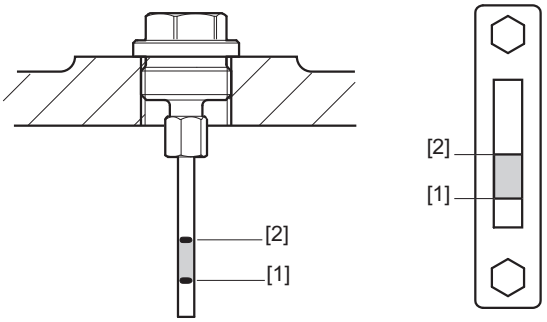
5.3.1 Information

- 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 final 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. Observe the information in chapter "Checking the oil level" (→ 🗎 174).
- 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. Refer to the overall documentation for the gear unit.
- For gear units with external supply pipes, e.g. oil cooling systems, establish the connections before filling the oil.
- Use a clean filling aid without zinc coating (plastic funnel or similar).

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Procedure



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1. Open the oil filling plug.
2. Fill in oil until the oil level is in the middle between marking [1] and marking [2].
3. Screw in the oil filling plug.

Video instructions

German

English

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5.3.2 Gear units with oil expansion tank /ET

NOTICE

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

Possible damage to property.

- Observe the oil viscosity during the filling process.

NOTICE

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

Possible damage to property.

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

Also observe the notes in chapter "Procedure for gear units with oil expansion tank / ET" (→ 🗎 177).

Thus, a higher minimum filling temperature might be required depending on the selected oil type. Guide values can be found in the following table.

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

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5.3.3 Gear units with shaft end pump /SEP

Procedure

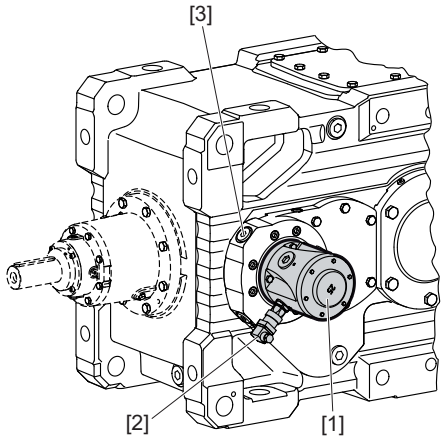
Check that the following conditions have been met:

- Connect the pressure switch [2] to the operator's control. Observe chapter "Pressure switch" (→ 🗎 160).
- Fill the gear unit with the oil type and oil quantity corresponding to the nameplate data. Check the oil level. For further information, refer to chapter "Changing the oil".
- Immediately before initial startup, open the screw plug [3] and fill the shaft end pump [1] completely with oil. After having filled in the oil, close the screw plug [3].

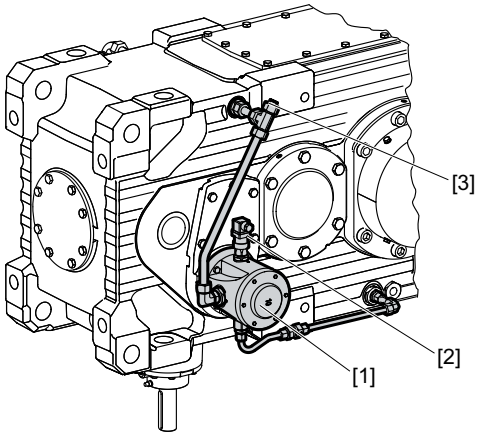
  This procedure must be repeated after a downtime of more than 6 months or an oil change.
- Before startup, fill the additional mount-on components (such as piping, cooler matrix, etc.) with oil on the pressure side. Doing so ensures that there is a sufficient oil supply when the entire system is started up. The oil filling holes are marked in the order dimension sheet.
- For further information, refer to chapter "Startup".

Gear units in mounting position M1

Size XF/XK160 – 320

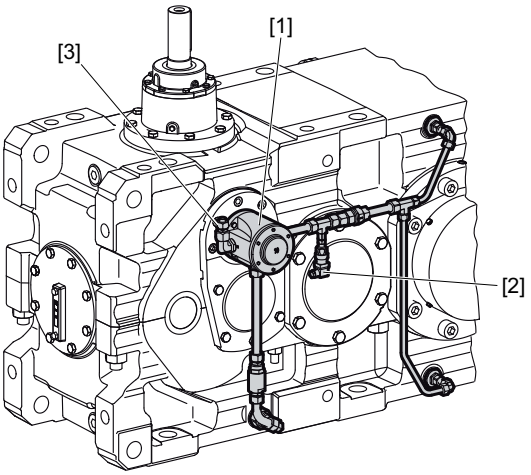


Size X4T160 – 210



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Size X4T220 – 250

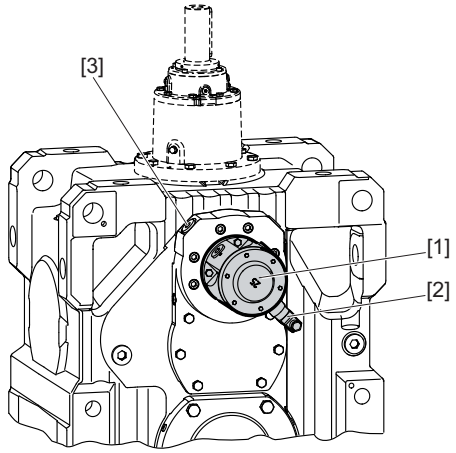


[1] Shaft end pump
[2] Pressure switch
[3] Screw plug

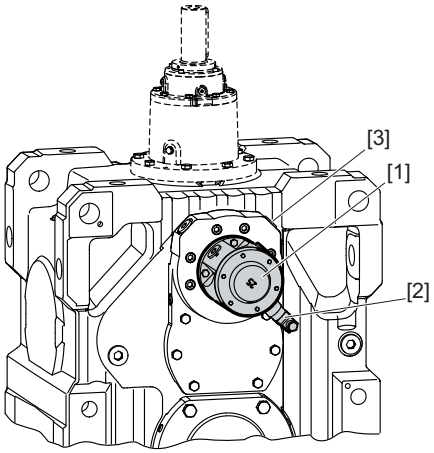
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Gear units in mounting position M4

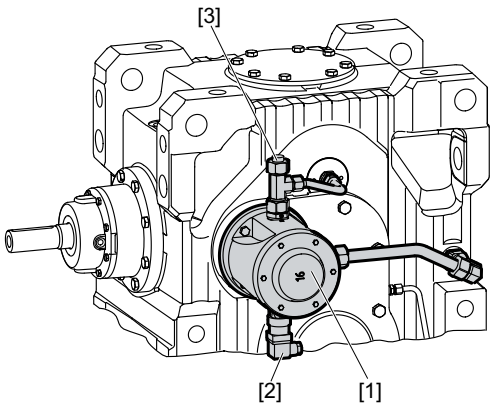
Size XF/XK 120 – 150



Size XF/XK 160 – 320

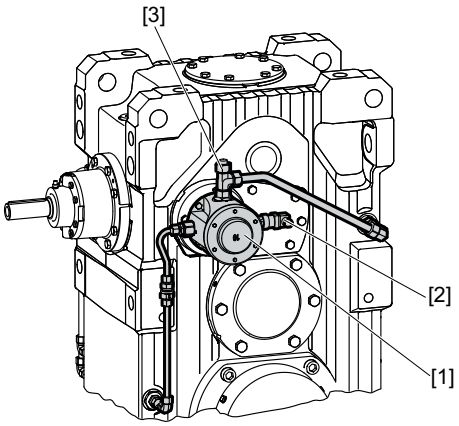


Size X4T120 – 150

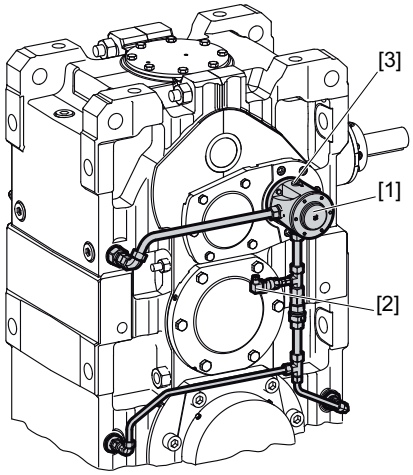


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Size X4T160 – 210



Size X4T220 – 250



[1] Shaft end pump
[2] Pressure switch
[3] Screw plug

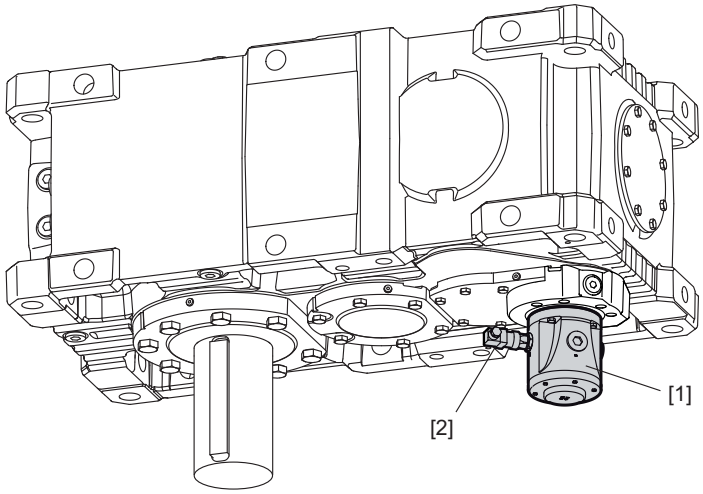
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Gear units in mounting position M5

Universal housing /HU

If the shaft end pump [1] is mounted below the oil level, the pump does not need to be filled with oil.

Size XF/XK120 – X320



[1] Shaft end pump
[2] Pressure switch

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5.3.4 Gear units with reduced oil level

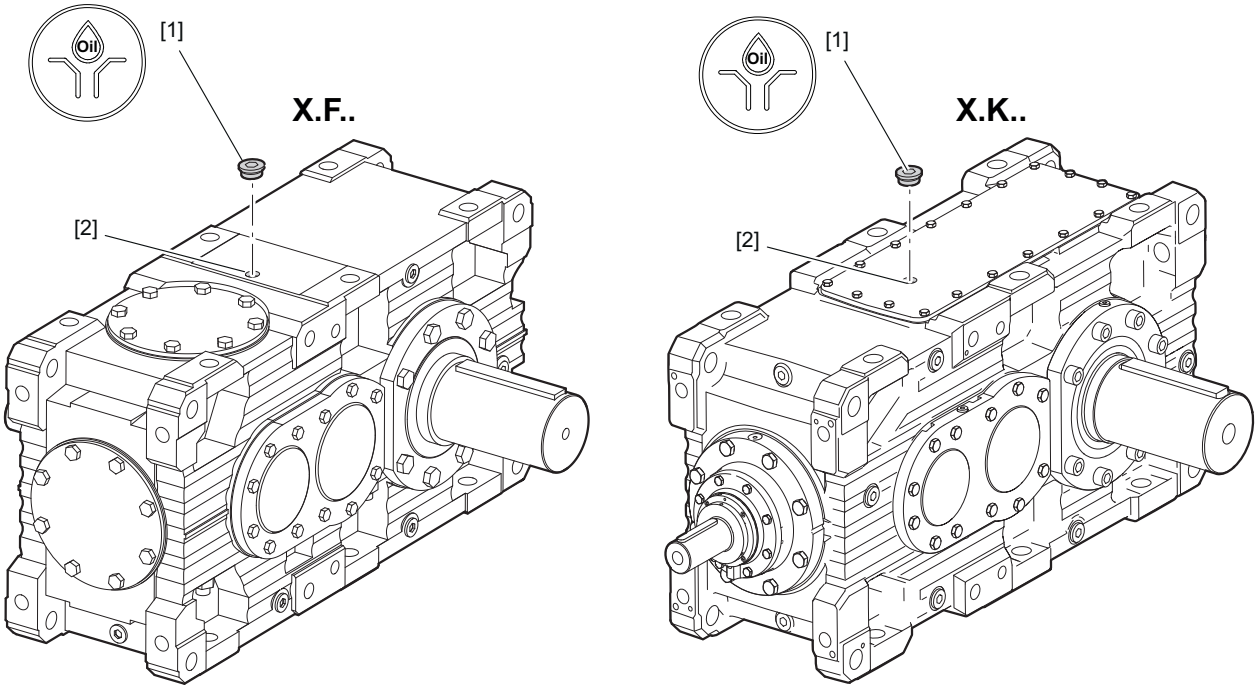
Procedure

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.



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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" (→ 🗎 174).
- Use a clean filling aid without zinc coating (plastic funnel or similar).

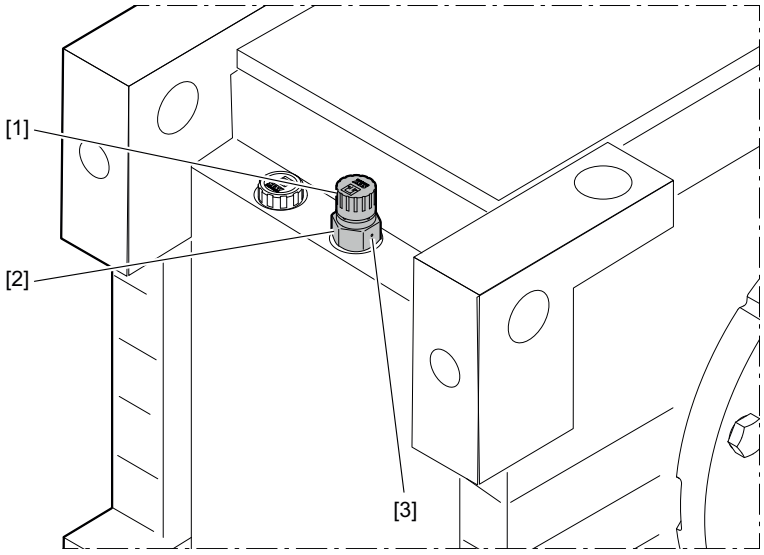
3. ⚠ **CAUTION!** Danger due to leakage of lubricant. Possible risk of slipping. Immediately remove any oil that has escaped with oil binder.
4. Screw the oil fill plug [1] and the oil dipstick back into place.

5.4 Installing the splash guard adapter

The splash guard adapter prevents the gear unit oil from escaping the breather during operation.

A splash guard adapter is used at certain gear unit speeds. If this is required, it is included in the delivery.

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



9007244784064395

Procedure

1. **NOTICE!** Improper mounting of the splash guard adapter may result in damage to the gear unit. Possible damage to property.
   Prevent foreign particles from entering into the gear unit when performing the following work.
2. Clean the tapped hole and the thread of the splash guard adapter with solvent.
3. Apply liquid threadlocker, e.g. Loctite® 577, to the thread of the splash guard adapter.
4. Screw the splash guard adapter into the gear unit.
5. Align the splash guard adapter [2] in such a way that the positioning mark [3] points to the opposite side of the end wheel.
6. Screw the breather [1] onto the splash guard adapter [2].

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5.5 Upon delivery the gear unit is filled with oil at the factory.

The gear unit is delivered filled with oil ex works.

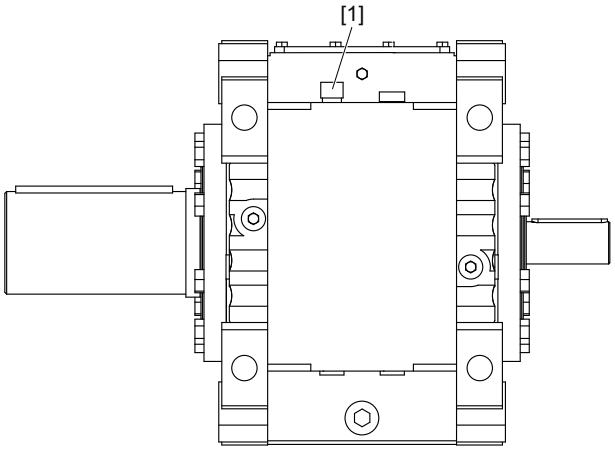
NOTICE

Faulty startup may result in damage to the gear unit.

Possible damage to property.

- Note that gear units with a shaft end pump, a motor pump, or a customer-installed cooling system must be vented before being taken into operation.
- Fill the shaft end pump completely with oil shortly before taking it into operation.

The following figure is an example. Proceed as follows.



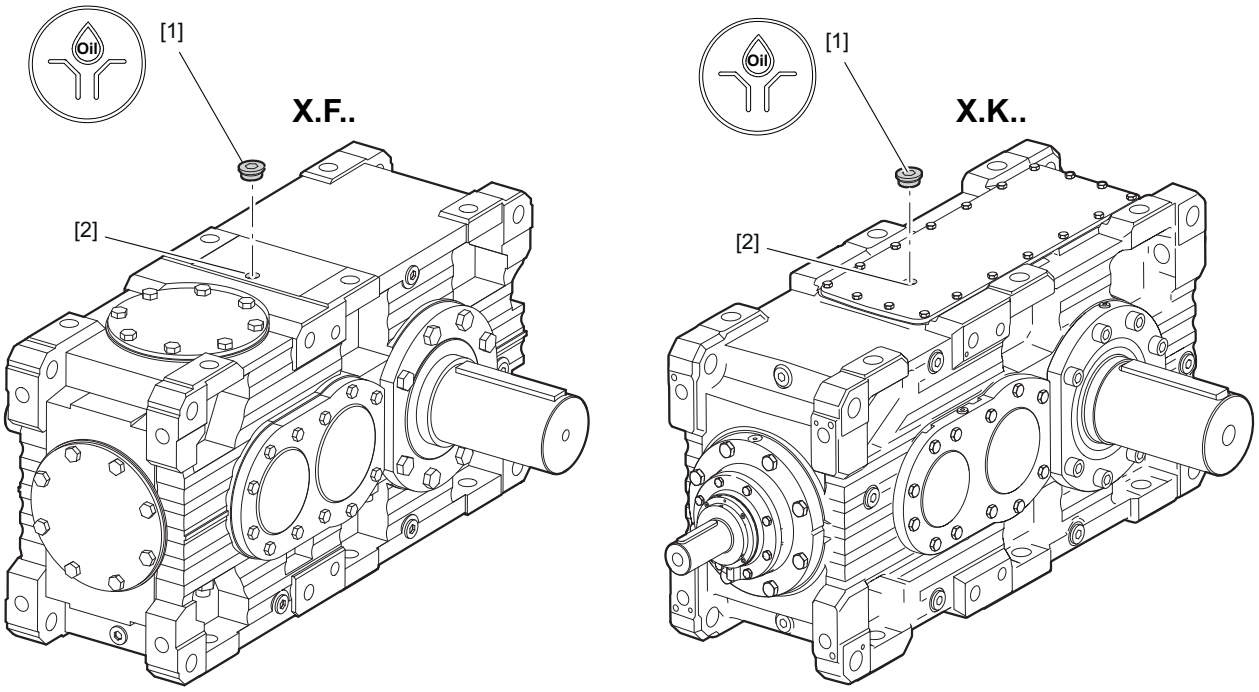
4688864907

1. Remove the closing plug.
2. Insert the breather [1] included in the delivery. For the position of the breather, refer to the order documents.
3. The oil level may deviate during transport, or due to different ambient conditions at the destination. For this reason, the oil filling must be checked and corrected if necessary. Check the oil level, see chapter "Checking the oil level" (→ 🗎 174).

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5.5.1 Gear units with reduced oil level

Observe the following procedure for gear units with splash lubrication and reduced oil level.



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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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5.6 Gear units with solid shaft

5.6.1 Mounting input and output components

NOTICE

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

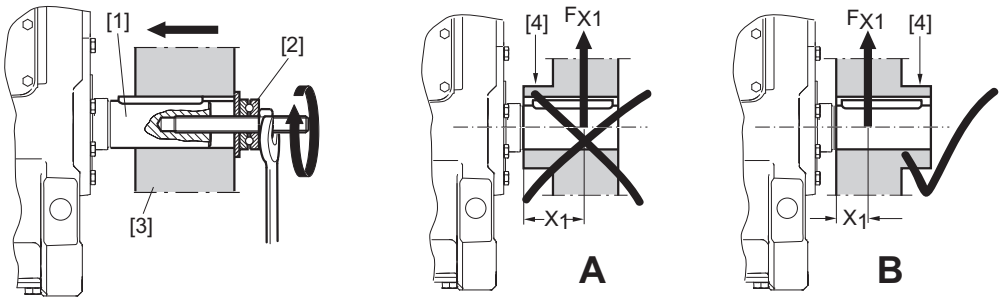
Possible damage to property.

- 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**.



12570941963

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

A unfavorable
B correct

5.7 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.

5.8 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.

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

5.9.1 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:

- R_e = 320 N/mm^2 for the sizes X..A100 – X..A290
- R_e = 360 N/mm^2 for the sizes X..A300 – X..A320

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

The minimum key length specified in the dimension sheet (see following page or in the overall documentation of the gear unit) must be adhered to. If a longer key is inserted, it must be arranged symmetrically to the hollow shaft.

With a through-going machine shaft or axial forces, SEW-EURODRIVE recommends that the machine shaft be designed with a contact shoulder. To prevent loosening of the retaining screw of the machine shaft with reversing load direction, secure it with a suitable thread locking device. If necessary, two eccentric retaining screws can be used.

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5.9.2 Mounting the gear unit onto the machine shaft

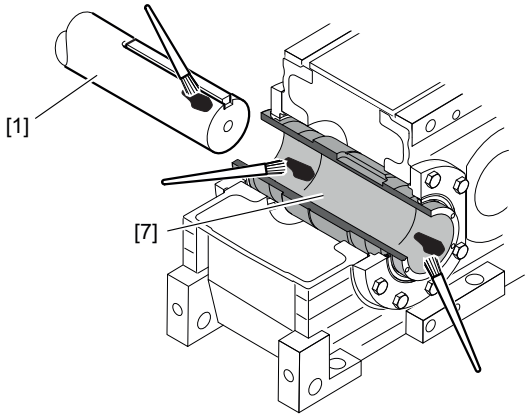
1. Make sure the dimensions of the machine shaft correspond to SEW specifications. Observe the dimensions of the machine shaft.
2. Loosen the retaining screws of the protection cover.
3. Remove the protection cover.

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].

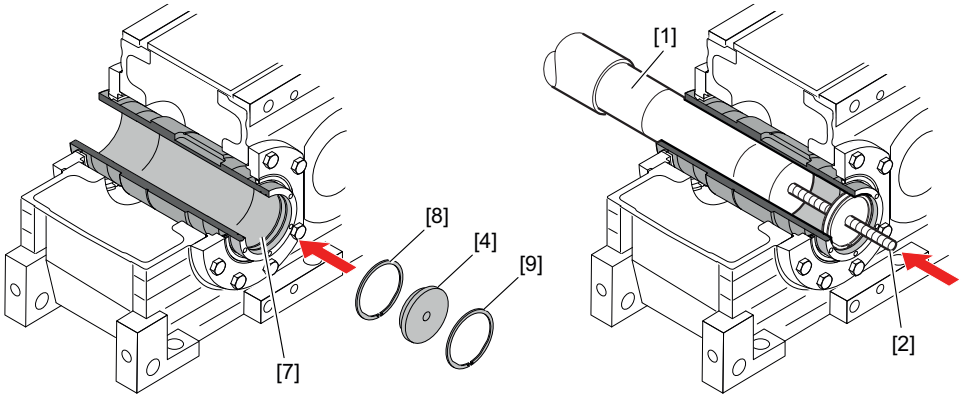


27021614604153611

[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].

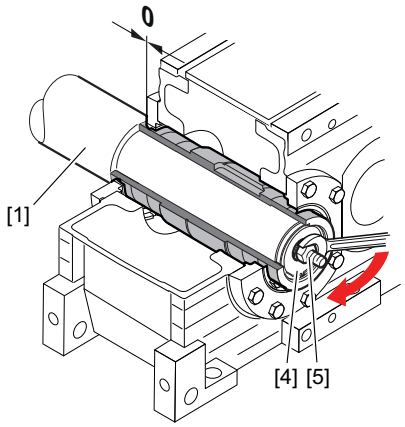
Size	2 × retaining ring (bore) DIN 472
X..A100	75 × 2.5
X..A110	85 × 2.5
X..A120	95 × 3
X..A130	105 × 4
X..A140	115 × 4
X..A150	125 × 4
X..A160	135 × 4

INFORMATION

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

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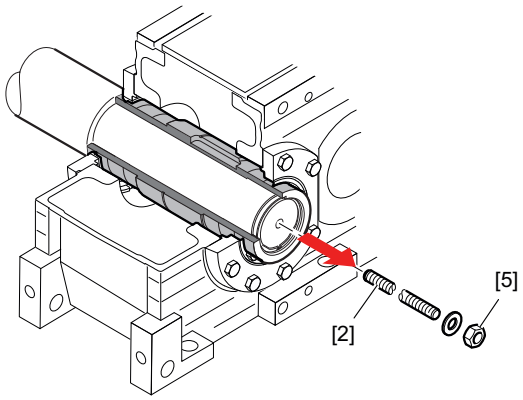
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



27021600652650123

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

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

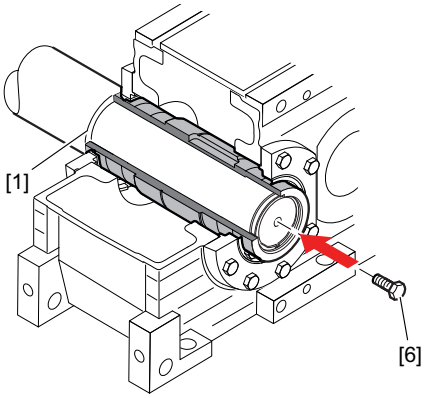


18014401397467147

[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



36028799898269579

[1] Machine shaft
[6] Retaining screw

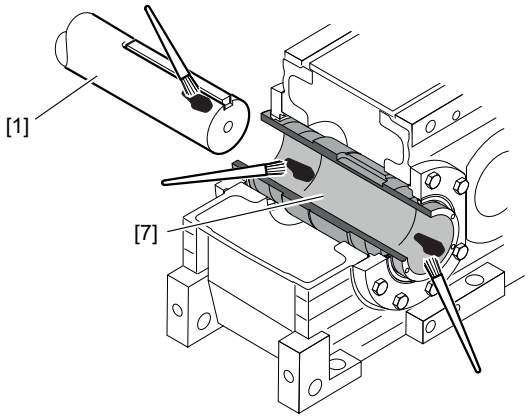
8. Mount the protection cover dust-tight to the gear unit.

Size X170 – 320

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].

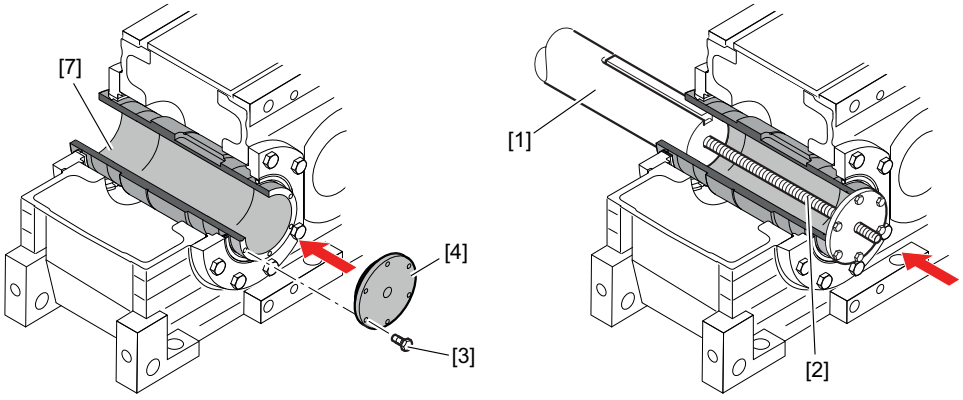


27021614604153611

[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 thread the threaded rod [2] into the machine shaft [1]. Observe the following thread sizes of the threaded rods [2].

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18014398819833995

[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 – 300	M36
X..A310 – 320	M42

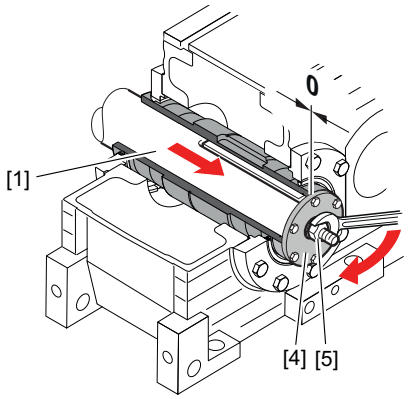
Observe the following information on the retaining screws [3].

Size	Thread size for 6 × retaining screws Strength class 10.9	Tightening torque
		Assembly/ operating state Nm
X..A170 – 190	M10 x 30	78
X..A200 – 230	M12 x 30	135
X..A240 – 300	M16 x 30	330
X..A310 – 320	M20 x 50	645

INFORMATION

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

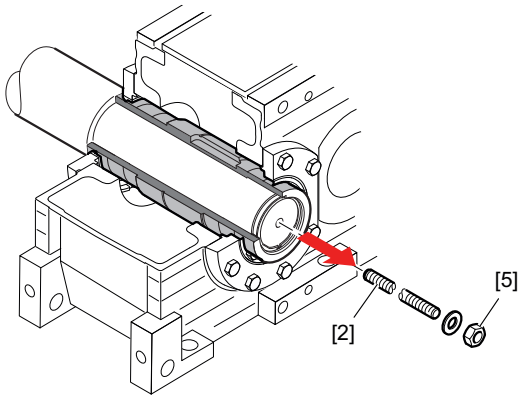
3. Tighten the machine shaft [1] with the nut [5] until the shaft end of the machine shaft [1] and the end plate [4] meet.



18014398819889291

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

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

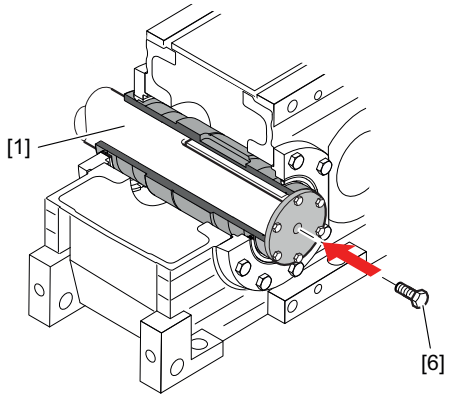


18014401397467147

[2] Threaded rod
[5] Nut

5. 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].

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18014398819897867

[1] Machine shaft
[6] Retaining screw

Size	Retaining screw	Tightening torque in Nm Strength class 8.8
X..A170 – 230	M30	1590
X..A240 – 300	M36	2760
X..A310 – 320	M42	4410

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

5.9.3 Removing the gear unit from the machine shaft

NOTICE

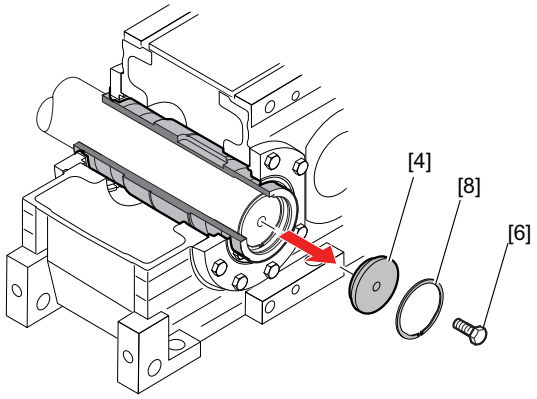
Incorrect disassembly of the gear unit from the machine shaft can damage bearings and other components.

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

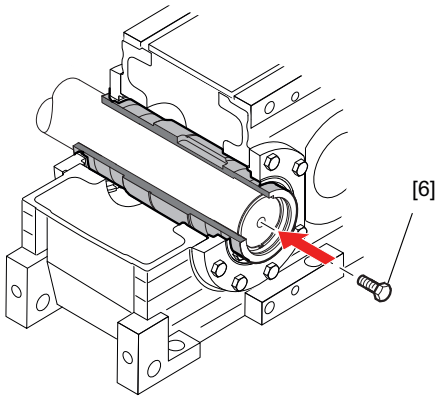
1. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].



18014401360659851

[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].

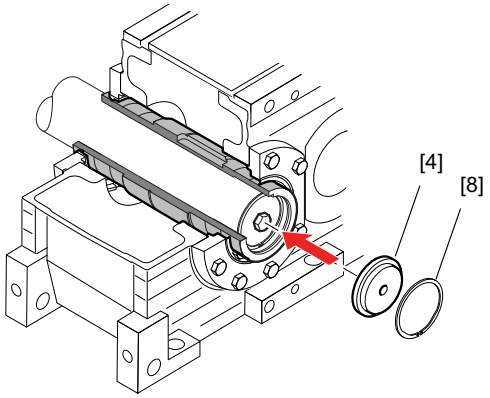


18014401360662283

[1] Machine shaft
[6] Retaining screw

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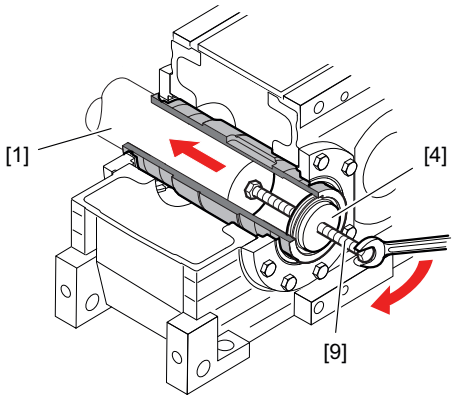
3. Turn over the end plate [4] and reinstall it with the outer retaining ring [8].



18014401360665611

[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].

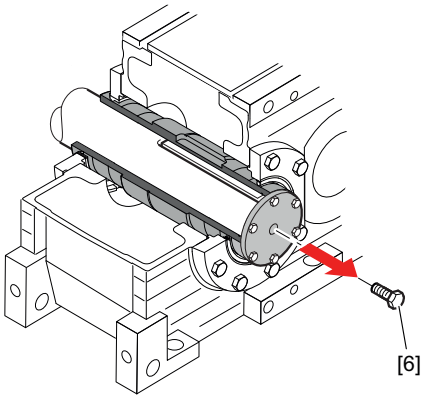


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[1] Machine shaft
[4] End plate
[9] Ejector screw

Sizes X170 – 320

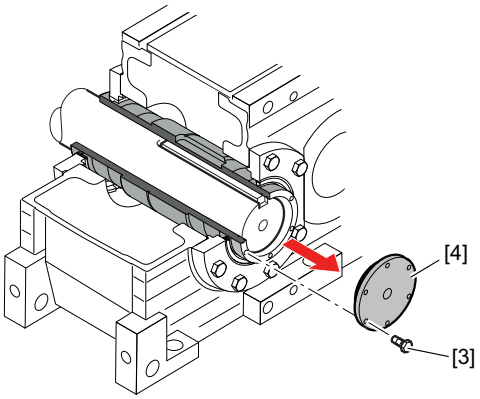
1. Loosen the retaining screw [6].



9007199565201035

[6] Retaining screw

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

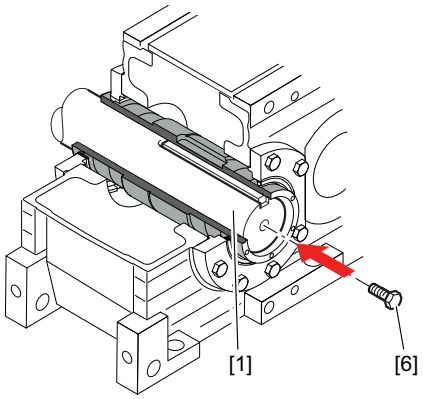


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[3] Retaining screw
[4] End plate

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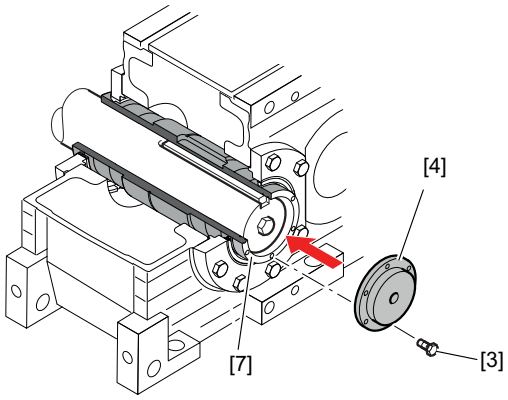
3. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1]. The screw head must rest on the shaft end face.



9007199565211019

[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.



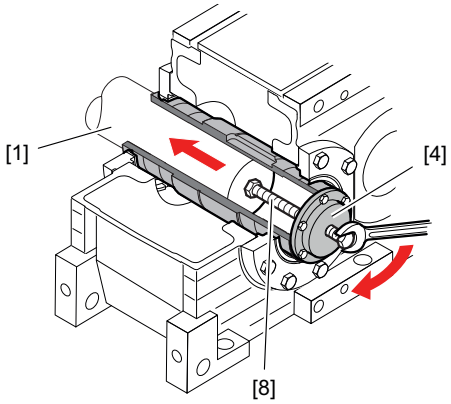
9007199565215115

[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].

INFORMATION

Disassembly is easier if you first apply assembly paste to the ejector screw [8] and the thread of the end plate [4].



9007199565219211

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

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

5.10.1 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:

R_e = 360 N/mm^2 for the sizes X..100 – X..320

5.10.2 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.

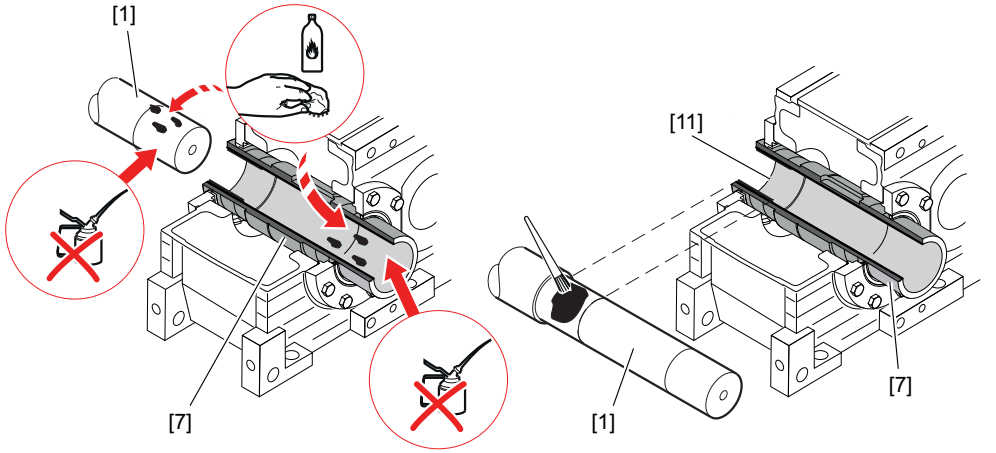
Size X100 – 160

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].

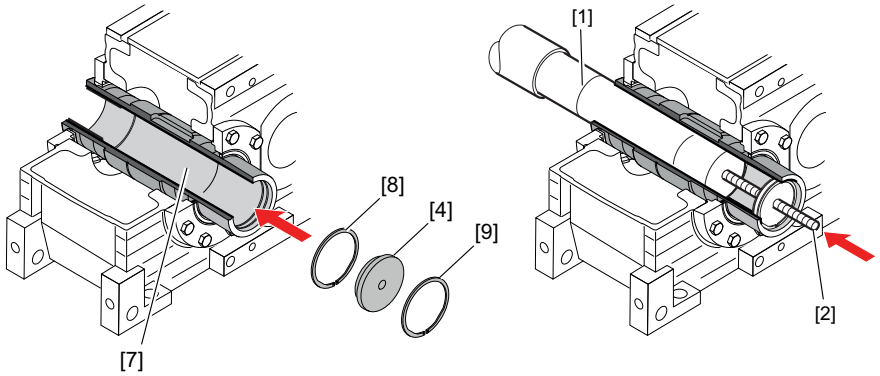
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9007216094676363

[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].



18014401388780811

[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].

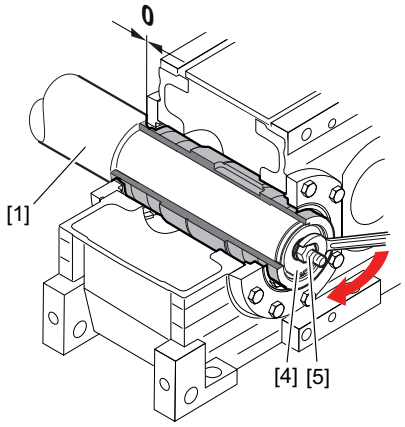
Size	2 × retaining ring (bore) DIN 472
X..H100	80 × 2.5
X..H110	90 × 2.5
X..H120	100 × 3
X..H130	110 × 4
X..H140	120 × 4
X..H150	130 × 4
X..H160	140 × 4

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INFORMATION

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

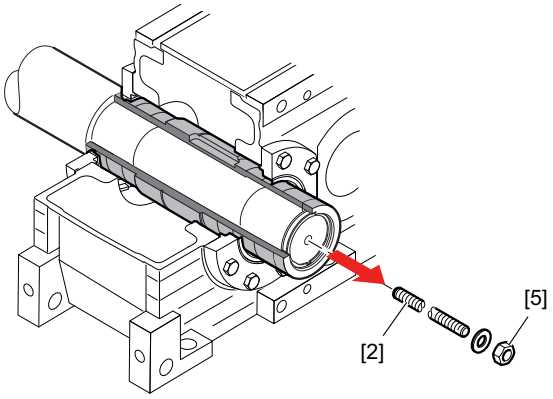
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



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

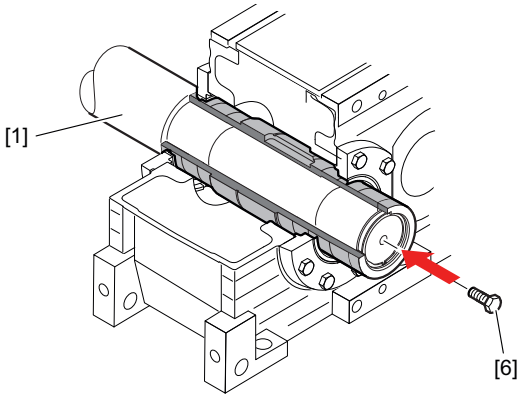
6. Loosen the nut [5]. Remove the threaded rod [2].



18014401388785419

[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].

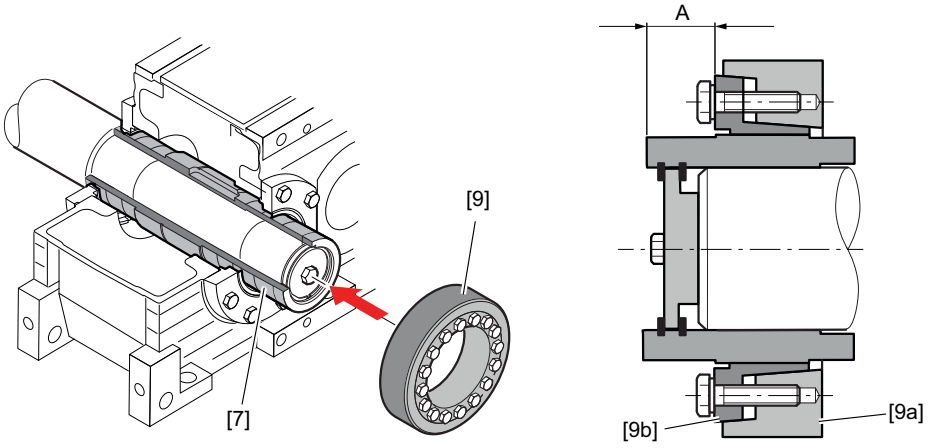


27021600652554123

[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.



27021600650488075

[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

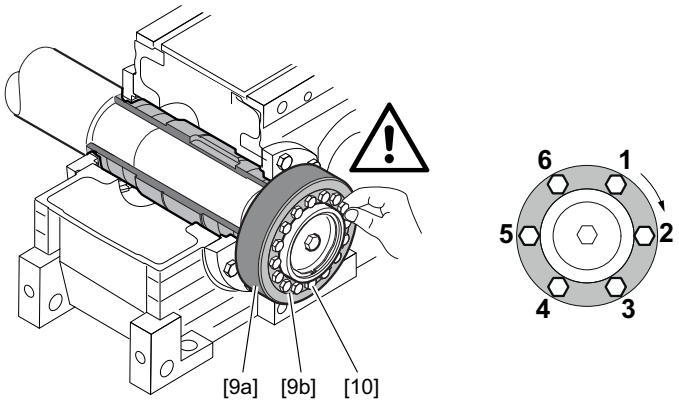
31981259/EN – 04/2026

Size	A ±0.5 in mm
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.

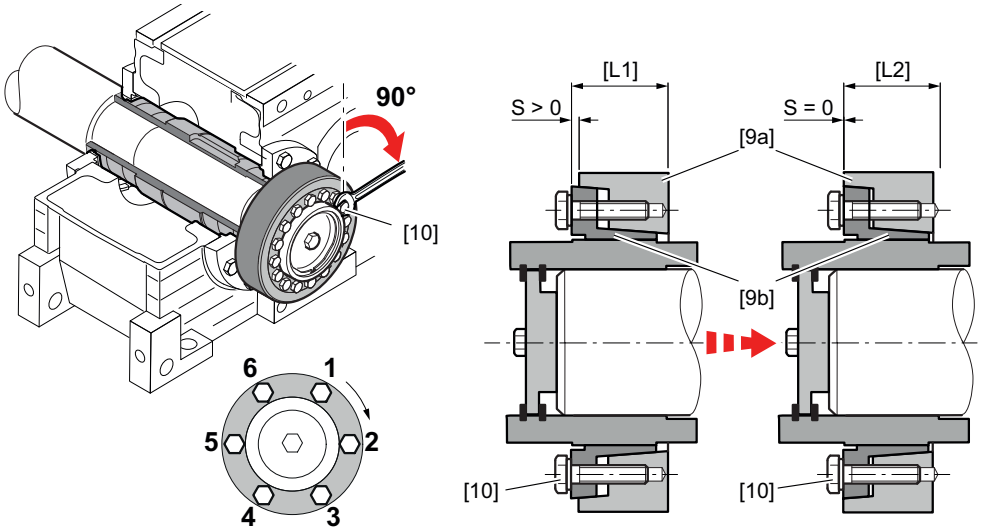


27021600650490251

[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.

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[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.

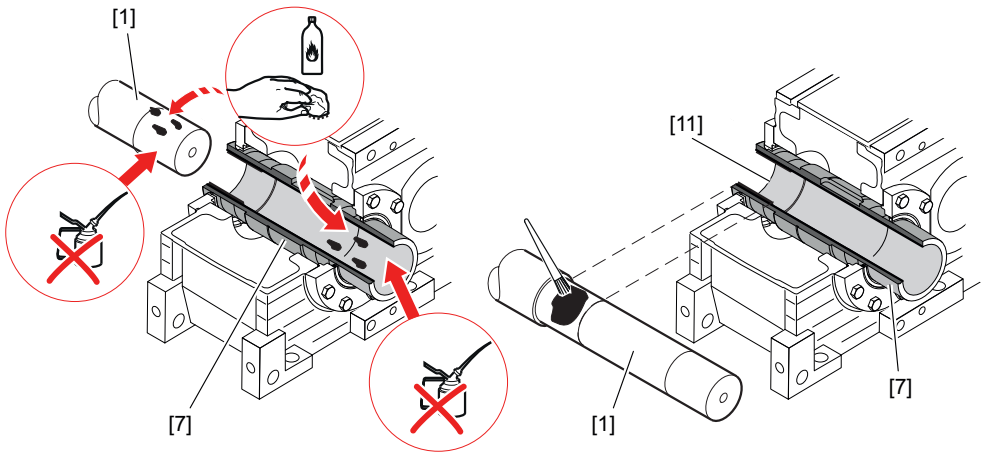
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Size X170 – 320

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].

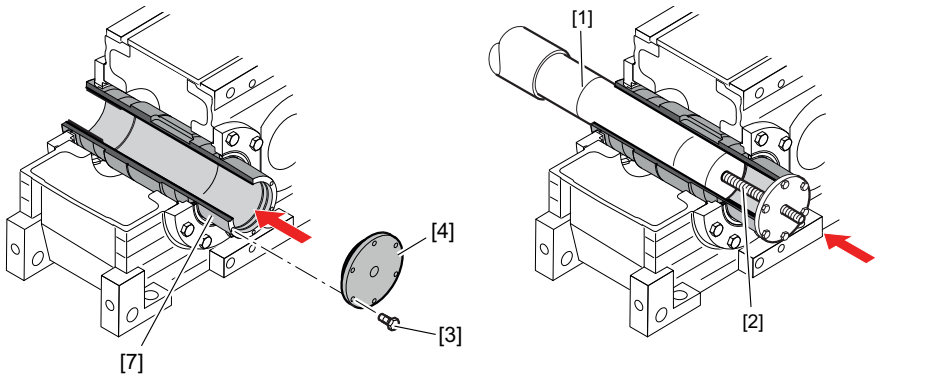
1. Before mounting the gear unit, degrease the hollow shaft [7] and the machine shaft [1]. Use a commercially available solvent. Do not let the solvent come into contact with the sealing lips of the oil seals.
2. **NOTICE!** Never apply assembly paste directly to the bushing [11] because the compound 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] Socket

4. Use the retaining screws [3] to attach the end plate [4] centrically to the hollow shaft [7]. Thread 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

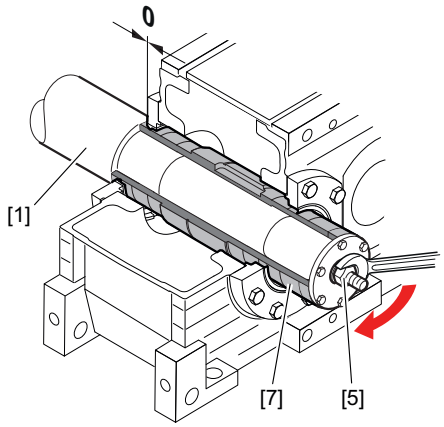
Observe the following thread sizes of the threaded rods [2].

Size	Strength class 8.8
X..H170 – 230	M30
X..H240 – 300	M36
X..H310 – 320	M42

Observe the following information on 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 – 300	M16x40	330	Tighten hand-tight
X..H310 – 320	M20x50	645	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 shoulders of the machine shaft [1] and the hollow shaft meet.

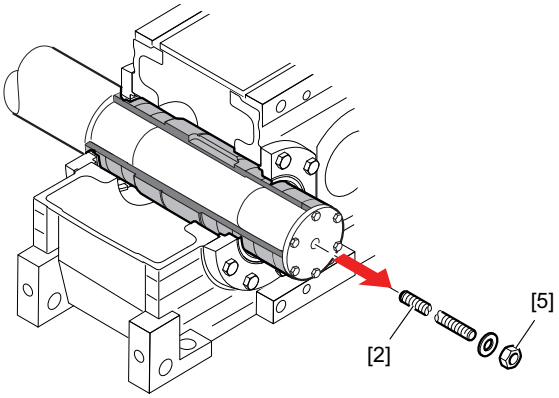


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[1] Machine shaft
[5] Nut
[7] Hollow shaft

31981259/EN – 04/2026

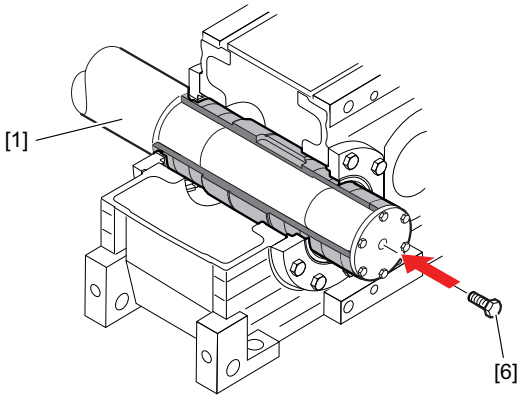
6. Loosen the nut [5]. Remove the threaded rod [2].



9007199565247243

[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].



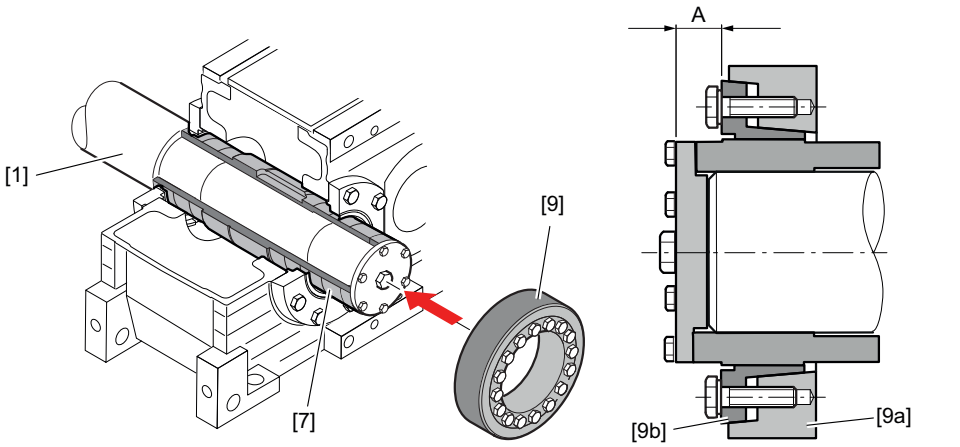
9007199565251723

[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 – 300	M36	2760
X..H310 – 320	M42	4410

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

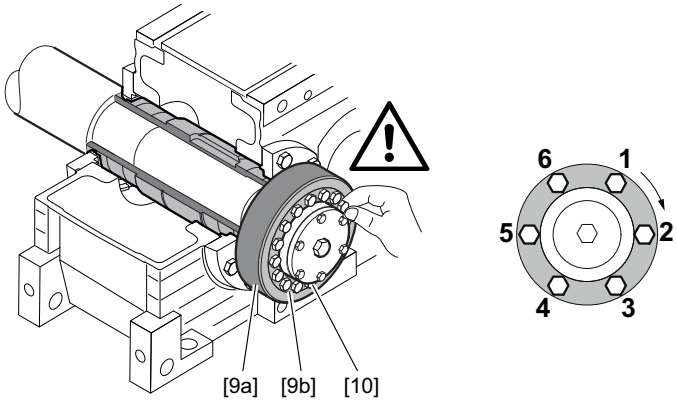
Size	A ±0.5 in mm
XH170 – 190	37
XH200 – 210	38
XH220 – 230	39
XH240 – 260	48
XH270 – 300	49
XH310 – 320	60

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.

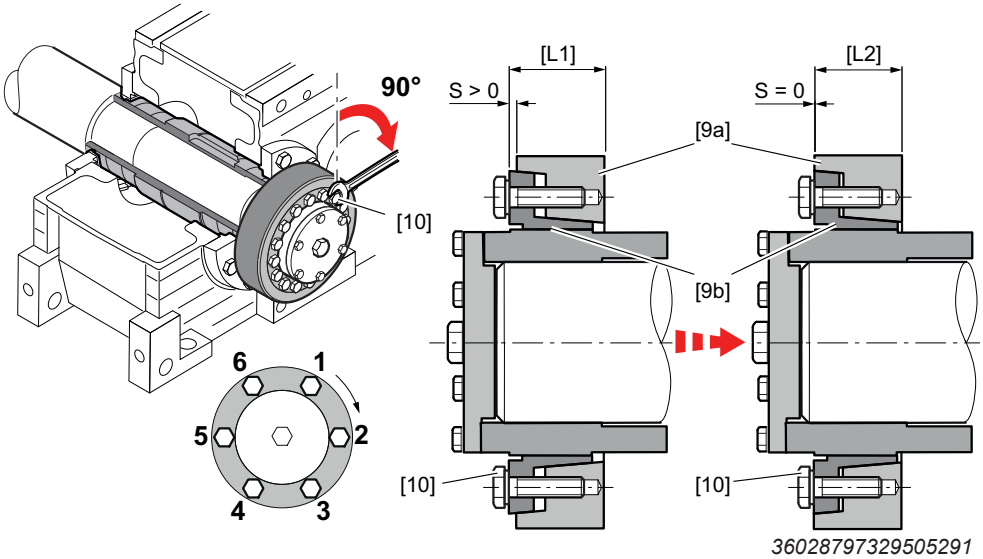
31981259/EN – 04/2026



18014398820019211

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

12. Work around the ring in several stages, evenly tighten 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.



36028797329505291

[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

Outer diameter of the shrink disk	Dimension S
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.

5.10.3 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.

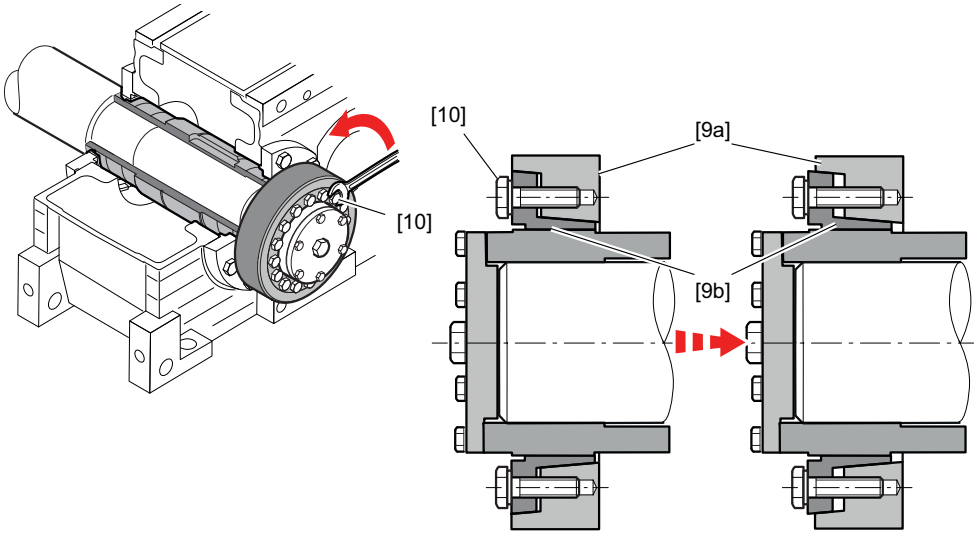
Sizes X100 – 160

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.

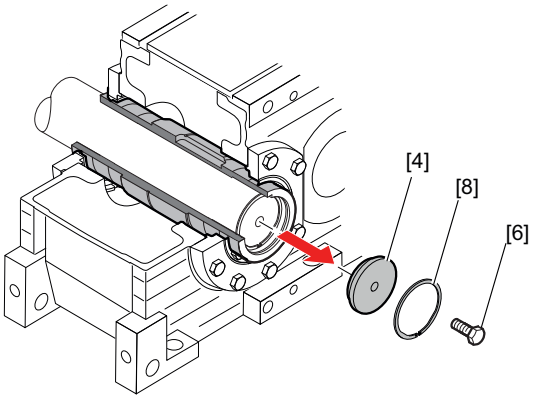
31981259/EN – 04/2026



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

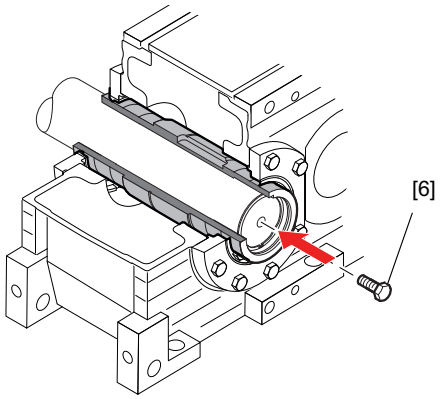
2. Remove the shrink disk from the hollow shaft.
3. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].



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

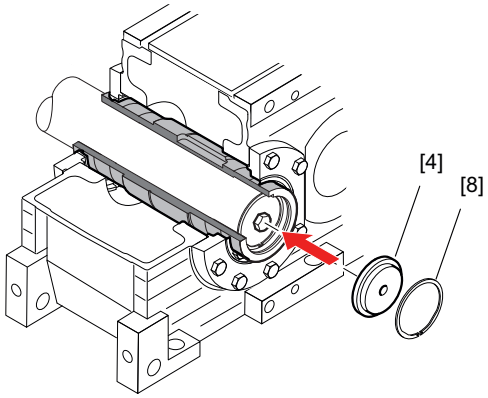
4. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



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[1] Machine shaft
[6] Retaining screws

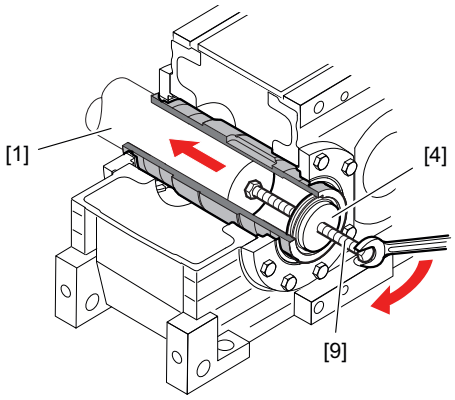
5. Turn the end plate [4] and reinstall the end plate [4] and the outer retaining ring [8].



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[4] End plate
[8] Retaining ring

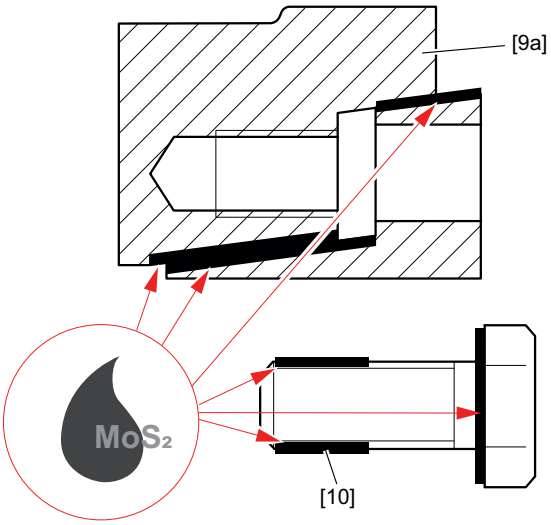
6. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Disassembly is easier if you first apply lubricant to the ejector screw [8] and the thread in the end plate [4].



54043198379633547

[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

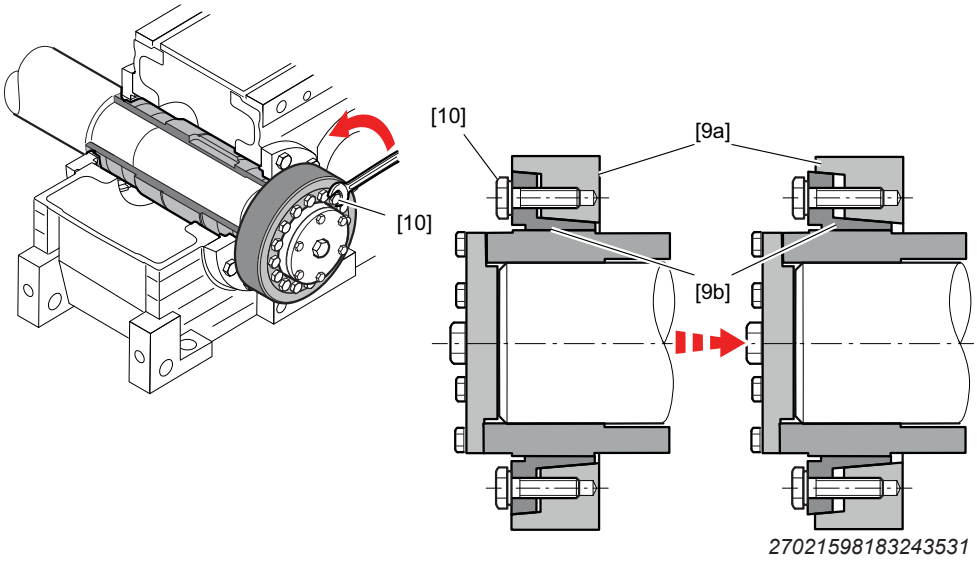
If the tapered surfaces of the shrink disk are damaged, the shrink disk must no longer be used. Replace the shrink disk.

Sizes X170 – 320

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

INFORMATION

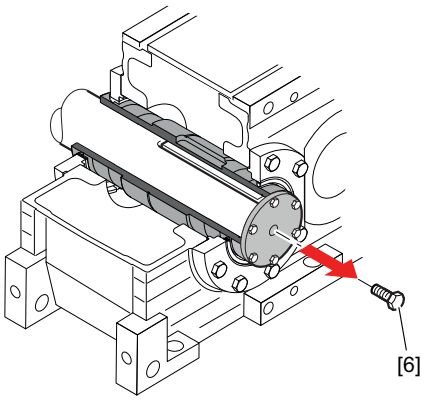
If the outer ring (stepped tapered ring) [9a] and the inner ring (stepped tapered bushing) [9b] do not loosen by themselves: Take the necessary number of screws and screw them evenly into the disassembly bores. Tighten the locking screws in several steps until the tapered bushing separates from the tapered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



27021598183243531

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

2. Loosen the retaining screw [6].

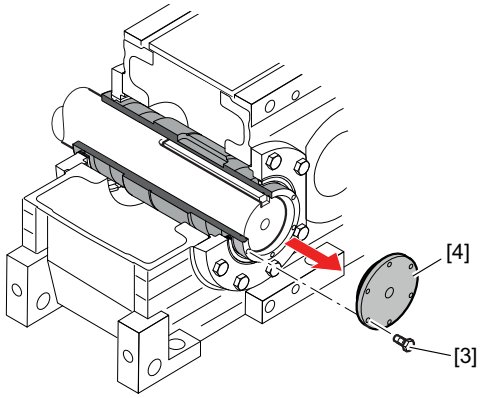


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[6] Retaining screw

31981259/EN – 04/2026

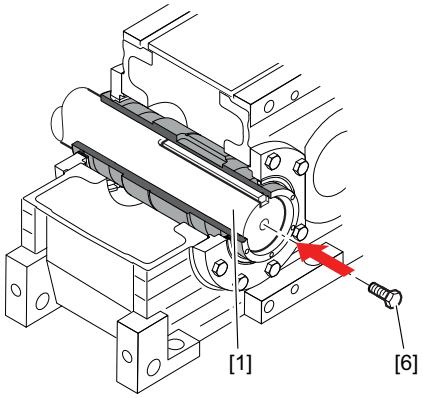
3. Remove the retaining screws [3] and remove the end plate [4].



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[3] Retaining screw
[4] End plate

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

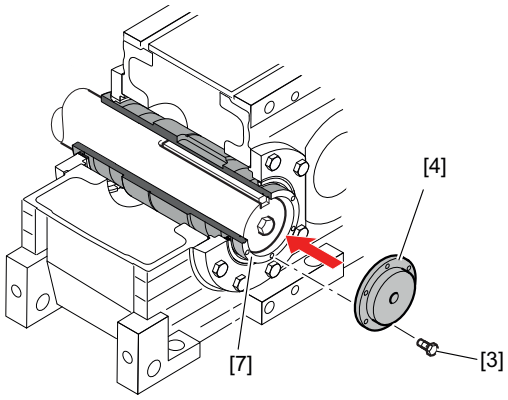


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[1] Machine shaft
[6] Retaining screw

31981259/EN – 04/2026

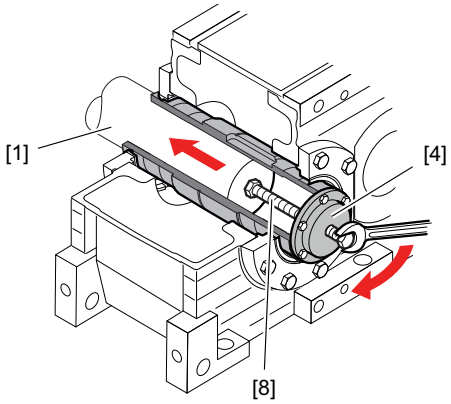
5. For disassembly of the gear unit, use the retaining screws [3] to attach the reversed end plate [4] centrically to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.



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

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].



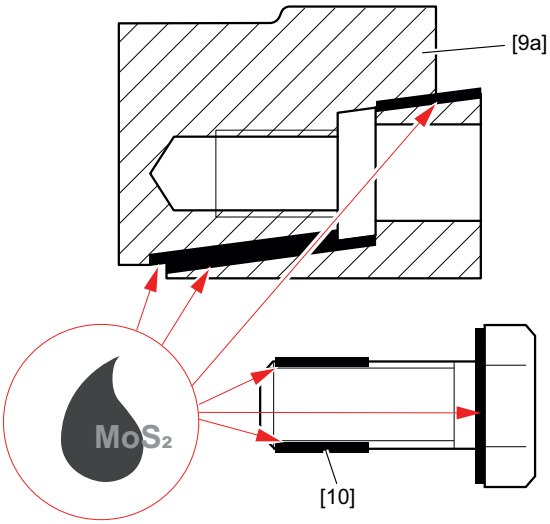
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[1] Machine shaft
[4] End plate
[8] Ejector screw

7. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.

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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).



45035997800090123

INFORMATION

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

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

5.11.1 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:

R_e = 320 N/mm^2 for the sizes X..100 – X..320

5.11.2 Mounting the gear unit onto the machine shaft

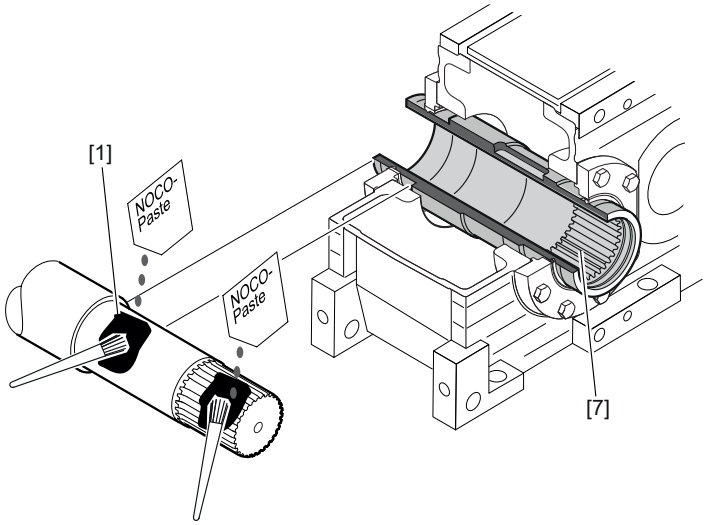
1. Make sure the dimensions of the machine shaft correspond to SEW specifications. Observe chapter "Dimensions of the machine shaft".
2. Loosen the retaining screws of the protection cover.
3. Remove the protection cover.

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].



18014401562850699

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

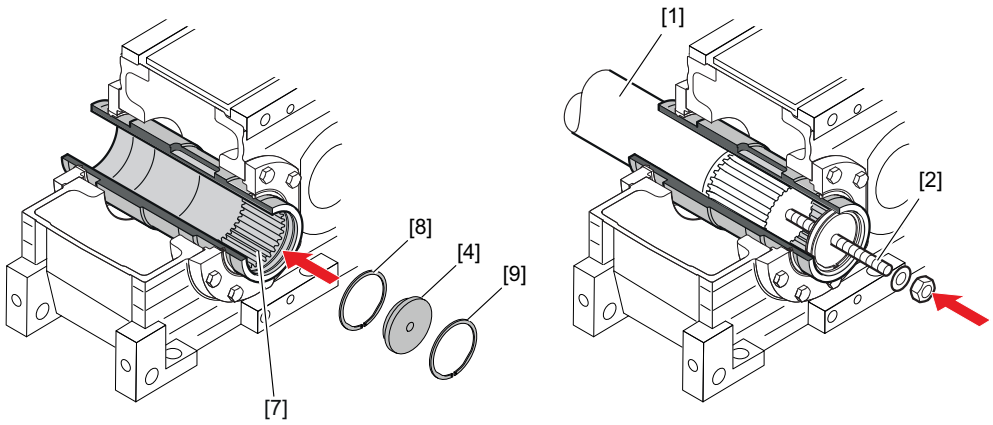
Size	Strength class 8.8
X..V100 – 150	M24
X..V160	M30

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

Size	2 × retaining rings (bore) DIN 472
X..V100	80 × 2.5
X..V110	90 × 2.5
X..V120	100 × 3
X..V130	110 × 4
X..V140	125 × 4
X..A150	130 × 4
X..A160	140 × 4

INFORMATION

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

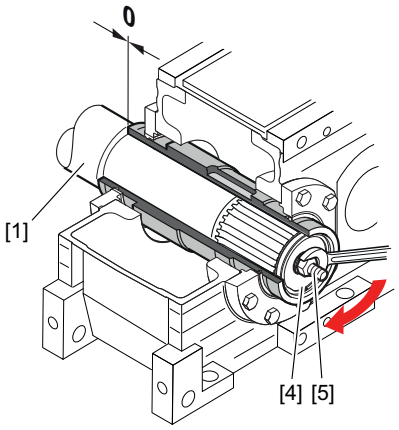


18014401562852875

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

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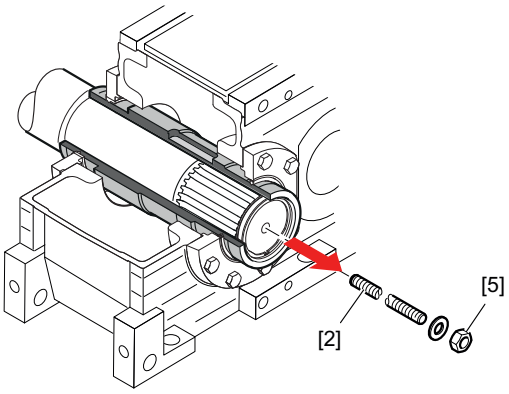
5. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



9007202308114571

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

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



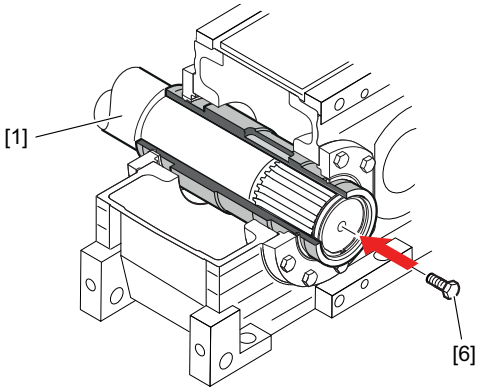
9007202308116747

[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..A100 – 150	M24	795
X..A160	M30	1590

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9007202308426123

[1] Machine shaft
[6] Retaining screw

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

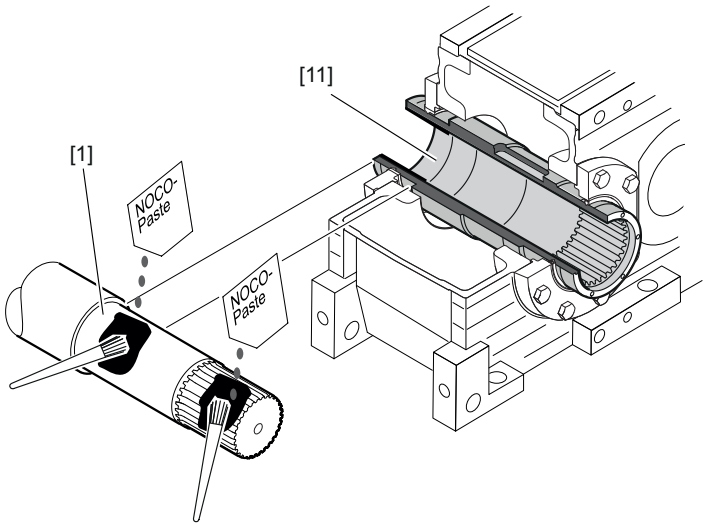
Size X170 – 320

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].

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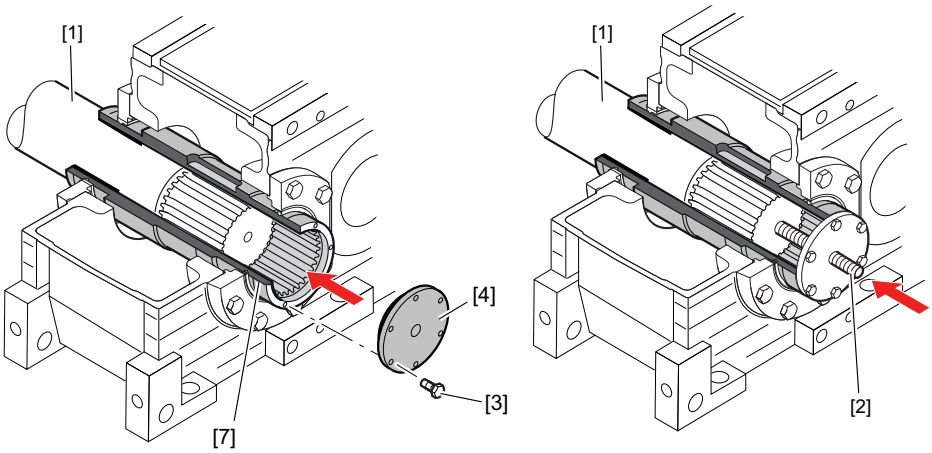
1. Apply some assembly paste, such as NOCO® fluid to the machine shaft [1] in the area of the bushing [11] and the splining.



27021598535909899

[1] Machine shaft
[11] Socket

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 thread the threaded rod [2] into the machine shaft [1]. Observe the following thread size of the threaded rod [2].



18014399281174539

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

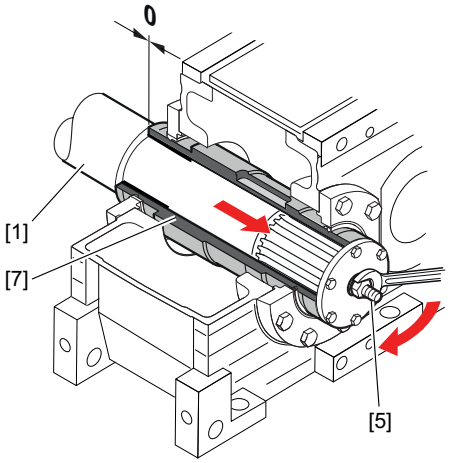
Size	Strength class 8.8
X..V170 – 230	M30
X..V240 – 300	M36
X..V310 – 320	M42

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Observe the following information on 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	M10 x 30	78	Tighten hand-tight
X..V200 – 230	M12 x 30	135	Tighten hand-tight
X..V240 – 300	M16 x 40	330	Tighten hand-tight
X..V310 – 320	M20 x 50	645	Tighten hand-tight

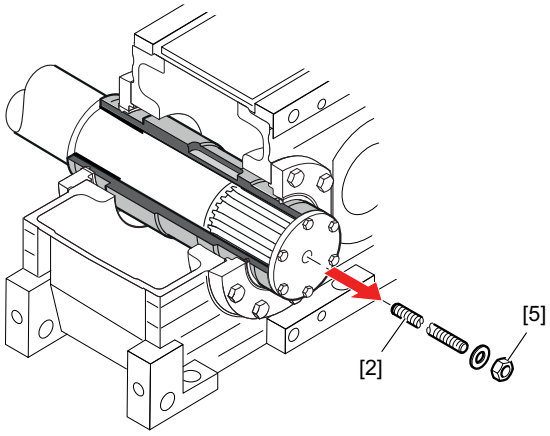
4. Screw the nut [5] onto the threaded rod up to the end plate [4]. Tighten the nut [5] until the shaft shoulders of the machine shaft [1] and the hollow shaft meet.



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

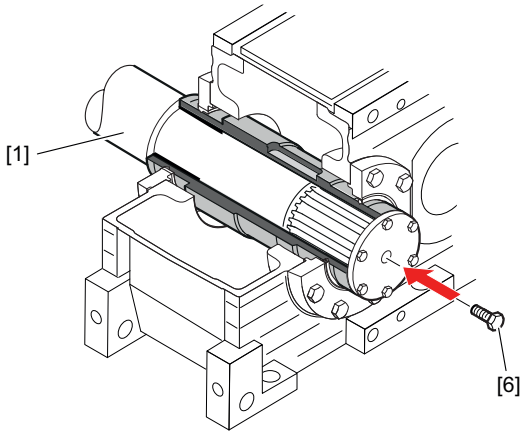
5. Loosen the nut [5]. Remove the threaded rod [2].



9007200026493579

[2] Threaded rod
[5] Nut

6. 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].



9007200026497675

[1] Machine shaft
[6] Retaining screw

Size	Retaining screw	Tightening torque in Nm Strength class 8.8
X..V170 – 230	M30	1590
X..V240 – 300	M36	2760
X..V310 – 320	M42	4410

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

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5.11.3 Disassembling the gear unit from the machine shaft

NOTICE

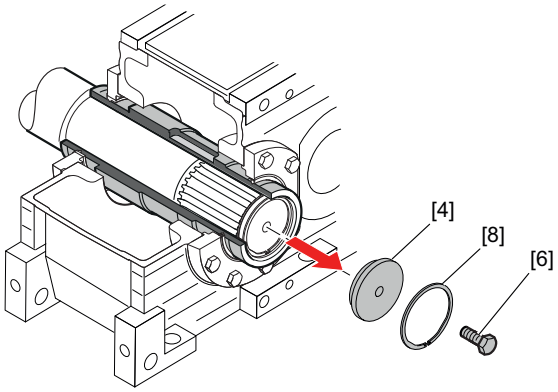
Incorrect disassembly of the gear unit from the machine shaft can damage bearings and other components.

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

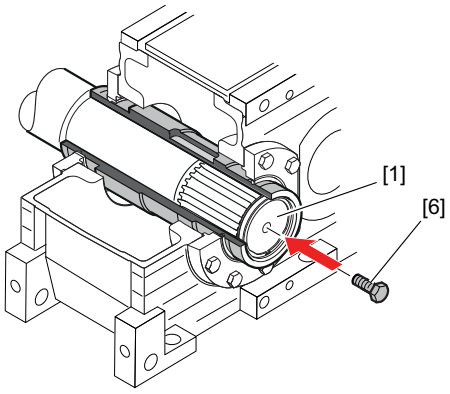
1. Loosen the retaining screw [6]. Remove the outer retaining ring [8] and pull off the end plate [4].



9007202308467595

[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].

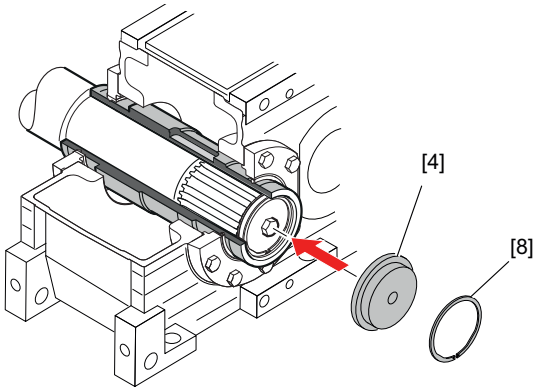


9007202495735051

[1] Machine shaft
[6] Retaining screw

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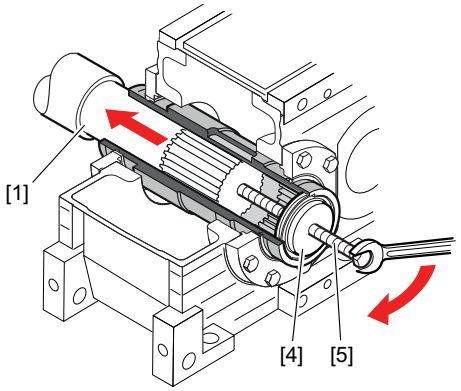
3. Turn the end plate [4] and reinstall the end plate [4] and the outer retaining ring [8].



9007202496006283

[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].



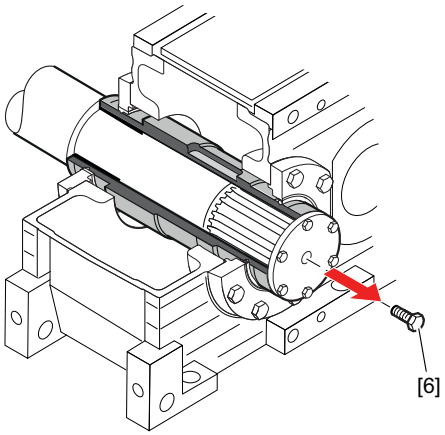
9007202496009099

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

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Sizes X170 – 320

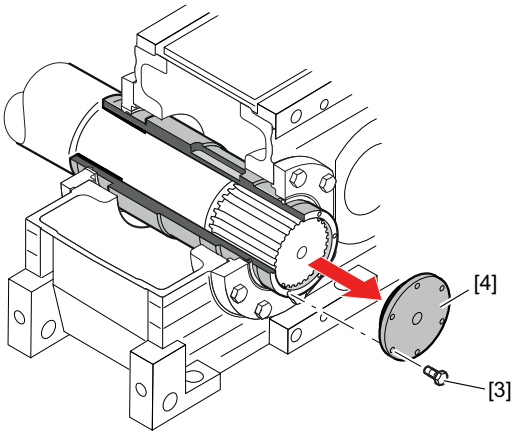
1. Loosen the retaining screw [6].



9007202496009611

[6] Retaining screw

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

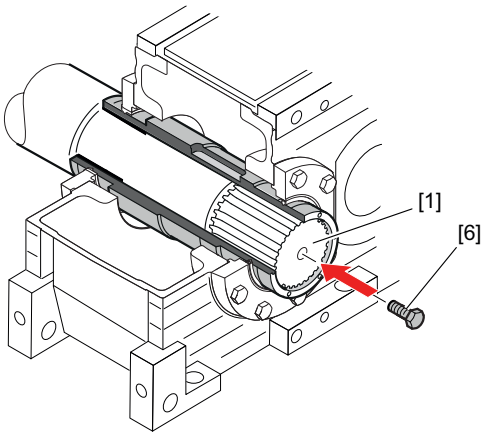


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[3] Retaining screw
[4] End plate

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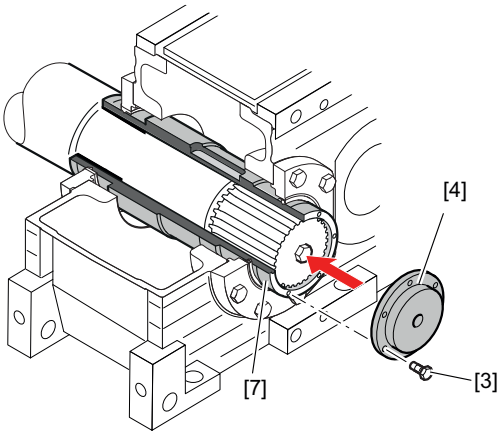
3. To protect the centering bore, screw the retaining screw [6] into the machine shaft [1].



9007202496021131

[1] Machine shaft
[6] Retaining screw

4. To disassemble the gear unit, flip the end plate [4] over and use the retaining screws [3] to reattach it centrically to the hollow shaft [7]. The retaining screws [3] should be tightened hand-tight.

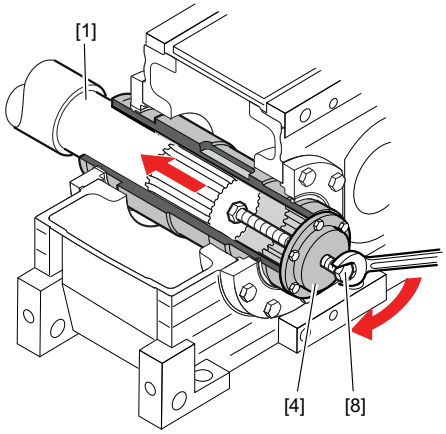


9007202496027915

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

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5. Thread the ejector screw [8] into the end plate [4] to remove the gear unit from the machine shaft [1]. Applying lubricant to the ejector screw [8] and the thread in the end plate [4] prior to disassembly makes the job easier.



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

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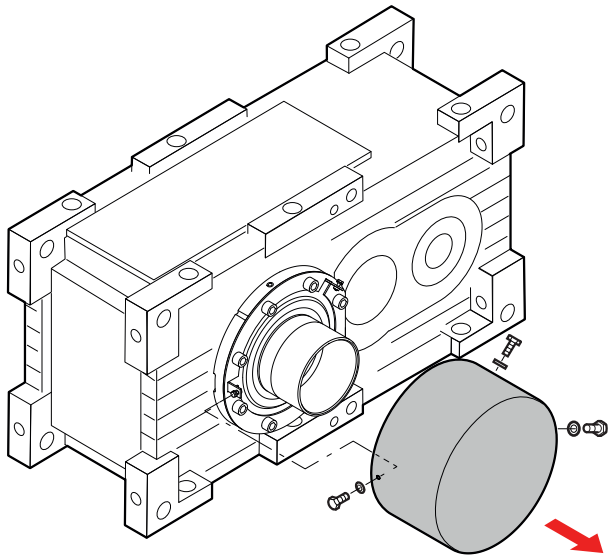
5.12 Output shaft with TorqLOC® /..T

5.12.1 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:

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

5.12.2 Removing the protection cover



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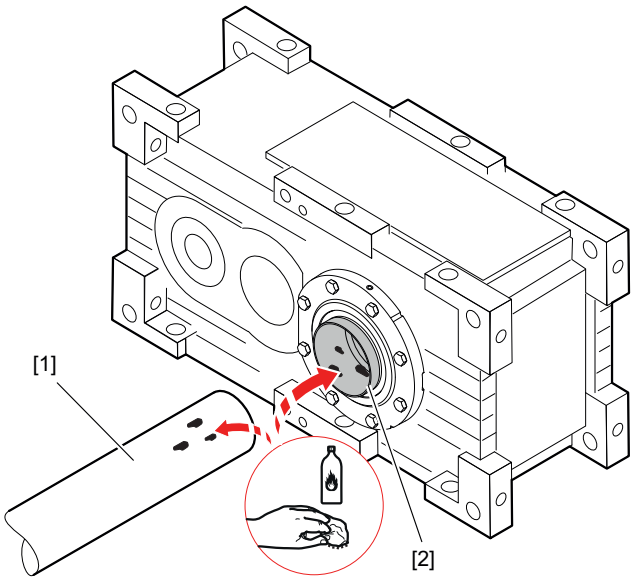
Proceed as follows to disassemble the protection cover:

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

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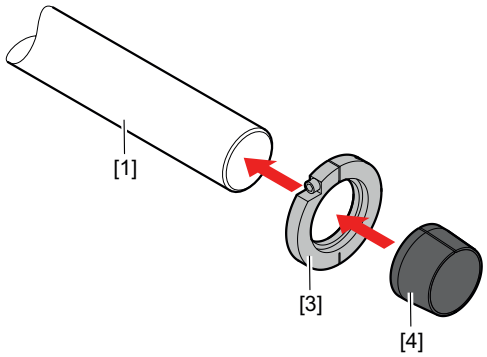
5.12.3 Mounting to customer shaft without shaft shoulder

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



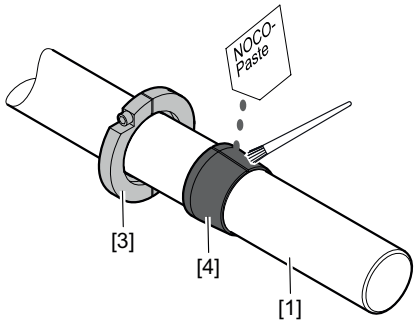
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2. Mount the stop ring [3] and the bushing [4] on the customer shaft.



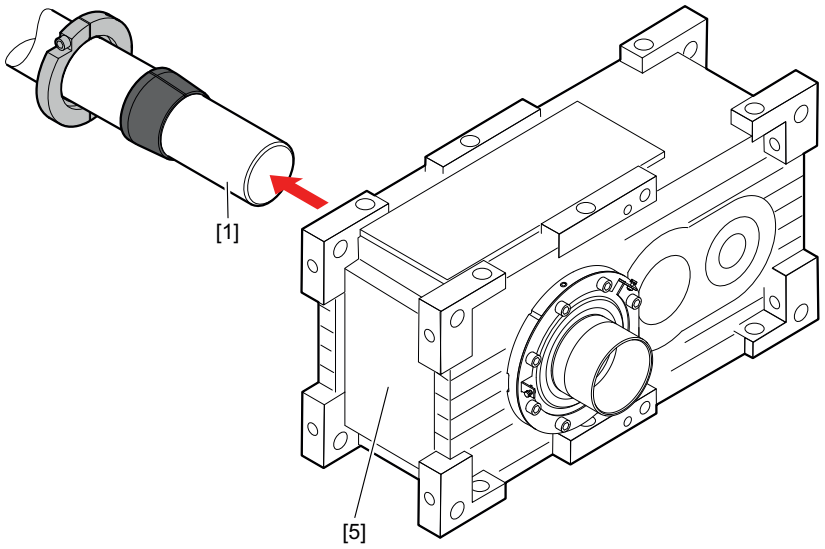
9007213481102475

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



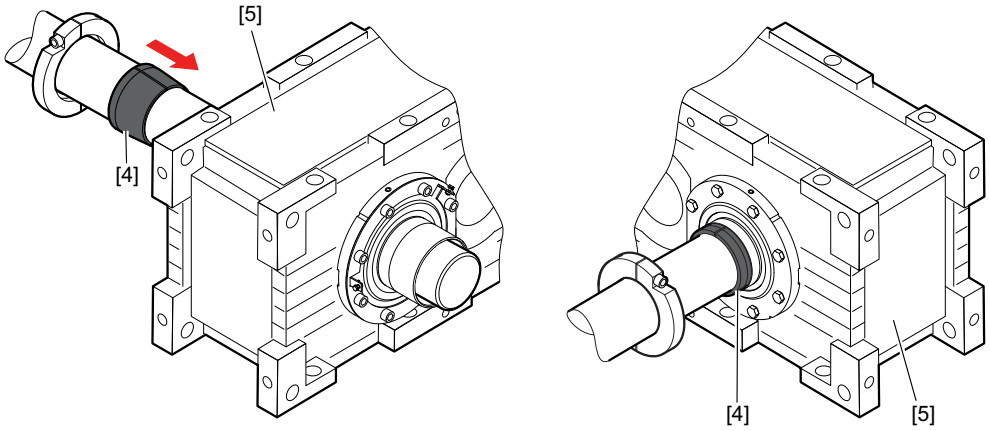
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4. Push the gear unit [5] onto the customer shaft.



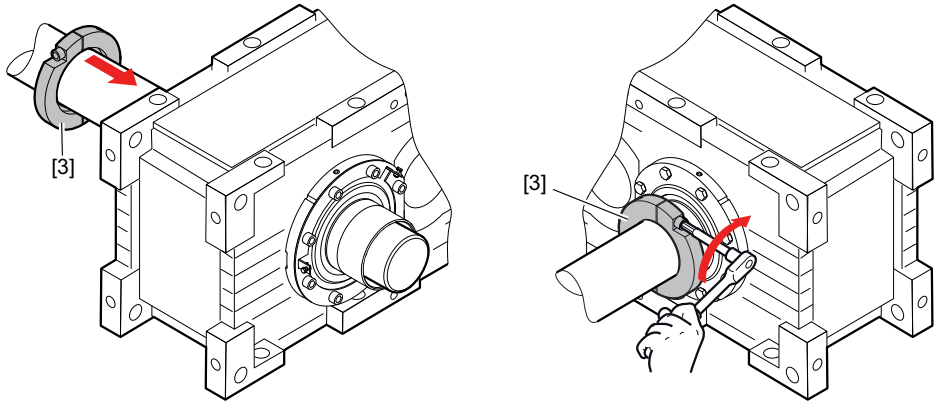
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5. Fasten the gear unit on the mounting surface (do not tighten the screws).
6. Slide the bushing [4} into the gear unit [5] up to the stop.



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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.



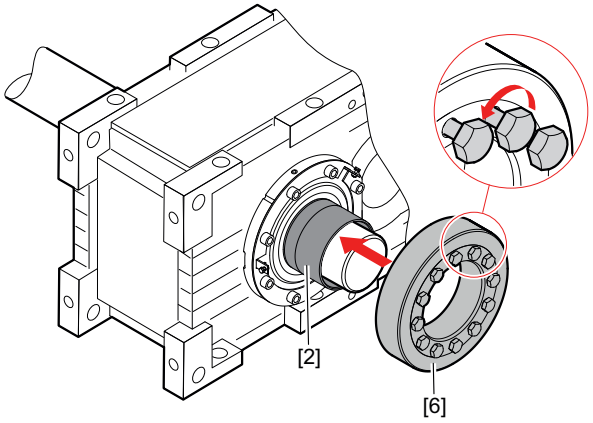
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Size	Screw	Tightening torque Nm
XT100	M10	79

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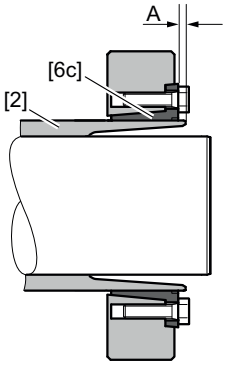
Size	Screw	Tightening torque Nm
XT110	M10	79
XT120	M10	79
XT130	M12	116
XT140	M12	116
XT150	M16	285
XT160	M16	285
XT170	M16	285

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].



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

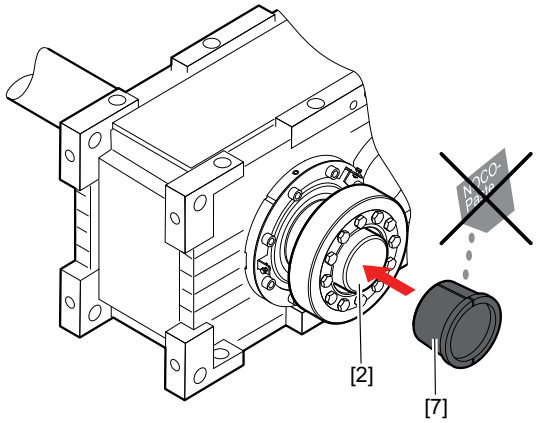


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Size	Dimension A in mm
X100	2.5
X110	4
X120	7
X130	7
X140	3
X150	5
X160	5
X170	10
X180	10
X190	10
X200	3

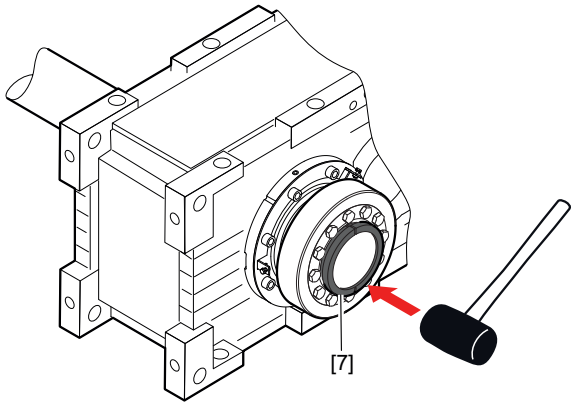
Size	Dimension A in mm
X210	3

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



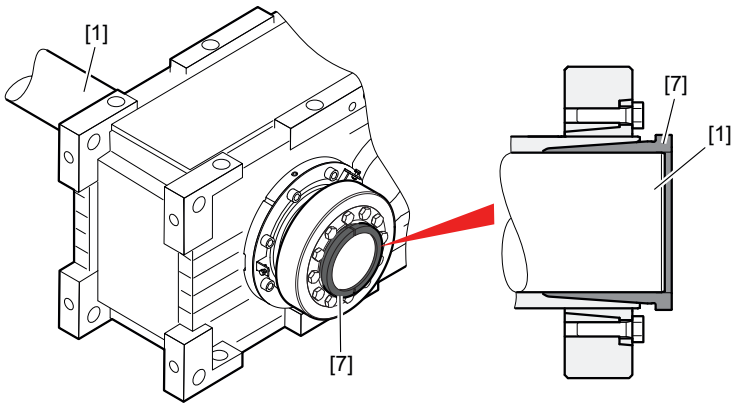
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11. Tap lightly on the flange of the counter bushing [7] to ensure that the bushing is fitted securely in the hollow shaft.



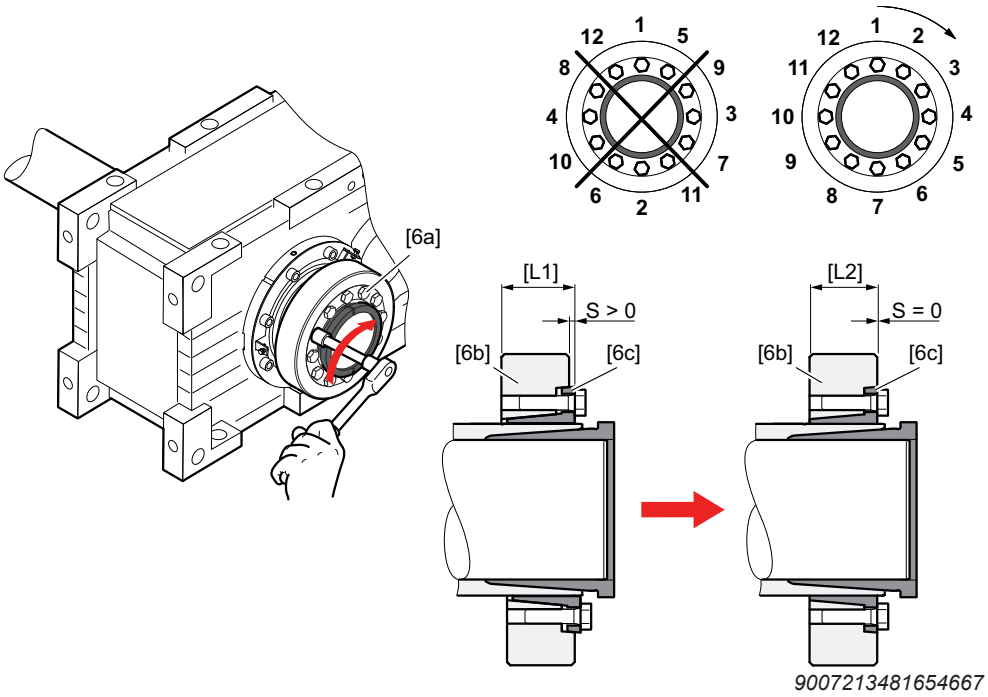
9007213481666827

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



9007213481659531

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)

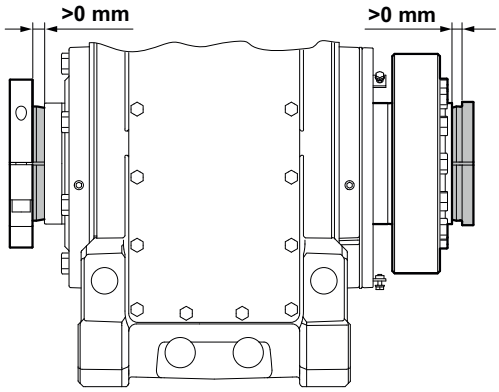
INFORMATION

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" (→ 🗎 113).

14. Tighten the locking screws clockwise (not in diametrically opposite sequence) by 1/4 revolution. Work around the ring in several stages, evenly tighten 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.

5.12.4 Mounting to customer shaft with shaft shoulder

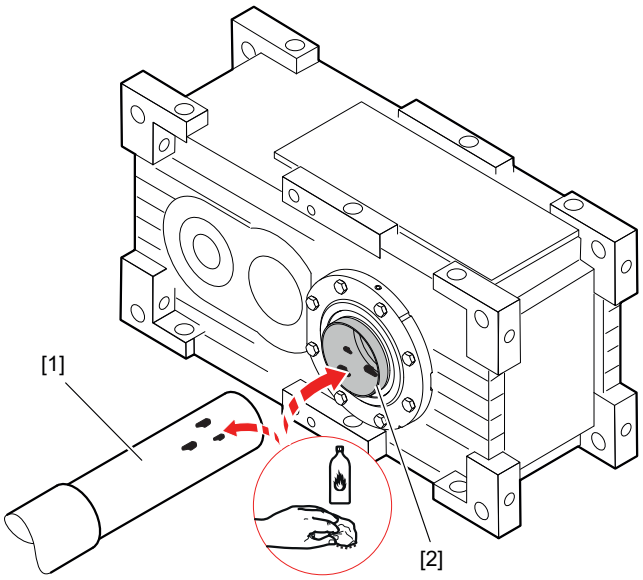
If a shaft with shaft shoulder is used, the shaft shoulder must have a minimum height. For the dimensions for the shaft diameter at the shaft shoulder and at the shaft at the area of hollow shaft, refer to the following table.

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

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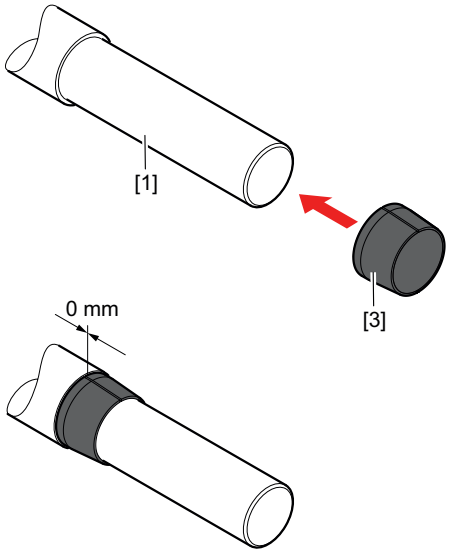
Size	Ø shaft shoulder in mm	Ø area of hollow shaft in mm
X200	190	175
X210	180	165
X210	185	170
X210	190	175
X210	195	180
X210	200	185

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



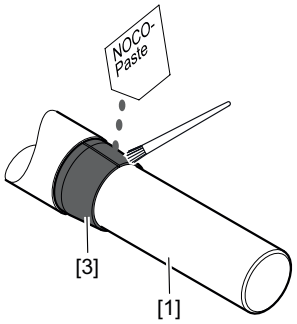
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2. Push the bushing onto the customer shaft up to the shaft shoulder.



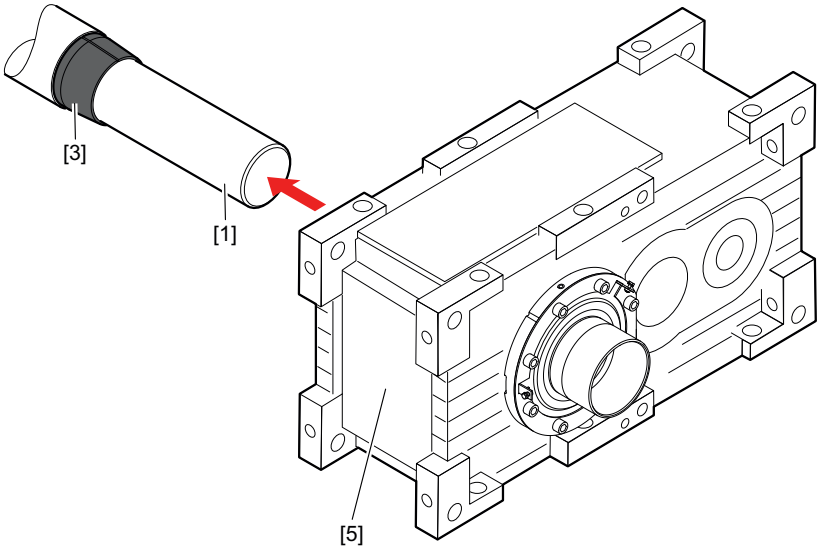
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3. Apply NOCO-Paste onto the bushing and spread it thoroughly.



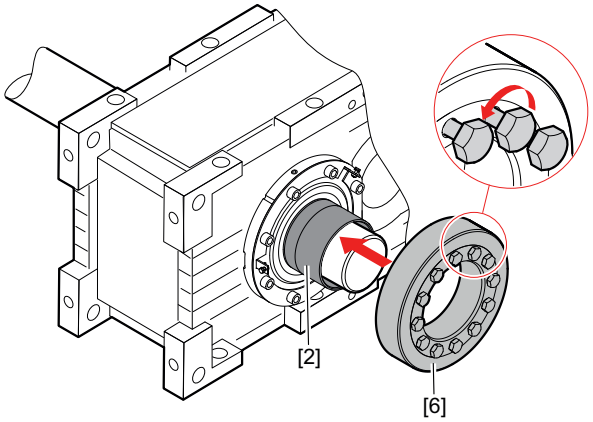
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4. Push the gear unit [5] onto the customer shaft up to the stop.



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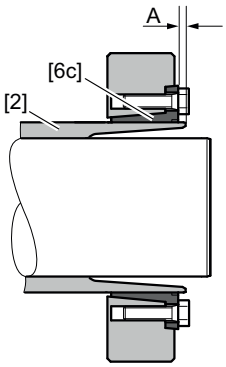
5. Fasten the gear unit on the mounting surface (do not tighten the screws).
6. ⚠ **CAUTION!** The shrink disk can slip when not tightened. Potential risk of crushing due to falling parts. Secure the shrink disk against slipping.
   NOTICE! Tightening the locking screws without first installing a shaft 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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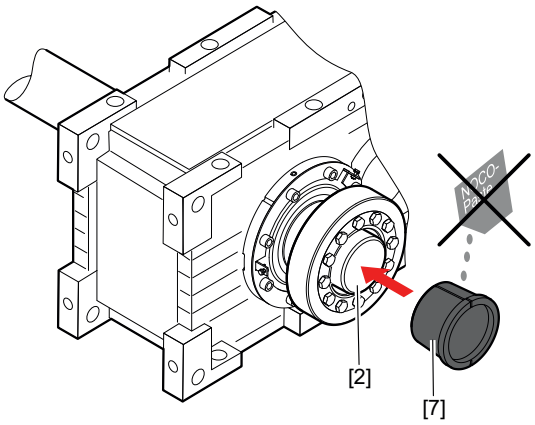
7. Position the inner ring [6c] of the shrink disk to dimension A.



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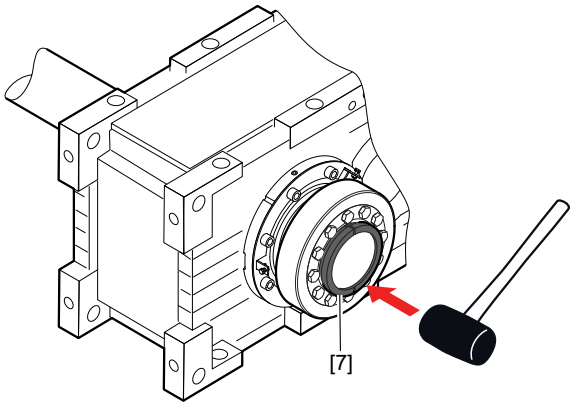
Size	Dimension A in mm
X100	2.5
X110	4
X120	7
X130	7
X140	3
X150	5
X160	5
X170	10
X180	10
X190	10
X200	3
X210	3

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



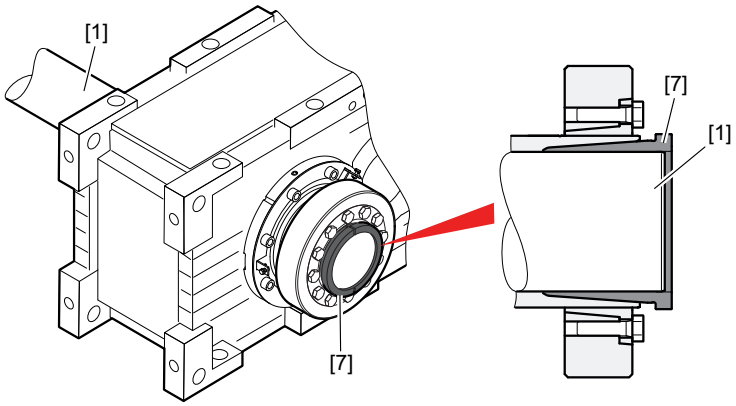
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9. Tap lightly on the flange of the counter bushing [7] to ensure that the bushing is fitted securely in the hollow shaft.



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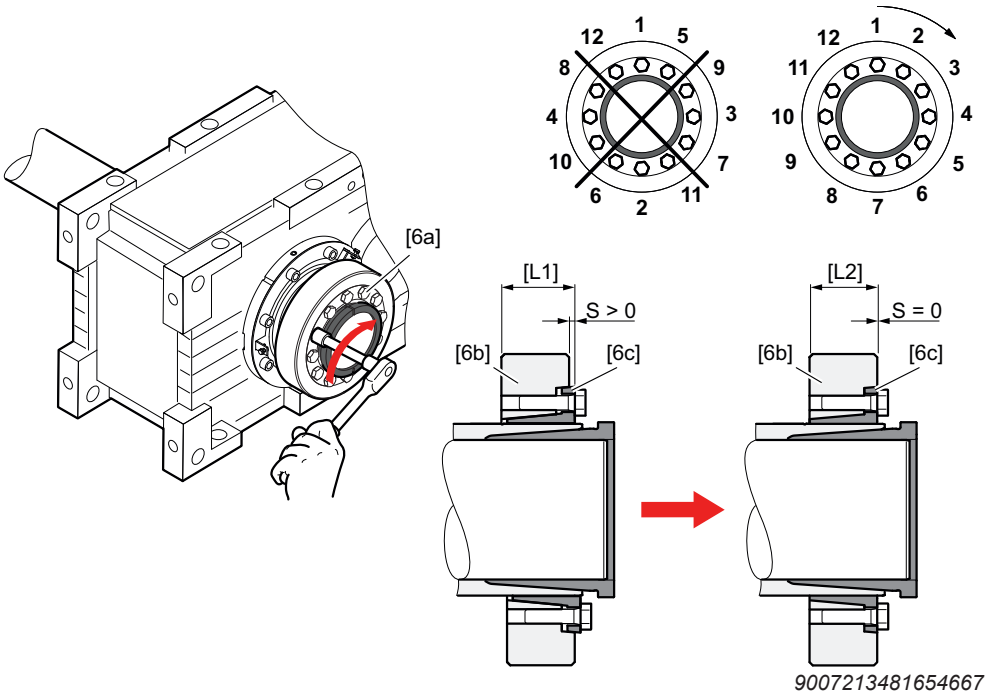
10. Make sure that the conical bushing [7] is pushed into the shaft until there is no play between the customer's shaft [1], bushing [7], and hollow shaft.



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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].



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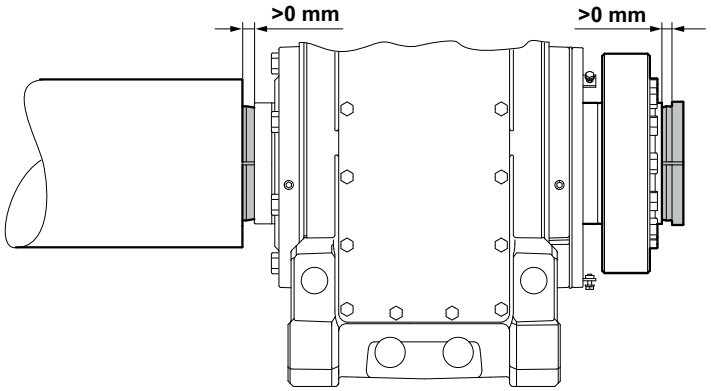
[6a] Locking screws
[6b] Outer ring
[6c] Inner ring
[L1] Delivery state (pre-assembled)
[L2] Completely assembled (ready for operation)

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" (→ 🗎 113).

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.



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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.

5.12.5 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:

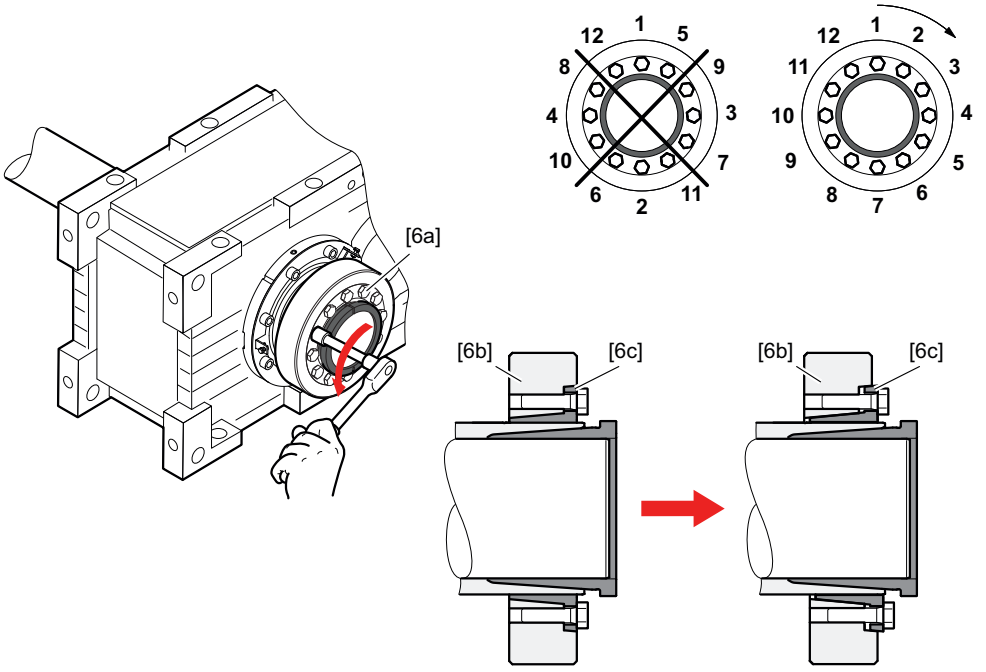
1. Loosen the locking screws [6a] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION

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

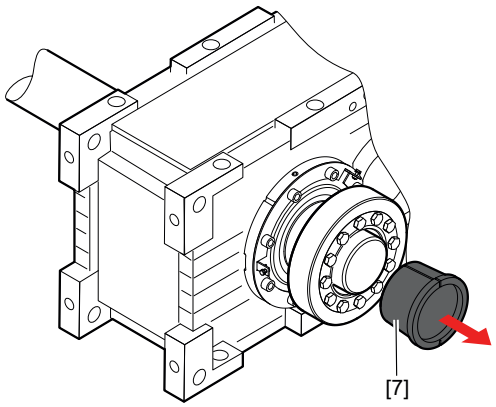
Take the necessary number of screws and screw them evenly into the disassembly bores. Tighten the clamping screws in several steps until the tapered bushing separates from the tapered ring.

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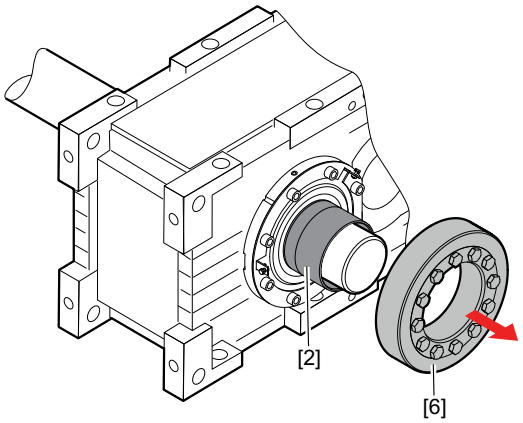
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2. Remove the conical steel bushing [7]. If the steel bushing is locked, use a puller for the disassembly.



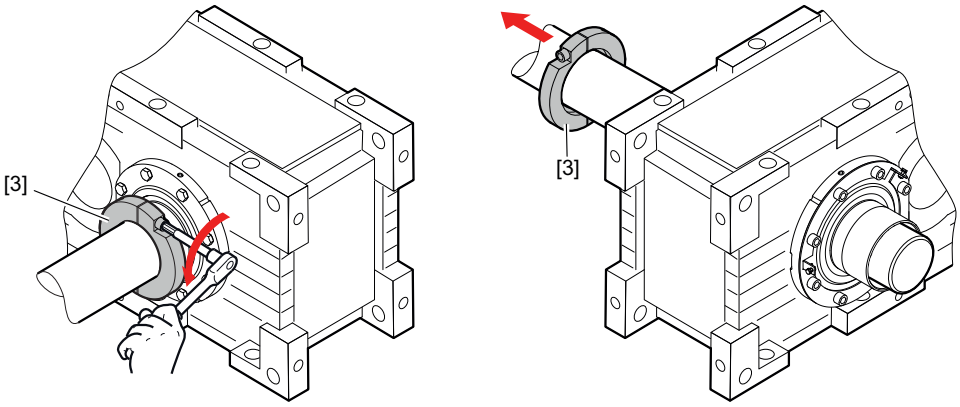
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3. Remove the shrink disk [6] from the hollow shaft [2].



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

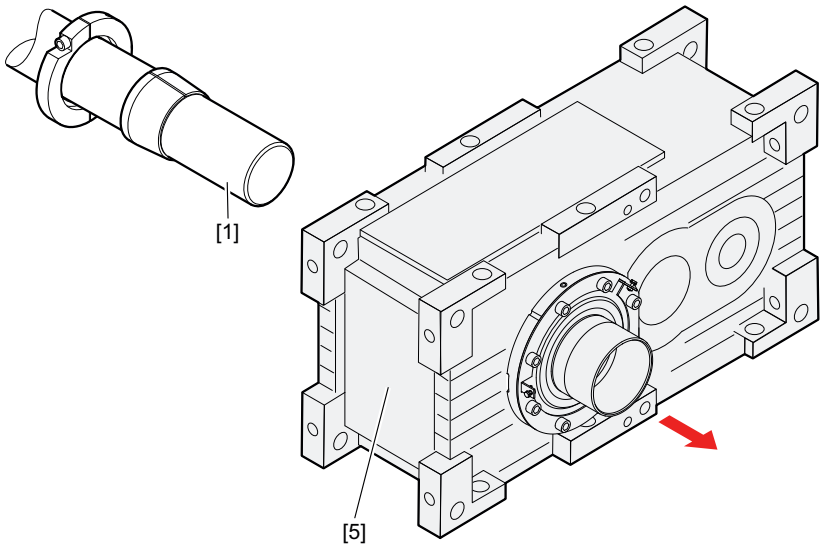


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INFORMATION

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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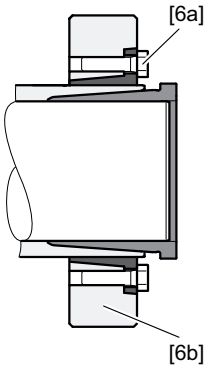
5.12.6 Cleaning and lubricating the shrink disk

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.

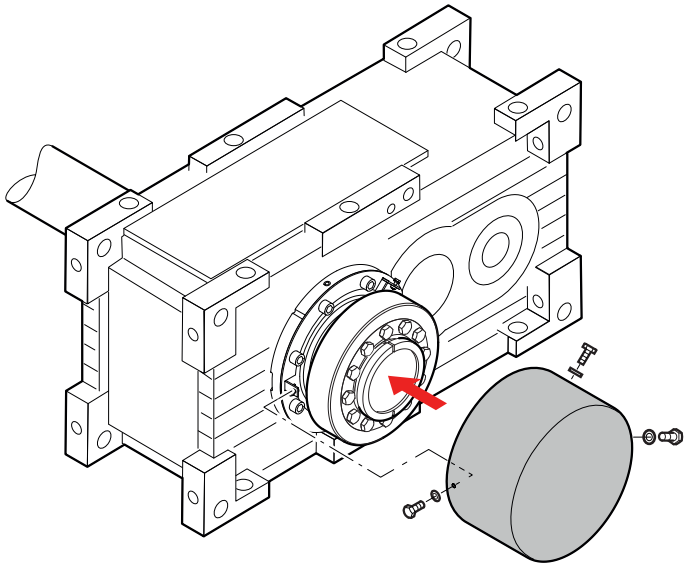


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[6a] Locking screws
[6b] Taper (outer ring)

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.

5.12.7 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.

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5.13 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.

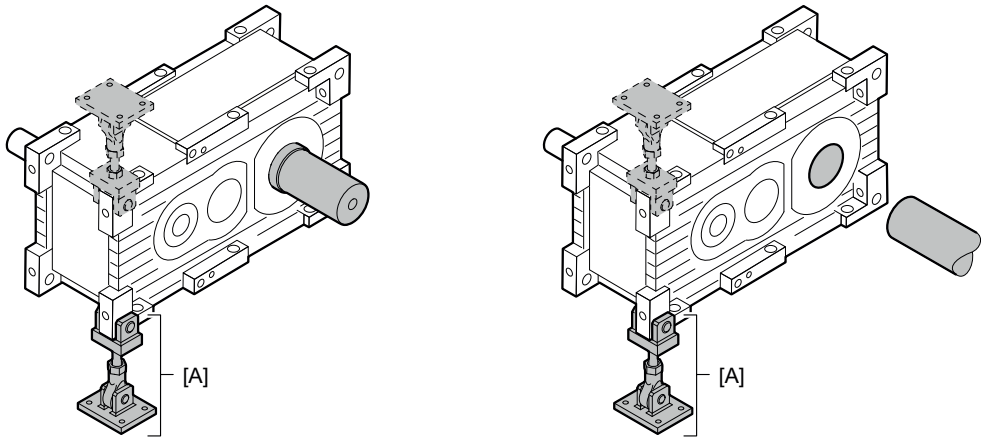
NOTICE

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.

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.

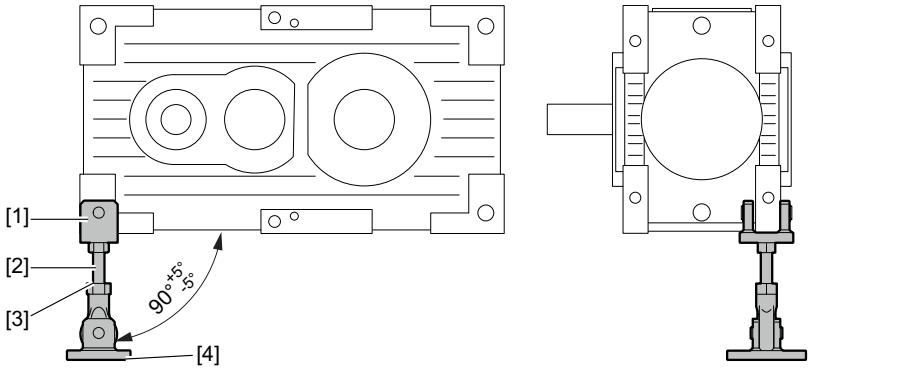


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1. Lift the gear unit with a suitable lifting device.
2. Mount the output shaft of the gear unit to the customer machine.
3. Mount the torque arm on the gear unit.

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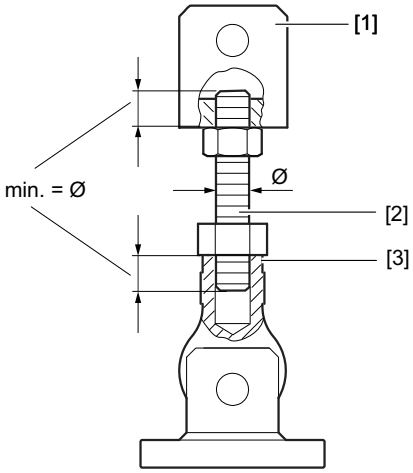
4. **NOTICE!** Make sure that the stud bolt [2] is simultaneously screwed into the yoke head [1] and joint head [3]. Possible damage to property. The stud bolt [2] must be screwed evenly into the yoke head [1] and joint head [3] by at least once the length of the thread diameter.



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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 threaded 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".



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

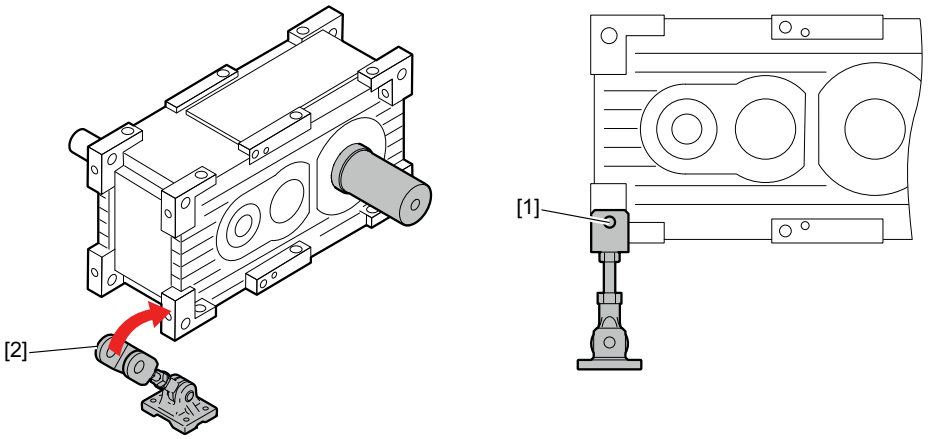
7. Use this position of the yoke plate to define the fastening points.
8. After the alignment process, tighten the nuts with the tightening torques listed in the following table.

Size	Screw/nut	Tightening torque
		Nm
X100 – 110	M20	140
X120 – 130	M24	140
X140 – 150	M24	140

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Size	Screw/nut	Tightening torque
		Nm
X160 – 190	M36	200
X200 – 230	M42	350
X240 – 280	M48	500
X290 – 320	M56	700

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



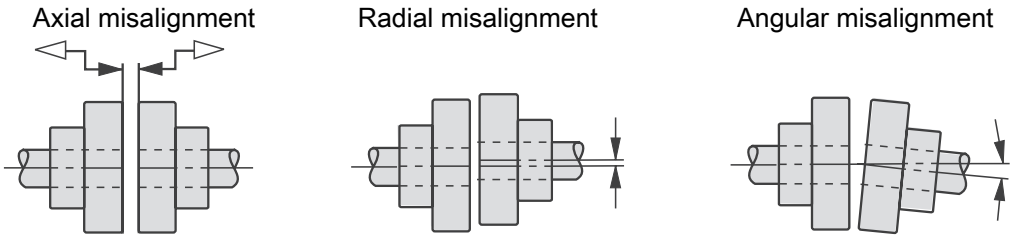
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11. Fasten the yoke head [2] with the bolt [1].
12. Remove the lifting device from the gear unit.

5.14 Aligning couplings/assembly tolerances

5.14.1 Aligning the coupling

Adjust the following misalignments when mounting couplings.



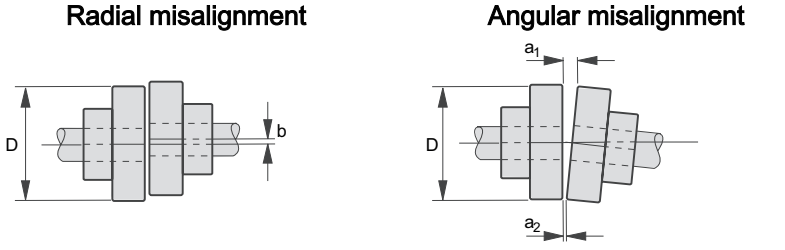
Use a laser-optical alignment system to align the coupling as accurately as possible.

5.14.2 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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5.15 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.

5.15.1 Maximum permitted motor weight

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

1. The maximum motor weight depends on the gear unit design and the type of fastening.
2. The maximum motor weight depends on the size of the motor adapter.

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

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

The tables below apply exclusively to stationary applications. For mobile applications such as travel drives, contact SEW-EURODRIVE in advance.

If the mounting position or mounting surface differs, please contact SEW-EURODRIVE.

The following applies to all tables:

G_M = Motor weight

G_G = Gear unit weight

Horizontal gear units

X.F..

Type of mounting	Mounting position M. / mounting surface F.
	M1/F1 and M3/F2
Foot-mounted X../ B	$G_M \leq 1.5\ G_G$
Shaft-mounted X../ T	$G_M \leq 0.5\ G_G$
Flange-mounted X../ F	$G_M \leq 0.5\ G_G$

X.K..

Type of mounting	Mounting position M. / mounting surface F.
	M1/F1 and M3/F2
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	$G_M \leq 0.5\ G_G$

X.T..

Type of mounting	Mounting position M. / mounting surface F.
	M1/F1 and M3/F2
Foot-mounted X../ B	$G_M \leq 2.0\ G_G$
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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Vertical gear units

INFORMATION

- When using the shaft-mounted version, contact SEW-EURODRIVE.
- Gear unit with mounting position M. / mounting surface F.: For M5/F4 and M6/F3, contact SEW-EURODRIVE.

X.F..

Type of mounting	Mounting position M. / mounting surface F.
	M5/F3 and M6/F4
Foot-mounted X../ B	$G_M \leq 2.0\ G_G$
Flange-mounted design X../F	$G_M \leq 1.5\ G_G$

X.K..

Type of mounting	Mounting position M. / mounting surface F.
	M5/F3 and M6/F4
Foot-mounted X../ B	$G_M \leq 1.5\ G_G$
Flange-mounted design X../F	$G_M \leq 0.75\ G_G$

X.T..

Type of mounting	Mounting position M. / mounting surface F.
	M5/F3 and M6/F4
Foot-mounted X../ B	$G_M \leq 1.75\ G_G$
Flange-mounted design X../F	$G_M \leq 1.25\ G_G$

Upright gear units

X.F..

Type of mounting	Mounting position M. / mounting surface F.
	M4/F6
Foot-mounted X../ B	$G_M \leq 1.25\ G_G$
Shaft-mounted X../ T	$G_M \leq 0.75\ G_G$
Flange-mounted X../ F	$G_M \leq 1.0\ G_G$

X.K..

Type of mounting	Mounting position M. / mounting surface F.
	M4/F6
Foot-mounted X../ B	$G_M \leq 1.75\ G_G$
Shaft-mounted X../ T	$G_M \leq 1.0\ G_G$
Flange-mounted X../ F	$G_M \leq 1.25\ G_G$

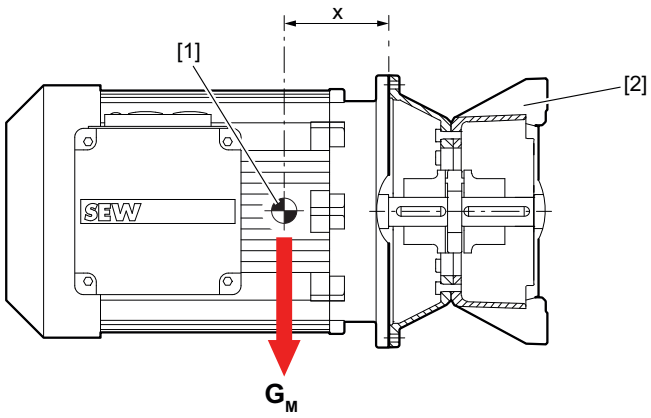
X.T..

Type of mounting	Mounting position M. / mounting surface F.
	M4/F6
Foot-mounted X../ B	$G_M \leq 1.5\ G_G$
Shaft-mounted X../ T	$G_M \leq 0.75\ G_G$
Flange-mounted X../ F	$G_M \leq 1.0\ G_G$

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2. Maximum motor weight depends on motor adapter size

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



56435332491

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

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.

5.15.2 Claw coupling

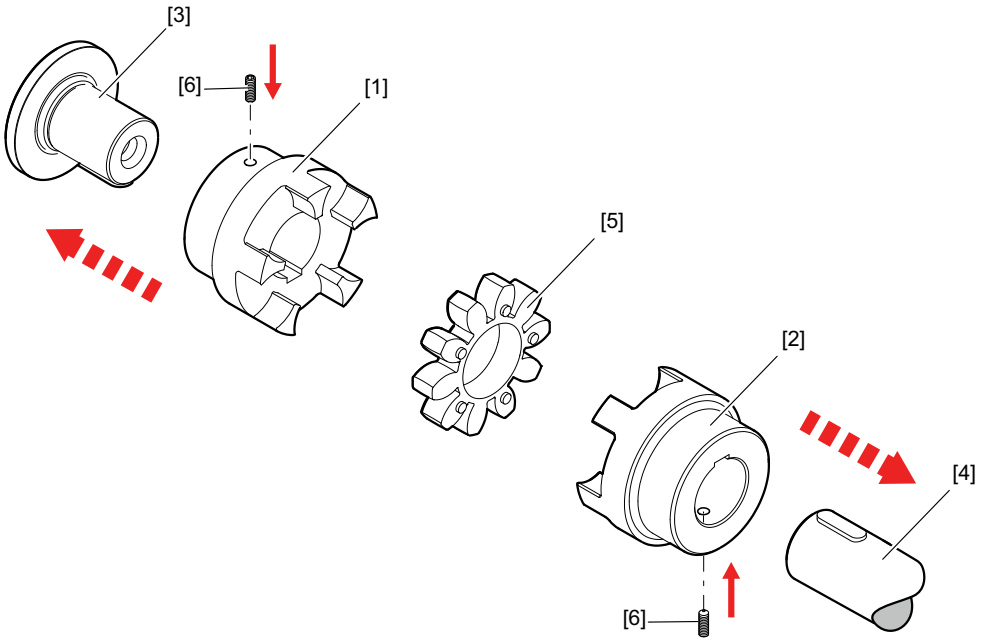
Observe the operating instructions of the respective coupling manufacturer.

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

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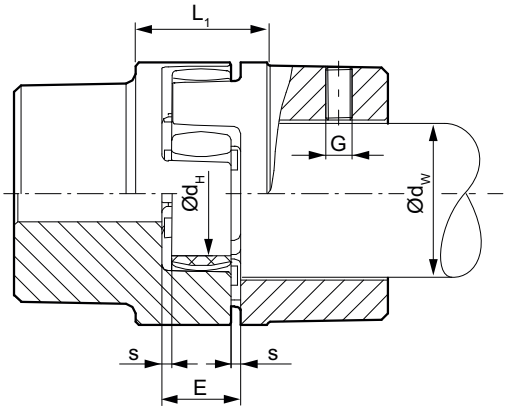
Torsionally flexible jaw-type coupling

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

Misalignment – Aligning the coupling

NOTICE

Improper mounting of the coupling may result in damage.

Possible damage to property.

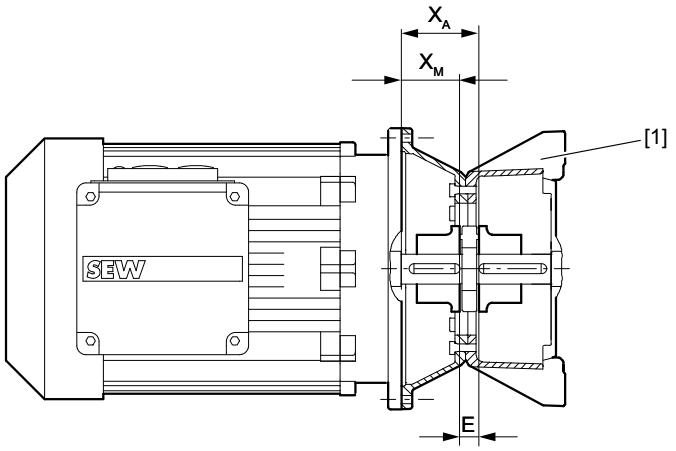
- The shaft ends must be aligned accurately to ensure a long service life of the coupling. It is essential that you adhere to the specified displacement values, see manufacturer documentation. Exceeding these values will damage the coupling. Exact coupling alignment increases its service life.

5.15.3 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.

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3. Push the coupling half onto the motor shaft and position it. When doing this, observe the information in chapter "Claw coupling" (→ 🗎 121) 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.

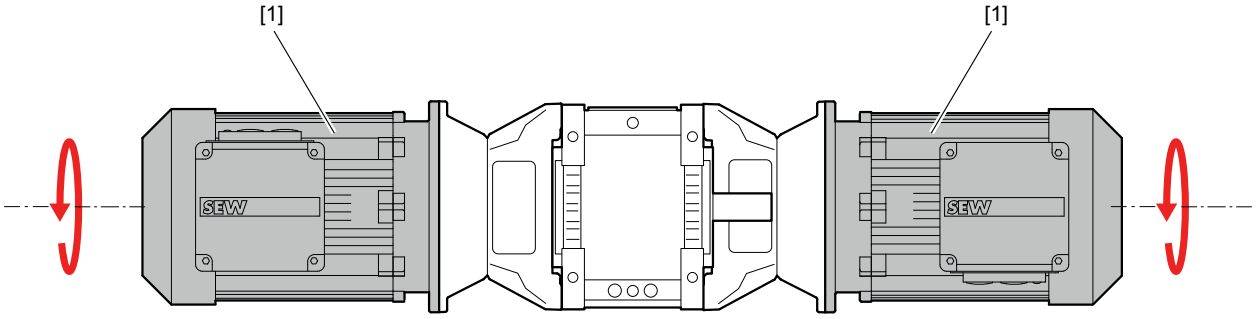
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5.15.4 Mounting 2 motors

Motor direction of rotation

For operation of the gear unit with 2 motors [1], make sure that the motors have a common direction of rotation in regard of the gear unit input shaft.

The following figure illustrates an example of the motor direction of rotation.



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5.16 Mounting flange /F



⚠ 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

Improper assembly or disassembly of the mounting flange may result in damage to the gear unit.

Possible damage to property.

- The mounting flange must only be disassembled and assembled under the instruction of the SEW-EURODRIVE Service.

NOTICE

Improper installation and mounting can damage the gear unit.

Possible damage to the gear unit.

- Gear units with mounting flange must not be additionally secured on the floor with a rigid connection. This is why neither foot mounting of the gear unit is permitted nor using a base frame.

The screws must not be lubricated during assembly.

Clean the screw thread. Coat the first few turns of the thread with a thread-locking compound (e.g. Loctite® 243). Adhere to the following tightening torques when mounting the mounting flange to the operator's machine.

Screw/nut	Tightening torque Strength class 10.9
	Nm
M12	135
M16	330
M20	645
M24	1120

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5.17 V-belt drives /VBD



⚠ WARNING

Overspeed can damage the belt pulley.

Severe or fatal injuries.

- Observe the maximum circumferential speed according to the manufacturer's specifications.

5.17.1 Maximum permitted motor weight

When selecting a motor, observe the permitted motor weight, the gear unit design and the type of gear unit mounting according to the following table.

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

X.F..

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

In this table:

G_M = Motor weight

G_G = Gear unit weight

X.K..

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

In this table:

G_M = Motor weight

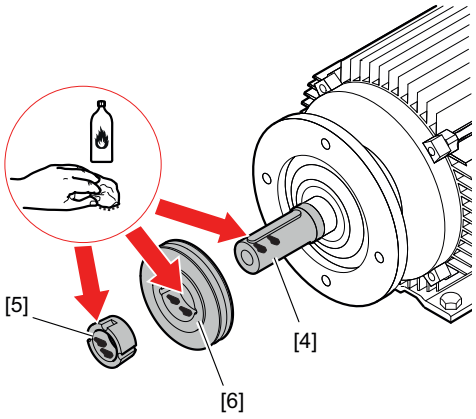
G_G = Gear unit weight

5.17.2 Mounting the V-belt drive

1. Mount the motor [1] on the base plate [2] (the retaining screws are not included in the delivery).

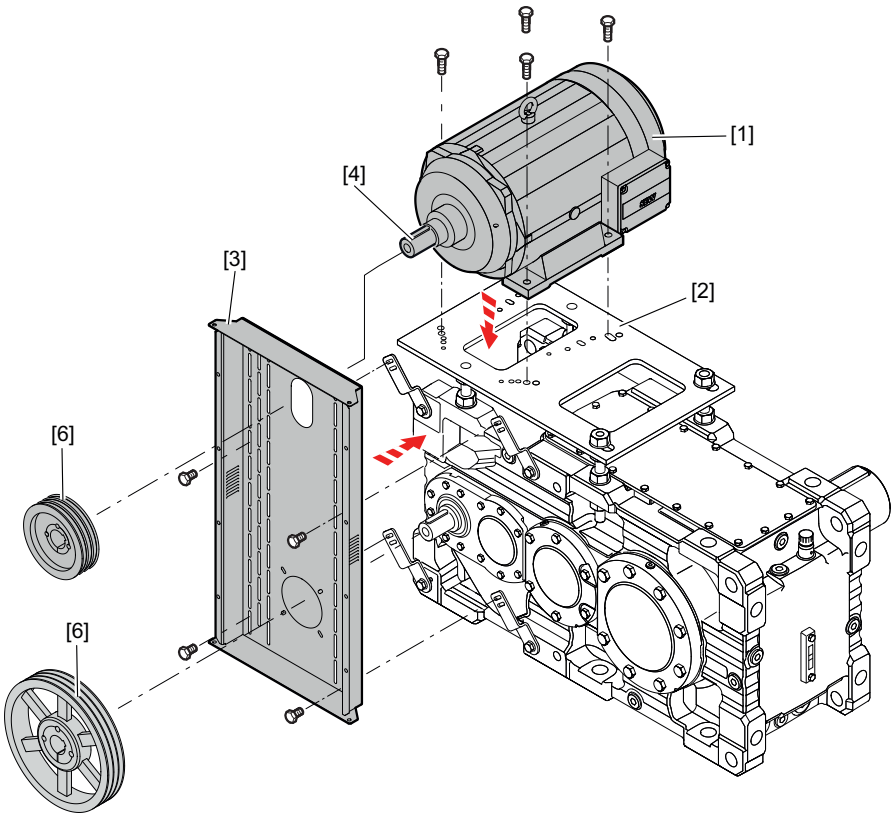
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2. Clean and degrease the shafts [4], the taper bushings [5], and the belt pulleys [6].



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3. Use the specified holding fixtures to secure the V-belt guard [3]. Take into account the room required for positioning and tightening the belts, as well as the desired direction in which the guard will be opened.



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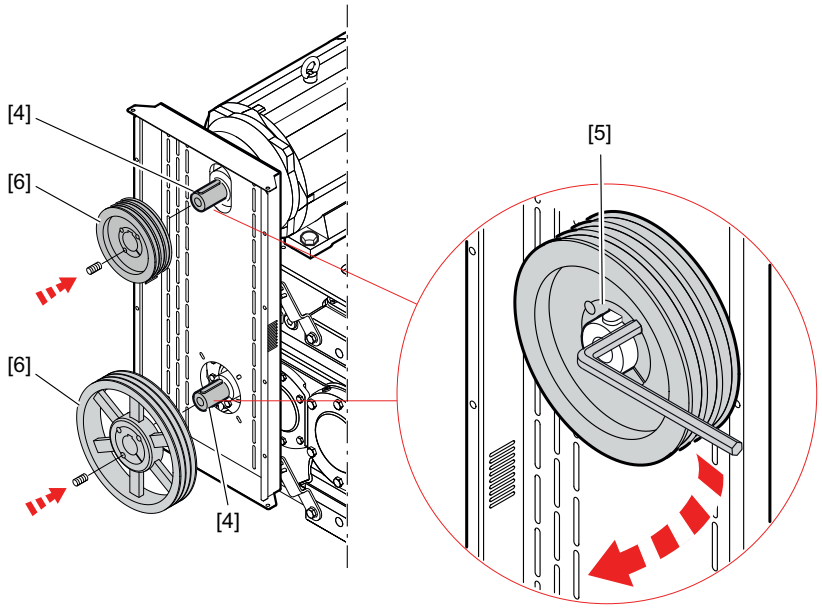
4. Mount the belt pulleys [6] completed with taper bushings on the gear unit and motor shaft [4]. Apply a little grease to the screws of the taper bushings and fill the unoccupied boreholes with grease to prevent soiling. Evenly tighten the locking screws of the taper bushings [5]. While tightening the screws, apply some light strokes to the hub to make the connection fit properly.

The following table shows the tightening torques for the taper bushings [5].

Dimensions	Wrench size	Number of screws	Tightening torque in Nm
TB 1008, 1108	3	2	5.7
TB 1210, 1215, 1310, 1610, 1615	5	2	20

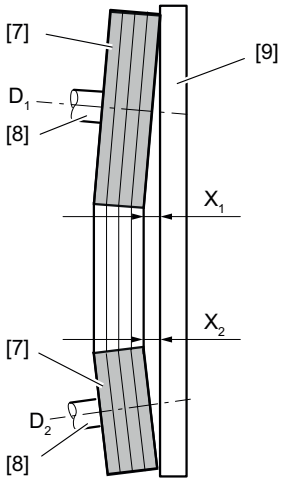
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Dimensions	Wrench size	Number of screws	Tightening torque in Nm
TB 2012	6	2	31
TB 2517	6	2	49
TB 3020, 3030	8	2	92
TB 3525, 3535	10	3	115
TB 4040	12	3	172
TB 4545	14	3	195
TB 5050	14	3	275



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5. Position the belt pulleys [7] as closely as possible to the shaft shoulder [8]. If the rim widths of the two disks deviate from each other, this must be taken into account during positioning. Check the alignment of the belt pulleys before and after you have tightened the taper bushings using a straightedge [9] or a suitable alignment tool. For the maximum permitted misalignment, refer to the following table.

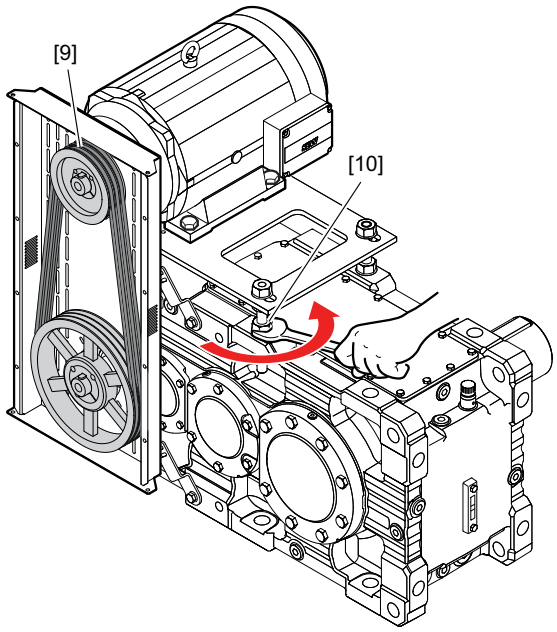


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Pulley diameter D_1, D_2 in mm	Maximum permitted distance X_1, X_2
112	0.5
224	1.0
450	2.0
630	3.0

For other diameter values, you have to interpolate the intermediate values for X_1 and X_2.

6. ⚠ **CAUTION!** Never apply force to mount the V-belt. Possible dangerous situation and damage to property. Be careful not to place your fingers between the belt pulley and the V-belt when adjusting and turning the V-belt pulley. Mounting using a screwdriver, etc. will damage the V-belt externally and internally.
   Place the V-belts [9] onto the belt pulleys and tighten them by adjusting the base plate using the threaded rods [10].

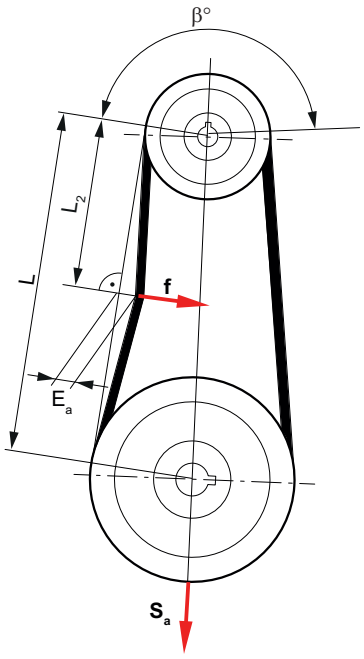


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7. Check the belt tension with a suitable preload measuring device. If no special measuring device is available, you can estimate the preload using the method described below.

- Refer to the following table to determine the test force [f] required to deflect the belt by a specific distance [E_a] in the middle of the free belt length if the belt has the correct tension.
- Compare the measured values with the values in the table (on the following pages). Adjust the tension of the belt until the measured values correspond to the values of the table.

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8. Tighten all the screws and nuts and once again check the alignment of the belt pulleys as well as the correct tension of the belt.
9. **NOTICE!** Exceeding the permitted bending moments can cause damage to the gear unit (leaks, premature bearing failure, shaft breakage). Possible damage to property.
   Adhere to the correct belt tension.
10. Install the protection cover for the V-belt drive properly.
11. Check the initial belt tension after about 24 hours of operation to compensate for the initial stretching of the V-belts. At the same time, also review the tight fit of the taper bushings and their locking screws.

INFORMATION

The data in the following table only applies if V-belts from SEW-EURODRIVE are used. When using V-belts from other manufacturers, the user is responsible for determining the belt tension and for observing the permitted bending moments.

X.F..

Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X100 – 110	1.25	4	25	9.4	10.7	64	56
		5.5	25	8.2	9.4	67	59
		7.5	25	8.1	9.4	70	62
		9.2	25	8.2	9.4	68	59
		11	25	8.1	9.4	70	61
		15	25	7.0	9.5	73	64
	1.4	4	25	9.5	10.8	63	55
		5.5	25	8.2	9.5	67	59
		7.5	25	8.1	9.4	71	62
		9.2	25	8.2	9.4	67	59
		11	25	8.1	9.4	70	61
		15	25	7.0	9.5	73	64
	1.6	4	25	9.5	10.7	64	56
		5.5	25	8.2	9.4	68	59
		7.5	25	8.0	9.3	71	63
		9.2	25	8.3	9.5	67	59
		11	25	8.0	9.3	71	62
		15	50	12.0	13.2	63	55
	1.8	4	25	9.5	10.7	64	56
		5.5	25	8.2	9.5	67	59
		7.5	25	8.1	9.4	71	62
		9.2	25	8.1	9.3	69	60
		11	25	8.1	9.4	70	61
		15	50	11.9	13.0	64	56
X120 – 130	1.25	2.2	25	11.0	12.5	52	45
		3	25	9.6	11.0	60	53
		4	25	12.5	12.5	49	43
		5.5	25	9.6	11.0	57	50
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	60	52
		15	25	8.2	11.1	62	55
		18.5	50	13.0	15.3	57	50
		22	50	12.1	13.9	59	52
		30	25	8.2	11.1	62	55
	1.4	2.2	25	11.1	12.6	51	45
		3	25	9.6	11.1	60	52
		4	25	12.6	12.6	49	43
		5.5	25	9.6	11.1	57	50
		7.5	25	9.6	11.1	60	52
		9.2	25	9.6	11.0	58	51
		11	25	9.6	11.1	59	52
		15	25	8.2	11.1	63	55
		18.5	50	13.0	15.4	57	50
		22	50	12.0	13.9	59	52
		30	25	8.2	11.1	63	55
	1.6	2.2	25	11.0	12.5	52	46
		3	25	9.5	11.0	60	53
		4	25	12.5	12.5	50	44
		5.5	25	9.5	11.0	58	51
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	59	52
		15	50	13.9	15.3	54	48
		18.5	50	13.0	15.3	57	50
		22	50	11.9	13.8	60	53
		30	75	12.7	15.9	56	49
	1.8	2.2	25	11.0	12.4	52	46
		3	25	9.5	11.0	61	53
		4	25	12.4	12.4	50	44
		5.5	25	9.5	11.0	58	51
		7.5	25	9.4	10.8	61	54
		9.2	25	9.4	10.9	59	51
		11	25	9.4	10.8	61	53
		15	50	14.0	15.4	54	47
		18.5	50	12.9	15.1	58	51
		22	50	11.9	13.8	60	53
		30	75	13.1	16.3	54	48

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Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X140 – 150	1.25	2.2	25	11.0	12.5	52	45
		3	25	9.6	11.0	60	53
		4	25	12.5	12.5	49	43
		5.5	25	9.6	11.0	57	50
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	60	52
		15	25	8.2	11.1	62	55
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	14.7	18.5	45	40
	1.4	2.2	25	11.1	12.6	51	45
		3	25	9.6	11.1	60	52
		4	25	12.6	12.6	49	43
		5.5	25	9.6	11.1	57	50
		7.5	25	9.6	11.1	60	52
		9.2	25	9.6	11.0	58	51
		11	25	9.6	11.1	59	52
		15	25	8.2	11.1	63	55
		18.5	50	15.8	18.7	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	16.7	19.4	44	39
		45	75	14.1	19.0	46	40
	1.6	2.2	25	11.0	12.5	52	46
		3	25	9.5	11.0	60	53
		4	25	12.5	12.5	50	44
		5.5	25	9.5	11.0	58	51
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	59	52
		15	50	13.9	15.3	54	48
		18.5	50	15.7	18.5	47	41
		22	50	14.5	16.8	49	43
		30	75	15.9	19.8	45	39
		37	50	13.8	15.9	52	45
		45	75	13.4	18.1	48	42
	1.8	2.2	25	11.0	12.4	52	46
		3	25	9.5	11.0	61	53
		4	25	12.4	12.4	50	44
		5.5	25	9.5	11.0	58	51
		7.5	25	9.4	10.8	61	54
		9.2	25	9.4	10.9	59	51
		11	25	9.4	10.8	61	53
		15	50	14.0	15.4	54	47
		18.5	50	15.7	18.5	47	42
		22	50	14.9	17.2	48	42
		30	75	16.1	20.1	44	39
		37	50	13.7	15.8	52	46
		45	75	15.6	19.5	44	39

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Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X160 – 170	1.25	4	25	12.5	12.5	49	43
		5.5	25	13.5	15.3	45	39
		7.5	25	11.7	13.5	49	43
		9.2	25	13.5	15.3	45	39
		11	25	11.7	13.5	48	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	16.5	20.8	40	35
		55	75	15.6	19.5	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
	1.4	4	25	12.6	12.6	49	43
		5.5	25	13.4	15.2	45	40
		7.5	25	11.7	13.5	49	43
		9.2	25	13.5	15.2	45	39
		11	25	11.7	13.5	49	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.7	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	16.7	19.4	44	39
		45	75	16.5	20.7	42	37
		55	75	16.0	19.9	41	36
		75	75	16.1	20.3	42	37
		90	75	13.0	17.4	46	40
	1.6	4	25	12.5	12.5	50	44
		5.5	25	13.4	15.2	45	40
		7.5	25	11.7	13.5	49	43
		9.2	25	13.5	15.3	45	39
		11	25	11.7	13.5	48	42
		15	50	17.1	18.7	44	39
		18.5	50	15.7	18.5	47	41
		22	50	14.5	16.8	49	43
		30	75	15.9	19.8	45	39
		37	50	13.8	15.9	52	45
		45	75	16.0	21.6	40	35
		55	75	16.5	20.9	41	36
		75	75	16.8	21.2	41	36
		90	75	13.5	18.2	44	39
	1.8	4	25	12.4	12.4	50	44
		5.5	25	13.4	15.2	45	40
		7.5	25	11.7	13.5	49	43
		9.2	25	13.5	15.3	45	39
		11	25	11.7	13.5	49	43
		15	50	17.0	18.7	44	39
		18.5	50	15.7	18.5	47	42
		22	50	14.9	17.2	48	42
		30	75	16.1	20.1	44	39
		37	50	13.7	15.8	52	46
		45	75	19.7	22.8	38	33
		55	75	14.4	17.8	44	39
		75	75	15.8	19.9	44	38
		90	75	12.7	17.0	47	41

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Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X180 – 190	1.25	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.3	52	46
		11	25	11.7	13.5	48	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	75	18.3	21.2	42	37
		37	75	20.5	23.7	36	31
		45	75	17.4	22.0	38	33
		55	75	16.7	20.8	39	34
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	15.5	20.7	39	34
		132	75	12.2	16.7	42	37
	1.4	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.2	52	46
		11	25	11.7	13.5	49	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.7	47	41
		22	50	14.6	16.9	49	43
		30	50	15.9	18.7	47	41
		37	75	20.8	24.0	35	31
		45	75	17.8	22.5	39	34
		55	75	16.0	19.9	41	36
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	16.5	22.2	37	32
		132	75	13.1	17.9	40	35
	1.6	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.3	52	46
		11	25	11.7	13.5	48	42
		15	50	17.1	18.7	44	39
		18.5	50	15.7	18.5	47	41
		22	50	14.5	16.8	49	43
		30	75	15.9	19.8	45	39
		37	50	16.3	18.7	44	38
		45	75	16.0	21.6	40	35
		55	75	17.0	21.4	39	35
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	15.7	19.6	39	34
		132	75	12.4	17.0	42	37
	1.8	7.5	25	11.7	13.5	49	43
		9.2	25	9.7	13.1	53	47
		11	25	11.7	13.5	49	43
		15	50	17.0	18.7	44	39
		18.5	50	15.7	18.5	47	42
		22	50	14.9	17.2	48	42
		30	75	16.1	20.1	44	39
		37	50	16.1	18.6	44	39
		45	75	20.3	23.4	37	32
		55	75	17.2	21.7	39	34
		75	75	19.8	24.9	35	30
		90	75	17.5	23.4	36	31
		110	75	15.0	20.0	38	33
		132	75	12.7	17.4	41	36

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Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X200 – 210	1.25	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.3	52	46
		11	25	11.7	13.5	48	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	75	18.3	21.2	42	37
		37	75	20.5	23.7	36	31
		45	75	17.4	22.0	38	33
		55	75	16.7	20.8	39	34
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	15.5	20.7	39	34
		132	75	12.2	16.7	42	37
	1.4	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.2	52	46
		11	25	11.7	13.5	49	43
		15	25	9.9	13.4	51	45
		18.5	50	15.8	18.7	47	41
		22	50	14.6	16.9	49	43
		30	50	15.9	18.7	47	41
		37	75	20.8	24.0	35	31
		45	75	17.8	22.5	39	34
		55	75	16.0	19.9	41	36
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	16.5	22.2	37	32
		132	75	13.1	17.9	40	35
	1.6	7.5	25	11.7	13.5	49	43
		9.2	25	9.8	13.3	52	46
		11	25	11.7	13.5	48	42
		15	50	17.1	18.7	44	39
		18.5	50	15.7	18.5	47	41
		22	50	14.5	16.8	49	43
		30	75	15.9	19.8	45	39
		37	50	16.3	18.7	44	38
		45	75	16.0	21.6	40	35
		55	75	17.0	21.4	39	35
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	15.7	19.6	39	34
		132	75	12.4	17.0	42	37
	1.8	7.5	25	11.7	13.5	49	43
		9.2	25	9.7	13.1	53	47
		11	25	11.7	13.5	49	43
		15	50	17.0	18.7	44	39
		18.5	50	15.7	18.5	47	42
		22	50	14.9	17.2	48	42
		30	75	16.1	20.1	44	39
		37	50	16.1	18.6	44	39
		45	75	20.3	23.4	37	32
		55	75	17.2	21.7	39	34

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Size X.F..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X220 – 230	1.25	11	50	19.7	21.7	38	33
		15	50	19.8	21.8	38	33
		18.5	50	18.6	21.8	40	35
		22	50	17.5	20.3	41	36
		30	25	11.9	16.1	43	38
		37	75	20.5	23.7	36	31
		45	75	17.4	22.0	38	33
		55	75	18.3	22.8	36	31
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	19.8	25.0	34	30
		132	75	17.2	23.1	37	32
		160	125	19.1	23.2	32	28
		200	125	16.6	20.5	35	31
	1.4	11	50	20.0	22.0	38	33
		15	25	11.9	16.1	43	38
		18.5	50	19.0	22.3	39	34
		22	50	17.5	20.3	41	36
		30	25	11.9	16.1	43	38
		37	75	18.9	23.6	37	32
		45	75	17.8	22.5	39	34
		55	75	17.5	23.4	36	32
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	19.4	24.5	35	31
		132	75	16.9	22.6	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	32
	1.6	11	50	19.7	21.6	38	34
		15	50	20.4	22.4	37	32
		18.5	50	18.7	22.1	40	35
		22	50	17.4	20.1	41	36
		30	75	18.9	23.6	37	33
		37	50	16.3	18.7	44	38
		45	75	16.0	21.6	40	35
		55	75	19.9	25.1	34	30
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	19.6	24.7	35	30
		132	75	17.0	22.8	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	33
	1.8	11	25	14.0	16.2	40	36
		15	50	20.0	22.0	38	33
		18.5	50	18.8	22.2	39	35
		22	50	17.2	19.9	42	37
		30	75	19.4	24.2	36	32
		37	50	16.1	18.6	44	39
		45	75	20.3	23.4	37	32
		55	75	17.4	21.6	36	32
		75	75	19.8	24.9	35	30
		90	75	17.5	23.4	36	31
		110	75	20.0	25.3	34	30
		132	75	17.4	21.6	36	32
		160	125	18.9	23.0	33	29
		200	125	16.4	20.4	36	31

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X.K..

Size X.K..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X100 – 110	1.25	4	25	9.4	10.7	64	56
		5.5	25	8.2	9.4	67	59
		7.5	25	8.1	9.4	70	62
		9.2	25	8.2	9.4	68	59
		11	25	8.1	9.4	70	61
		15	25	7.0	9.5	73	64
		18.5	50	11.0	13.0	64	57
	1.4	4	25	9.5	10.8	63	55
		5.5	25	8.2	9.5	67	59
		7.5	25	8.1	9.4	71	62
		9.2	25	8.2	9.4	67	59
		11	25	8.1	9.4	70	61
		15	25	7.0	9.5	73	64
		18.5	50	11.2	13.2	66	58
	1.6	4	25	9.5	10.7	64	56
		5.5	25	8.2	9.4	68	59
		7.5	25	8.0	9.3	71	63
		9.2	25	8.3	9.5	67	59
		11	25	8.0	9.3	71	62
		15	50	12.0	13.2	63	55
		18.5	50	11.1	13.1	67	58
	1.8	4	25	9.5	10.7	64	56
		5.5	25	8.2	9.5	67	59
		7.5	25	8.1	9.4	71	62
		9.2	25	8.1	9.3	69	60
		11	25	8.1	9.4	70	61
		15	50	11.9	13.0	64	56
		18.5	50	11.0	12.9	68	60
X120 – 130	1.25	5.5	25	9.6	11.0	57	50
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	60	52
		15	25	8.2	11.1	62	55
		18.5	50	13.0	15.3	57	50
		22	50	12.1	13.9	59	52
		30	25	8.2	11.1	62	55
		37	75	14.0	16.2	52	46
		45	75	14.7	18.5	45	40
	1.4	5.5	25	9.6	11.1	57	50
		7.5	25	9.6	11.1	60	52
		9.2	25	9.6	11.0	58	51
		11	25	9.6	11.1	59	52
		15	25	8.2	11.1	63	55
		18.5	50	13.0	15.4	57	50
		22	50	12.0	13.9	59	52
		30	25	8.2	11.1	63	55
		37	75	13.9	16.1	53	46
		45	75	14.1	19.0	46	40
	1.6	5.5	25	9.5	11.0	58	51
		7.5	25	9.5	11.0	60	53
		9.2	25	9.6	11.1	57	50
		11	25	9.5	11.0	59	52
		15	50	13.9	15.3	54	48
		18.5	50	13.0	15.3	57	50
		22	50	11.9	13.8	60	53
		30	75	12.7	15.9	56	49
		37	50	11.1	12.8	64	57
		45	75	13.4	18.1	48	42
	1.8	5.5	25	9.5	11.0	58	51
		7.5	25	9.4	10.8	61	54
		9.2	25	9.4	10.9	59	51
		11	25	9.4	10.8	61	53
		15	50	14.0	15.4	54	47
		18.5	50	12.9	15.1	58	51
		22	50	11.9	13.8	60	53
		30	75	13.1	16.3	54	48

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Size X.K..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X140 – 150	1.25	15	25	8.2	11.1	62	55
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	14.7	18.5	45	40
		55	75	15.5	19.4	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
	1.4	15	25	8.2	11.1	62	55
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	14.7	18.5	45	40
		55	75	15.5	19.4	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
	1.6	15	25	8.2	11.1	62	55
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	14.7	18.5	45	40
		55	75	15.5	19.4	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
	1.8	15	25	8.2	11.1	62	55
		18.5	50	15.8	18.6	47	41
		22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	14.7	18.5	45	40
		55	75	15.5	19.4	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
X160 – 170	1.25	22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	17.0	19.7	43	38
		45	75	16.5	20.8	40	35
		55	75	15.5	19.4	42	37
		75	75	16.9	21.3	40	35
		90	75	13.6	18.2	44	38
		110	75	12.4	16.5	46	41
		132	75	11.2	12.0	56	49
	1.4	22	50	14.6	16.9	49	43
		30	25	9.9	13.4	51	45
		37	75	16.7	19.4	44	39
		45	75	16.5	20.7	42	37
		55	75	14.9	18.6	44	39
		75	75	16.1	20.3	42	37
		90	75	13.0	17.4	46	40
		110	75	13.3	17.8	45	40
		132	75	10.8	11.1	57	50
	1.6	22	50	14.5	16.8	49	43
		30	75	15.9	19.8	45	39
		37	50	13.8	15.9	52	45
		45	75	16.0	21.6	40	35
		55	75	16.5	20.9	41	36
		75	75	16.8	21.2	41	36
		90	75	13.5	18.2	44	39
		110	75	16.1	17.2	47	41
		132	75	13.9	14.6	51	45
	1.6	22	50	14.9	17.2	48	42
		30	75	16.1	20.1	44	39
		37	50	13.7	15.8	52	46
		45	75	19.7	22.8	38	33
		55	75	16.1	20.3	42	37
		75	75	15.8	19.9	44	38
		90	75	12.7	17.0	47	41
		110	75	15.1	15.8	49	43
		132	75	12.6	13.7	53	47

Size X.K..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X180 – 190	1.25	30	75	18.3	21.2	42	37
		37	75	20.5	23.7	36	31
		45	75	17.4	22.0	38	33
		55	75	16.7	20.8	39	34
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	15.5	20.7	39	34
		132	75	12.2	16.7	42	37
	1.4	30	50	15.9	18.7	47	41
		37	75	20.8	24.0	35	31
		45	75	17.8	22.5	39	34
		55	75	16.0	19.9	41	36
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	16.5	22.2	37	32
		132	75	13.1	17.9	40	35
	1.6	30	75	15.9	19.8	45	39
		37	50	16.3	18.7	44	38
		45	75	16.0	21.6	40	35
		55	75	17.0	21.4	39	35
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	15.7	19.6	39	34
		132	75	12.4	17.0	42	37
	1.8	30	75	16.1	20.1	44	39
		37	50	16.1	18.6	44	39
		45	75	20.3	23.4	37	32
		55	75	17.2	21.7	39	34
		75	75	19.8	24.9	35	30
		90	75	17.5	23.4	36	31
		110	75	15.0	20.0	38	33
		132	75	12.7	17.4	41	36
X200 – 210	1.25	30	50	20.1	23.8	36	32
		37	50	18.8	22.1	40	35
		45	75	18.7	23.4	38	33
		55	75	18.3	22.8	36	31
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	19.8	25.0	34	30
		132	75	17.2	23.1	37	32
		160	125	19.1	23.2	32	28
		200	125	16.6	20.5	35	31
	1.4	30	75	23.4	27.1	33	29
		37	75	20.2	25.3	36	31
		45	75	17.2	21.7	39	34
		55	75	17.5	23.4	36	32
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	19.4	24.5	35	31
		132	75	16.9	22.6	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	32
	1.6	30	75	22.4	27.8	33	29
		37	75	19.1	23.9	36	32
		45	75	16.0	21.6	40	35
		55	75	19.9	25.1	34	30
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	19.6	24.7	35	30
		132	75	17.0	22.8	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	33
	1.8	30	75	21.9	27.2	34	30
		37	75	18.8	23.4	37	33
		45	75	20.3	23.4	37	32
		55	75	17.4	21.6	36	32
		75	75	19.8	24.9	35	30
		90	75	17.5	23.4	36	31
		110	75	20.0	25.3	34	30
		132	75	17.4	21.6	36	32
		160	125	18.9	23.0	33	29
		200	125	16.4	20.4	36	31

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Size X.K..	Gear ratio	Motor power kW	Test force N	Indentation depth mm	Indentation depth mm	Frequency 1/s	Frequency 1/s
				Initial assembly	Used belts	Initial assembly	Used belts
X220 – 230	1.25	37	50	18.8	22.1	40	35
		45	75	18.7	23.4	38	33
		55	75	18.3	22.8	36	31
		75	75	20.2	25.5	34	30
		90	75	18.7	23.3	35	31
		110	75	19.8	25.0	34	30
		132	75	17.2	23.1	37	32
		160	125	19.1	23.2	32	28
		200	125	16.6	20.5	35	31
	1.4	30	75	23.4	27.1	33	29
		37	75	20.2	25.3	36	31
		45	75	17.2	21.7	39	34
		55	75	17.5	23.4	36	32
		75	75	19.8	25.0	35	30
		90	75	17.2	23.1	36	32
		110	75	19.4	24.5	35	31
		132	75	16.9	22.6	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	32
	1.6	30	75	22.4	27.8	33	29
		37	75	19.1	23.9	36	32
		45	75	16.0	21.6	40	35
		55	75	19.9	25.1	34	30
		75	75	20.3	25.6	34	30
		90	75	17.4	23.3	36	32
		110	75	19.6	24.7	35	30
		132	75	17.0	22.8	37	33
		160	125	18.2	22.1	34	30
		200	125	15.8	19.6	37	33
	1.8	30	75	21.9	27.2	34	30
		37	75	18.8	23.4	37	33
		45	75	20.3	23.4	37	32
		55	75	17.4	21.6	36	32
		75	75	19.8	24.9	35	30
		90	75	17.5	23.4	36	31
		110	75	20.0	25.3	34	30
		132	75	17.4	21.6	36	32
		160	125	18.9	23.0	33	29

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5.18 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 from external damage.
- Make sure that the air inlet of the fan remains unobstructed.
- Check that the air intake is kept free and that it is within the specified angle.
- For gear units with mounted coupling, sufficient clearance must be ensured for the intake of cooling air when attaching the protective cover. For information regarding the required clearance, refer to the order-specific dimension sheet in the overall documentation for the gear unit.

Observe 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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5.19 Water cooling cartridge /CCT

5.19.1 Notes on connection/installation

NOTICE

Improper installation of the water cooling cartridge 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.
- When connecting the piping system, avoid stress on the connection points. 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.

5.19.2 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.

The cooling water quantity must be dimensioned individually for each cooling cartridge.

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

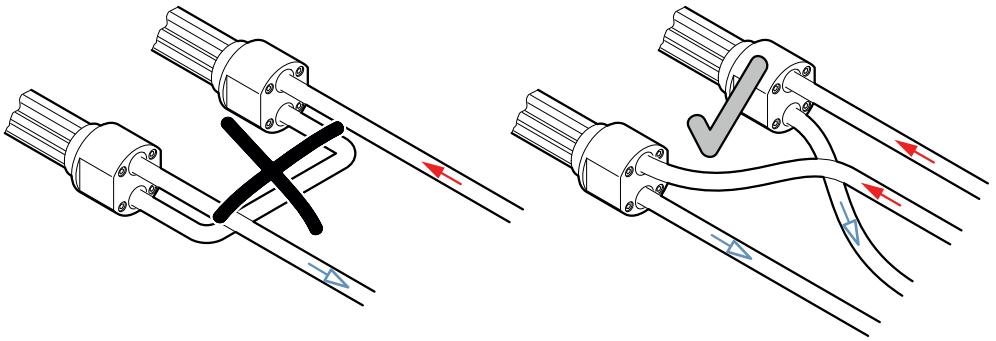
Size	Max. cooling water volume flow l/min	Max. water pressure bar
X100 – 110	11	10
X120 – 130	11	10
X140 – 150	15	10
X140 – 150	15	10
X140 – 150	15	10
X160 – 170	15	10
X180 – 190	28	10
X200 – 210	28	10
X220 – 230	28	10

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Size	Max. cooling water volume flow l/min	Max. water pressure bar
X240 – 250	28	10
X260 – 270	25	10
X280 – 300	25	10
X310 – 320	25	10

5.19.3 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. The flow direction of the cooling water is arbitrary.



9007199624816907

Supply (cold water inflow)
Return (warm water outflow)

The following pipe threads are available for connecting to the cooling circuit.

Size	Pipe thread
X100 – 130	1"
X140 – 170	1 1/4"
X180 – 250	1 1/2"
X260 – 320	2"

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5.19.4 Requirements on the water quality

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 the use of water cooling cartridges. The water quality is determined by the water hardness and pH value of the water.

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

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	+ (< 25 000 mg/l)
Sulfate	Up to 70	+
	70 to 300	+
	> 300	+ (< 25 000 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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5.20 Water cooling cover /CCV

5.20.1 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.

5.20.2 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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5.20.3 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"

5.20.4 Cooling media

Note the following information:

- 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.

5.21 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.

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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.

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5.21.1 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" (→ 🗎 166).

  At this temperature, the thermostat switches off the oil heater, see chapter "Limit temperature for gear unit startup" (→ 🗎 166). 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.
- 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" (→ 🗎 152).

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5.21.2 Thermostat

Electrical connection



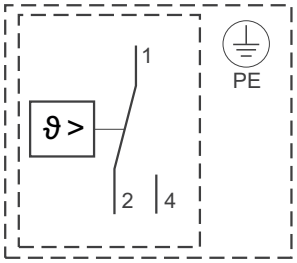
⚠ WARNING

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.

Technical data

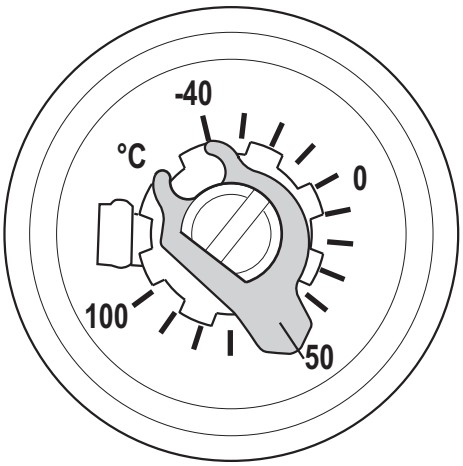
Maximum switching capacity:		
AMTHs-SW-2	Voltage	Current
		Terminal 2/4
	AC 230 + 10% cosφ = 1 (0.6)	10 A
	DC 230 + 10%	0.25 A

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: **Overvoltage category II**	2500 V (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

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



16834938379

5.21.3 Temperature sensor for oil bath temperature

In standard design, the oil heater is controlled by a thermostat installed on the gear unit. Instead, the oil heater can be controller by a temperature sensor installed on the gear unit.

The operator's control evaluates the temperature sensor and controls the operator's switching devices. Integrate the temperature sensor for the oil temperature to the operator's control in such a way that the order-specific switching points are implemented.

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

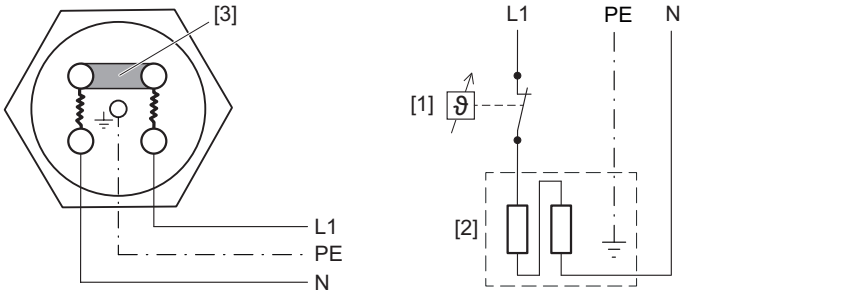
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5.21.4 Connection power and electrical connection of resistor element

The gear unit heater comes equipped with cable glands and jumpers. These are included in the delivery of the screw-in heaters and are already preassembled. The gear unit heater is connected to the current supply via terminal studs. Use suitable ring cable lugs for connecting the supply cable according to the connection thread of the terminal studs (M4).

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

A heating element consists of 2 tubular heating elements. The tubular heating elements of the heater are connected in series. The following figure shows the connection in the connection area of the heating element:



27021600516850699

Observe the electrical characteristic data of the control zone.

[1] Thermostat

[2] Heating element

[3] Jumper

Cable bushing: 1 x PG11

The following table shows the connected load of the heater that can be installed.

Gear unit		P_{inst} 1 heating element		P_{inst} 2 heating elements	
Size	**Design**		**K/h**		**K/h**
X100	X2K / X2F / X3K	1 × 0.4	6	2 × 0.4	11
	X3T / X3F	1 × 0.3	3	2 × 0.3	7
X110	X3T / X3F	1 × 0.3	4	–	–
X120	X4F / X3T / X4T	1 × 0.3	3	2 × 0.3	5
X130	X4F / X3T / X4T	1 × 0.4	3	–	–
X140	X4F / X3T / X4T	1 × 0.4	3	2 × 0.4	5

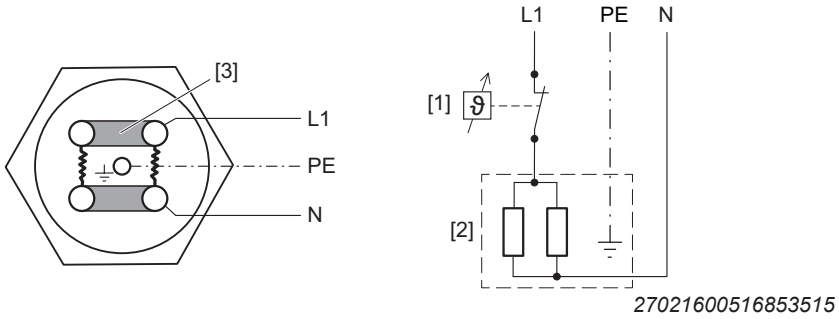
K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

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

A heating element consists of 2 tubular heating elements. The tubular heating elements of the heater are connected in parallel. The following figure shows the connection in the connection area of the heating element:



27021600516853515

Observe the electrical characteristic data of the control zone.

[1] Thermostat

[2] Heating element

[3] Jumper

Cable bushing: 1 x PG11

The following table shows the connected load of the heater that can be installed:

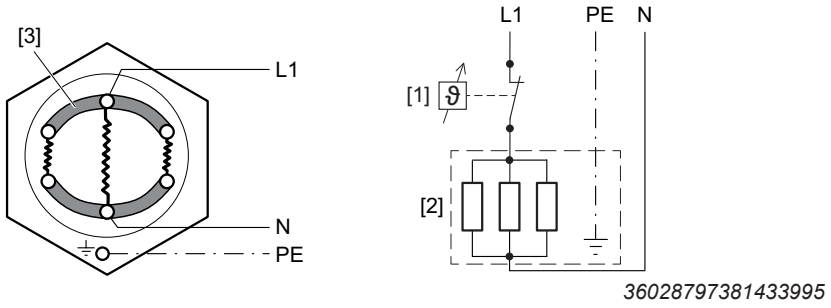
		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X110	X2F / X2K / X3K	1 × 0.6	6	–	–
X120	X2K	1 × 0.6	6	2 × 0.6	11
	X2F / X3K / X3F / X4K	1 × 0.7	6	2 × 0.7	11
X130	X2F / X2K / X3K / X3F / X4K	1 × 0.7	5	–	–
X140	X2K	1 × 0.7	4	2 × 0.7	9
	X2F / X3F / X3K / X4K	1 × 0.8	5	2 × 0.8	10
X150	X2K	1 × 0.8	5	–	–
	X2F / X3F / X3K / X4K	1 × 0.9	5	–	–
	X4F / X3T / X4T	1 × 0.6	3	–	–
X160	X2K	1 × 0.9	4	2 × 0.9	8
	X2F / X3F / X3K / X4K	1 × 1.1	4	2 × 1.1	8
	X4F / X3T / X4T	1 × 0.7	3	2 × 0.7	5
X170	X2K	1 × 0.9	4	–	–
	X2F / X3F / X3K / X4K	1 × 1.1	4	–	–
	X4F / X3T / X4T	1 × 0.7	3	–	–

K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

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

A heating element consists of 3 tubular heating elements. The tubular heating elements of the heater are connected in parallel. The following figure shows the connection in the connection area of the heating element:



36028797381433995

Observe the electrical characteristic data of the control zone.

[1] Thermostat

[2] Heating element

[3] Jumper

Cable bushing: 1 x PG16

The following table shows the connected load of the heater that can be installed:

		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X180	X2F / X2K / X3K / X3F / X4K	1 × 1.6	5	–	–
	X3T / X4F / X4T	1 × 1.1	4	2 × 1.1	7
X190	X2F / X2K / X3K / X3F / X4K	1 × 1.6	5	–	–
	X3T / X4F / X4T	1 × 1.1	3	–	–
X200	X2K	1 × 1.6	4	–	–
	X2F / X3K / X3F / X4K	1 × 1.8	4	–	–
	X4F / X4T	1 × 1.3	3	–	–
	X3T	1 × 1.1	2	2 × 1.1	5
X210	X2K	1 × 1.6	4	–	–
	X2F / X3K / X3F / X4K	1 × 1.8	4	–	–
	X3T / X4F / X4T	1 × 1.3	3	–	–
X220	X2K	1 × 1.8	3	–	–
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 x 2.2	4	–	–
X230	X2K	1 × 1.8	3	–	–
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.2	4	–	–
X240	X2K	1 × 1.8	3	–	–
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.2	3	–	–
X250	X2K	1 × 2.2	3	–	–

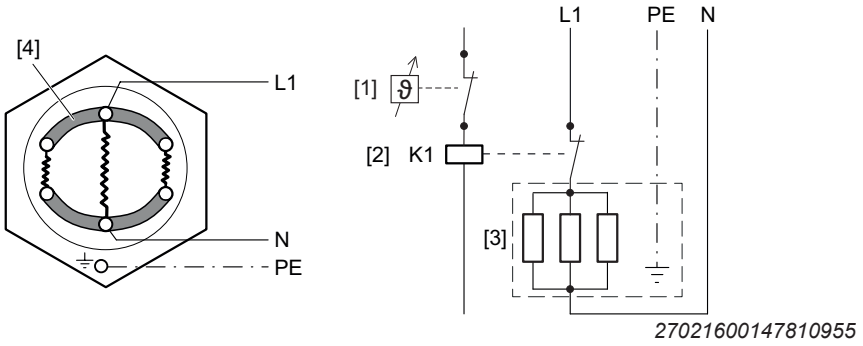
K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

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

A heating element consists of 3 tubular heating elements. The tubular heating elements of the heater are connected in parallel. The following figure shows the wiring ex works (as viewed into the connection space):



27021600147810955

Observe the electrical characteristic data of the control zone.

[1] Thermostat
[2] Contactor (not included in the scope of delivery)
[3] Heating element
[4] Jumper

Cable bushing: 1 x PG16

The following table shows the connected load of the heater that can be installed:

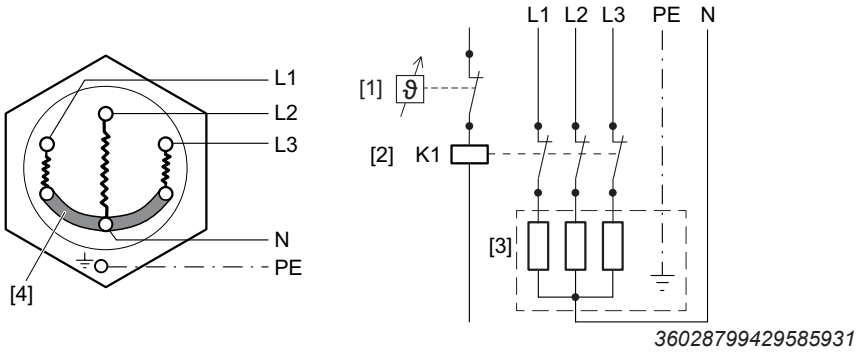
		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X180	X2F / X2K / X3K / X3F / X4K	–	–	2 × 1.6	10
X200	X2K	–	–	2 × 1.5	8
	X2F / X3K / X3F / X4K	–	–	2 × 1.8	8
	X4F / X4T	–	–	2 × 1.3	6
X220	X2K	–	–	2 × 1.8	7
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	–	–	2 × 2.2	8
X240	X2K	–	–	2 × 1.8	5
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	–	–	2 × 2.2	6
X250	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.6	3	–	–

K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

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

A heating element consists of 3 tubular heating elements. The tubular heating elements of the heater are in star connection. The following figure shows the connection in the connection area of the heating element:



36028799429585931

Observe the electrical characteristic data of the control zone.

[1] Thermostat
[2] Contactor (not included in the delivery)
[3] Heating element
[4] Jumper

Cable bushing: 1 x PG16

The following table shows the connected load of the heater that can be installed:

		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X180	X2F / X2K / X3K / X3F / X4K	1 × 1.6	5	2 × 1.6	10
	X3T / X4F / X4T	1 × 1.1	4	2 × 1.1	7
X190	X2F / X2K / X3K / X3F / X4K	1 × 1.6	5	–	–
	X3T / X4F / X4T	1 × 1.1	3	–	–
X200	X2K	1 × 1.6	4	2 × 1.6	8
	X2F / X3K / X3F / X4K	1 × 1.8	5	2 × 1.8	8
	X4F / X4T	1 × 1.3	3	2 × 1.3	6
	X3T	1 × 1.1	2	2 × 1.1	5
X210	X2K	1 × 1.6	4	–	–
	X2F / X3K / X3F / X4K	1 × 1.8	4	–	–
	X3T / X4F / X4T	1 × 1.3	3	–	–
X220	X2K	1 × 1.8	3	2 × 1.8	7
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.2	4	2 × 2.2	8
X230	X2K	1 × 1.8	3	–	–
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.2	4	–	–
X240	X2K	1 × 1.8	3	2 × 1.8	5
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.2	3	2 × 2.2	6
X250	X2K	1 × 2.2	3	–	–
	X2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 2.6	3	–	–

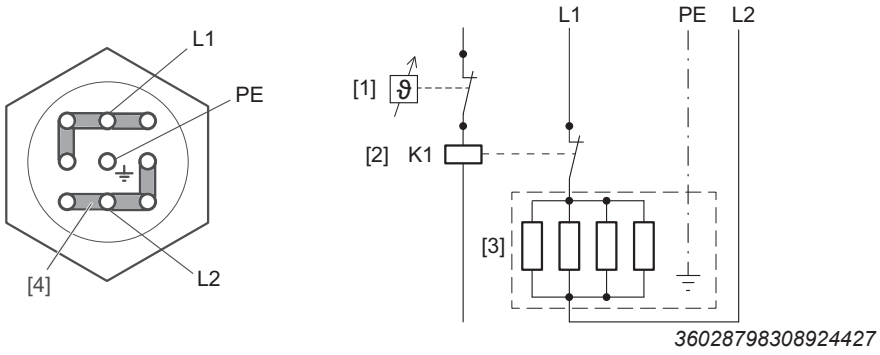
K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

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

A heating element consists of 4 tubular heating elements. The tubular heating elements of the heater are connected in parallel. The following figure shows the wiring ex works (as viewed into the connection space):



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Observe the electrical characteristic data of the control zone.

[1] Thermostat
[2] Contactor (not included in the delivery)
[3] Heating element
[4] Jumper

Cable bushing: 1 x PG16

The following table shows the connected load of the heater that can be installed:

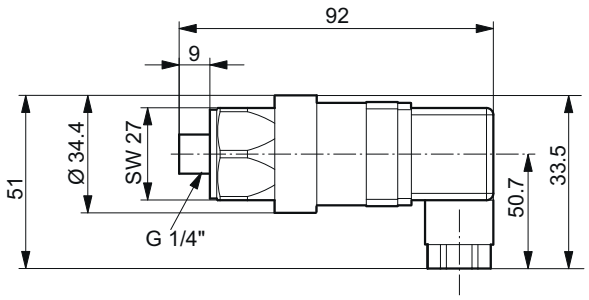
		P_{inst}		P_{inst}	
Gear unit		**1 heating element**		**2 heating elements**	
Size	**Design**		**K/h**		**K/h**
X260	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 3.8	4	2 × 3.8	8
X270	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 3.8	4	–	–
X280	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 4.2	4	–	–
X290	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 4.2	3	2 × 4.2	6
X300	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 4.2	3	–	–
X310	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 5.0	3	2 × 5.0	6
X320	2F / X3F / X4F / X3K / X4K / X3T / X4T	1 × 5.0	3	–	–

K/h = heating capacity (Kelvin/hour)

P_{inst} = Power of the installed heating element

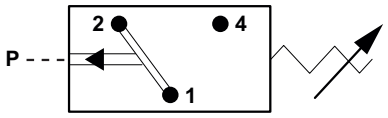
5.22 Pressure switch /PS

5.22.1 Dimensions



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5.22.2 Electrical connection



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

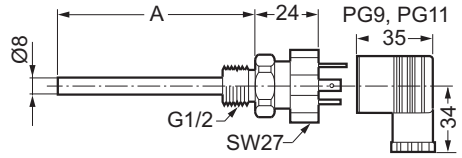
5.22.3 Technical data

- 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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5.23 Temperature sensor /Pt100

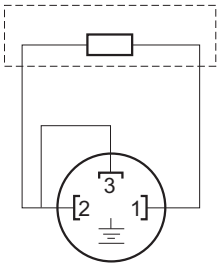
5.23.1 Dimensions



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A in mm
50
150

5.23.2 Electrical connection



18014398868640523

[1] [2] Resistor element connection

5.23.3 Technical data

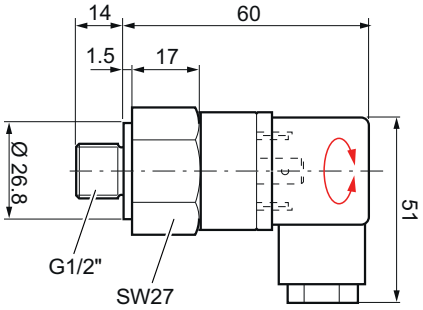
- Design with thermowell and changeable measuring insert
- Sensor tolerance K ± (0.3 + 0.005 × T), (corresponds to DIN IEC 751 class B)

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

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5.24 Temperature switch /NTB

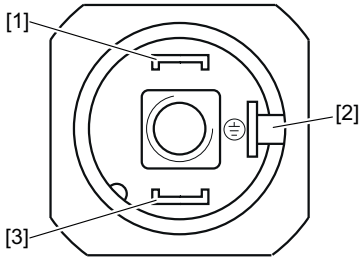
5.24.1 Dimensions



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5.24.2 Electrical connection

To ensure a long service life and proper function, it is recommended to use a relay in the circuit instead of a direct connection through the temperature switch.



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

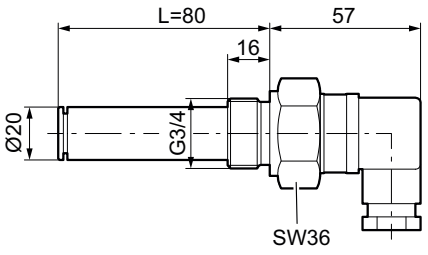
5.24.3 Technical data

- Trip temperature: 70 °C, 80 °C, 90 °C, 100 °C ± 5 °C
- Contact capacity: 10 A – AC 240 V
- Connector: DIN EN 175301-803 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the connector for electrical connection is 0.25 Nm.

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5.25 Temperature switch /TSK

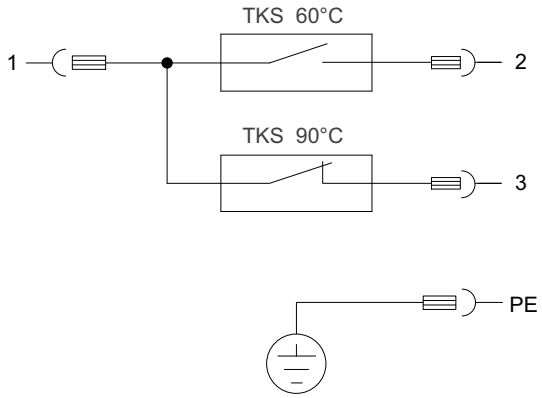
5.25.1 Dimensions



56786717195

5.25.2 Electrical connection

To ensure a long service life and proper function, it is recommended to use a relay in the circuit instead of a direct connection through the temperature switch.



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

5.25.3 Technical data

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

5.26 Brake

If a brake is installed in a drive package, it is mounted at the factory but not adjusted.

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.

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6 Startup

6.1 Before you start

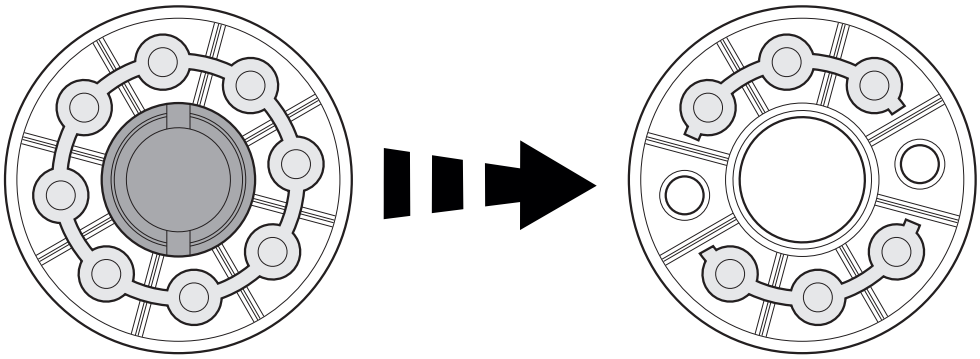
Check that the following conditions have been met:

- For gear units with extended storage option, observe the information in chapter "Gear unit with long-term preservation".
- Remove any present transport protection.
- Secure the existing oil drain valves against unintended opening.
- As of size X..220 and for X2F..180 – 210, avoid no-load operation independent of the driven machine because operation with a load below the minimum load can damage the rolling bearings of the gear unit.
- For operation at low ambient temperatures, ensure that the limit temperature is adhered to, see chapter "Limit temperature for gear unit startup" (→ 🗎 166). Ensure that the heating time is sufficient.

6.1.1 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.



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6.2 Shaft end pump /SEP

Check the following to ensure safe operation of the shaft end pump:

- Do not start up the gear unit if the pressure switch is not connected.
- It is essential that the gear unit is sufficiently lubricated from the very beginning. Contact SEW-EURODRIVE if the shaft end pump does not build up pressure within 10 seconds after the gear unit has been started up.
- A minimum speed of ≥ 400 min^{-1} is required for proper operation of the shaft end pump. If you use variable input speeds e.g. inverter-controlled drives or if you intend to change the input speed of a gear unit equipped with a shaft end pump, it is essential that you contact SEW-EURODRIVE.
- An oil heater is mandatory when operating gear units with shaft end pump at low ambient temperatures. For further information, refer to chapter "Permitted lubricants" (→ 🖹 206).

6.3 Backstop /BS

NOTICE

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

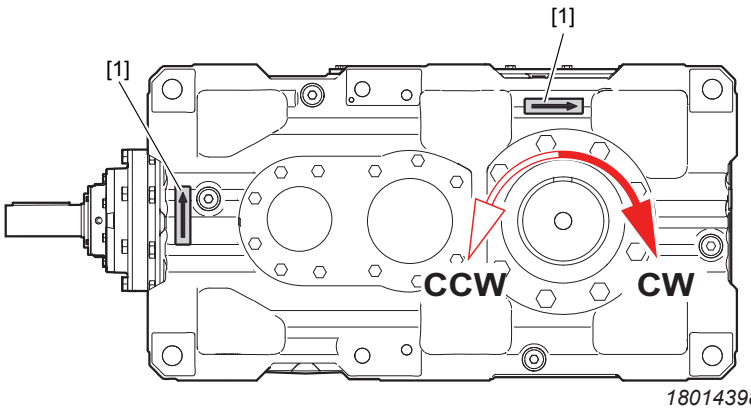
Possible damage to property.

- 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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6.4 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 information in the lubricant table:

https://www.sew-eurodrive.de/products/gear_units/standard_gear_units/accessories_and_options/lubricants/lubricants.html

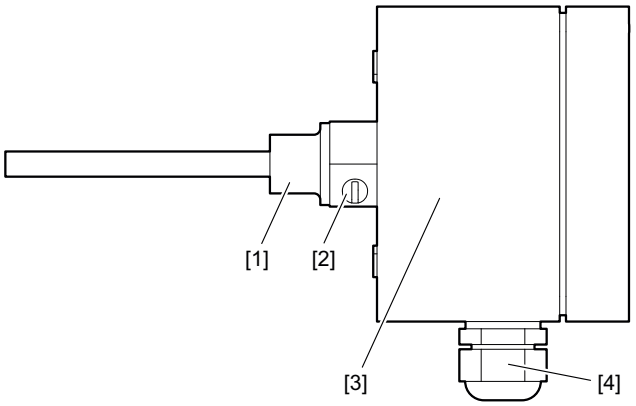
6.5 Oil heater /OH

6.5.1 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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6.6 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" (→ 202).

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.

6.7 Water cooling cartridge /CCT

After the water cooling cartridge has been installed in the system, it can be taken into operation and operated without any 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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6.8 Speed limits with reduced oil level

INFORMATION

To ensure reliable lubrication of the gear unit components, the gear unit must not be operated below the specified speed limits. Observe the order-specific information on the nameplate regarding the minimum speed.

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.

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7 Inspection/maintenance

7.1 Information

Check that the following conditions 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.

Only use original spare parts in accordance with the supplied spare and wearing parts list.

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7.2 Inspection and maintenance intervals

The following table shows the time intervals to be observed and the corresponding measures:

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[1)]	• 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. • Refill sealing grease of the lower bearing on the output shaft with drywell sealing systems. In dusty environments, regrease every 3 months. • For V-belt drives: Check the belt tension and condition of the V-belt pulleys and belts.

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Time interval	Required steps
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. • Check the breather. Replace, if necessary. It is recommended to replace the breather once a year. • Check the alignment of the input shaft and output shaft. • Check the condition and leak tightness of all rubber tubes (aging effects). • Clean the oil filter. If required, replace the filter element. • 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 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 in the following chapter)	• Change the oil. Observe the specifications of the oil manufacturer.

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Time interval	Required steps
Varies (depending on external factors)	• Check the installed hose pipes. • Clean the outer gear unit housing. • Cleaning the fan • Touch up or renew the surface/corrosion protection paint. • Replace damaged seals. • Replace the backstop. Wear may occur in the backstop when operated below lift-off speed. This is why you should consult SEW-EURODRIVE for defining the maintenance intervals. • Check the water cooling cover /CCT or 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.

1) Note that under certain conditions you can forgo the first oil change after 500 operating hours. For detailed information, refer to the order documents. If you have any questions, contact SEW-EURODRIVE.

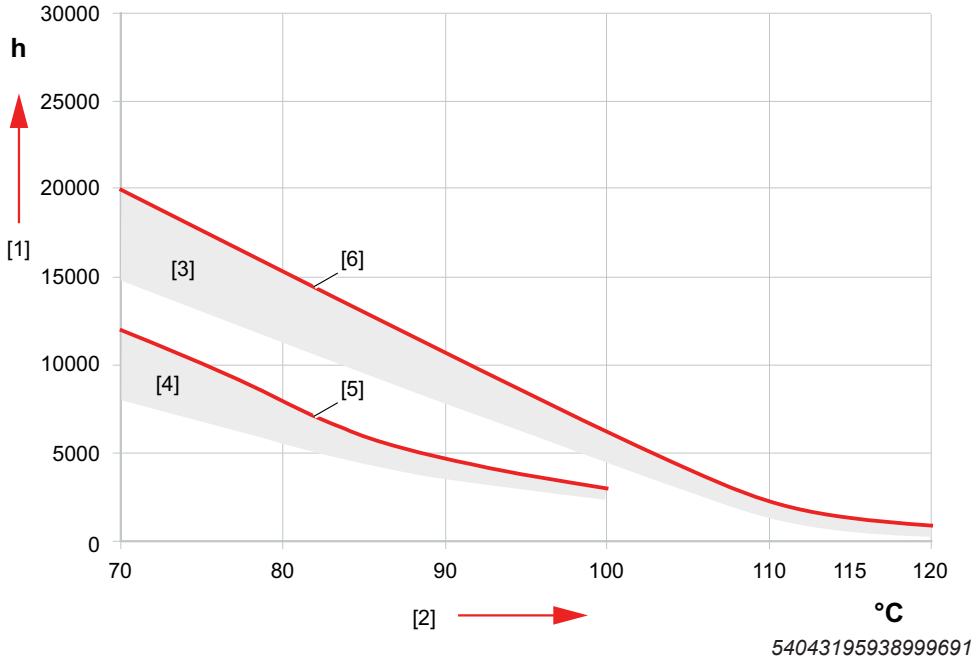
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7.3 Lubricant change intervals

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

INFORMATION

Mineral CLP lubricants and synthetic lubricants based on PAO oils (polyalphaolefin) 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] GearOil Base by SEW-EURODRIVE
[6] GearOil Synth by SEW-EURODRIVE

INFORMATION

SEW-EURODRIVE recommends that the gear unit oil is analyzed regularly (see chapter "Checking the oil consistency" (→ 🗎 182)) to optimize the lubricant change intervals.

7.4 Checking the oil level

7.4.1 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.

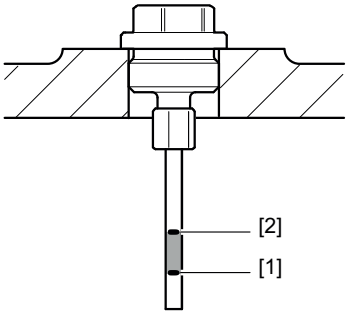
- Check the oil level only when the gear unit has cooled down in idle state. SEW-EURODRIVE recommends checking the oil level at an oil temperature of 20 °C to 40 °C. The oil level must be in the middle between the markings [1] and [2] at the oil dipstick or oil level glass.
- For gear units in fixed 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, oil drain, and oil fill openings are indicated on the gear unit by symbols.
- Check the oil level again after the first few operating hours when the gear unit is at standstill.

7.4.2 Standard procedure

Video instructions	
German	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 markings [1] and [2].
4. If the oil level is too low, proceed as follows:

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

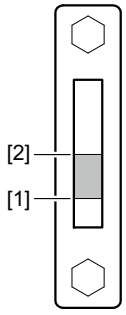
5. If you have filled in too much oil, proceed as follows:

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

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

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Oil level glass

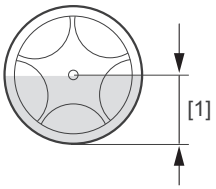


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1. The oil level must be in the middle between marking [1] and marking [2].
2. If the oil level is too low, proceed as follows:
   - Open the oil filling plug.
   - Fill in oil of the same oil grade until the oil level is in the middle between markings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

Oil sight glass

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

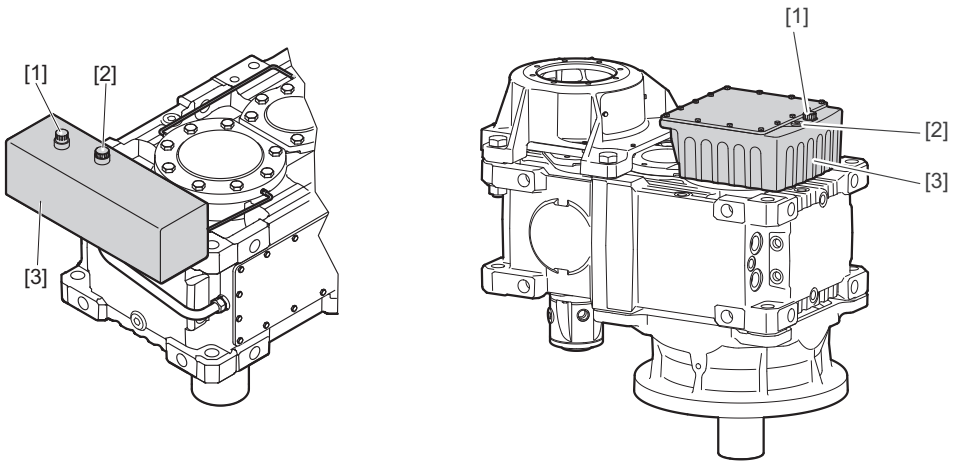


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7.4.3 Procedure for gear units with oil expansion tank /ET

Any oil level below or above the level specified by SEW-EURODRIVE is permitted during operation as long as there is oil in the oil expansion tank [3] and the oil expansion tank does not overflow. However, to ensure proper lubrication of the gear unit under all operating conditions, the oil level must be checked regularly and carefully.



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[1] Breather
[2] Oil dipstick
[3] Oil expansion tank

1. Shut down the gear unit and enable it to cool down until the gear unit temperature is between 20 °C and 40 °C.
2. Check the oil level using the oil dipstick or the oil level glass. Observe chapter "Standard procedure" (→ 🗎 174).

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

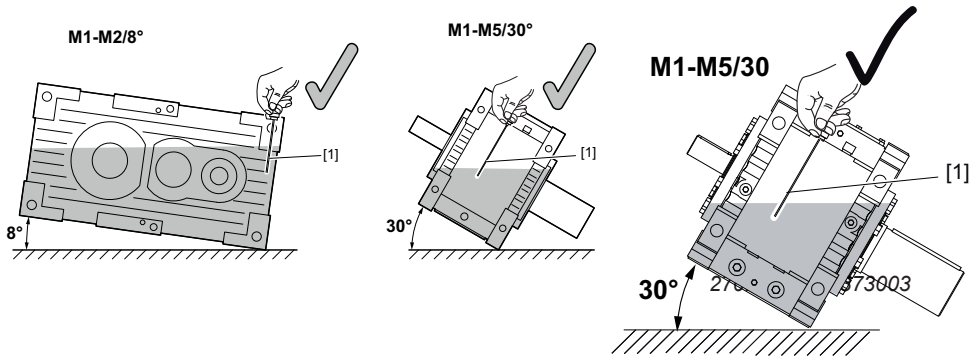
Observe the information on the nameplate and in the order documents.

Fixed pivoted mounting positions

Procedure

Check the oil level in the fixed, intended position. Observe the notes in chapter "Standard procedure" (→ 🗎 174).

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



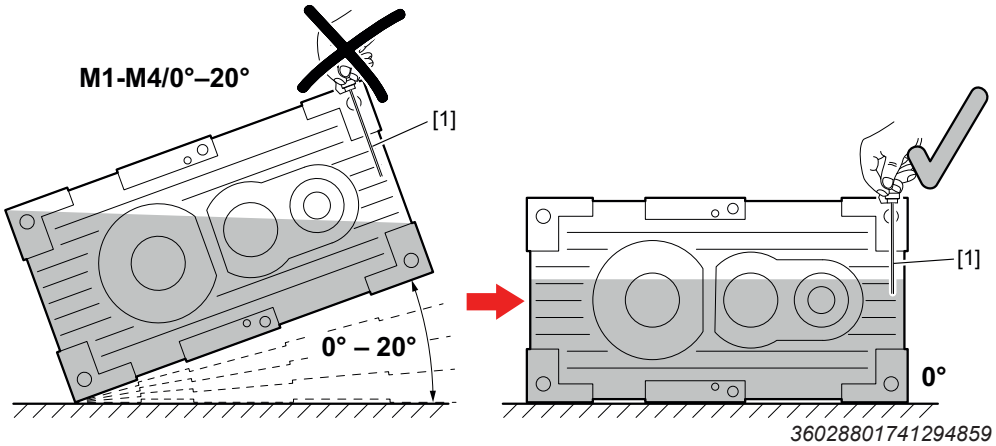
[1] Oil dipstick
Oil

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" (→ 🗎 174).

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



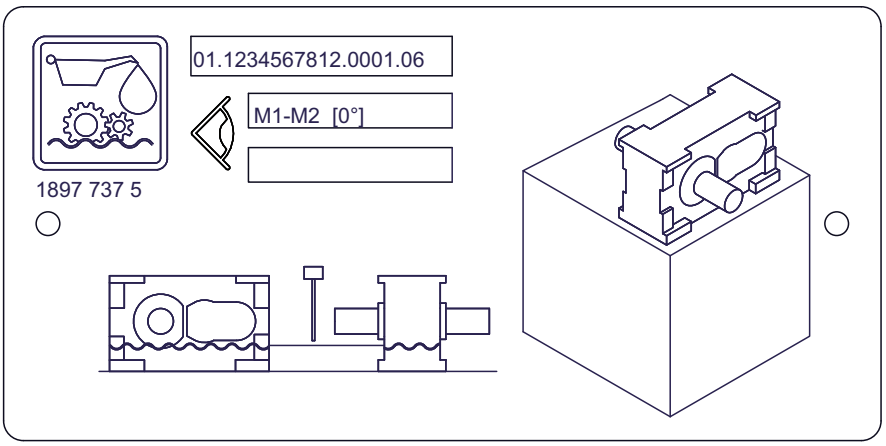
[1] Oil dipstick
Oil

Information sign

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

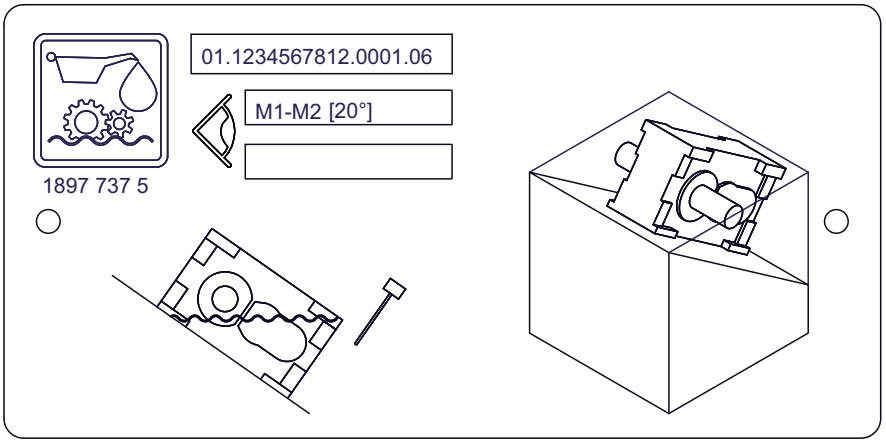
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The following figure shows an example of the information sign for check mounting position 0°.



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



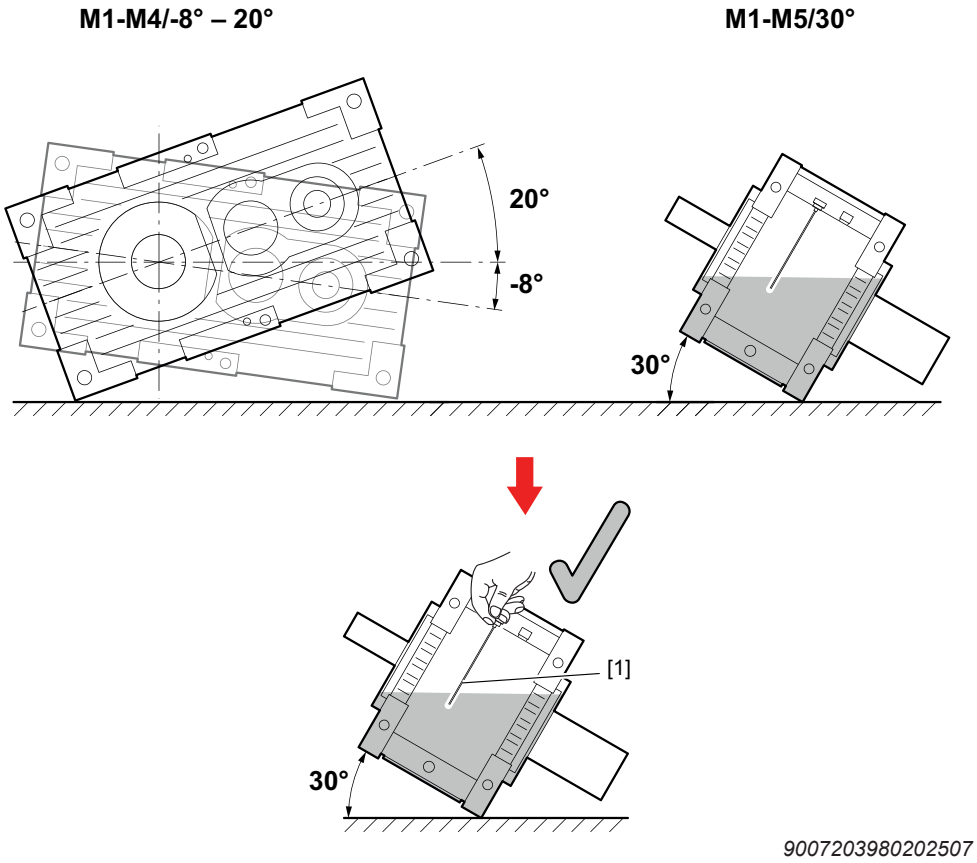
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Combination of fixed and variable pivoted mounting positions

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" (→ 🗎 174).

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



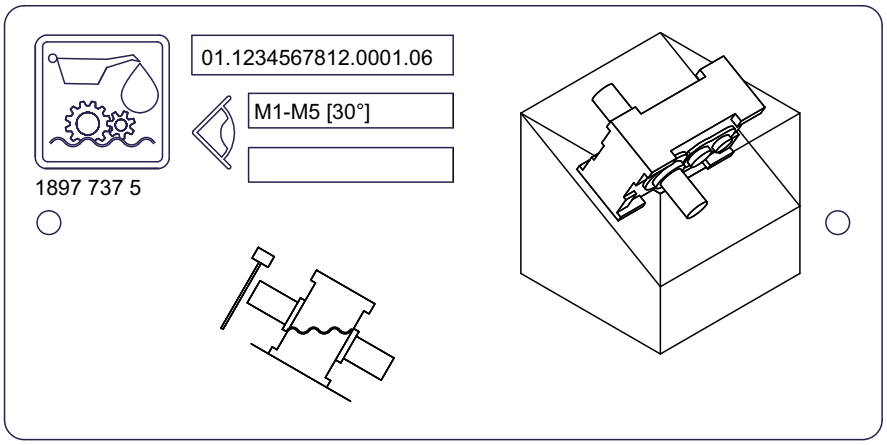
9007203980202507

[1] Oil dipstick
▯ Oil

Information sign

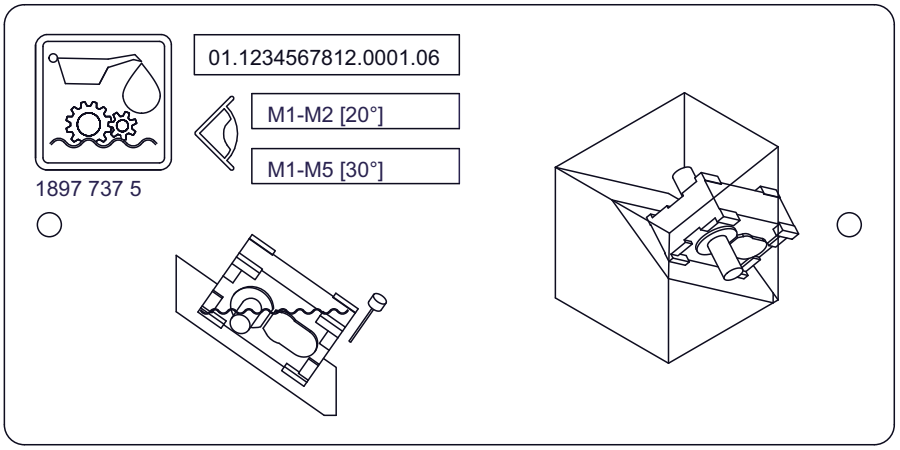
Observe the additional information sign on the gear unit. Check the oil level in the test mounting position specified on the nameplate.

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°.



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7.5 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.

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7.6 Changing the oil

7.6.1 Notes

Check that the following conditions have been met:

- 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 above 50 °C.
- The oil grade and oil viscosity are listed on the nameplate of the gear unit.
- 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.
- 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 can indicate that foreign liquids (e.g. water) have entered. An oil level below the min. marking can indicate a leakage. Find out and eliminate the cause before you fill in new oil.
- Replace any damaged gaskets of the oil drain plug.
- 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.
- Empty the oil-bearing system of gear units with oil cooling system and oil supply system according to the manufacturer's maintenance instructions. If required, empty accessories such as oil filters and pipes.
- For gear units with reduced oil level, observe chapter "Gear units with reduced oil level" (→ 🗎 49).

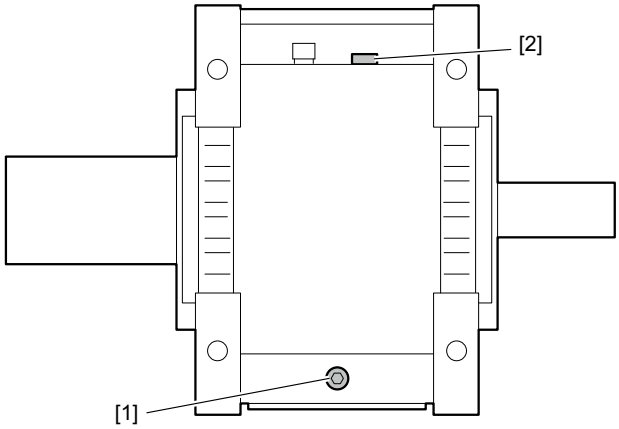
Video instructions

German

English

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7.6.2 Basic gear unit



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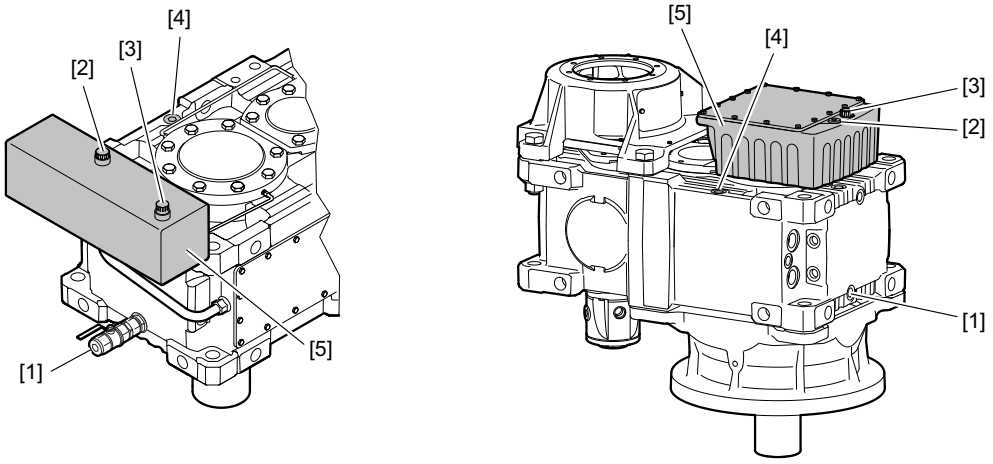
1. ⚠ **WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Severe injuries.
   Allow the gear unit to cool down below 50 °C before you start working on it.
2. Place a suitably large container underneath the oil drain [1].
3. Remove the oil filling plug(s)/breather(s) [2]. If necessary, remove the splash guard adapter [2].
4. Open the oil drain [1] carefully. Drain all the oil into the container.
5. Clean the magnetic oil drain plug, if available.
6. Close the oil drain [1] again.
7. Pour in new oil of the same grade through the oil filling opening [2].

- 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. For additional information, refer to chapter "Checking the oil level" (→ 🗎 174).
- Use a clean filling aid without zinc coating (plastic funnel or similar).

8. Re-insert the splash guard adapter, if available. For further information, refer to chapter "Installing the splash guard adapter" (→ 🗎 50).
9. Screw the oil fill plug [2] with the integrated 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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7.6.3 Gear units with oil expansion tank /ET



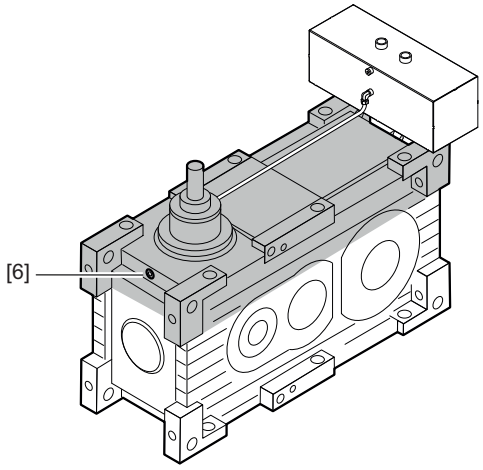
61076406411

INFORMATION

The oil drains faster if the upper closing elements, such as oil dipstick [2], breather [3] or screw plugs [4] are removed and when the oil change is performed when the gear unit is warm.

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. Remove the oil drain plug(s). Open the oil drain [1].
3. Place a suitable container underneath the oil drain plug(s) or oil drain valve [1].
4. Drain all the oil into the container.
5. Clean the magnetic oil drain plug, if available.
6. Close the oil drain [1] again.
7. Open the oil fill plug. Observe the mounting position and the following notes:

Mounting positions M1 and M3:

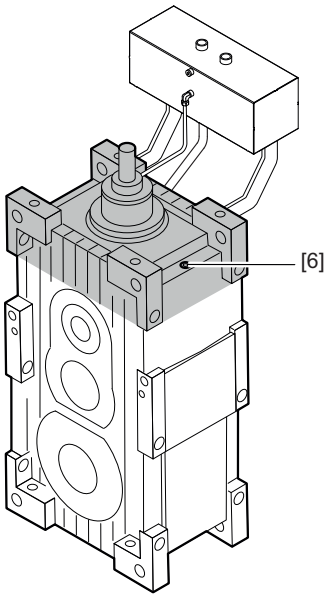


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8. Open at least one of the screw plugs [6] located on the side in the upper fifth (marked gray) of the gear unit housing.

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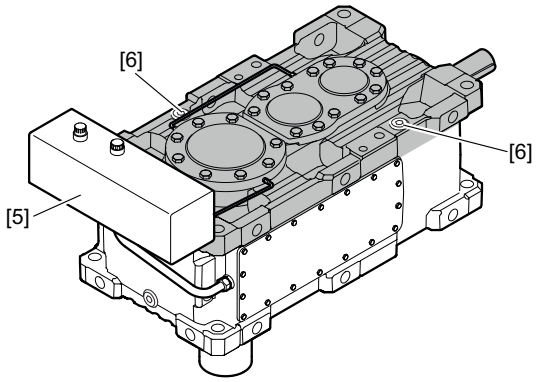
Mounting positions M2 and M4:



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9. Open at least one of the screw plugs [6] on the top or at least one of the screw plugs [6] located on the side in the upper fifth (marked gray) of the gear unit housing.

Mounting position M5 and M6:



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10. Open all accessible screw plugs [6] on the top of the gear unit housing and all accessible screw plugs located on the side in the upper fifth (marked gray) of the gear unit housing.
11. Fill in oil of the same type through one of the housing openings [6] or the oil expansion tank [5]. If oil leaks from an opening, close the opening and keep filling the gear unit until the specified oil level is reached in the oil expansion tank [5].

INFORMATION

Preheating the oil to max. 40 °C accelerates the filling process. You may also use a pump to fill the gear unit. During the filling process, the oil level in the oil expansion tank must never increase to a point that oil leaks from the oil expansion tank into the breather pipes.

12. Check the breather [3] for proper functioning before you install it.
13. Screw in the oil dipstick [2].

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14. Start up the gear unit.
15. Check the oil level at least every 30 minutes until the operating temperature is reached. If necessary, fill in additional oil.
16. Let the gear unit cool down to a temperature between 20 °C and 40 °C and check the oil level again. Add oil if necessary.
17. ⚠ **CAUTION!** Danger due to leakage of lubricant. Possible risk of slipping. Immediately remove any oil that has escaped with oil binder.

INFORMATION

During the first operating hours, air pockets loosen from the gear unit and escape through the breather, so that the oil level needs to be checked.

7.6.4 Gear units with shaft end pump /SEP

Fill the shaft end pump completely with oil shortly before taking it into operation. Observe the procedure described in chapter "Gear units with shaft end pump / SEP" (→ 🗎 44).

7.7 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.

7.8 Replacing the desiccant breather filter

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.

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7.8.1 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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7.9 Refill the regreasable sealing systems with grease



⚠ WARNING

Risk of crushing due to rotating parts.

Severe or fatal injuries.

- Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Check that no voltage is applied. Ground and short-circuit. Cover or isolate neighboring live parts.



INFORMATION

- Slowly turn the shaft when relubricating the bearing to ensure better distribution of the grease.
- Refer to www.sew-eurodrive.de/lubricants for the used lubricants.
- Immediately remove any old grease that has leaked out.

1. For the exact lubrication points, refer to the order-specific dimension sheet.
2. Use moderate pressure to force grease into each lubrication point until new grease leaks out of the sealing gap.
3. The used grease is pressed out of the sealing gap together with any contaminants it has absorbed.

7.10 Relubricating the bearing for Drywell sealing systems



⚠ WARNING

Risk of crushing due to rotating parts.

Severe or fatal injuries.

- Observe the 5 safety rules before commencing the work: Disconnect. Secure the device against a restart. Check that no voltage is applied. Ground and short-circuit. Cover or isolate neighboring live parts.

NOTICE

Excessive press-in pressure can cause grease to leak between the sealing lip of the oil seal and the shaft. The sealing lip can be damaged or slip.

Possible damage to property.

- Make sure that the grease drain is open and the excess used grease can escape.

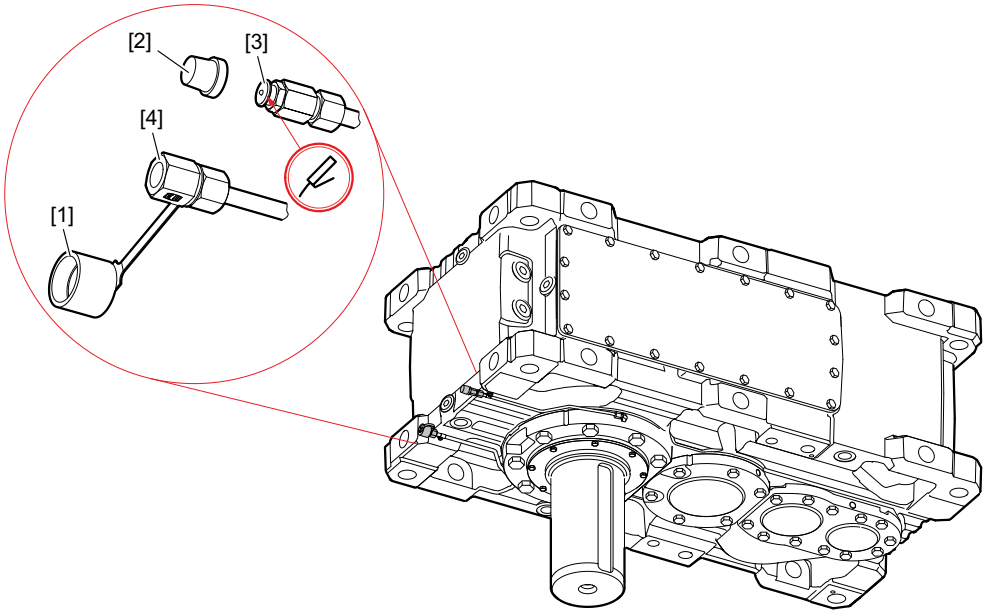


INFORMATION

- Slowly turn the shaft when relubricating the bearing to ensure better distribution of the grease.
- Refer to www.sew-eurodrive.de/lubricants for the used lubricants.
- Immediately remove any old grease that has leaked out.

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7.10.1 Gear unit with universal housing /HU



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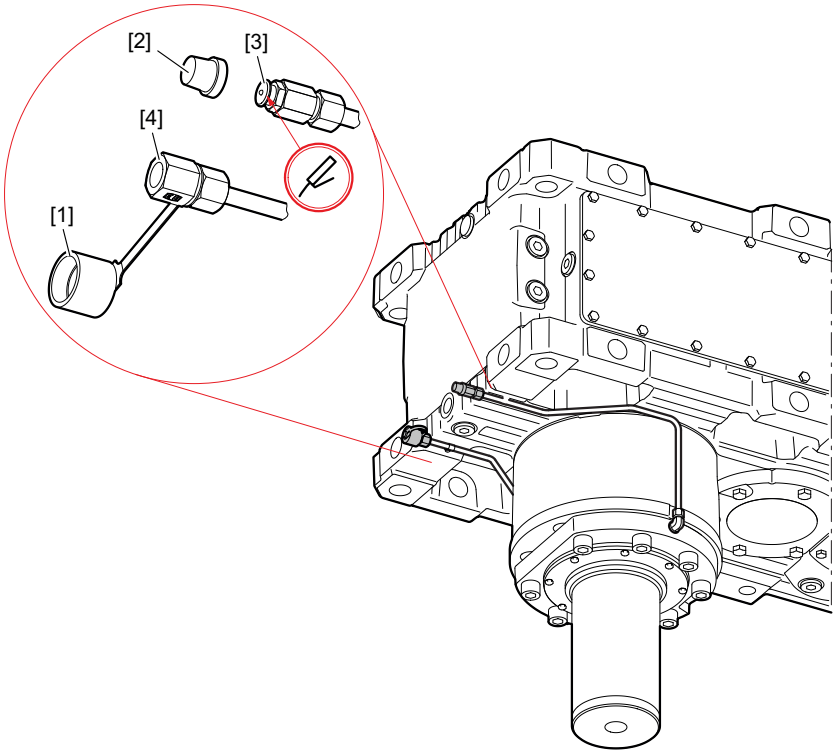
1. Remove the protection cap [1] to allow the excess old grease to escape.
2. Remove the protection cap [2]. Apply moderate pressure to refill the following amount of grease at the grease nipple [3].

Size	Amount of grease in g
X120	50
X130 – 140	60
X150	70
X160 – 170	90
X180 – 190	110
X200 – 210	200
X220 – 230	200
X240 – 250	300
X260	300
X270 – 280	450
X290 – 300	400
X310 – 320	550

3. Place the protection cap [2] on the grease nipple [3].
4. Attach the protection cap [1].

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7.10.2 Gear unit with universal housing /HU and EBD



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1. Remove the protection cap [1] to allow the excess old grease to escape.
2. Remove the protection cap [2]. Apply moderate pressure to refill the following amount of grease at the grease nipple [3].

Size	Amount of grease in g
X140	120
X150	140
X160	180
X170	180
X180	220
X190	220
X200	400
X210	400

3. Place the protection cap [2] on the grease nipple [3].
4. Attach the protection cap [1].

7.11 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

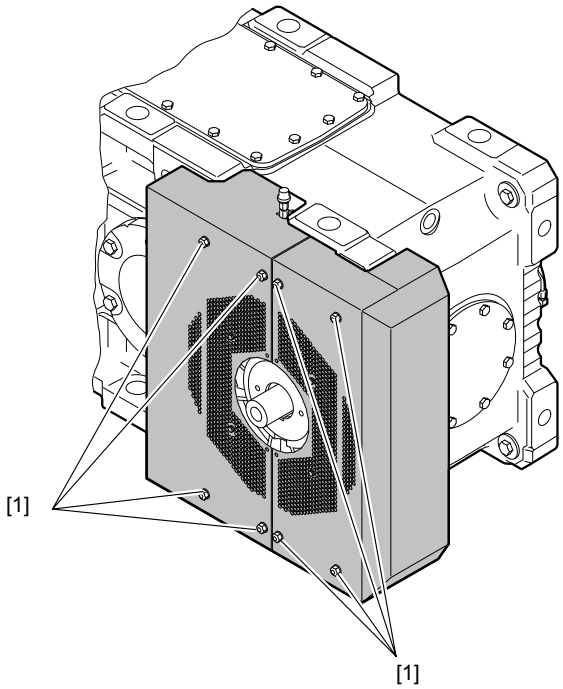
Improper assembly of the fan guard after disassembly (e.g. for inspection purposes) may result in damage to the fan.

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.

7.11.1 X.F..

1. Loosen the 8 screws [1].
2. Remove the 2 fan guards



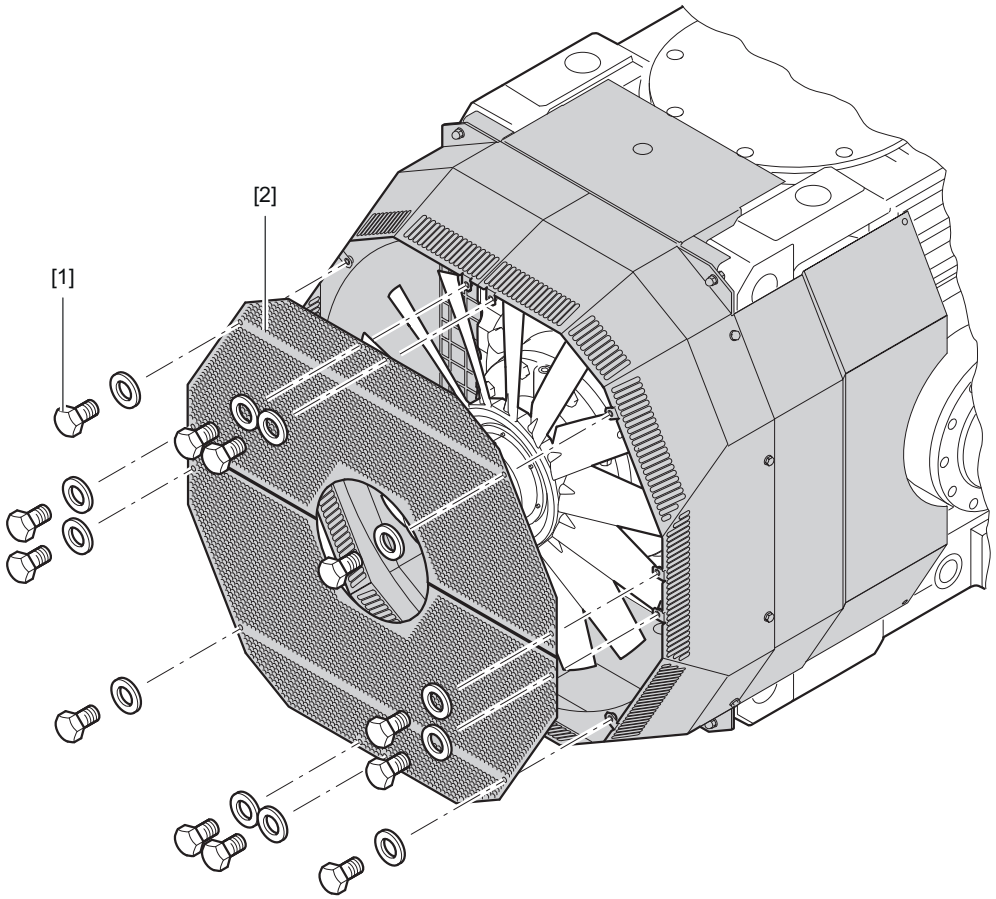
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3. Remove any dirt from the fan wheel, fan guard, and protective grid using a hard brush, for example.
4. Assemble the two fan guards in reverse order.
5. Before restarting the fan, make sure the fan guards are mounted properly. The fan must not touch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

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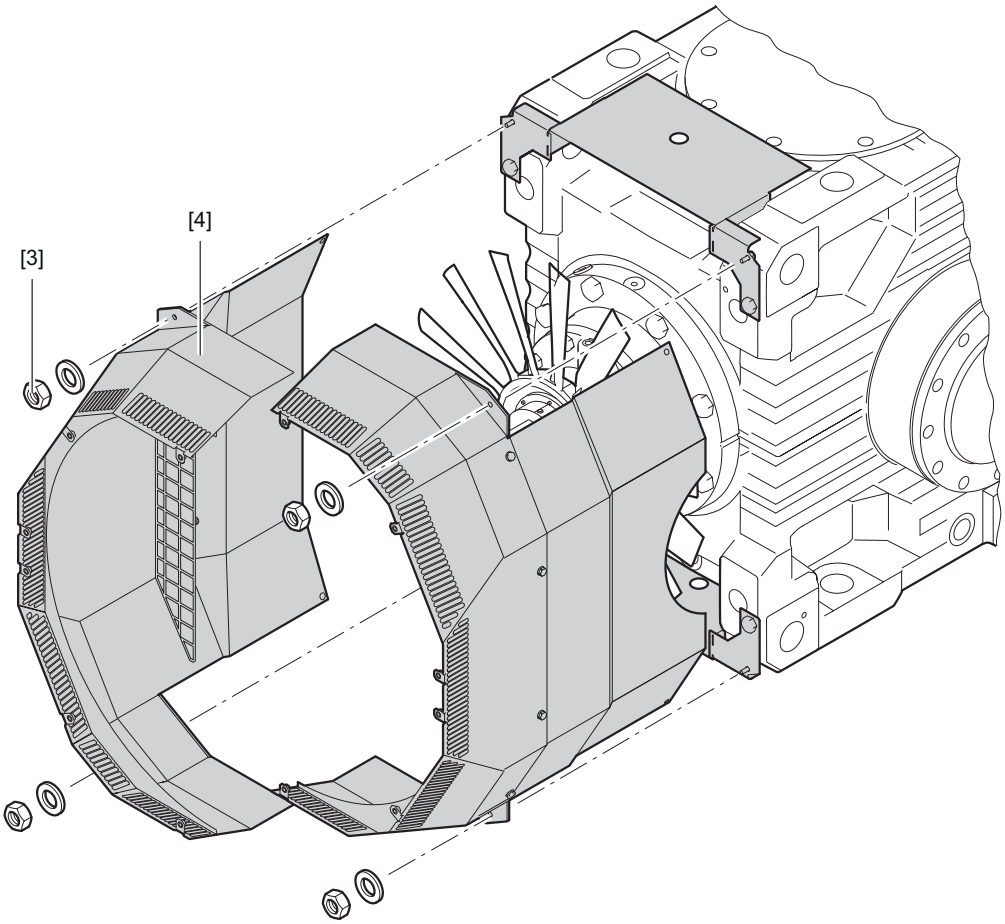
7.11.2 X.K.. with universal fan guard

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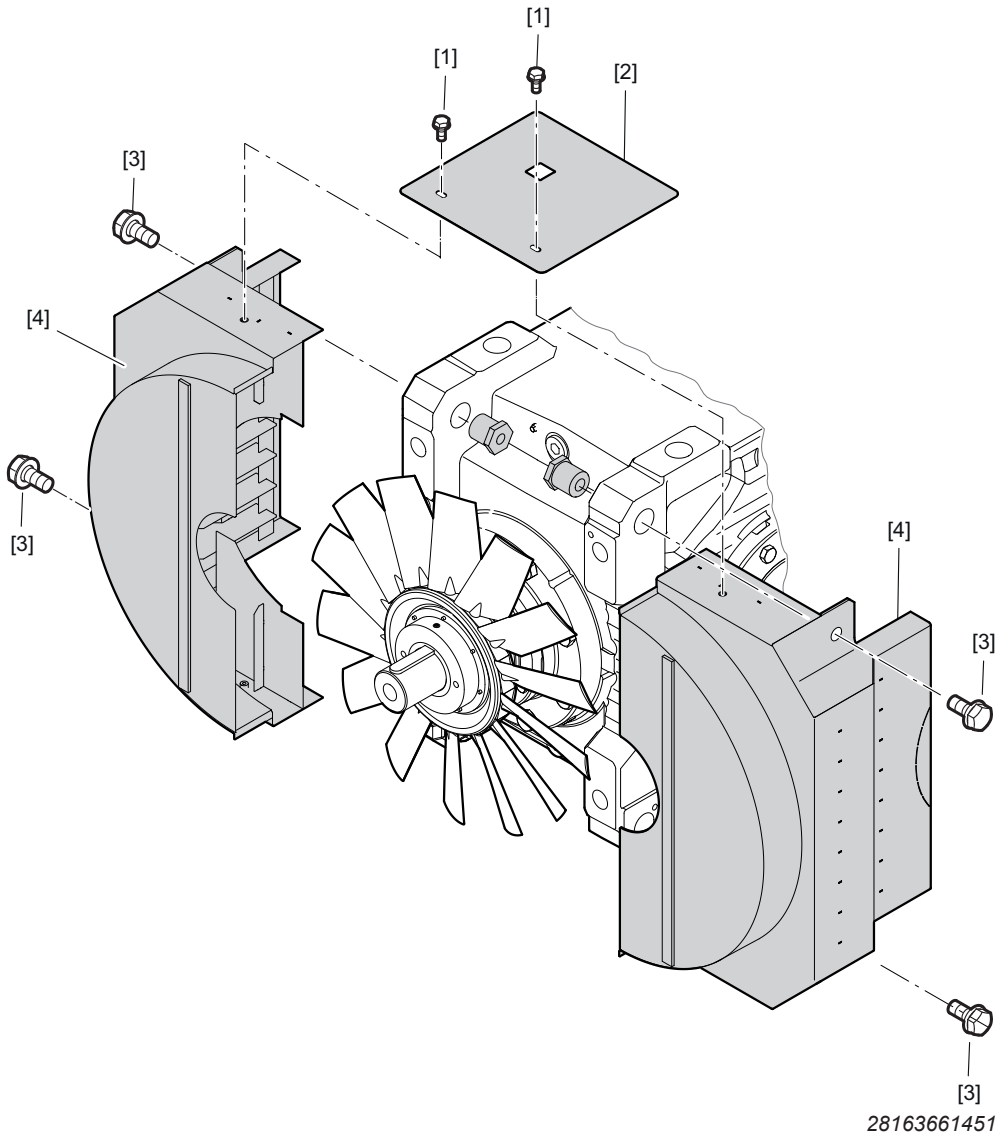
4. Remove any dirt from the fan wheel, fan guard and protective grid using a hard brush, for example.
5. Assemble the fan guard in reverse order.
6. Before restarting the fan again, make sure the fan guard is mounted properly. The fan must not touch the fan guard.

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7.11.3 Axial fan

Universal and horizontal housing /HU /HH

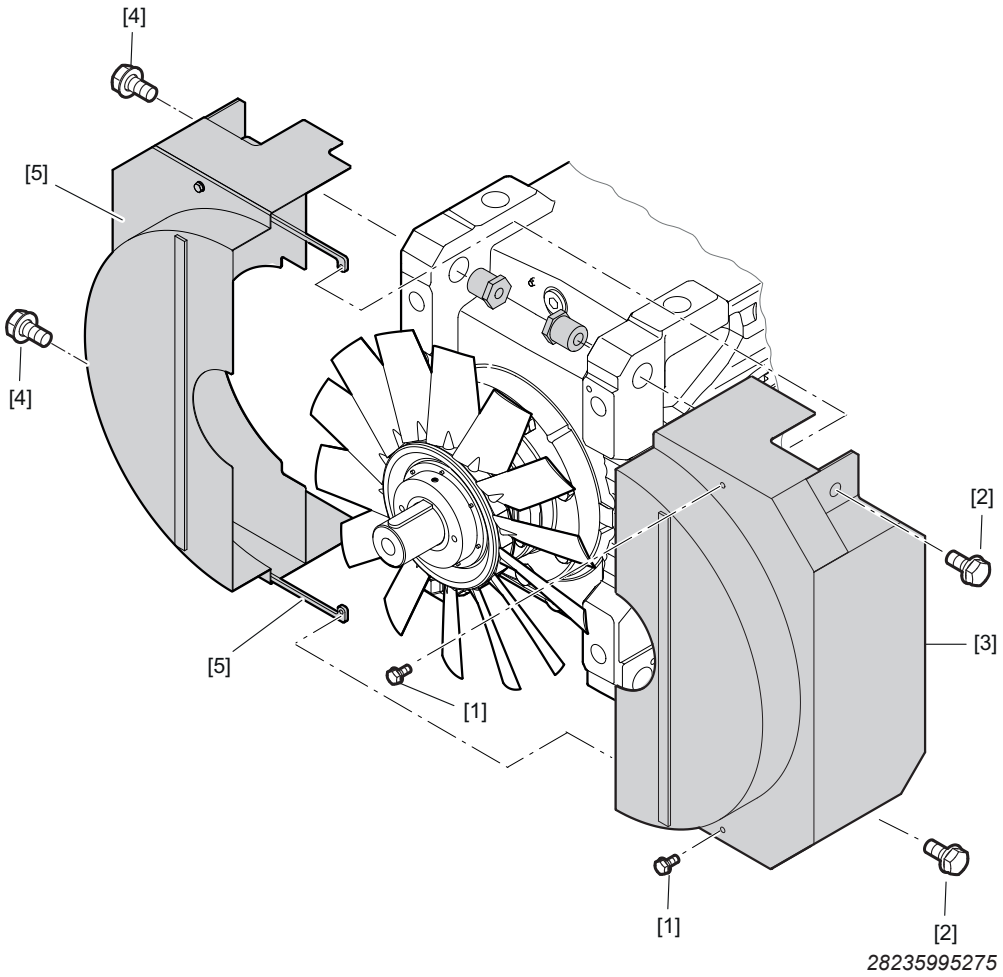
Size X100 – 250



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1. Loosen the screws [1] and remove the fan guard [2].
2. Loosen the screws [3] and remove the fan guards [4].
3. Remove any dirt from the fan wheel, fan guard, and protective grid using a hard brush, for example.
4. Before restarting the fan, make sure the fan guard is mounted properly. Mount the wheel in the reverse order.

Size X260 – 320



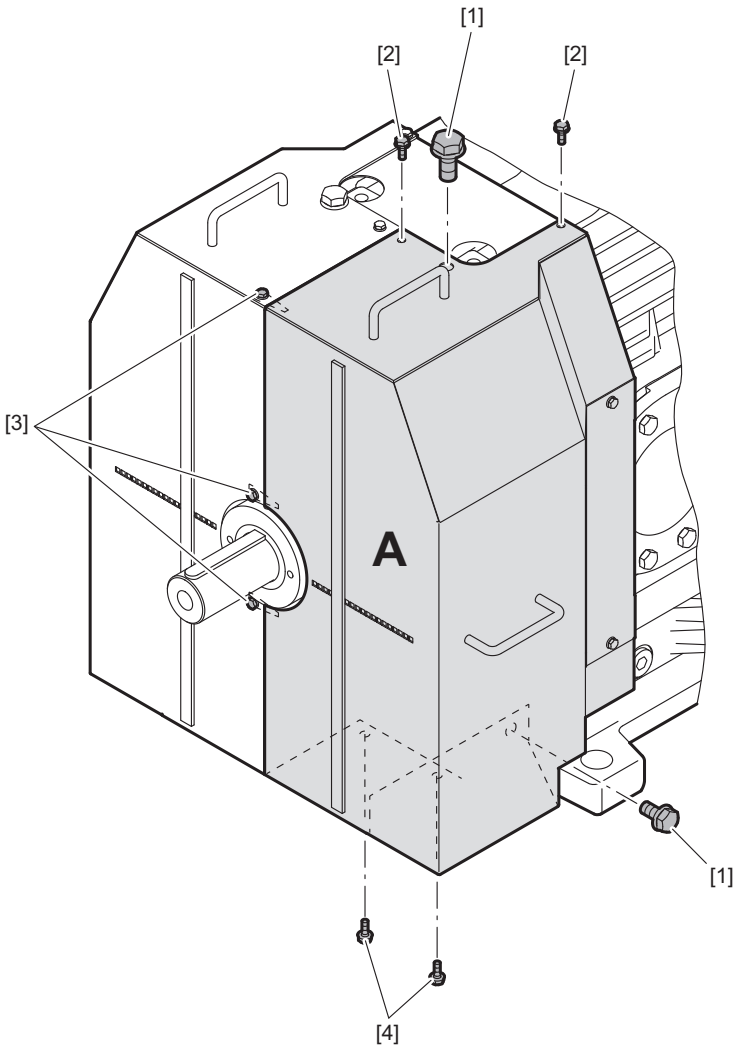
1. Loosen the 2 screws [1].
2. Loosen the screws [2] and remove the fan guard [3].
3. Loosen the screws [4] and remove the fan guard [5].
4. Remove any dirt from the fan wheel, fan guard, and protective grid using a hard brush, for example.
5. Before restarting the fan, make sure the fan guard is mounted properly. Mount the wheel in the reverse order.

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Thermal housing /HT

Removing the fan guards

1. Fan guard A

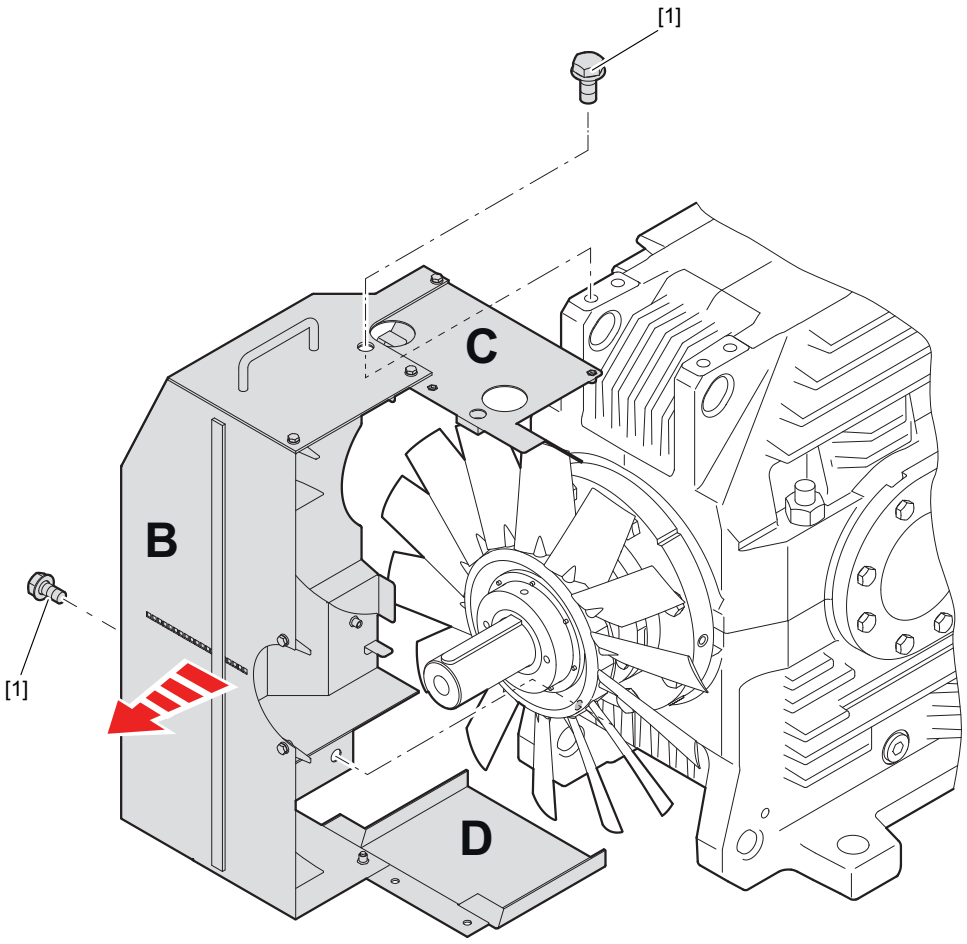


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1. Loosen the 2 screws [1].
2. Loosen the 2 screws [2].
3. Loosen the 3 screws [3].
4. Loosen the 2 screws [4].
5. Remove the fan guard **A**.

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2. Fan guards B, C, D



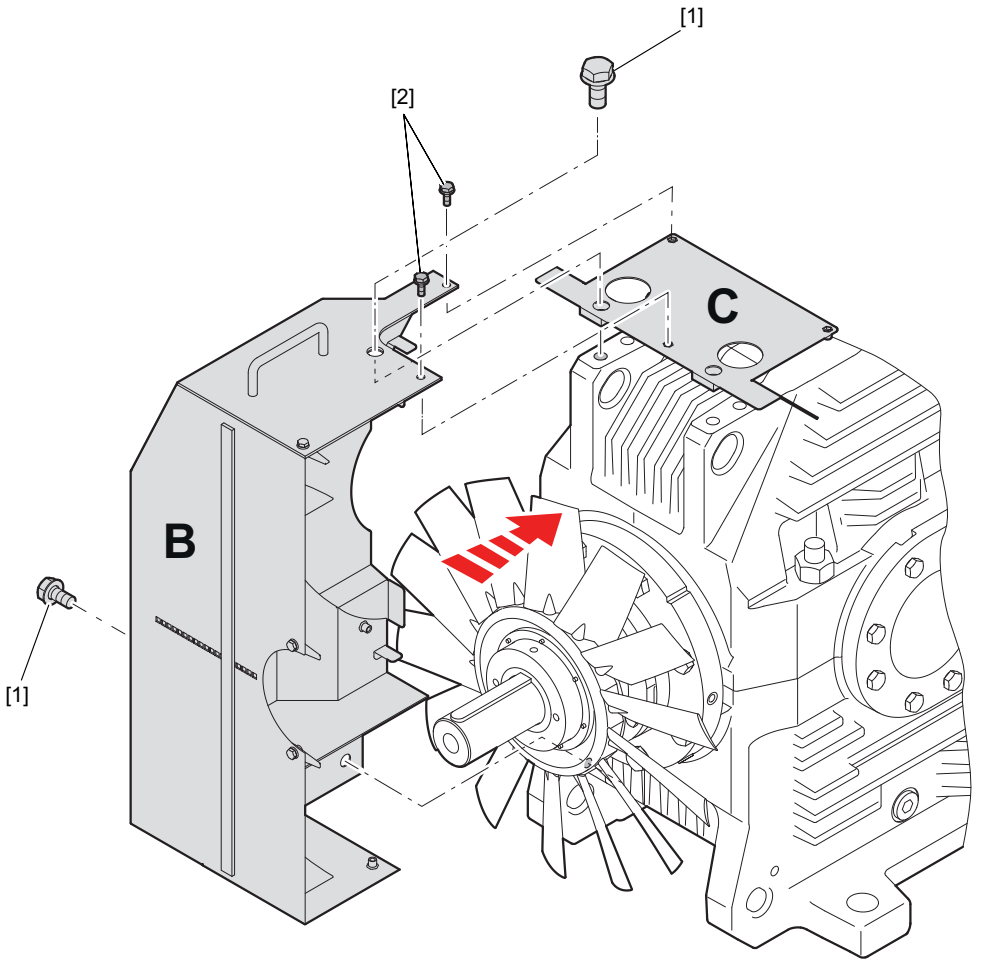
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1. Loosen the 2 screws [1].
2. Remove the fan guards **B, C, and D**.
3. Remove any dirt from the fan wheel, fan guard, and protective grid using a hard brush, for example.

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Mounting the fan guards

1. Fan guards B, C



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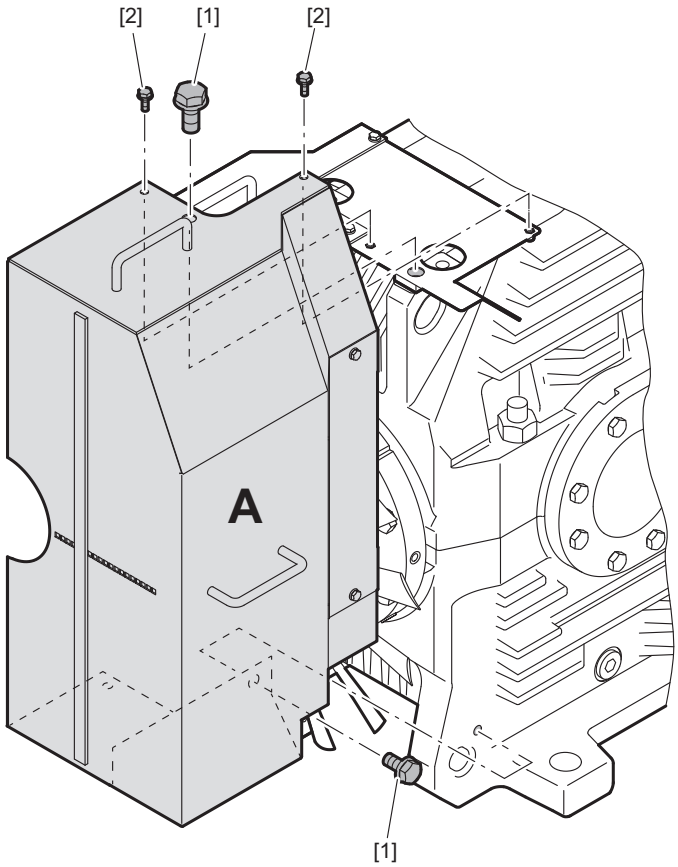
1. Mount the fan guards **B and C** onto the gear unit, using screws [1].
2. Tighten the 2 screws [2].

2. Fan guard A

1. Mount the fan guard **A** using the 2 screws [1].

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2. Tighten the 2 screws [2].

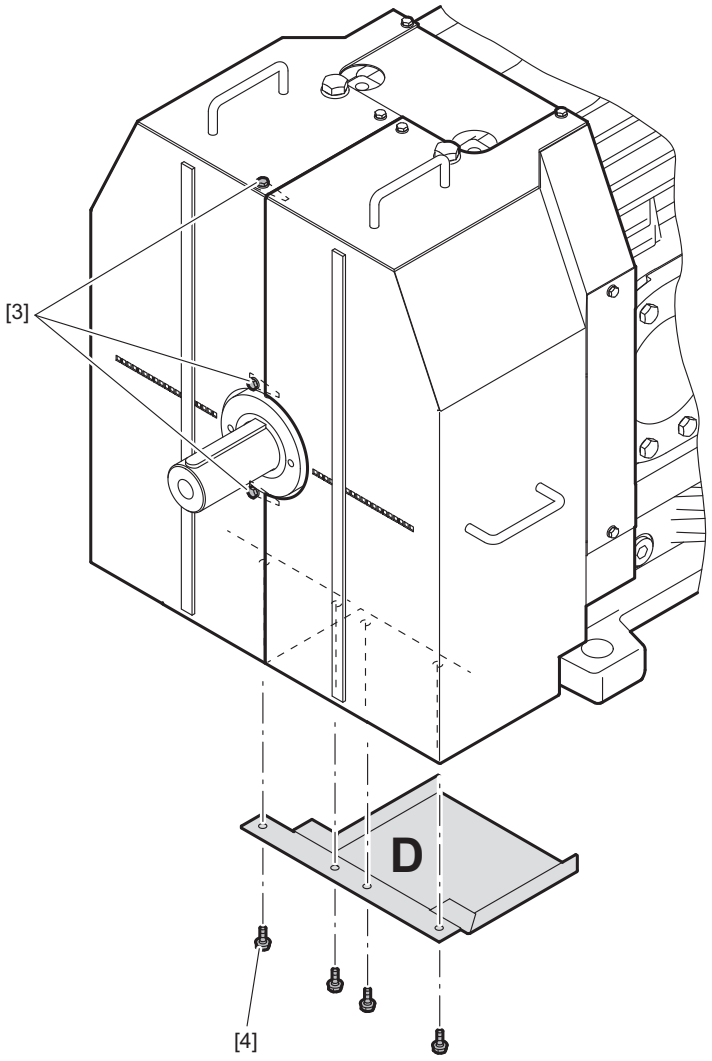


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3. Insert the 3 screws [3].

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4. Mount the fan guards **D** using 4 screws [4].



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5. Before restarting the fan again, make sure the fan guard is mounted properly. For mounting the protection cover, proceed in the reverse order.

7.12 Cleaning the water cooling cover /CCV

7.12.1 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.

7.12.2 Procedure

1. Let the gear unit cool down before you start working on it.
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" (→ 🗎 39).

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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.

7.13 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.

7.13.1 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.

7.13.2 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.

7.13.3 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.

- Use a clean filling aid without zinc coating (plastic funnel or similar).
- 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" (→ 🗎 174).

13. Before restarting the system, vent the pipes.
14. Check the tightness.

7.14 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. Let the gear unit cool down before you start working on it.
2. Remove the cabling of the heating element.
3. Before disassembling the heating element, drain the oil.
4. Screw the heating element out of the gear unit housing.
5. **NOTICE!** Improper cleaning may damage the heating elements. Possible damage to property.
   Clean the tubular heating elements with solvent. Replace any defective heating elements.
6. Apply LOCTITE® 577 to the 2 threads of the heating element.
7. Fasten the heating element by applying torque only to the head of the hex screw.
8. Close the oil drain valve.
9. Pour in new oil of the same grade through the oil fill opening.

- Use a clean filling aid without zinc coating (plastic funnel or similar).
- 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" (→ 🗎 174).

10. Connect the heating element.
11. Check the tightness.

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8 Permitted lubricants

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

8.1 Lubricant selection

Note the following when selecting the lubricants.

NOTICE

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 approvals for specific applications 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 Malfunctions/remedy

9.1 Before you start

Observe the following points when working on the drive:

- De-energize the drive before starting work.
- Secure the drive against unintended power-up.
- Let the unit cool down sufficiently before you start working on it.
- Gear unit and motor may only be disconnected by qualified specialists. Contact SEW-EURODRIVE.

9.2 Service

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

- Complete nameplate data
- Type and extent of the failure
- Time the failure occurred and any accompanying circumstances
- Assumed cause
- Video and audio recordings, if possible

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9.3 Possible malfunctions/remedy

Fault	Possible cause	Measure
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
Unusual, regular running noise	• Meshing/grinding noise: Bearing damage	• Check the oil consistency; change bearings
	• Knocking noise: Irregularity in the gearing	• Contact SEW-EURODRIVE. For a better assessment of the failure, send an audio recording of the noise
	• Deformation of the housing upon tightening	• Check the gear unit mounting for possible deformation and correct if necessary
	• Noise generation caused by insufficient rigidity of the gear unit foundation	• Reinforce the gear unit foundation
Unusual, irregular running noises	• Foreign objects in the oil	• Check the oil consistency • Stop the drive, contact SEW-EURODRIVE
Unusual noise in the area where the gear unit is mounted	• Gear unit mounting has loosened	• Tighten retaining screws and nuts to the specified torque • Replace the damaged/defective retaining screws or nuts
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

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Fault	Possible cause	Measure
Oil leaking • From cover plate • From gear unit cover • From bearing cover • From mounting flange	• Seal not tight at: – Cover plate – Gear unit cover – Bearing cover – Mounting flange	• Tighten the bolts on the respective cover. Observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking
Oil leaking[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	• Retighten screw
	• Fittings loosened	• Retighten the fitting and screw. Secure screw fitting with Loctite®
Severe V-belt wear	• Inadequate alignment of the V-belt pulleys	• Check the alignment of the V-belt pulley and the belt pretension.
	• Harmful ambient conditions (e.g. abrasive particles, chemical substances)	• Protect the belt drive from environmental influences, but also ensure sufficient ventilation.
	• Overload of the belt drive	• Replace the V-belt if necessary; contact SEW-EURODRIVE
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

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Fault	Possible cause	Measure
Gear unit does not reach cold start temperature	• Thermostat set incorrectly	• Check the setting of the thermostat
	• Oil heater faulty or connected incorrectly	• Check if 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

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

9.4 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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10 Contacting SEW-EURODRIVE

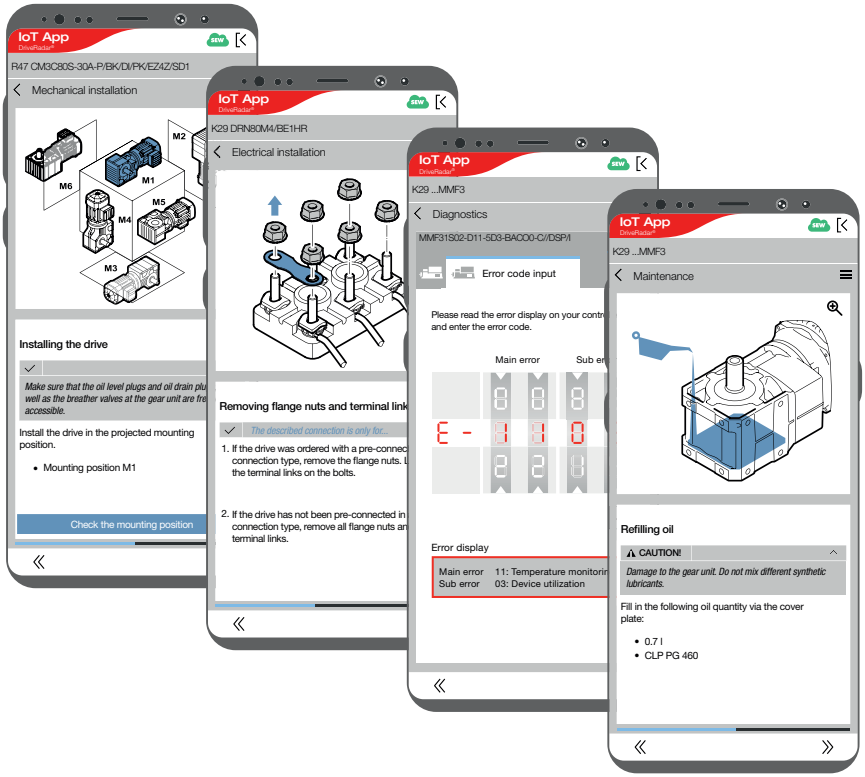
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

https://www.sew-eurodrive.de/contacts-worldwide



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IoT App
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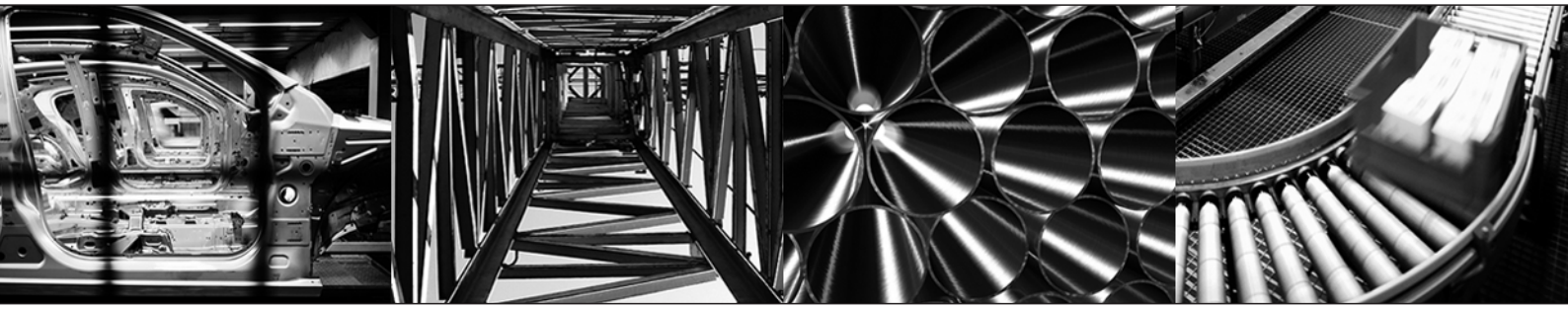


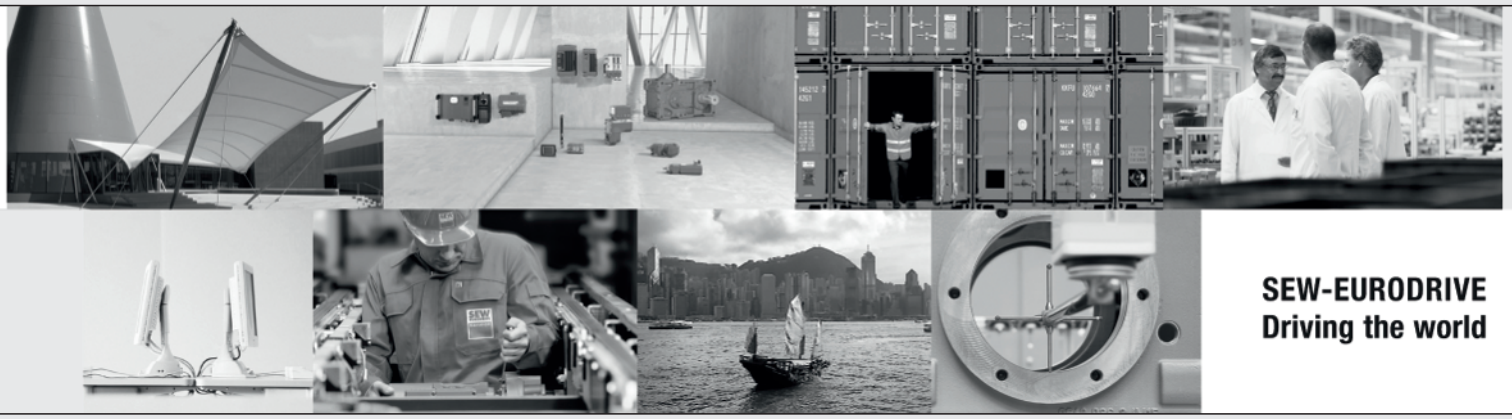
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