



SEW
EURODRIVE

Assembly and operating instructions



Industrial gear units

P-X1.e series bevel planetary gear unit

Torque classes from 24 to 500 kNm



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1 General information

1.1 About this documentation

The documentation at hand is the original.

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

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

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

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

Signal word	Meaning	Consequences if not observed
▲ DANGER	Imminent danger	Death or severe injuries
▲ WARNING	Possibly dangerous situation	Death or severe injuries
▲ CAUTION	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment

1.2.2 Structure of section-related safety notes

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

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



SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

Meaning of the hazard symbols

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

Hazard symbol	Meaning
	General hazard
	Warning of dangerous electrical voltage
	Warning of automatic startup

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

1.3 Decimal separator in numerical values

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

Example: 30.5 kg

1.4 Recycling, reprocessing, reuse

When manufacturing products, SEW-EURODRIVE makes sure to keep the use of new natural resources to a minimum in the interests of the circular economy. Key aspects here are the recycling of materials as well as the inspection and/or processing of returned components and their reuse in new products. These processes are only used at SEW-EURODRIVE if the resulting materials and components correspond to the quality of new products.

1.5 Product names and trademarks

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

1.6 Copyright notice

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1.7 Other applicable documentation

The following documentation and documents should also be observed:

- If using gearmotors, also refer to the safety notes for motors in the corresponding operating instructions.
- Operating instructions of the attached options (if applicable).
- Order-specific documentation, such as:
 - Dimension sheet
 - Technical specifications
 - Spare and wearing parts list

1.8 Symbols on the gear units

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

Icons	Meaning
	Indicates the oil filling point . Also serves as proper ventilation when changing the oil.
	Indicates the oil drain .
	Indicates the position of the breather . Serves to avoid mistaking the oil measuring position for the venting position.
	Used to avoid faults due to lack of understanding. Observe the information in the operating instructions.
	Indicates the magnetic oil dipstick .
	Indicates the magnetic oil drain plug .
	Indicates the position of the relubrication points and makes it easier to find the points to be lubricated. Helps prevent bearing damage.

Icons	Meaning
	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 .
	Indicates the grease drain screw and is used to locate the grease drain option.
	Indicates the air outlet screw .
	Caution: Risk of burns due to hot surface.
	Caution: Removing the dipstick during operation may result in damage to the gear unit.
	Caution: Risk of burns due to hot gear oil.

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

Meaning	
The brake is not set at the factory.	
 18855199	VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE DE Die Bremse ist ab Werk nicht eingestellt. Mögliche Sachschäden! • Bremse vor der Inbetriebnahme gemäß Betriebsanleitung einstellen
	EN The brake has not been set at the factory Potential damage to property! • Prior to startup, set the brake according to the operating instructions.
	F Le frein n'est pas réglé d'usine. Risque de dommages matériels ! • Avant la mise en service, régler le frein conformément aux instructions de la notice d'exploitation.
	ES El freno no viene ajustado de fábrica. ¡Posibles daños materiales! • Antes de la puesta en marcha, ajustar el freno según las instrucciones de funcionamiento.
 18977405	DE Kupplung wird ohne Fett geliefert. Mögliche Sachschäden! • Vor der Inbetriebnahme Kupplung mit Fett befüllen.
	EN Coupling delivered without grease Possible damage to property. • Fill coupling with grease prior to startup.
	F L'accouplement est livré sans graisse. Risque de dommages matériels ! • Avant la mise en service, remplir l'accouplement de graisse.
	ES El acoplamiento se suministra sin grasa. ¡Posibles daños materiales! • Llenar el acoplamiento con grasa antes de la puesta en marcha.
 18977405	NL Koppeling wordt zonder vet geleverd. Mogelijke materiële schade! • Koppeling vóór de inbedrijfstelling met vet vullen.
	PL Sprzęgło jest dostarczane bez smaru. Możliwe szkody materialne! • Przed uruchomieniem należy napędzić sprzęgło smarem.

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9007204570573323

Meaning

The coupling is delivered without oil.

VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE			
  18977413	(DE) Kupplung wird ohne Öl geliefert. Mögliche Sachschäden! • Vor der Inbetriebnahme Kupplung mit Öl befüllen.	(EN) Coupling delivered without oil Possible damage to property. • Fill coupling with oil prior to startup.	
	(F) L'accouplement est livré sans huile. Risque de dommages matériels ! • Avant la mise en service, remplir l'accouplement d'huile.	(ES) El acoplamiento se suministra sin aceite. ¡Posibles daños materiales! • Llenar el acoplamiento con aceite antes de la puesta en marcha.	
	(NL) Koppeling wordt zonder olie geleverd. Mogelijke materiële schade! • Koppeling vóór de inbedrijfstelling met olie vullen.	(PL) Sprzęgło jest dostarczane bez oleju. Możliwe szkody materialne! • Przed uruchomieniem należy napelnić sprzęgło olejem.	

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The gear unit is protected against corrosion with VCI.

VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE				
  18977421	(DE) Getriebe ist mit VCI rostgeschützt. Nicht öffnen! Mögliche Sachschäden! • Vor der Inbetriebnahme Vorarbeiten gemäß Betriebsanleitung durchführen. • Keine offene Flamme!		(EN) Gear unit with VCI corrosion protection. Do not open! Potential damage to property! • Prior to startup, perform preliminary work according to operating instructions • No open flames!	
	(F) Réducteur protégé contre la corrosion avec VCI. Ne pas ouvrir Risque de dommages matériels ! • Avant la mise en service, réaliser les travaux préliminaires indiqués dans la notice d'exploitation. • Pas de flammes ouvertes !		(ES) Reductor está protegido con VCI contra la corrosión. ¡No abrir! ¡Posibles daños materiales! • Antes de la puesta en marcha, efectuar los trabajos preparatorios según las instrucciones de funcionamiento. • No debe haber fuego abierto.	
	(NL) Tandwielkast is met VCI tegen corrosie beschermd. Niet openen! Mogelijke materiële schade! • Vóór de inbedrijfstelling voorbereidingen conform technische handleiding uitvoeren. • Geen open vuur!		(PL) Przekładnia zabezpieczona jest przed korozją za pomocą środka VCI. Nie otwierać! Możliwe szkody materialne! • Przed uruchomieniem należy przeprowadzić czynności przygotowawcze zgodnie z informacjami zawartymi w instrukcji obsługi! • Unikać otwartych płomieni!	

9007204570575499

Meaning	
The gear unit is delivered without oil.	
VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE   18977383 (DE) Getriebe wird ohne Öl geliefert. Mögliche Sachschäden! • Vor der Inbetriebnahme Ölbefüllung gemäß Betriebsanleitung durchführen. (F) Le réducteur ne contient pas d'huile à la livraison. Dommages matériels possibles ! • Avant la mise en service, effectuer le remplissage d'huile conformément à la notice d'exploitation. (NL) Tandwielkast wordt zonder olie geleverd. Mogelijke materiële schade! • Vóór de inbedrijfstelling olie conform technische handleiding bijvullen. (EN) Gear unit is delivered without oil. Potential damage to property! • Prior to startup, fill in oil according to operating instructions. (ES) El reductor se suministra sin aceite. ¡Posibles daños materiales! • Antes de la puesta en marcha, efectuar el llenado de aceite según las instrucciones de funcionamiento. (PL) Przekładnia dostarczana jest bez oleju. Możliwe straty rzeczowe! • Przed uruchomieniem należy wlać olej zgodnie z informacjami zawartymi w instrukcji obsługi.	
27021603080059659	

1.9 Symbols on the dimension sheet

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

Symbols	Meaning
	Indicates the oil filling point .
	Indicates the oil drain .
	Indicates the position of the breather .
	Indicates the position of the inspection cover .
	Indicates the position of the attachment points for transport .
	Indicates the position of the oil dipstick .
	Indicates the position of the oil level glass .
	Indicates the position of the oil sight glass .
	Indicates the position of the relubrication points .
	Indicates the position of the relubrication points .

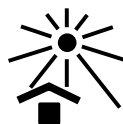
Symbols	Meaning
	Indicates the position of the grease outlet .
	
	
	Indicates the oil inflow .
	Indicates the oil return .
	Indicates the position of the magnetic screw plug .
	Indicates the position of the torque arm .
	Indicates the position of the operator's vibration sensor with connection dimensions.
	Indicates the position of the oil heater .

1.10 Symbols on the packaging

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



Fragile



Protect
from heat



Fasten
here



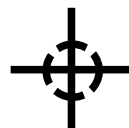
Hand hooks
prohibited



Up



Keep dry



Center of gravity

1811486091

2 Safety notes

2.1 Designated use

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

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

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

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

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

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.

2.1.1 Restrictions of use

The following applications are prohibited unless the device is explicitly designed for such use:

- Use in potentially explosive areas
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, and radiation
- Operation in applications with impermissibly high mechanical vibration and shock loads in excess of the regulations stipulated in EN 60068-2-6 and/or EN 60068-2-27.

2.2 Preliminary information

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

2.3 Duties of the user

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

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

- Setup and installation
- Installation and connection
- Startup

- Maintenance and repairs
- Shutdown
- Disassembly

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

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

2.4 Target group

Specialist for mechanical work	Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of mechanics in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of electrical engineering in accordance with the national regulations • Familiarity with this documentation
Additional qualifications	In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.
Instructed persons	All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.5 Creating a safe working environment

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

Rotating parts

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

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

Falling load

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

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

Hot surfaces

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

- Let the product and its accessories cool down before touching it.
- Do not touch any surfaces of the product during operation, except for the control elements.
- Observe the information signs and product safety labels on the product.

Use of hazardous substances, lubricants, adhesives

Observe the following information to avoid poisoning or fire hazards:

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

Missing protective equipment

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

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

2.5.2 Performing electrical work safely

Observe the following information to perform electrical work safely:

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

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

Live parts

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

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

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

2.6 Transportation

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

Observe the following information to avoid danger.

- Secure the gear unit against falling over during the lifting process.
- Use suitable, adequately dimensioned, and undamaged means of 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.

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.

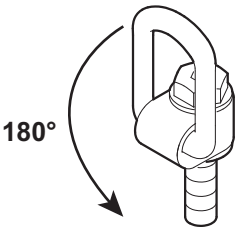
Always observe the product safety labels attached to the gear unit. They have the following meaning:

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.

3 Transportation/storage

Before transporting the gear unit, observe the safety notes in chapter "Transportation" (→ 18) and the following information.

- The weight of the gear unit (without oil) is indicated on the nameplate or on the dimension sheet. Comply with the loads and regulations specified there.
- If possible, transport the gear unit without oil fill. If this is not possible, note that the weight information on the nameplate refers only to the no-load weight of the gear unit.
- Only use the specified attachment points [1] to transport the gear unit, see the following illustrations and order documents. The load suspensions of the motor or mount-on components are provided for stabilization purposes only.
- Make sure that the lifting eyebolts are screwed in completely and are flush to the contact surface. Tighten the lifting eyebolts at least hand-tight. Observe the following information.



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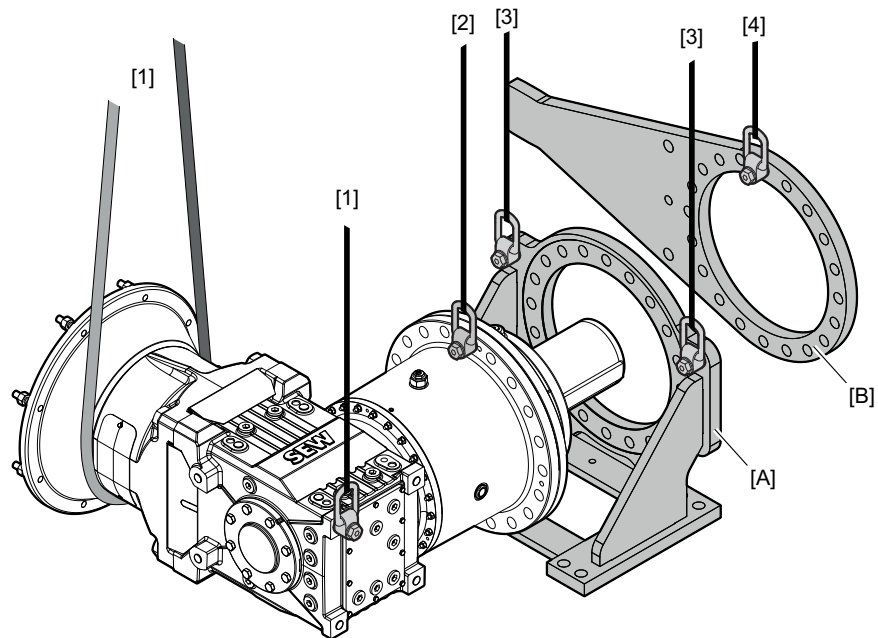
Lifting eyebolts DIN 580/DIN 582	
Correct: Angle of tension force vector towards the eye plane, max. 45°	Incorrect: Tension away from the eye plane

3.1 Procedure

Observe the operating instructions of the motor when lifting the motor.

3.1.1 Gear unit in mounting position M1/0° (also applies to M1/180°) without motor

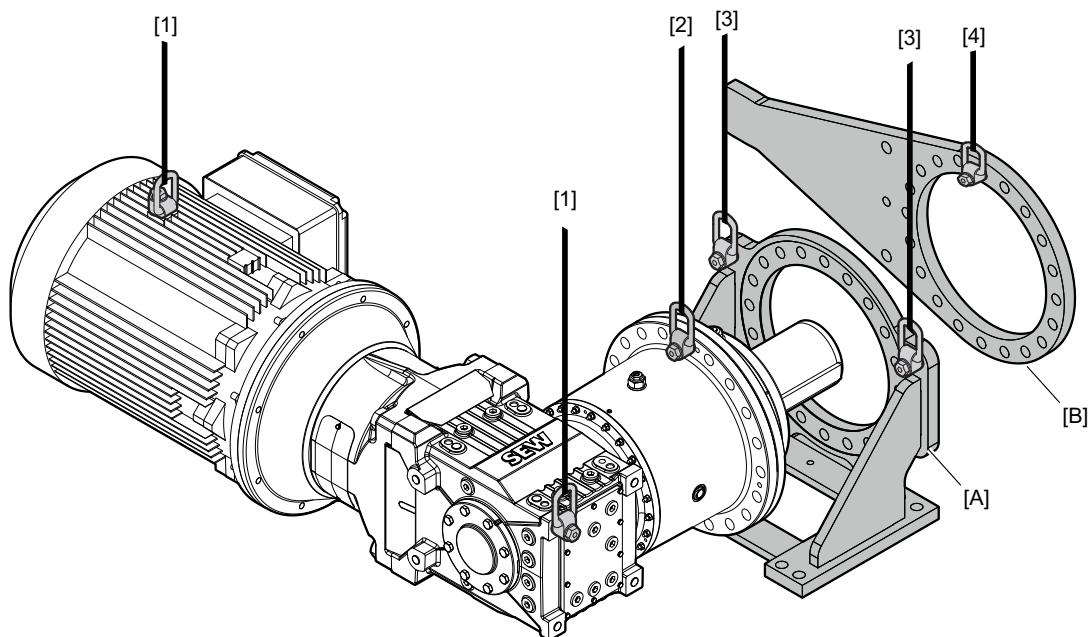
To transport the gear unit, only use only the provided attachment points [1] [2]. If a foot-mounted design [A] is installed, the attachment points [3] replace the attachment point [2]. If a torque arm [B] is installed, the attachment point [4] replaces the attachment point [2].



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3.1.2 Gear unit in mounting position M1/0° (also applies to M1/180°) with motor

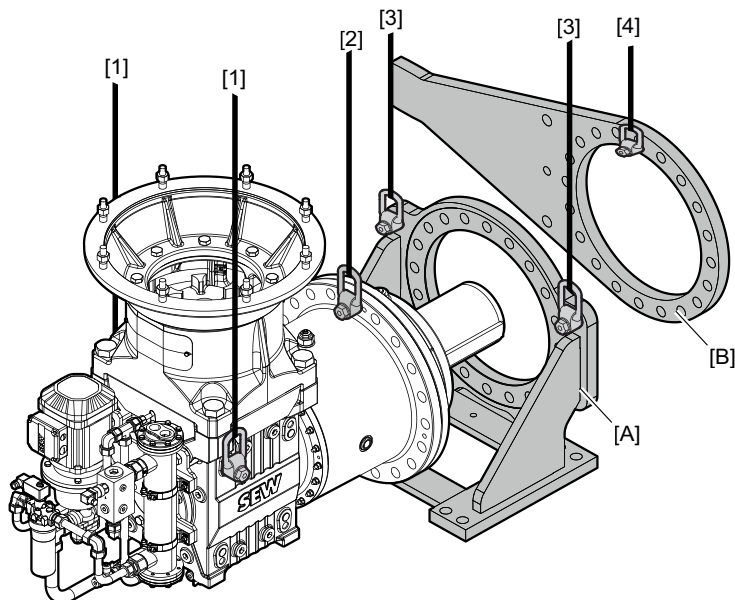
To transport the gear unit, only use only the provided attachment points [1] [2]. If a foot-mounted design [A] is installed, the attachment points [3] replace the attachment point [2]. If a torque arm [B] is installed, the attachment point [4] replaces the attachment point [2].



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3.1.3 Gear units in mounting position M1/270° without motor

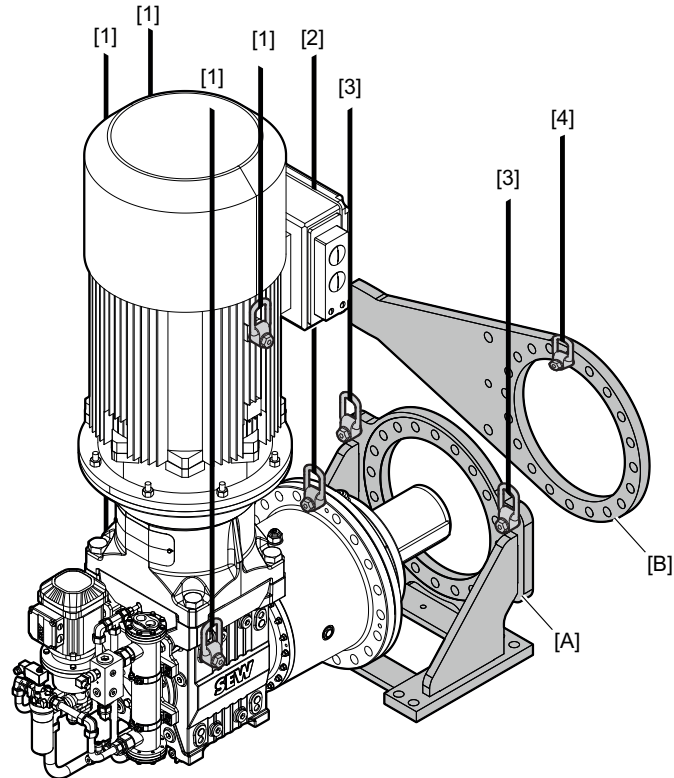
To transport the gear unit, only use only the provided attachment points [1] [2]. If a foot-mounted design [A] is installed, the attachment points [3] replace the attachment point [2]. If a torque arm [B] is installed, the attachment point [4] replaces the attachment point [2].



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3.1.4 Gear units in mounting position M1/270° with motor

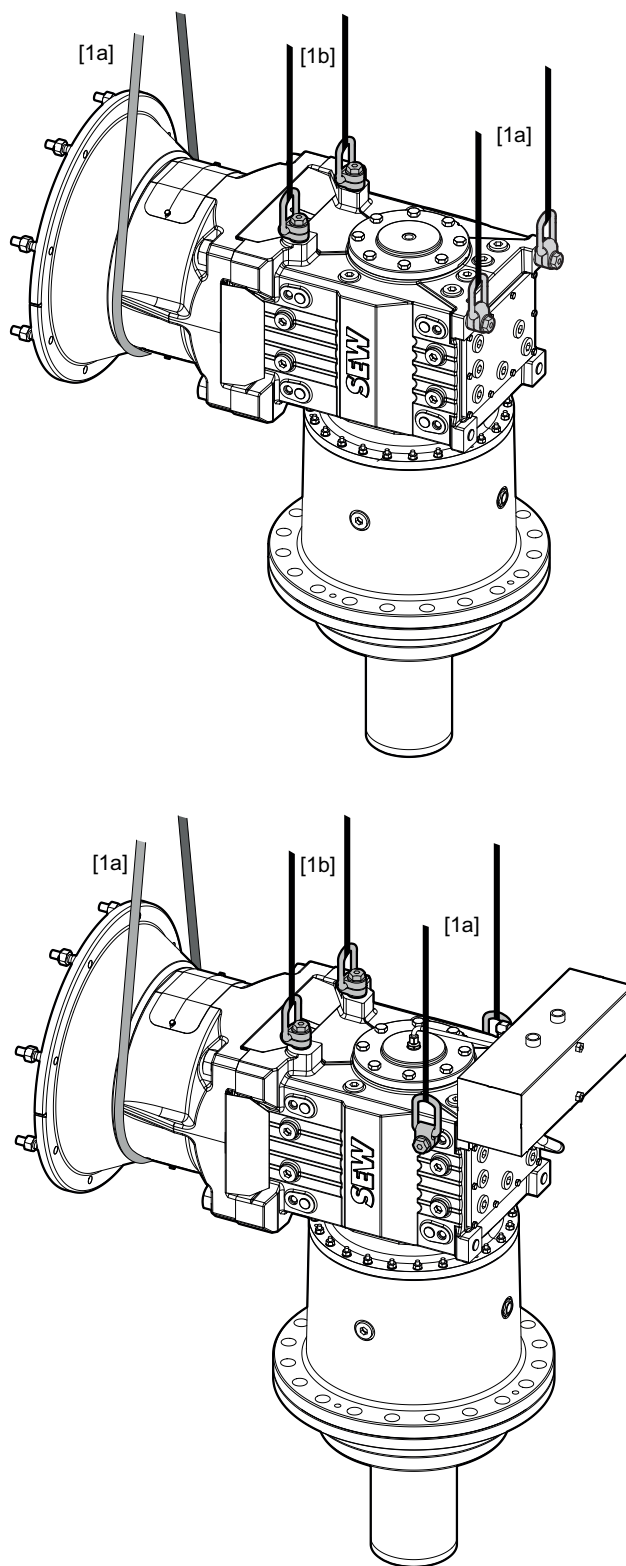
To transport the gear unit, only use only the provided attachment points [1] [2]. If a foot-mounted design [A] is installed, the attachment points [3] replace the attachment point [2]. If a torque arm [B] is installed, the attachment point [4] replaces the attachment point [2].



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3.1.5 Gear units in mounting position M4/0° without motor

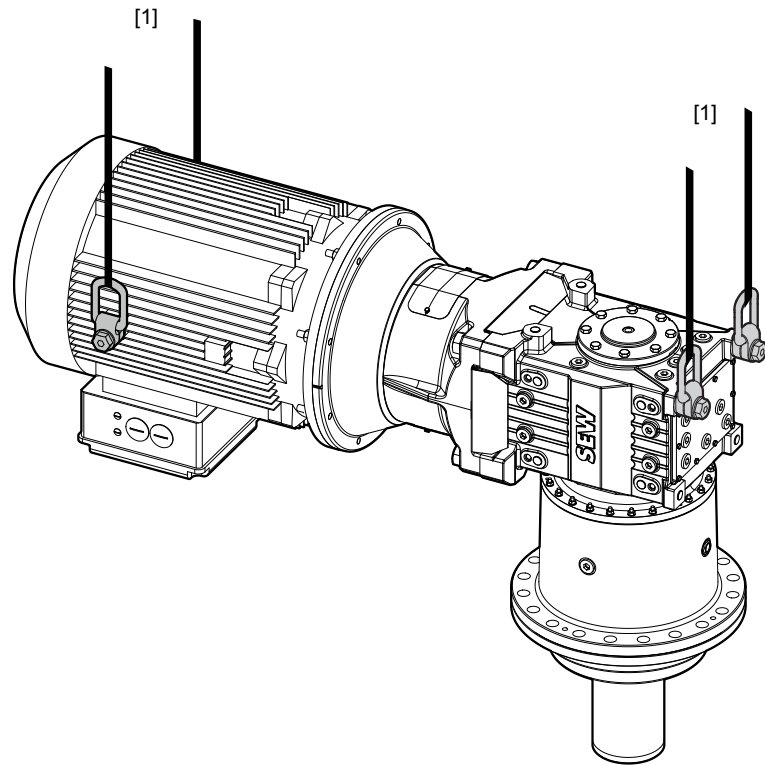
Use the attachment points [1a]. In case of difficult spaces, the attachment points [1b] can be used as an alternative.



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3.1.6 Gear unit in mounting position M4/0° with motor



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3.2 Storage and transport conditions

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

3.2.1 Internal conservation

Standard corrosion protection

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

Long-term corrosion protection

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

Corrosion protection with VCI anti-corrosion agent is not permitted for gear units that are operated with food grade lubricants. Contact SEW-EURODRIVE in such cases.

3.2.2 Exterior corrosion protection

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

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

3.2.3 Packaging

Standard packaging

The gear unit is delivered on a pallet without cover.

Use: transport by truck or rail

Long-term packaging

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

Use: transport by ship and/or extended storage

3.2.4 Storage conditions

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

- While in storage until startup, the gear unit must be stored in a shock-free manner to prevent damage to the rolling bearing races.

- 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 Anti-corit 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

3.3 Gear unit shutdown / gear unit preservation



⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

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

Additional preservation measures are required if the gear unit is to be shut-down for a longer period. While doing so, be mindful of the gear unit's installation location, ambient conditions, and condition of the lubricant. Depending on the conditions, corrosion protection may already be required a few weeks after idling time.

3.3.1 Internal preservation

Observe the following points when applying the corrosion protection on the gear unit.

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. Anticorit VCI UNI O-40 from FUCHS LUBRITECH, www.fuchs-lubritech.com). The quantity depends on the available internal volume of the gear unit. Filled oil can usually remain in the drive.
- Replace the breather with a screw plug and close the gear unit so that it is air tight. The breather must be installed correctly again before startup.

After longer gear unit operation

- As the oil might be contaminated (due to e.g. oil sludge, water, etc.) after longer operating periods, drain the oil and thoroughly rinse the inside of the gear unit with new oil prior to preservation. Observe the notes in chapter "Changing the oil" (→ 150). The inside of the gear unit can then be protected again corrosion as described above.

Alternatively, you can perform the internal preservation with the oil type specified on the nameplate. In this case, fill the gear unit completely 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.

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

3.3.2 Exterior corrosion protection

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



INFORMATION

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

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

Refer to chapter "Startup" before restarting the gear unit.

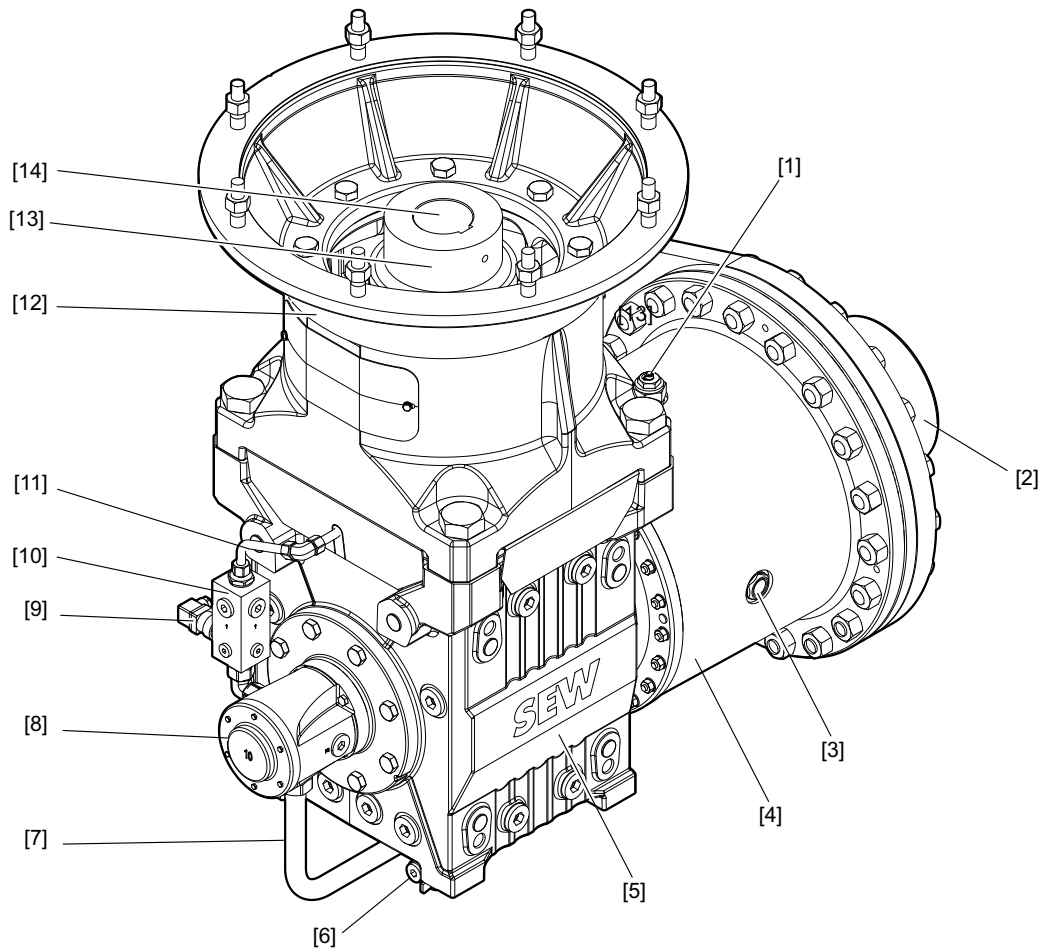
4 Gear unit structure

4.1 Overview of gear unit and mount-on components

The gear unit is a combination of:

- Output stage: P2..e or P... series planetary gear unit
- Primary gear unit: X1KP..e bevel-helical gear unit
- Optional system components: Oil heater, water cooling cartridges, fan in motor adapter, motor, coupling, shaft end pump or oil cooling system with pressure lubrication.
- Optional mount-on parts: Motor adapter, torque arm, foot mounting

The gear units have a **shared oil chamber**.



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- | | |
|-----------------------------|---------------------------|
| [1] Breather | [8] Shaft end pump |
| [2] Output shaft | [9] Pressure switch |
| [3] Oil sight glass | [10] Gauge mounting block |
| [4] Planetary gear unit | [11] Pressure pipe |
| [5] Bevel-helical gear unit | [12] Motor adapter |
| [6] Oil drain valve | [13] Coupling |
| [7] Suction pipe | [14] Input shaft |

4.2 Nameplate

The following figure shows the structure of the nameplate:

[1] **SEW-EURODRIVE** 76646 Bruchsal/Germany

[2] Type P2PH042e/TX1KP080e/HP/F

[3] Nr. 01.1234567812.0001.06

[4] min. [5] norm. [6] max. i 108,64 [15]

[7] PK1 kW 121 151 165 Fs 2.0 [16]

[8] MK Nm 50000 50000 91340 PM kW 165 [17]

[9] n1 rpm 1200 1477 1800 Ta °C 0...+40 [18]

[10] n2 rpm 11.0 13.8 16.6 1743 895 0.13

[11] IM M1/270°

[12] Made in Germany

[13] Qty. of greasing points 0 Fans 0 [19] Mass kg 1087 [20] Year 2025 [21]

[14] Synthetic Oil CLP HC320 – 35,5 ltr.

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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
[21]	• Year of manufacture

4.3 Type designation

The following example shows the structure of the type designation:

P2PH042e/T X1KP080e/HP/F	
P	Industrial gear unit series
2	Number of gear unit stages • 2 = 2-stage
P	Gear unit design • P = Coaxial design
H	Output shaft type • S = Solid shaft with key • R = Smooth solid shaft • L = Splined solid shaft • H = Hollow shaft with shrink disk • V = Splined hollow shaft
042	Planetary gear unit size • 002 – 0102
e	Generation P2.e
T	Gear unit mounting • /B = Foot • /T = Torque arm • /F = Flange
X	Industrial gear unit series
1	Number of gear unit stages • 1 = Single-stage
K	Gear unit design • K = Bevel-helical gear unit
P	Output shaft type • P = Intermediate shaft for planetary gear units
080	Gear unit size • 60 – 100
e	Generation X.e
HP	Housing design • HP = Housing for planetary gear units
F	Gear unit mounting • /F = Flange

4.4 Abbreviations for output shaft designs

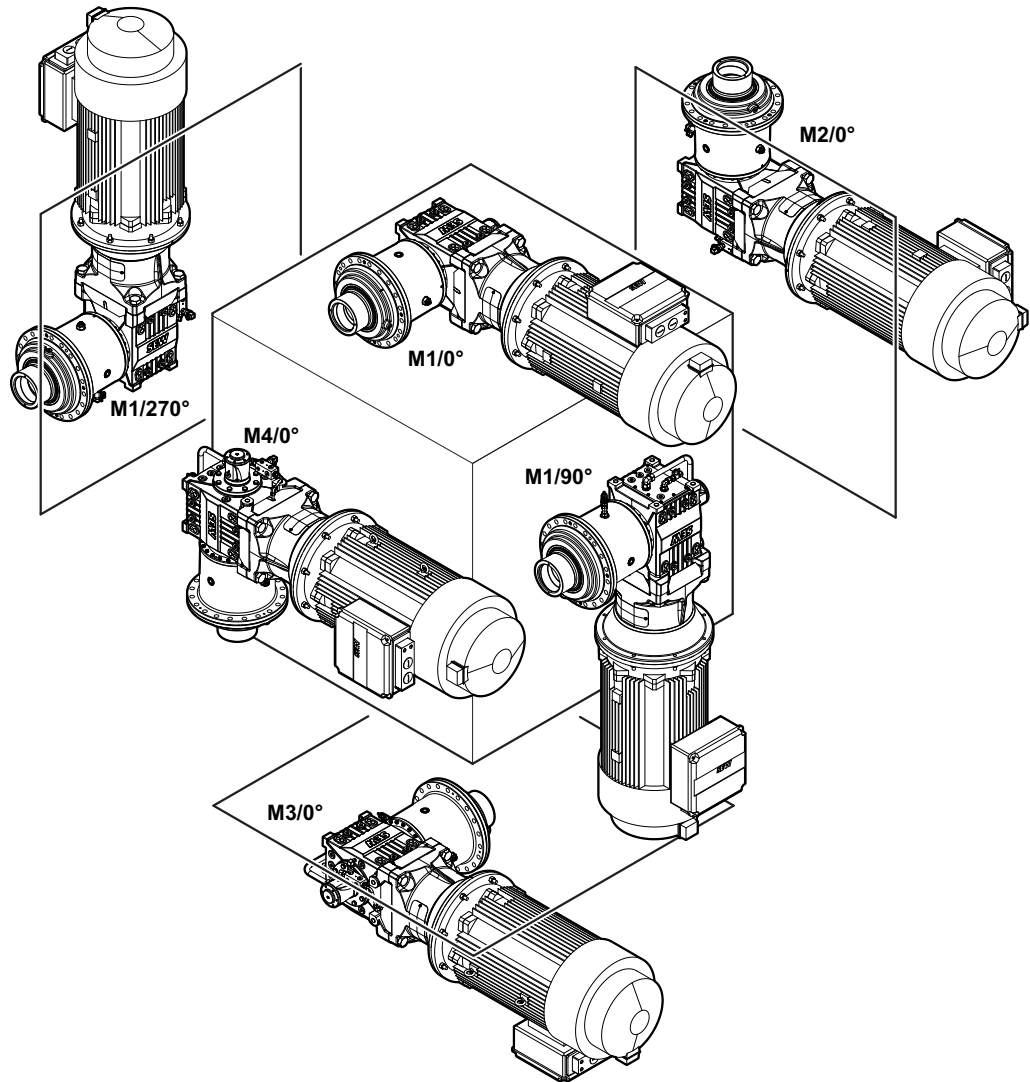
..PHF042e/T	
P	• Gear unit design
H	Output shaft type: • - = Solid shaft with key(s) (1 or 2) • R = Smooth solid shaft • L = Splining on the outside • H = Shrink disk
F	Gear unit mounting: • - = Foot-mounted design • F = Flange-mounted design
042	• Size
/T	• Torque arm

4.5 Mounting position

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

Definition

The mounting position of the combined gear unit corresponds to the planetary stage. The mounting position of the primary gear unit is specified as an angle. Different mounting positions result from the angle of view of the primary gear unit. For further information, refer to the following chapter "Mounting positions of primary gear units".



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4.6 Mounting positions of primary gear units

The following information is defined.

P... M1	
X1KP 0° (M1)	X1KP 270° (M4)
X1KP 90° (*)	X1KP 180° (M3)

P... M2	
X1KP 0° (*)	X1KP 270° (*)
X1KP 90° (*)	X1KP 180° (*)

P... M3	
X1KP 0° (M3)	X1KP 270° (*)
X1KP 90° (M4)	X1KP 180° (M1)

P... M4	
X1KP 0° (M5)	X1KP 270° (M5)
X1KP 90° (M5)	X1KP 180° (M5)

P... M5	
X1KP 0° (*)	X1KP 270° (M1)
X1KP 90° (M3)	X1KP 180° (M4)

P... M6	
X1KP 0° (M4)	X1KP 270° (M3)
X1KP 90° (M1)	X1KP 180° (*)

M1/M2/M3/M4/M5/M6

= Mounting positions of the gear unit position

0°/90°/180°/270°

= Mounting position of the X1KP...e bevel-helical gear unit

(*) In case of this mounting position, contact SEW-EURODRIVE.

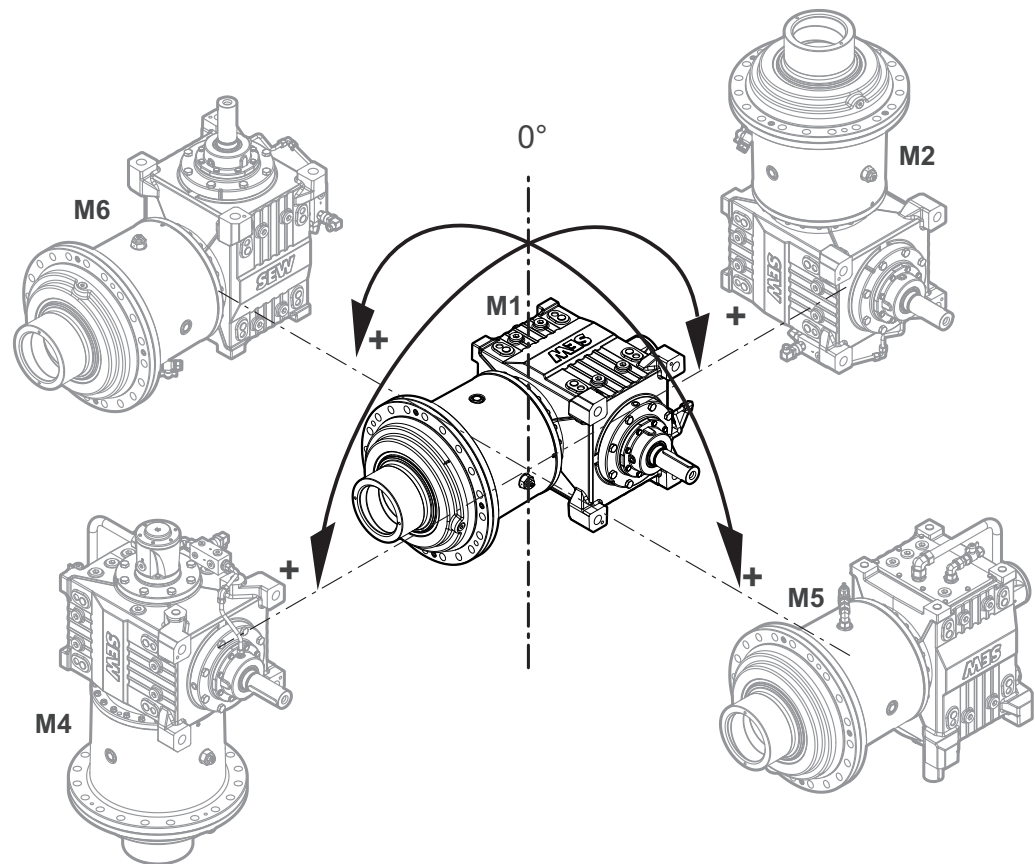
4.7 Fixed and variable pivoted mounting positions

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

INFORMATION



- Fixed and variable pivoted mounting positions are only possible after consultation with SEW-EURODRIVE. Observe the order documents, e.g. the dimension sheet.
- Fixed and variable pivoted mounting positions may involve restrictions for accessories and technical data and possibly longer delivery times. Contact SEW-EURODRIVE.



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4.7.1 Fixed pivoted mounting position

Definition:

Gear units with fixed pivoted mounting position have a fixed mounting position that differs from the standard.

This means the gear unit does not change its mounting position during operation.

Example:

The type designation is set up as follows:

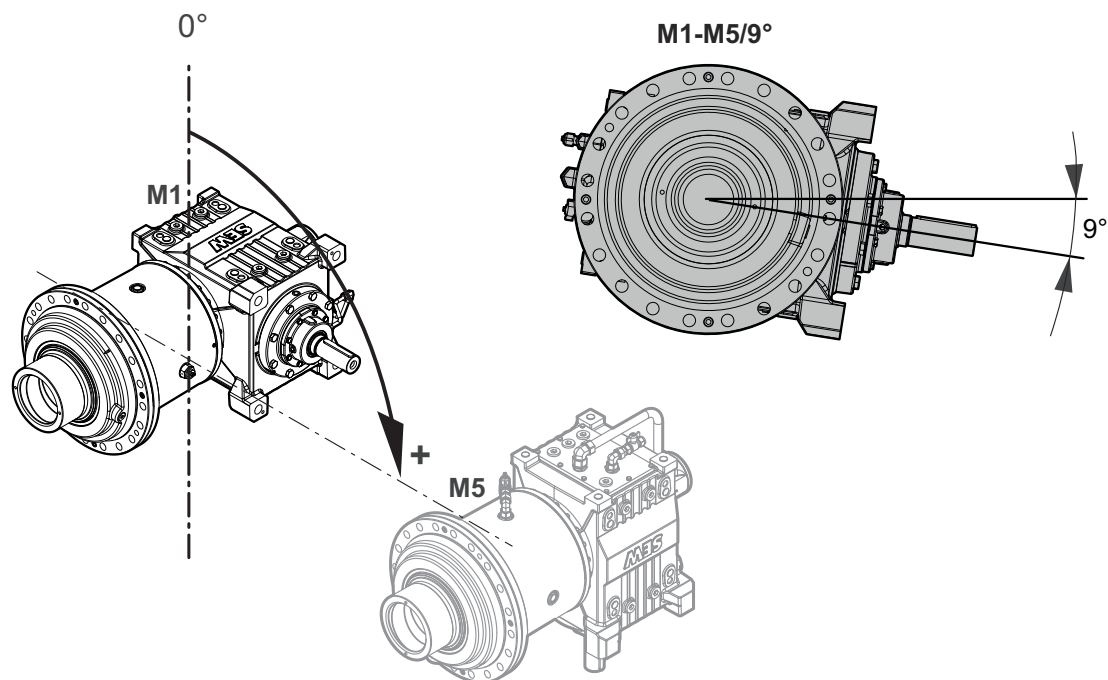
M1 = Initial mounting position

M5 = Pivoting direction

9° = Fixed pivoting angle

Pivoted from mounting position M1 to M5 by 9°

This results in the following fixed pivoted mounting position:



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

4 Gear unit structure

Fixed and variable pivoted mounting positions

The fixed pivoted mounting position is shown on the nameplate.



		min.	nom.	max.	i	
Type		P2PH042e/T X1KP080e/HP/F				
Nr.		01.1234567812.0001.06				
PK1	kW	121	151	165	Fs	108,64
MK	Nm	50000	50000	91340	PM kW	2.0
n1	rpm	1200	1477	1800	Ta °C	165
n2	rpm	11.0	13.8	16.6		0...+40
IM		1743 895 0.13				
IM		M1 – M5/9°				
Made in Germany						
Qty. of greasing points		0	Fans	0	Mass kg	1087
					Year	2024
Synthetic Oil CLP HC320 – 35,5 ltr.						

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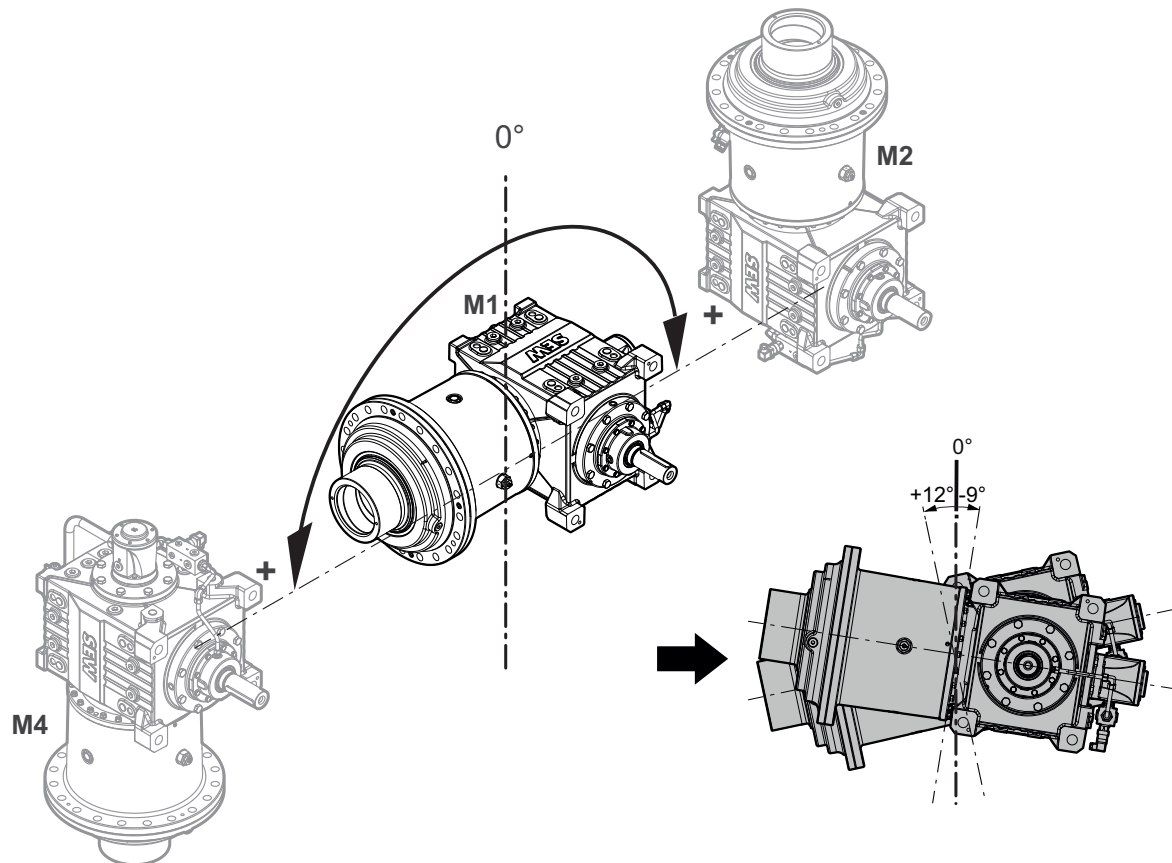
4.7.2 Variable pivoted mounting position

Definition:

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

Example:

The gear unit is operated in variable pivoted mounting position M1 to M2 by 9° and M1 to M4 by 12° .



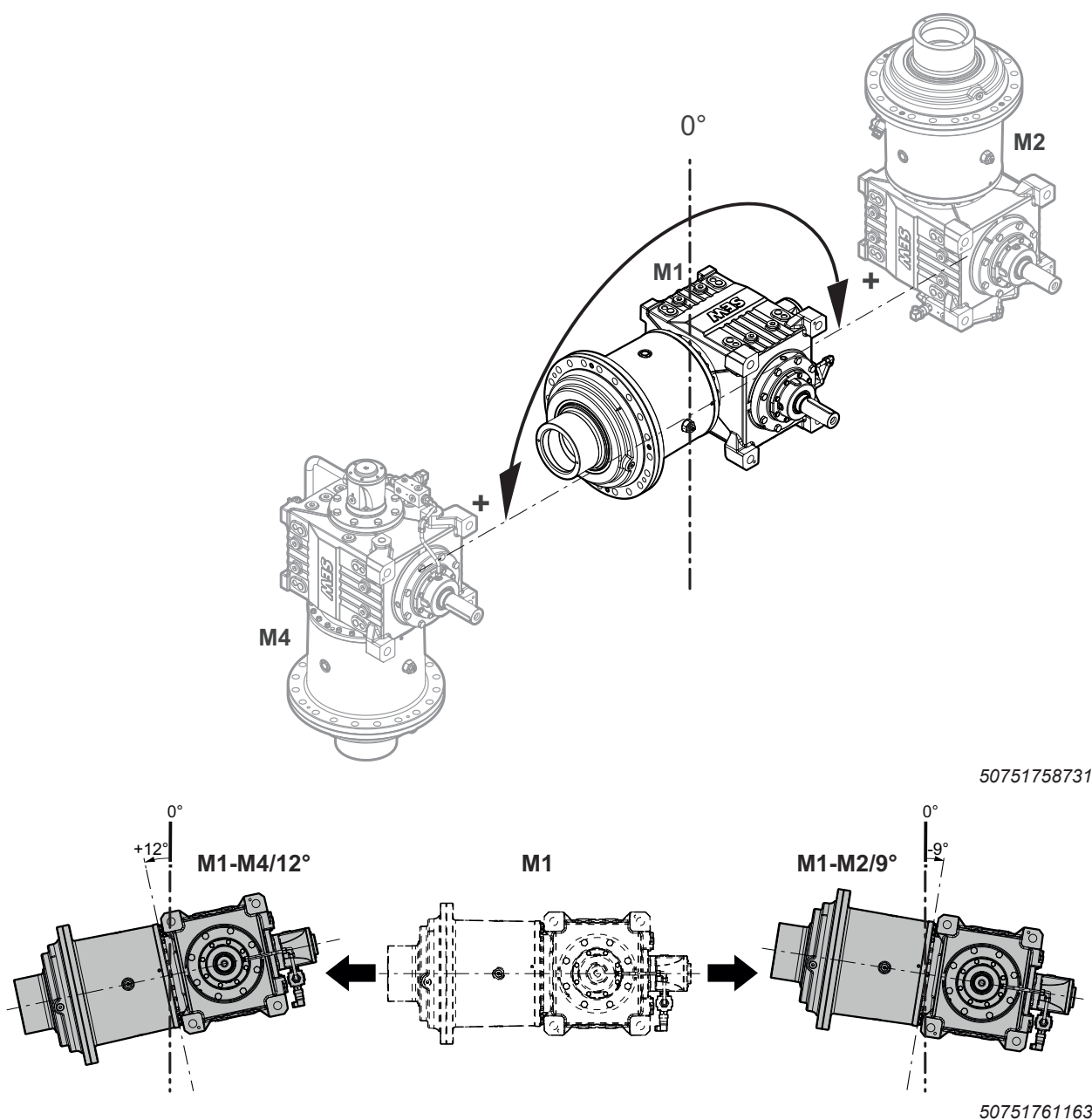
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Step 1:

The largest pivoting angle determines the positive pivoting direction ($12^\circ > 9^\circ$). In this example, this is 12° towards M4.

Pivoted from M1 to M4 by $+12^\circ$

Pivoted from M1 to M2 by -9°



This example results in the following type designation:

M1 – M4/ -9° – 12°

M1 = Initial mounting position

M4 = Pivoting direction

12° = 12° from M1 to M4

-9° = 9° from M1 to M2 (= -9° from M1 to M4)

The variable pivoted mounting position is shown on the nameplate.

SEW-EURODRIVE

76646 Bruchsal/Germany

Type

P2PH042e/T X1KP080e/HP/F

Nr.

01.1234567812.0001.06

min.

nom.

max.

i

121

151

165

108,64

PK1

kW

Fs

50000

50000

91340

PM

kW

165

MK

Nm

1200

1477

1800

Ta

°C

0...+40

n1

rpm

11.0

13.8

16.6

1743 895 0.13

n2

rpm

M1 – M4/-9° – 12°

IM

Made in Germany

Qty. of greasing points

0

Fans

0

Mass kg

1087

Year

2024

Synthetic Oil CLP HC320 – 35,5 ltr.

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Step 2:

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

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

01.1807051011.0001.12

M1 – M4 / 10 °

1986 968 1DE

M2

M1

M4

M6

M1

M5

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SEW
EURODRIVE

Assembly and operating instructions – P-X1.e series bevel planetary gear unit

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4.7.3 Combination of fixed and variable pivoted mounting positions

Fixed and variable pivoted mounting positions can be combined.

Example:

The following example shows a combination of a fixed and variable pivoted mounting position.

The type designation is set up as follows:

M1 – M4/9° (Fixed pivoted mounting position)

M1 = Initial mounting position

M4 = Pivoting direction

9° = Fixed pivoting angle

M1 – M6/-9° – 12° (Variable pivoted mounting position)

M1 = Initial mounting position

M6 = Pivoting direction

12° = 12° from M1 to M6

-9° = 9° from M1 to M5 (= -9° from M1 to M6)

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

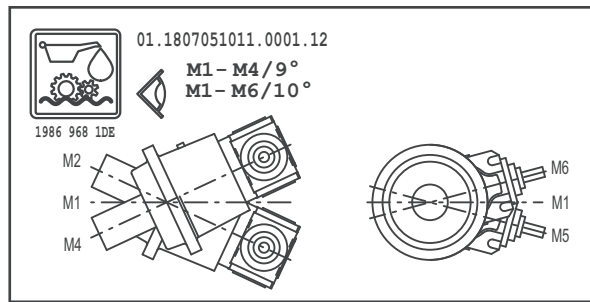
SEW-EURODRIVE		76646 Bruchsal/Germany	
Type	P2PH042e/T X1KP080e/HP/F		
Nr.	01.1234567812.0001.06		
	min.	nom.	max.
PK1 kW	121	151	165
MK Nm	50000	50000	91340
n1 rpm	1200	1477	1800
n2 rpm	11.0	13.8	16.6
i	108,64		
Fs	2.0		
PM kW	165		
Ta °C	0...+40		
IM	M1 – M4/9° M1 – M6/-9 – 12°		
Made in Germany			
Qty. of greasing points	0	Fans	0
Mass kg	1087	Year	2024
Synthetic Oil CLP HC320 – 35,5 ltr.			

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

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

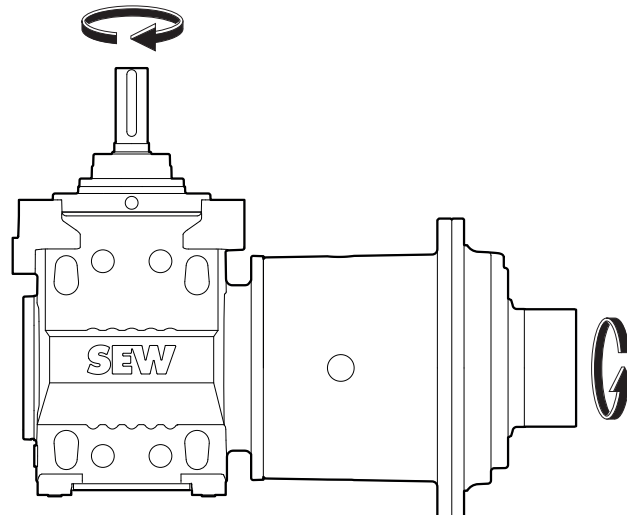
In this example, the user checks the oil level at M1 – M4/9° M1 – M6/10°.



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4.8 Direction of rotation dependencies

The following figure shows the direction of rotation dependencies between input and output shaft. The gear unit and the position of the backstop are schematically depicted.



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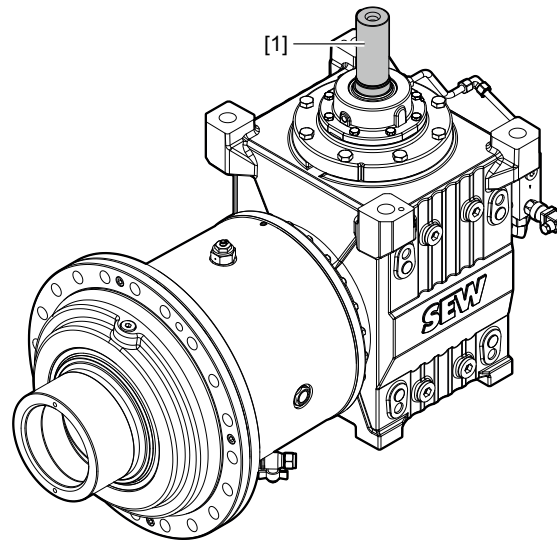
4.9 Input and output shafts

There are 2 types of shafts:

- High-speed shaft (**HSS**), usually an input shaft
- Low-speed shaft (**LSS**), usually an output shaft

4.9.1 Input shaft

The input shaft (HSS) is provided with a closed keyway according to DIN 6885/T1 and a center bore according to DIN 332. The delivery includes a matching key in accordance with DIN 6885/T1 – form A.

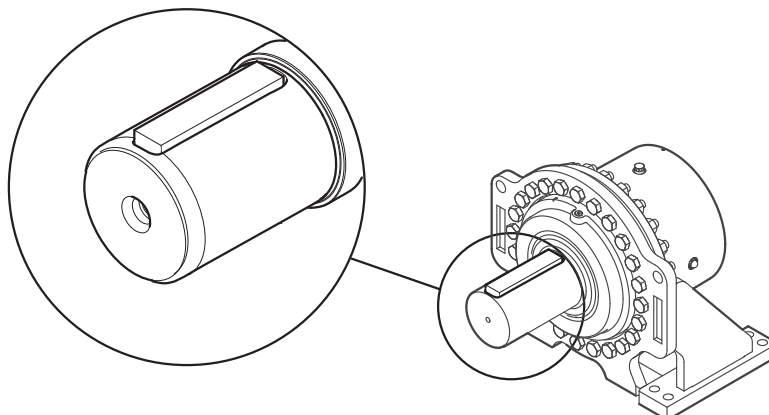


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4.9.2 Output shaft designs

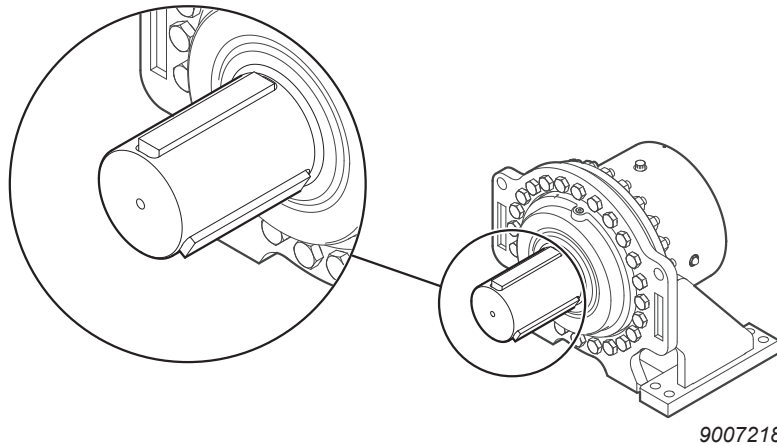
The output shaft [LSS] of the planetary gear unit is available in the following designs:

Output shaft as solid shaft with key P2.e./..S or P../.._

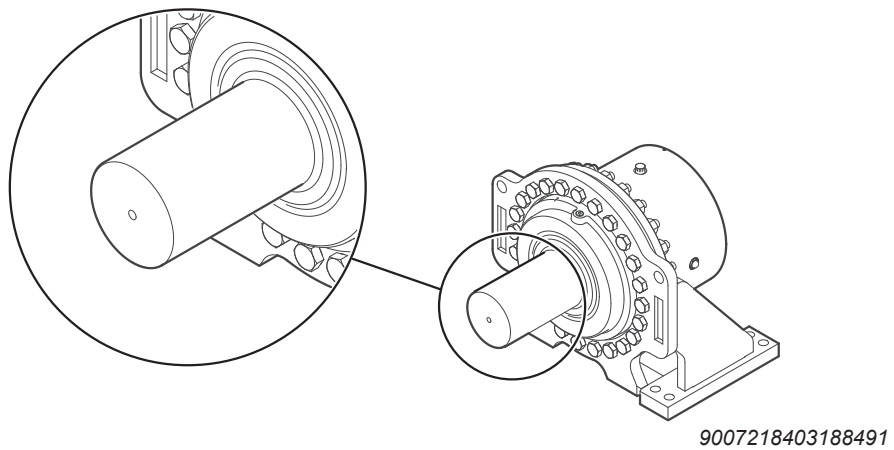


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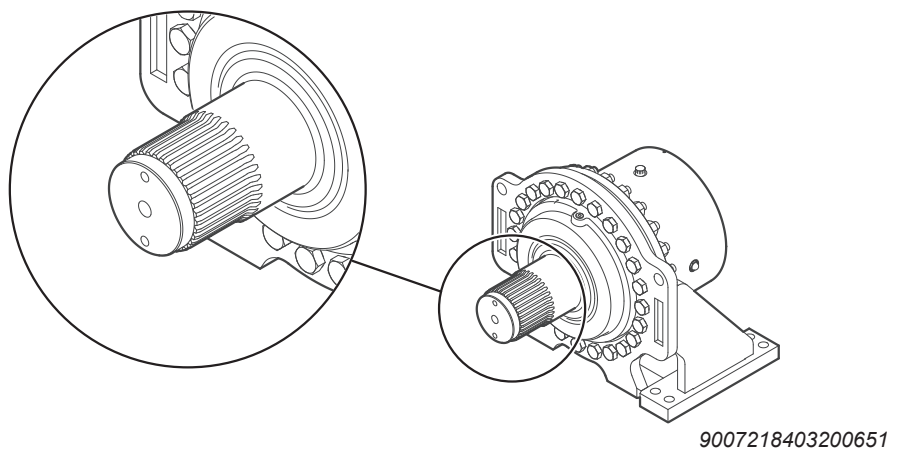
Output shaft as solid shaft with 2 keys P2.e../..S or P../.._



Output shaft as a smooth solid shaft /..R



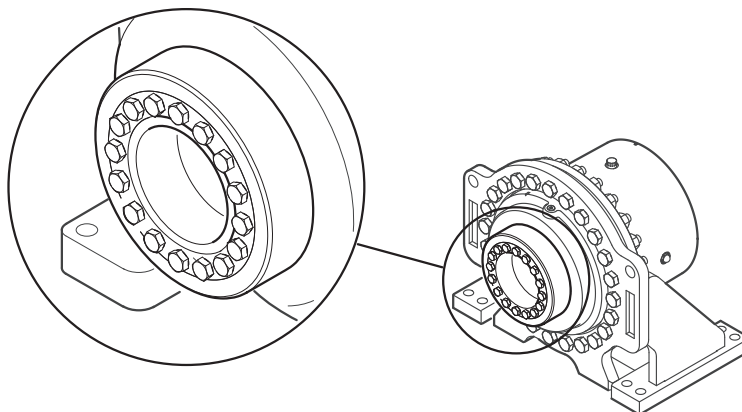
Output shaft as a splined solid shaft /..L



4 Gear unit structure

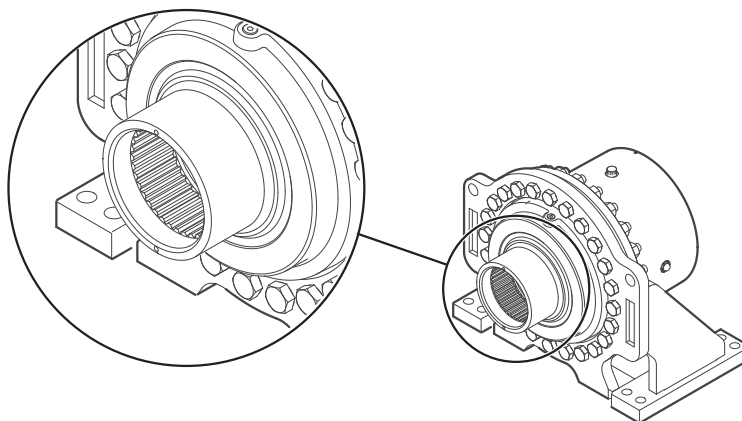
Input and output shafts

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



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Output shaft as a splined hollow shaft /..V

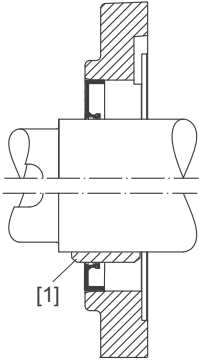
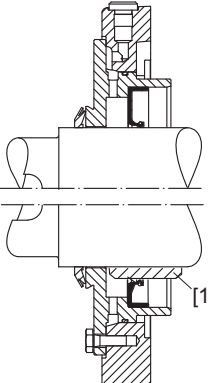
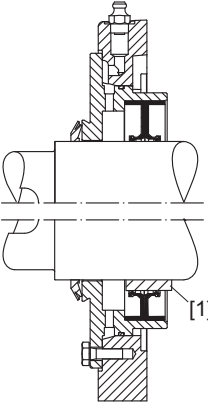
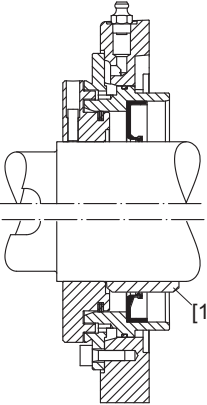


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4.10 Sealing system

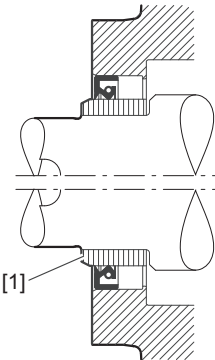
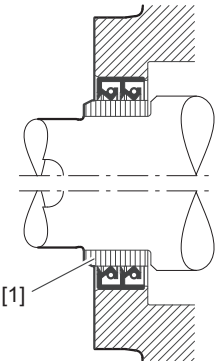
4.10.1 Input shaft

Standard	Dust-protected	Dust-protected regreasable	Radial labyrinth seal (Taconite) regreasable
Single oil seal with dust protection lip	Single oil seal with dust protection cover	Double lip seal with dust protection cover	Single oil seal with radial labyrinth seal
• Normal environment	• Medium dust load with abrasive particles	• High dust load with abrasive particles	• Very high dust load with abrasive particles
			

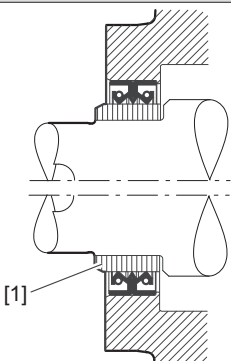
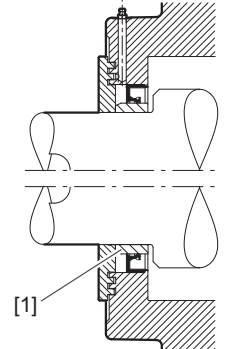
[1] Optional with oil seal sleeve

4.10.2 Output shaft

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

Designation	Property	Environment	Figure
Standard for mounting positions M1/M3/M5/M6	Single oil seal, inside sealing with dust protection lip on a hardened sleeve [1]	Normal environment	
Standard for mounting position M4 (optional for mounting positions M1/M3/M5/M6)	2 oil seals, inside sealing on a hardened sleeve [1]	Medium dust load with abrasive particles	

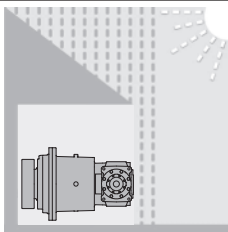
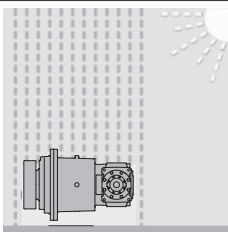
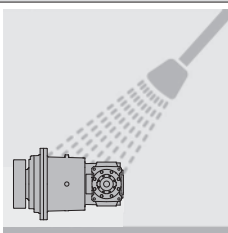
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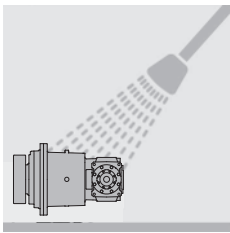
Designation	Property	Environment	Figure
Standard for mounting position M2 (optional for mounting positions M1/M3/M5/M6)	1 oil seal, sealing on the inside, and 1 oil seal, sealing on the outside, on a hardened sleeve [1]	High dust load with abrasive particles and splash water load	
Radial labyrinth seal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

4.11 Coating and surface protection systems

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

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

OS 1 low environmental pollution	
	Suitable for environments prone to condensation and atmospheres with low humidity or contamination, such as outdoor applications under roof or with protection, unheated buildings where condensation can build up. Based on corrosivity category: C2 (low)
Sample applications	• Systems in saw mills • Agitators and mixers
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	–
OS 2 medium environmental pollution	
	Suitable for environments with high humidity or moderate atmospheric contamination, such as applications outdoors subject to direct weathering. Based on corrosivity category: C3 (moderate)
Sample applications	• Applications in gravel plants • Cable cars
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	240 h
OS 3 high environmental pollution	
	Suitable for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasionally acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt exposure. Based on corrosivity category: C4 (high)
Sample applications	• Port cranes • Sewage treatment plants • Mining applications
Condensation test ISO 6270	240 h
Salt spray test ISO 7253	480 h

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

INFORMATION



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

4.12 Types of lubrication

A distinction is made between 3 lubrication types, taking into account the mounting positions of the planetary gear units.

4.12.1 Splash lubrication

The gear unit is half filled with oil. Gearing and bearing parts that are not immersed in the oil bath are lubricated by splashing oil.

4.12.2 Bath lubrication

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

4.12.3 Pressure lubrication

The X1KP..e bevel-helical gear unit is lubricated with pressure lubrication. A shaft end pump or motor pump in conjunction with a mounted oil-water cooler /OWP1 provides lubrication. The lubrication line continuously supplies the gearing and bearing points above the oil level with oil.

5 Structure of options and additional features

5.1 Oil expansion tank /ET

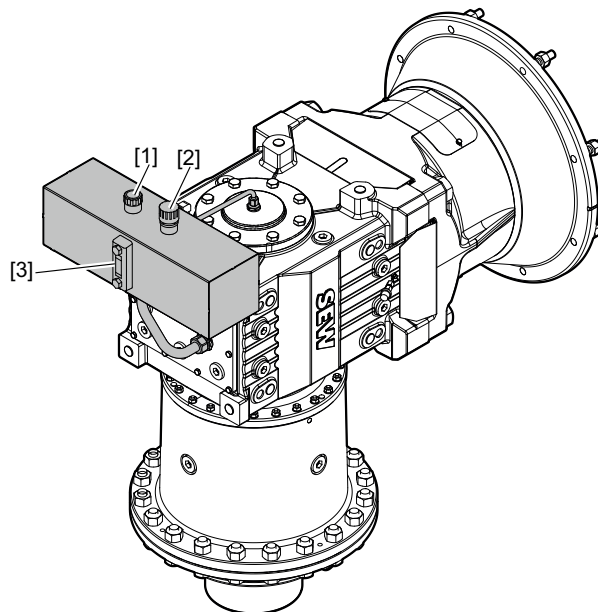
The oil expansion tank compensates for changes in the oil volume in the system caused by temperature variations. When the temperature of the gear unit increases, the oil expansion tank absorbs excess oil and returns it when the temperature decreases. This ensures that the gear unit is always supplied with the optimum amount of oil in every operating state.

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

5.1.1 Mounting position M4

Standard lubrication type with oil expansion tank for bath lubrication:

- Oil expansion tank for volume compensation
- Oil level is checked by an oil dipstick [1] or oil level glass [3] (option)
- Oil filling via the oil expansion tank



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- [1] Oil dipstick
[2] Breather

- [3] Oil level glass (option)

5.2 Torque arm /T

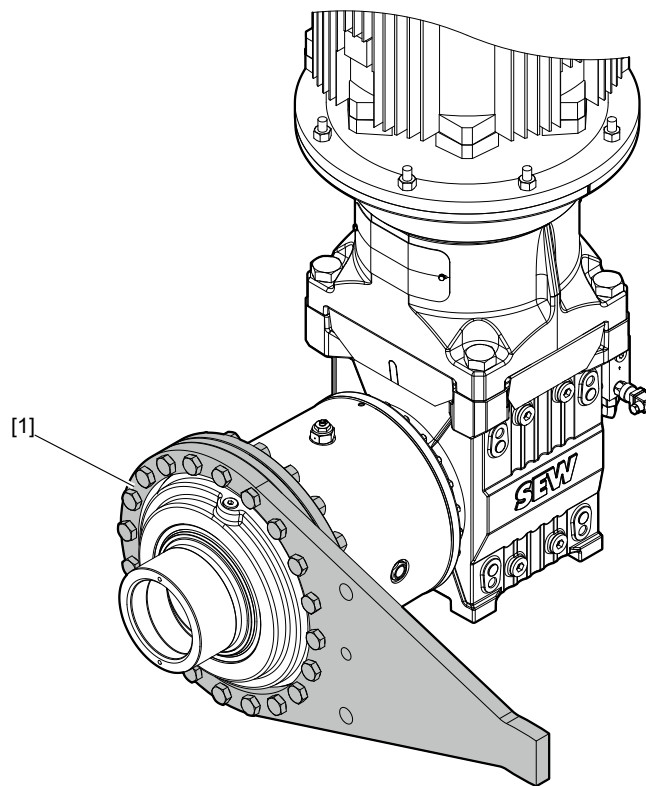
An optional torque arm is available to support the reaction torque of solid and hollow shaft gear units in the shaft-mounted design.

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

5.2.1 Single-sided torque arm

Depending on the customer's request, the torque arm [1] is either included in the delivery or mounted on the gear unit. The retaining screws are included in the scope of delivery.

The figure shows an example structure of a planetary gearmotor with a torque arm [1] on one side.



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5.3 Motor adapter /MA

Motor adapters [1] are available for the mounting of

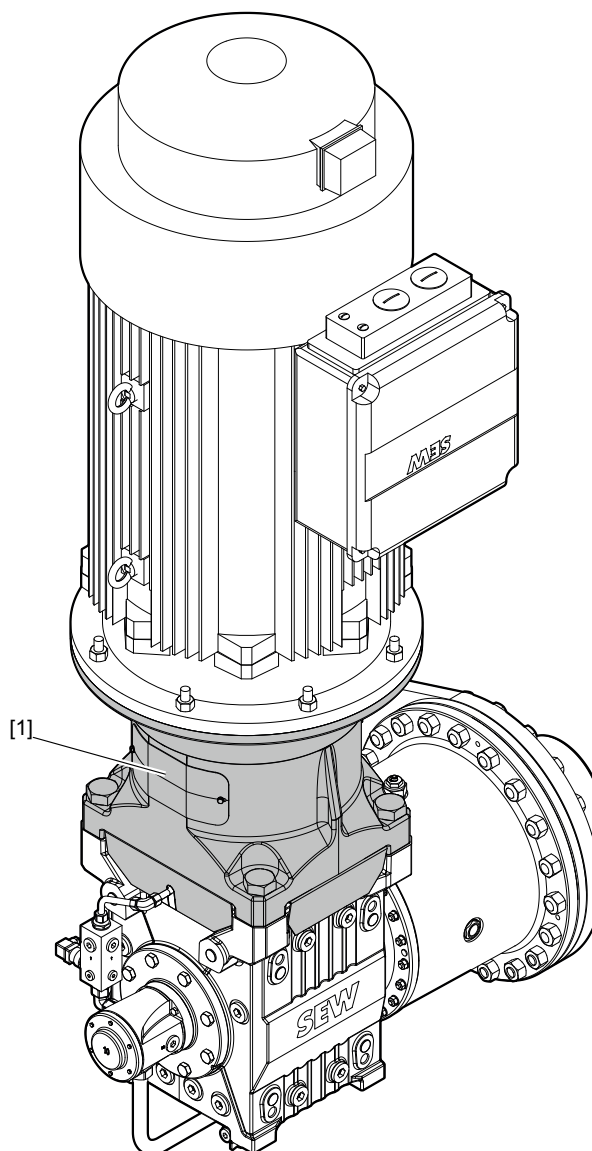
- **IEC (B5) motors** of sizes 160 to 355
- **NEMA ("C" face) motors** of sizes 254 to 449

INFORMATION



- The gear unit 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.

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



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5.4 Shaft end pump /SEP

The direction-independent shaft end pump [1] supplies all bearing points and gearing above the oil sump with oil via a tube system.

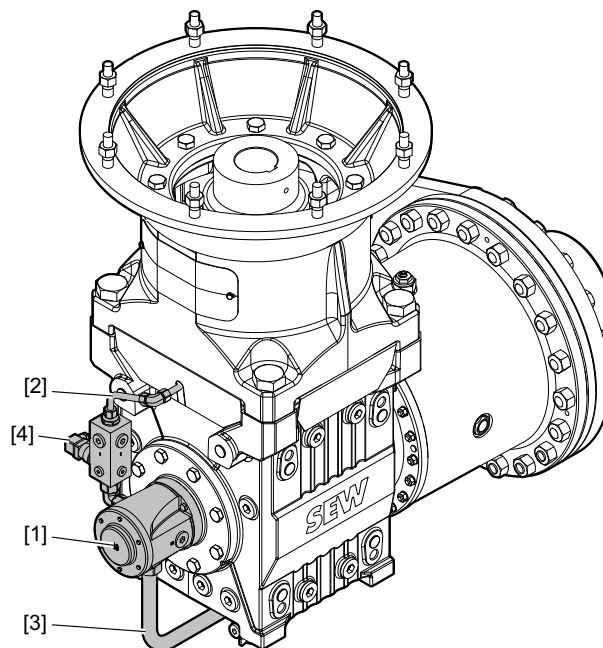
It is mounted externally on the gear unit and is driven via an intermediate shaft of the gear unit, which ensures a high reliability of the pump function.

INFORMATION



A minimum speed of the pump of $\geq 400 \text{ min}^{-1}$ is required for proper operation of the shaft end pump. If you use variable input speeds (e.g. for inverter-controlled drives) or if you intend to change the input speed of a gear unit equipped with a shaft end pump, contact SEW-EURODRIVE.

The figure shows the shaft end pump mounted to the gear unit.



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[1] Shaft end pump
[2] Pressure pipe

[3] Suction pipe
[4] Pressure switch

5.5 Pressure switch /PS

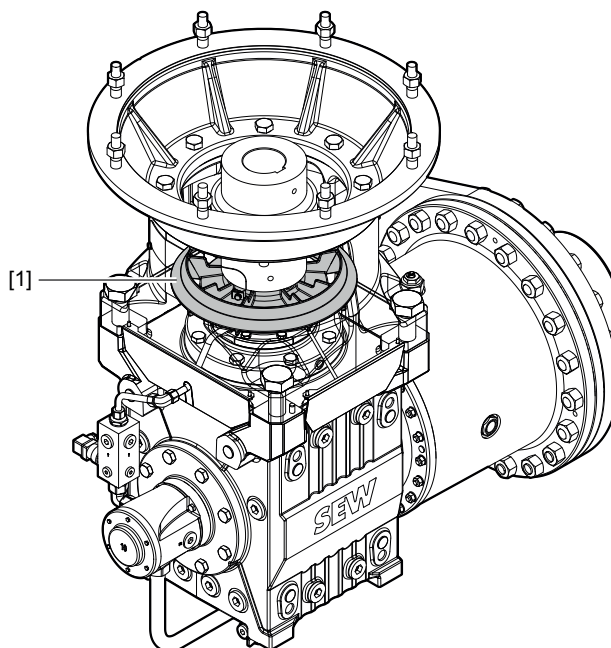
The pressure switch shows the correct oil pressure in the pressure pipe and in this way confirms that the pressure lubrication is ready for operation. Therefore, the pressure switch must be monitored by the user.

Pressure might build up with a delay during the startup phase of the gear unit with a shaft end pump. This slow pressure build-up can trigger an error signal by the pressure switch, which can be bridged. The bridging time of the pressure switch should be limited to 5 to a maximum of 10 seconds.

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

5.6 Fan /FAN

To increase the thermal rating, a direction-independent radial fan [1] can be installed. Observe the specifications in the order documents.



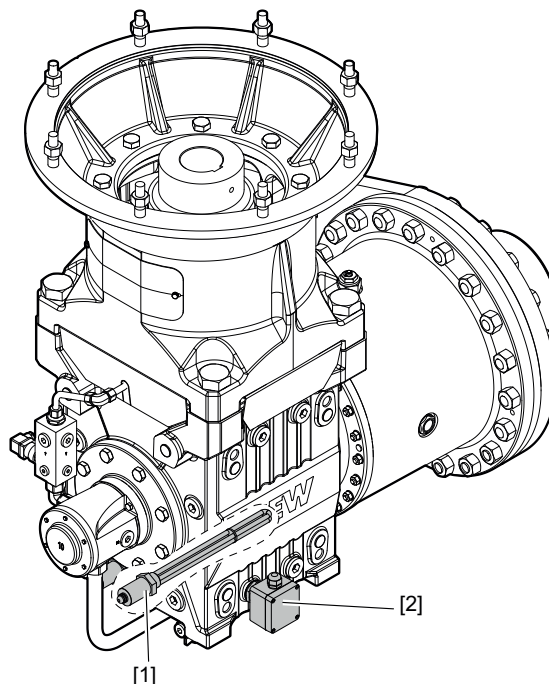
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5.7 Oil heater /OH

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

The oil heater consists of 2 main parts:

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



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[1] Oil heater

[2] Thermostat with integrated temperature sensor

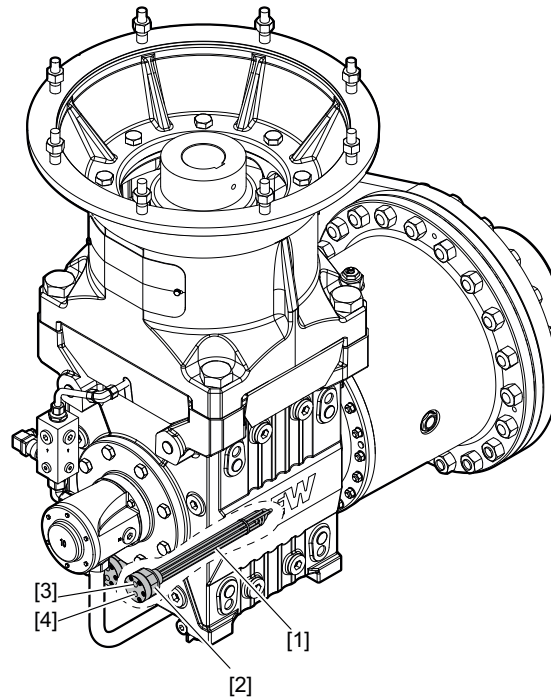
Observe the following information.

- Up to three heating elements can be connected in parallel to shorten the heating times. Contact SEW-EURODRIVE.
- The position of the thermostat varies depending on the design and mounting position of the gear unit.

5.8 Water cooling cartridge /CCT

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

5.8.1 Structure



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

The water cooling cartridge consists of 3 main parts:

- Cooling pipes (CuNi alloy), stainless steel optional
- Tube plate (brass)
- Connection piece (brass; gray cast iron; steel)

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

5.9 Temperature sensor /Pt100

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

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

5.10 Temperature switch /NTB

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

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

- as an "early warning"
- or
- as a "main alarm" for switching off the main motor.

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

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

5.11 Oil cooling system

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

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

The following oil cooling system is intended for use with P... X1KP...e:

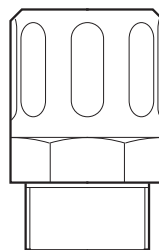
- Oil-water cooler for pressure lubrication /OWP1

5.12 Breather /BPG

The breather prevents non-permitted pressure increases generated by heating or cooling during operation.

Observe the following information.

5.12.1 Breather (standard)

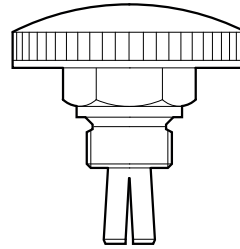


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Structure

Features	
Housing material	Steel
Filter inserts	Wire mesh
Design	3/4" or 1"

5.12.2 Steel breather for harsh operating conditions

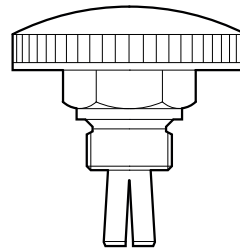


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Structure

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

5.12.3 Stainless steel breather for harsh operating conditions



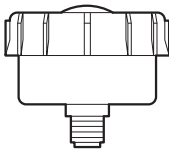
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Structure

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

5.12.4 Breather with filter insert /PI

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

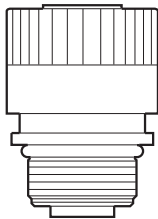


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Structure

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

5.12.5 Plastic breather



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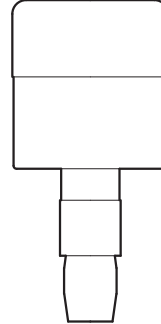
Structure

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

5.12.6 Desiccant breather filter /DC

The filter contains a desiccant that absorbs water vapor from the inflowing air.

The filter can also retain oil mist from the outflowing air, which reduces the environmental impact and increases the efficiency of the system



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Structure

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

6 Installation/assembly

6.1 Required tools/resources

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

- Wrench set
- Torque wrench
- Mounting device
- Compensation elements (washers, spacing rings), if necessary
- Fasteners for input/output elements
- Lubricant, e.g. NOCO-Paste from SEW-EURODRIVE → except for hollow-shaft gear units with shrink disk
- For hollow-shaft gear units → aids for assembly/disassembly on the machine shaft
- Fastening parts for the gear unit base

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

6.2 Tolerances

6.2.1 Gear unit

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

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

6.3 Preliminary work for installation/assembly

6.3.1 Information

Read chapter "Creating a safe working environment" (→ 16) before starting any work.

Check that the following conditions have been met:

NOTICE

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

Possible damage to property.

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

6.3.2 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).

6.4 Installing the gear unit



⚠ WARNING

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

Severe or fatal injuries.

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

NOTICE

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

Possible damage to property.

- The foundation must be level and flat; the gear unit may not be deformed when tightening the retaining screws. Unevenness must be leveled out appropriately.
- Observe the weight specified on the nameplate.

To quickly and reliably mount a gear unit with foot mounting, the correct type of foundation must be selected and extensive planning is required, which includes the creation of system layouts with all necessary construction and dimension details.

To quickly and reliably mount a gear unit with flange mounting, an appropriate steel construction must be selected and extensive planning is required, which includes the creation of system layouts with all necessary construction and dimension details.

To avoid damaging vibrations and oscillations, make sure that the foundation or steel construction is sufficiently stiff when mounting a gear unit with foot mounting or flange mounting. The foundation or steel construction must be dimensioned according to the weight and torque of the gear unit, taking into account the forces acting on the gear unit.

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

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

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

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

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

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

Do not lubricate the screw connections during installation.

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

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

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

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

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

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

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

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

6.4.3 Aligning the shaft axis



⚠ WARNING

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

Severe or fatal injuries.

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

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

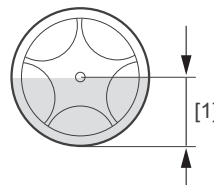
Therefore, the aim must always be zero deviation. For example, the requirements of the couplings can also be found in the operating instructions.

6.5 Requirements

- Use an oil from the current lubricant table:
https://www.sew-eurodrive.de/products/gear_units/standard_gear_units/accessories_and_options/lubricants/lubricants.html
- Fill the oil only when the gear unit is in the intended mounting position.
- Make sure the oil is fluid when filling it into the gear unit. The flowability can be improved through prior heating, e.g. by using an oil heater. SEW-EURODRIVE recommends an oil temperature of 20 °C to 40 °C for filling in oil.
- Fill the gear unit with the oil grade specified on the nameplate. The oil quantity specified on the nameplate is an approximate quantity. The marks on the oil sight glass or oil dipstick are the decisive indicators of the oil quantity to be filled.
- When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the oil fill quantity is higher. In this case, observe the respective "Oil Cooling System" operating instructions from SEW-EURODRIVE.
- For gear units with external supply pipes, e.g. oil cooling systems, establish the connections before filling the oil.
- Use a clean filling aid (plastic funnel or similar) for filling the oil. Avoid using galvanized filling aids.
- To speed up the filling process, remove the splash guard adapter at the oil fill opening. Then fill the oil into the gear unit. Observe chapter "Installing the splash guard adapter" (→ 72) for mounting the splash guard adapter.

Oil sight glass

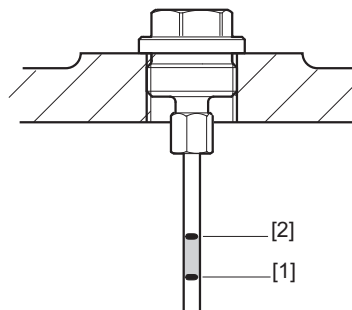
1. Open the oil fill plug.
2. Fill in the oil via the oil fill plug until the oil level reaches the center [1] of the oil sight glass.
3. Screw in the oil fill plug.



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Oil dipstick

4. Open the oil fill plug.
5. Fill in oil until the oil level is in the middle between marking [1] and marking [2].
6. Screw in the oil fill plug.



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6.5.1 Gear units with oil expansion tank /ET

NOTICE

An oil viscosity above the permitted level of 3500 mm²/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.

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

6.5.2 Gear units with shaft end pump /SEP

1. Connect the pressure switch to the operator's control. Observe chapter "Pressure switch" (→ 134).
2. Fill the gear unit with the oil type and oil quantity corresponding to the nameplate data; see chapter "Changing the oil" (→ 150).
Before initial startup or after having changed the oil, fill any 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.
3. Check the oil level using the oil dipstick or the oil level glass. For further information, refer to chapter "Checking the oil level" (→ 145).

6.6 Gear unit with splash guard adapter

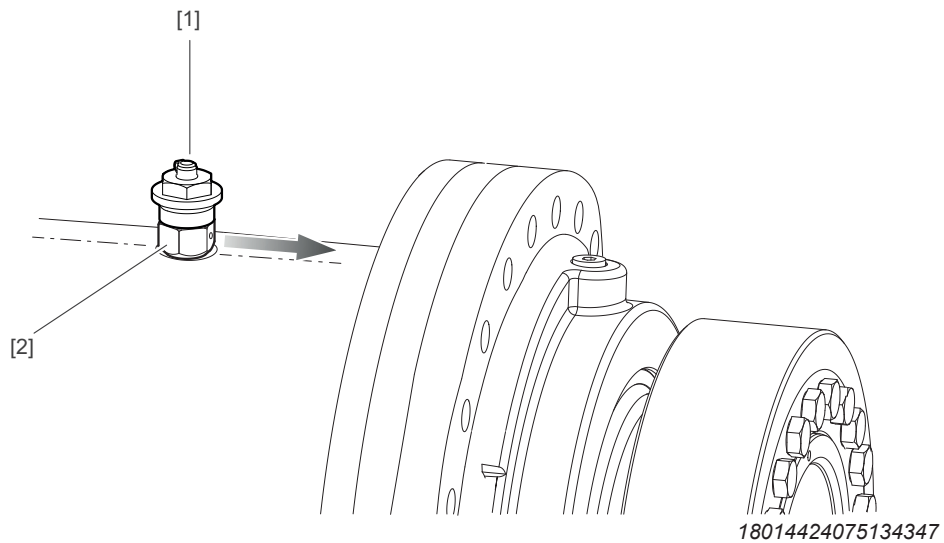
NOTICE

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.

After an oil change or after disassembly of the splash guard adapter, the splash guard adapter [2] and the breather [1] must be installed prior to startup. These are included in the scope of delivery of the gear unit.



6.6.1 Installing the splash guard adapter

Procedure

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

6.7 Gear units delivered with oil fill (option)

NOTICE

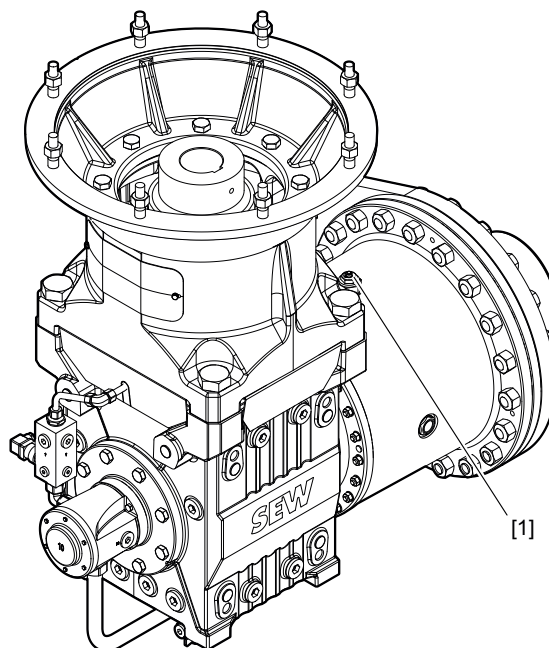
Faulty startup may result in damage to the gear unit.

Possible damage to property.

- It is important that gear units with shaft end pump, motor pump or customer-installed cooling system are vented before taking them into operation the first time.

For gear units that are delivered with oil fill, the breather [1] must be installed prior to startup. It is enclosed with the delivery.

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



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1. Remove the closing plug.
2. Insert the breather [1].
3. Check the oil level. Observe chapter "Checking the oil level" (→ 145).

6.8 Gear units with solid shaft

INFORMATION



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

6.8.1 Assembling the input and output components

NOTICE

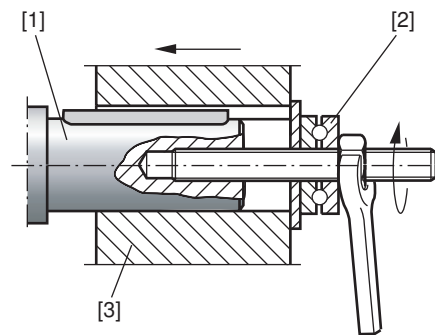
Bearings, housing or shaft may be damaged due to improper assembly.

Possible damage to property.

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

Installation with mounting device

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

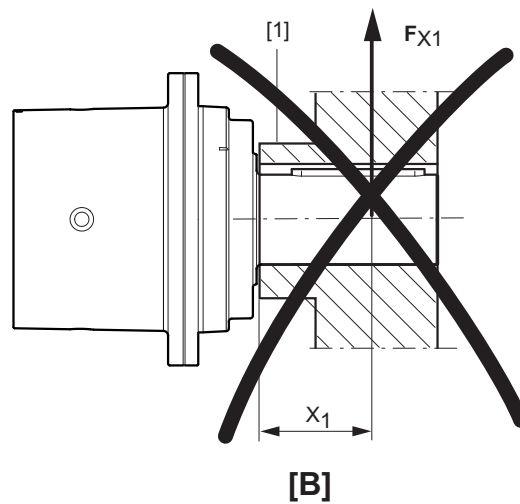
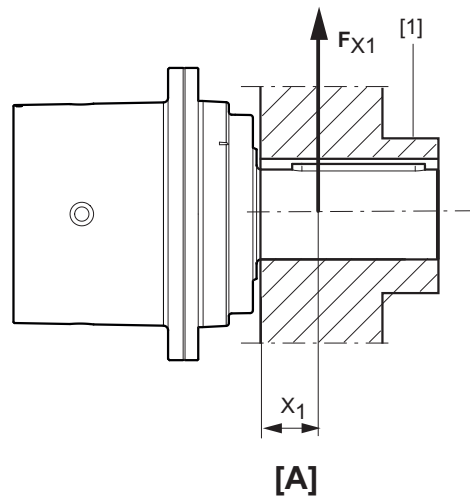


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- [1] Gear unit shaft end
- [2] Thrust bearing
- [3] Coupling hub

Avoiding excessive overhung loads

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



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

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INFORMATION

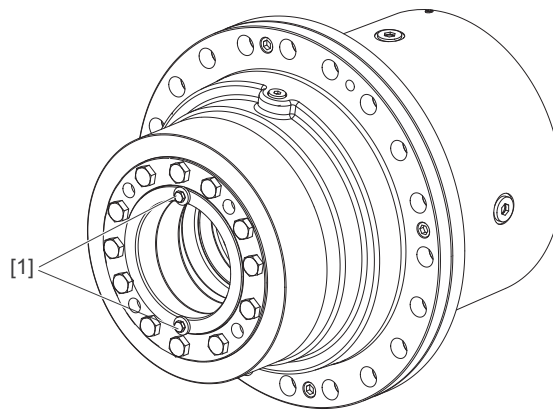


Mounting is easier if you first apply lubricant containing MoS₂ to the output element and/or heat it up briefly (to 80 – 140 °C).

6.9 Output shaft as hollow shaft with shrink disk

Note the following points when you assemble the shrink disk:

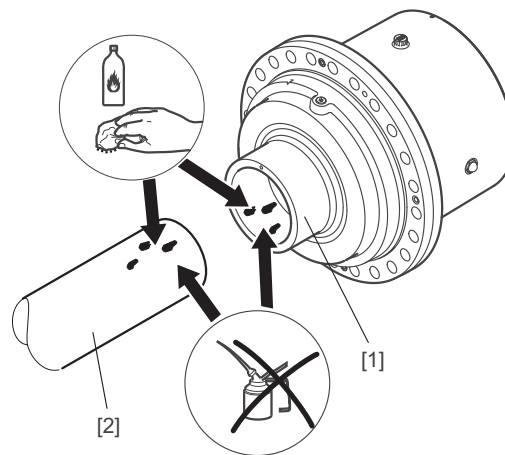
- Ensure that the dimensions of the machine shaft correspond to the specifications of SEW-EURODRIVE.
- The material of the machine shaft should be dimensioned by the customer according to the loads that will occur. The shaft material should have a yield point of at least 320 N/mm².
- Note that the shrink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



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6.9.1 Assembly

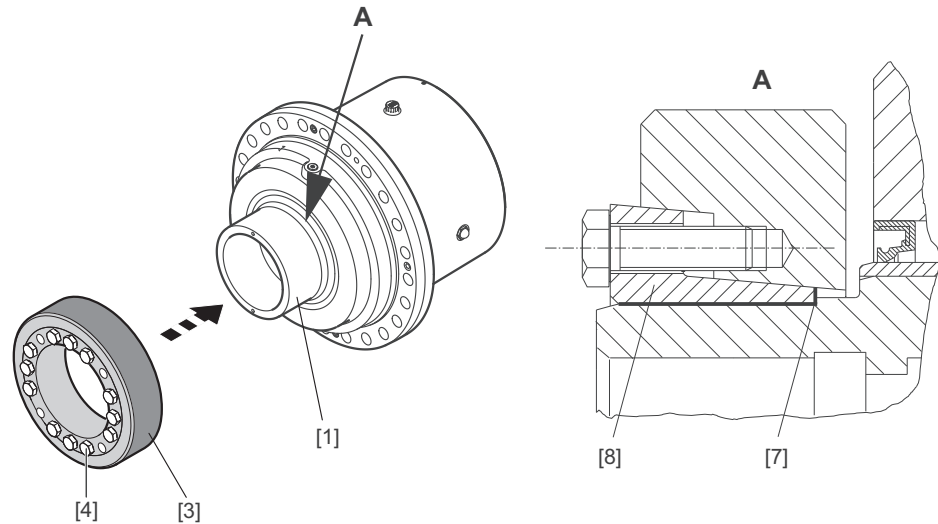
1. Before installing the shrink disk, clean and degrease the hub [1] and the machine shaft [2]. This is very important for reliable torque transmission.



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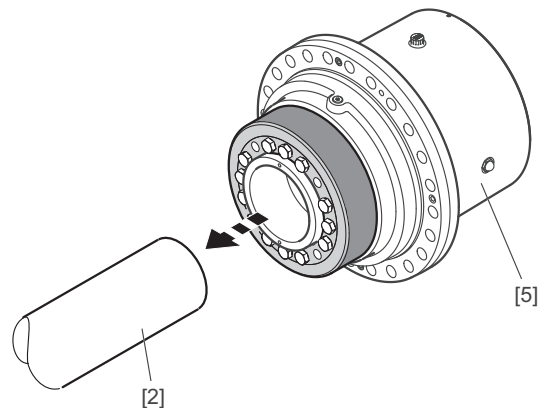
2. **▲ CAUTION!** The shrink disk can slip when untightened. Risk of injury to persons and damage to property. Secure the shrink disk against slipping. Slide the shrink disk with untightened screws onto the hollow shaft [1] and position the inner ring [8] of the shrink disk.

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



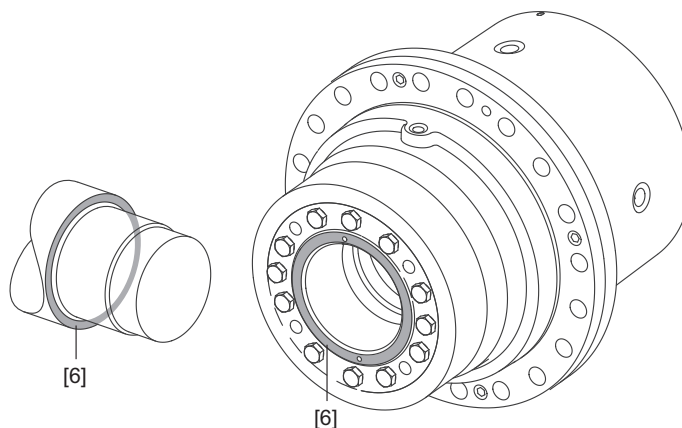
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4. Install the machine shaft [2] or push the gear unit [5] onto the machine shaft [2] all the way. Carry out the individual installation steps slowly to allow the compressed air to escape around the outside of the shaft.



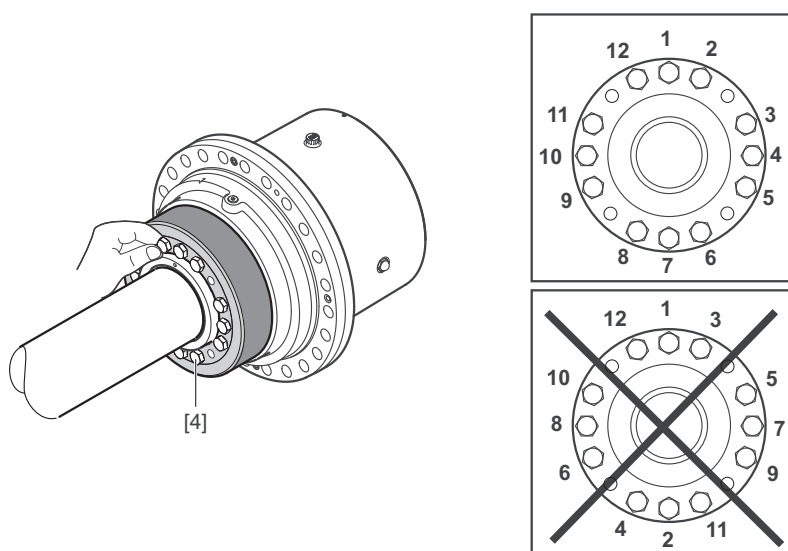
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5. To guarantee a complete torque transmission from the gear unit to the machine shaft, observe the following procedure during assembly. Push the gear unit onto the machine shaft until the contact surfaces [6] touch.



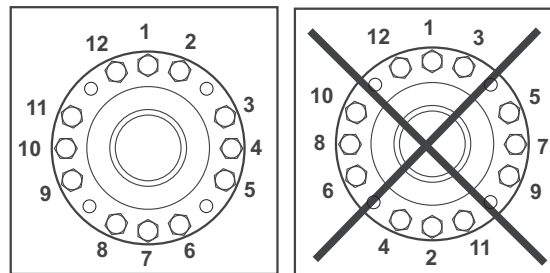
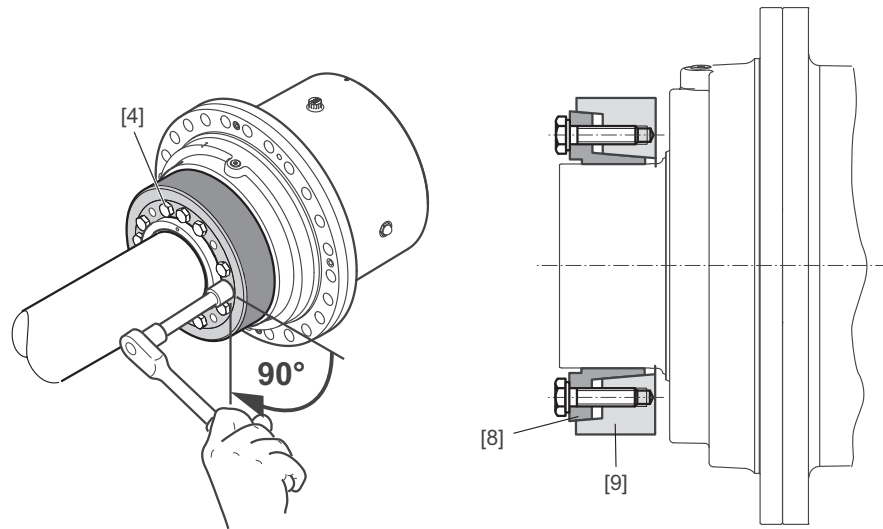
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6. First tighten the locking screws [4] finger-tight. Then tighten all locking screws by working round equally (not in diametrically opposite sequence) in $\frac{1}{4}$ -turn increments.



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7. Observe the tightening torque in the following table. Tighten the locking screws [4] by continuing to work round in $\frac{1}{4}$ -turn increments until you reach the tightening torque.



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

Shrink disk type		Size	Screws	Rated torque Nm	Tightening torque Nm ± 20%
TAS-Schäfer	Circular spring				
TAS 3191	RfN 4161	P.002	M16	41000	250
TAS 3181	RfN 4161	P.012	M16	75500	290
TAS 3181	RfN 4161	P.022	M16	95500	290
TAS 3181	RfN 4181	P.032	M20	134000	570
TAS 3181	RfN 4181	P.042	M20	194000	570
TAS 3181	RfN 4181	P.052	M20	255000	570
TAS 3181	RfN 4181	P.062	M24	405000	980
TAS 3181	RfN 4181	P.072	M24	525000	980
TAS 3181	RfN 4181	P.082	M24	720000	980
TAS 3181	RfN 4181	P.092	M27	906000	1450
TAS 3181	RfN 4181	P.102	M27	1160000	1450

INFORMATION



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

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



⚠ CAUTION

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

Possible injury to persons.

- After assembly, check to verify that the protective cover is properly attached.

6.9.2 Removal



⚠ WARNING

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

Severe injuries.

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

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.
- Disassemble the shrink disk properly. Never completely unscrew the locking screws because the shrink disk might jump off and cause an injury.
- Do not swap the shrink disks of several gear units or their individual parts.

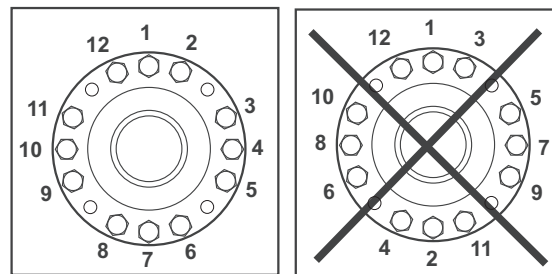
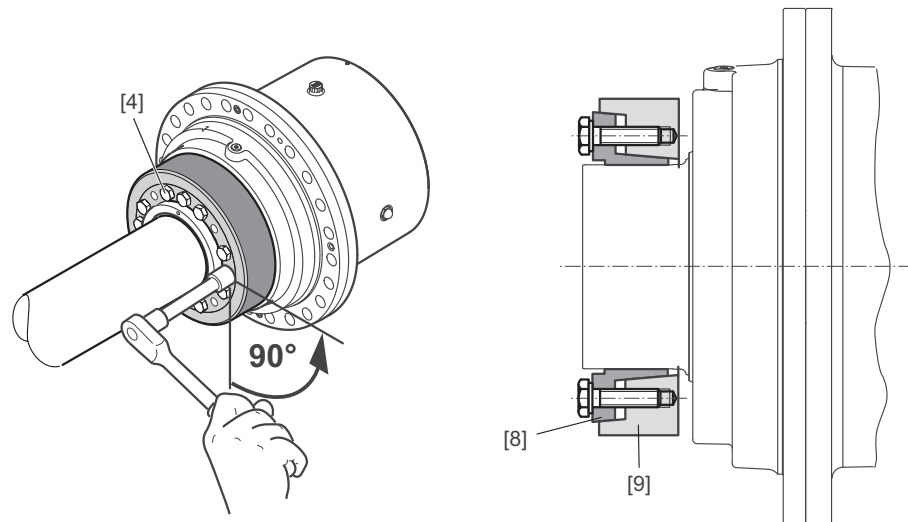
1. **NOTICE!** Improper loosening of the locking screws can lead to straining of the connecting surface. Possible damage to property.
Loosen the locking screws [4] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION



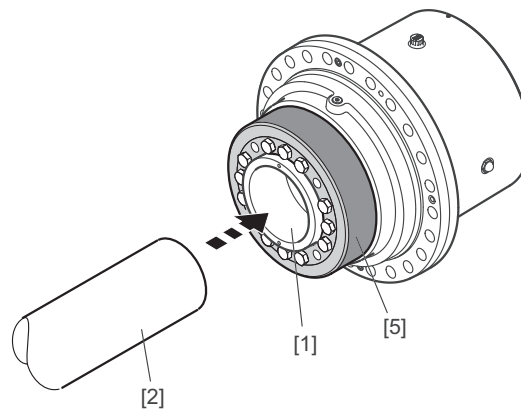
If the taper (outer ring) [9] and the taper bushing (inner ring) [8] do not loosen by themselves:

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



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



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3. **⚠ WARNING!** The shrink disk can slip when untightened. Possible injury to persons and damage to property. Secure the shrink disk against slipping. Remove the shrink disk [3] from the hub [1].

6.9.3 Cleaning and lubrication

INFORMATION

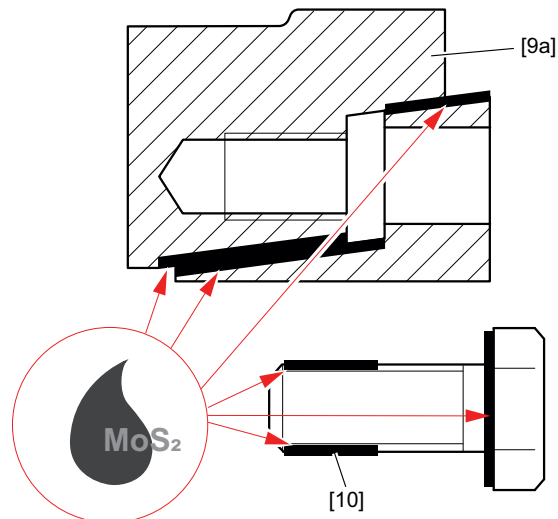


Perform the following steps carefully to ensure proper functioning of the shrink disk. Use only products that are comparable to the specified solid lubricant.

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

Procedure

1. Thoroughly clean the removed shrink disk from dirt and the remaining adhering lubricants.
2. Lubricate the clamping screws [10] on the thread and under the head with a compound containing MoS_2 , such as "gleitmo 100" by FUCHS LUBRITECH (www.fuchs-lubritech.com).
3. Also evenly lubricate the tapered surface of the taper (outer ring) [9a] with a thin layer of an MoS_2 compound.



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[9a] Taper (outer ring)

[10] Locking screws

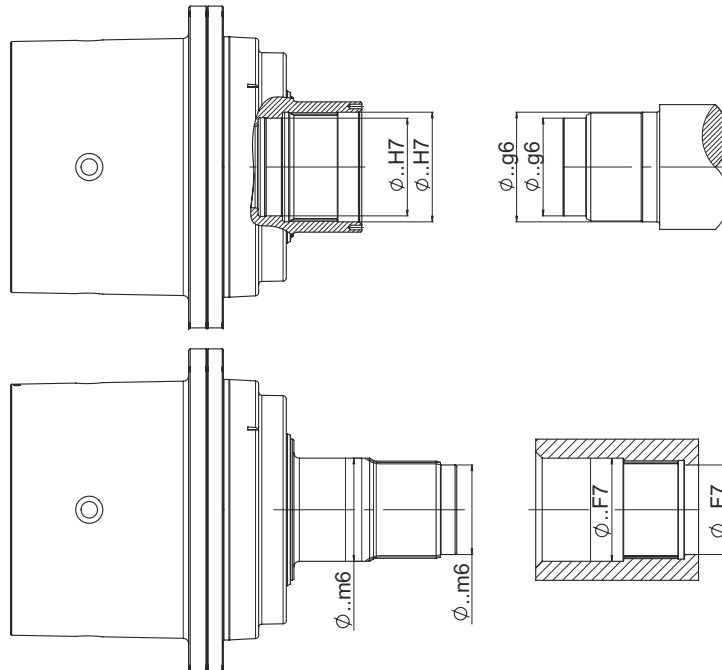
6.10 Gear unit with splining

6.10.1 Notes for mounting the gear unit

INFORMATION



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



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

NOTICE

Due to the rigid connection between the machine shaft and the gear shaft, 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 gear shaft.

Possible damage to property.

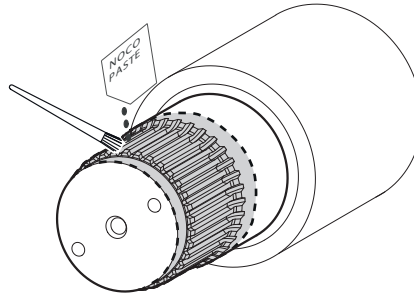
- For machine shafts without their own bearing or with only one bearing point, the gear unit is normally designed with foot or flange mounting and used as a bearing point. Ensure excellent coaxial alignment with the existing bearing point in these cases.
- If the machine shaft has at least two bearing 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.

6.10.2 Mounting the gear unit onto the machine shaft**INFORMATION**

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

Output shaft as a splined hollow shaft /..V

1. Apply some NOCO-Paste to the machine shaft around the centering seats and the splining.

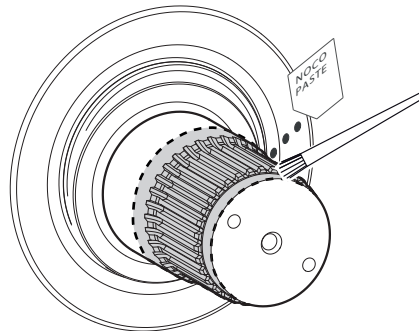


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2. Push the gear unit onto the machine shaft. The splining of the gear shaft must mesh with the splining of the machine shaft.
3. Make sure that the machine shaft is at the correct position in axial direction.

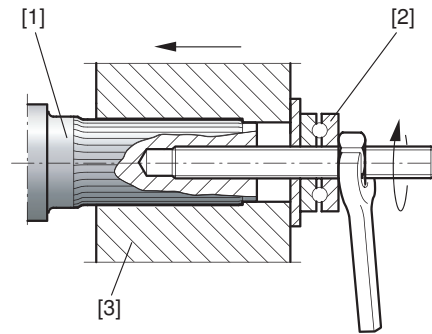
Output shaft as a splined solid shaft /..L

1. Apply some NOCO-Paste to the gear shaft around the centering seats and the splining.



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2. Push the gear unit onto the machine shaft. Use a mounting device, if necessary. The splined solid shafts of the gear shaft and the machine shaft must mesh.



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

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

6.10.3 Disassembling the gear unit from the machine shaft

NOTICE

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

Possible damage to property.

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

6.11 Torque arm

6.11.1 Notes on installation



⚠ WARNING

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

Severe or fatal injuries.

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

NOTICE

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

Possible damage to property.

- Do not deform the torque arm.

NOTICE

Strain on the torque arm may break the housing.

Possible damage to property.

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



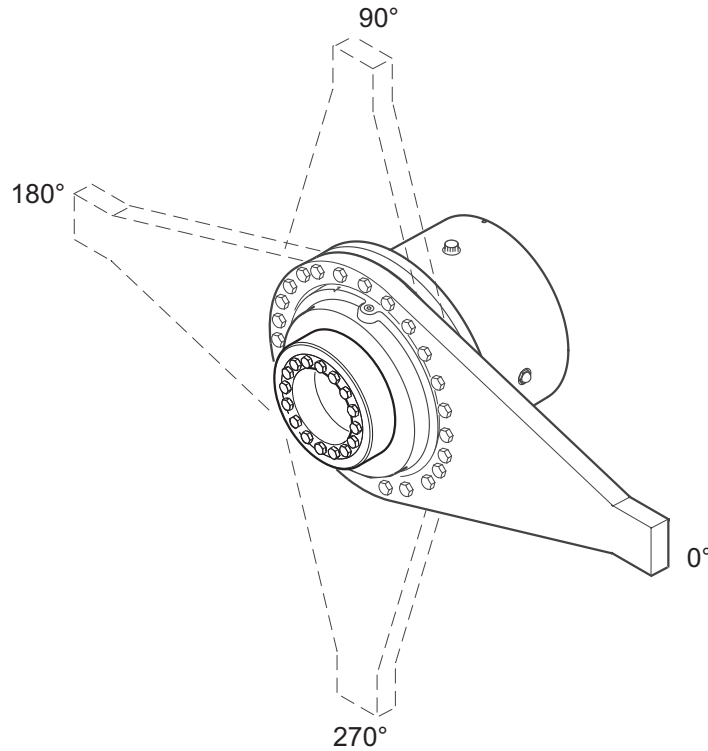
INFORMATION

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

6.11.2 Single-sided torque arm

Installation situation

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



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

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

Dimensions

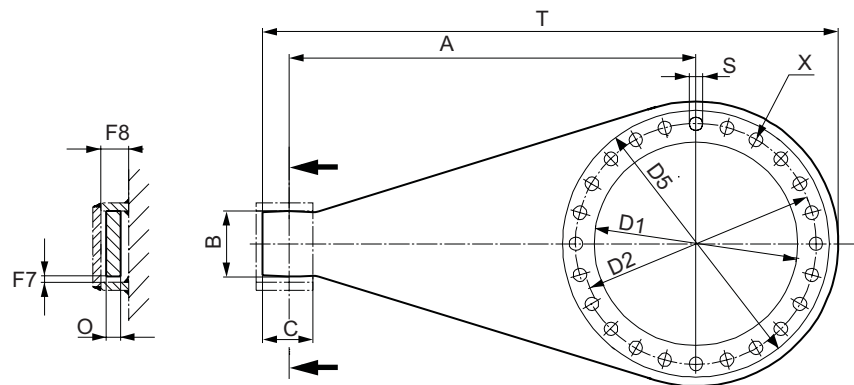
The following figure shows a sample torque arm with dimensions.

NOTICE

Mounting elements may be damaged by excessive impacts.

Possible damage to property

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



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

INFORMATION



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

Tightening torques

INFORMATION



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

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

Use only the following tools for installation:

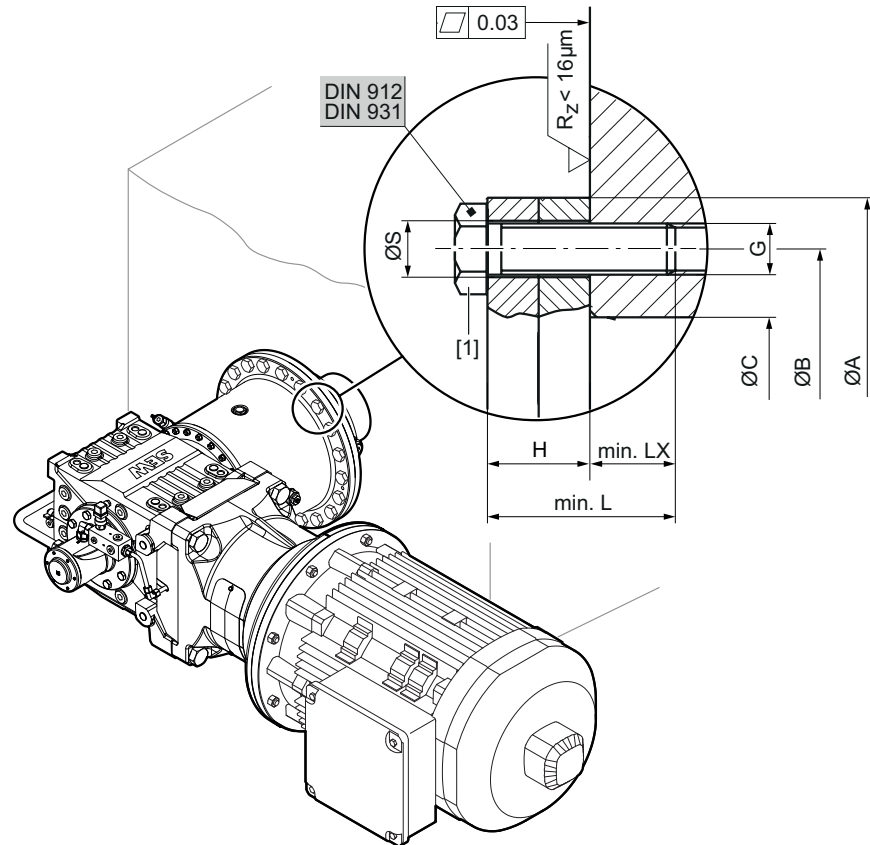
- Signal-generating torque wrench
- Motorized torque wrench with dynamic torque measuring
- Torque-controlled, gradual hydraulic tools

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

6.12 Flange-mounted gear units

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

Retaining screws [1] are not included in the scope of delivery.



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INFORMATION



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

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

Use only the following tools for installation:

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

The following values in the table apply to steel constructions. Observe the additional information on the dimension sheet.

The following values in the table apply to steel constructions.

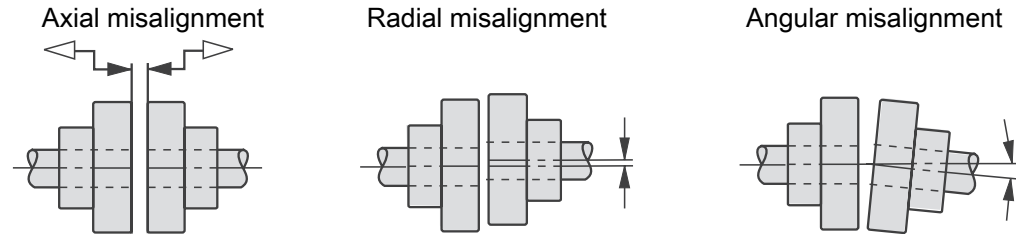
The following values in the table apply to steel constructions.

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

6.13 Aligning couplings/assembly tolerances

6.13.1 Aligning the coupling

Adjust the following misalignments when mounting couplings.



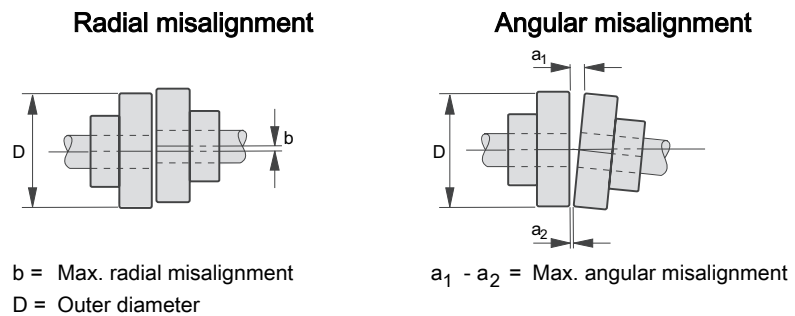
Use a laser-optical alignment system to align the coupling as accurately as possible.

6.13.2 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.



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

Outer diameter D in mm	Mounting tolerances in mm					
	$n < 500 \text{ min}^{-1}$		$n: 500 - 1500 \text{ min}^{-1}$		$n > 1500 \text{ min}^{-1}$	
	$a_1 - a_2$	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	–	–

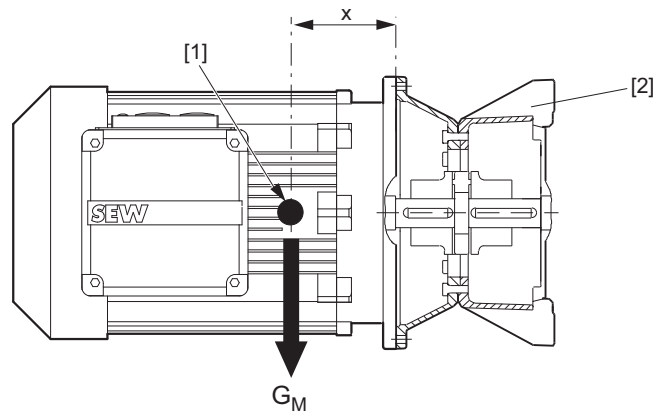
6.14 Motor mounting on a gear unit

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

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

6.14.1 Maximum motor weight of the mounted motor

The following maximum loads on the motor adapter must not be exceeded. For mobile applications (e.g. travel drives), contact SEW-EURODRIVE.



[1] Center of gravity of the motor
[2] Motor adapter

X = Center of gravity distance
 G_M = Weight of the mounted motor

The following limit load curves are valid for mounting positions M1/M1, M1/M4, and M4/M5 (for the definition of mounting positions, refer to chapter "Mounting position" (→ 34)). The corresponding limit load curve must be selected depending on the gear unit combination. If the motor weight is below the limit load curve, mounting is permitted. If the weight is above the limit load curve, contact SEW-EURODRIVE.

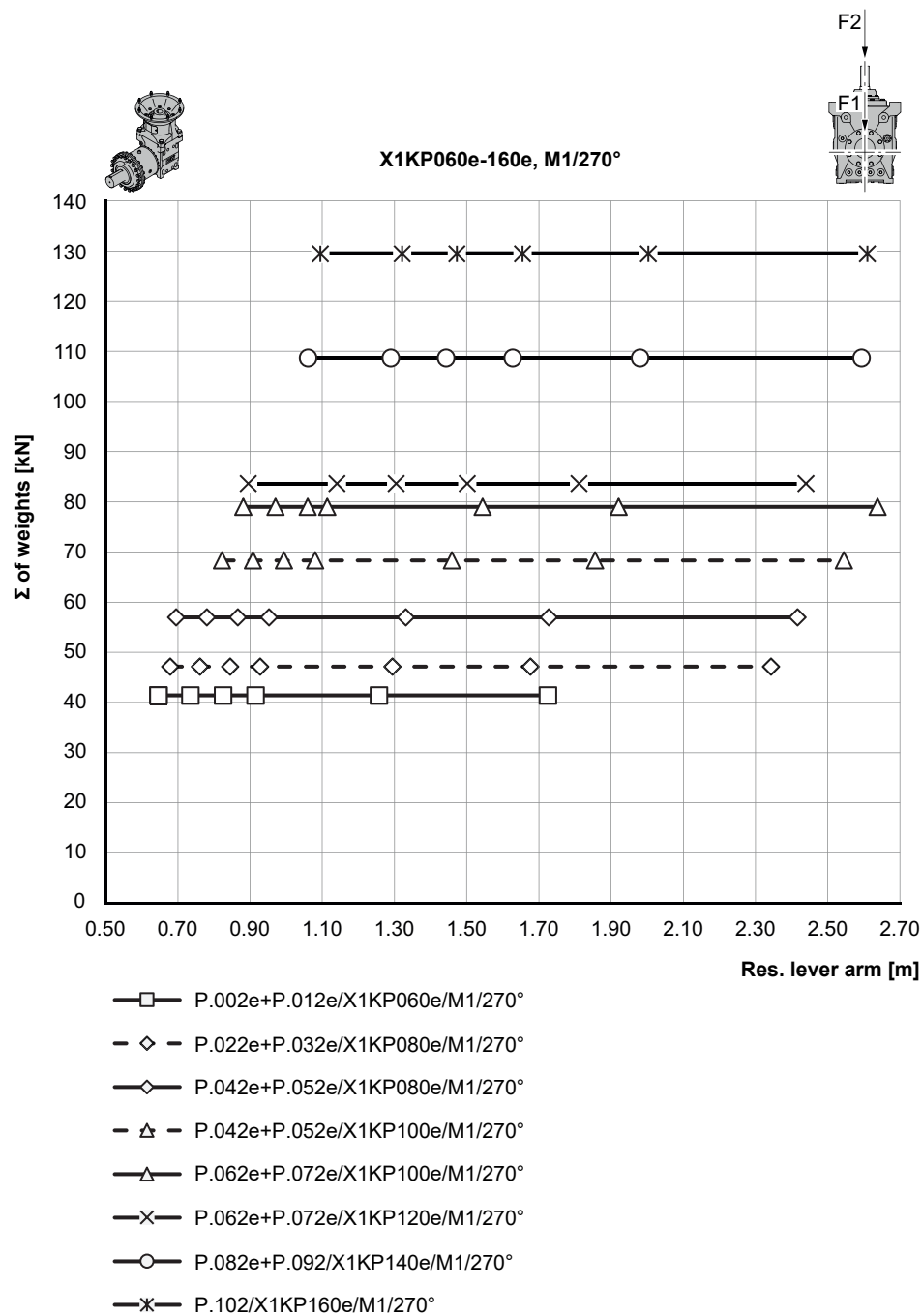
Other mounting positions can also be evaluated qualitatively using the limit load curves. If the weight is also below the limit load curve in a different mounting position, mounting is also permitted. If the weight is above the curve in the other mounting position, contact SEW-EURODRIVE again.

The following limit load curves show the motor weight above the center of gravity distance:

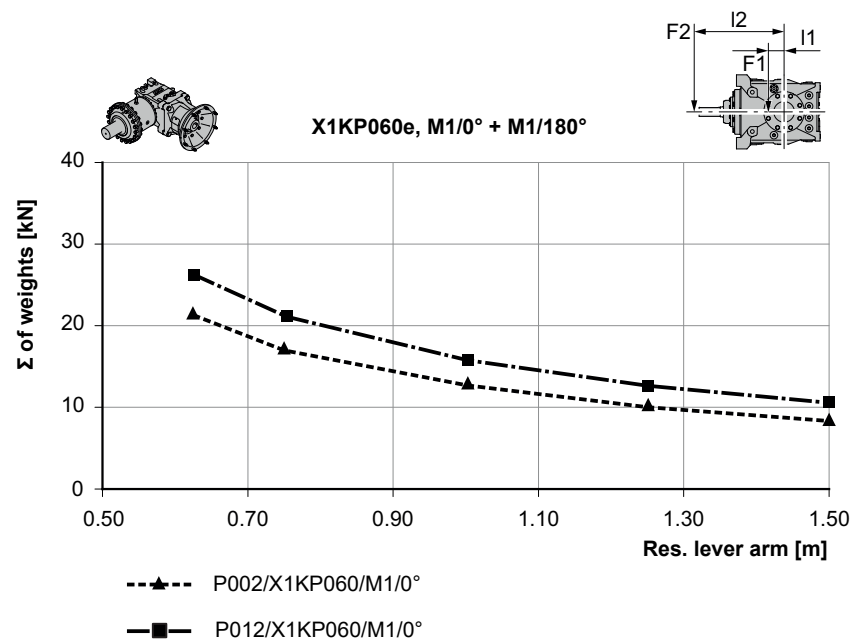
mm = X → Center of gravity of the motor from the flange surface

kg = G_M → Weight of the mounted motor

Sum of the weights



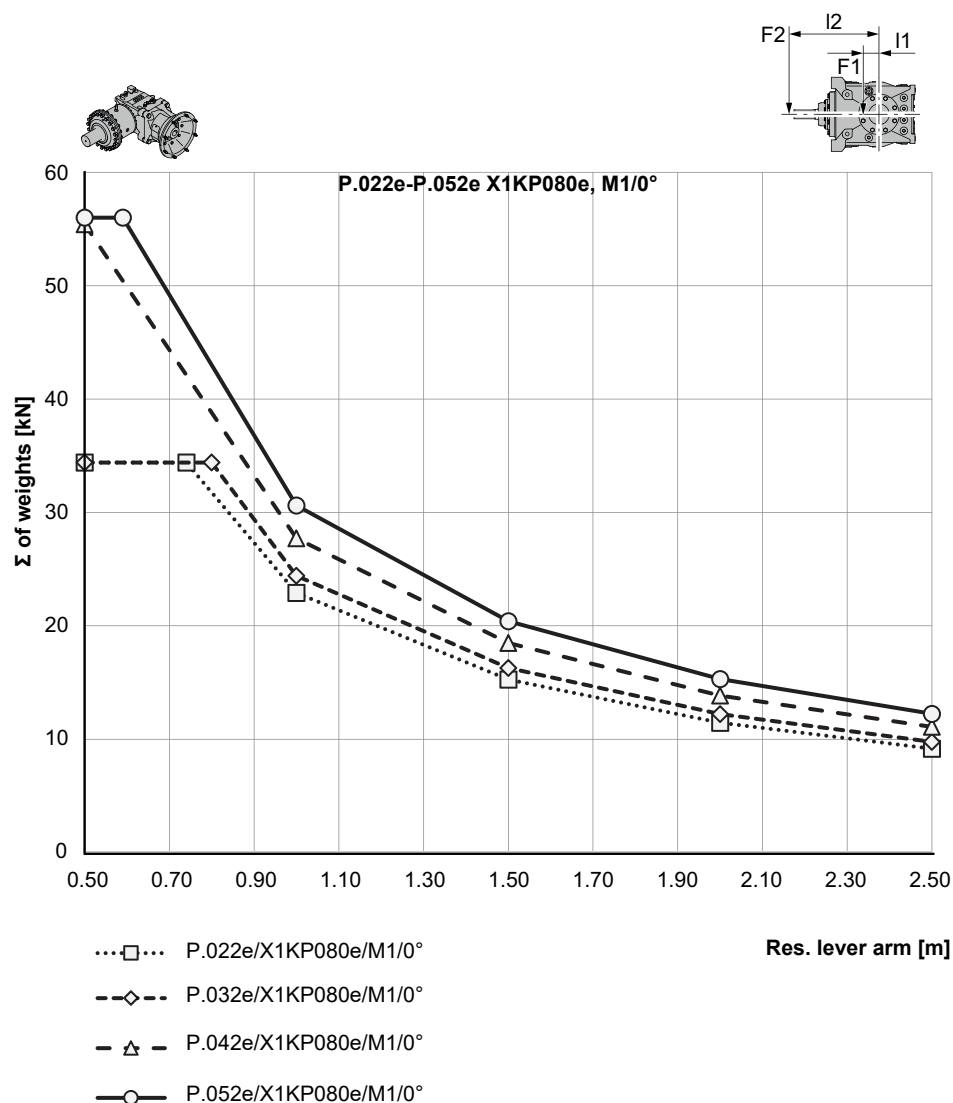
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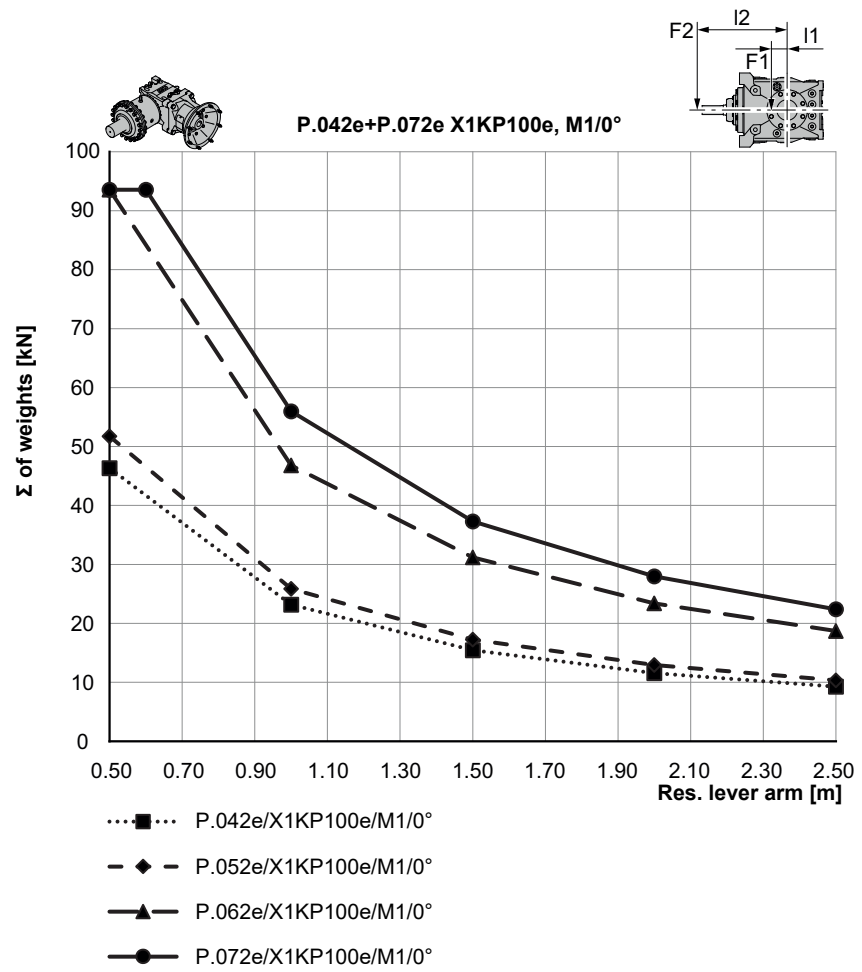
6 Installation/assembly

Motor mounting on a gear unit



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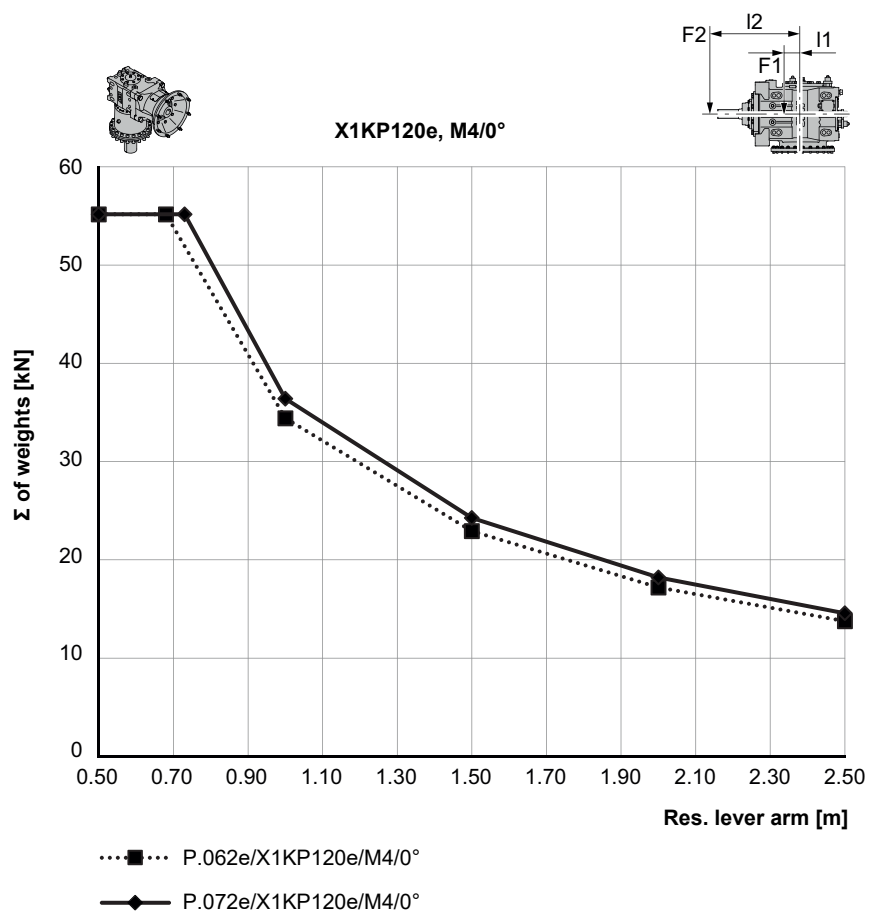
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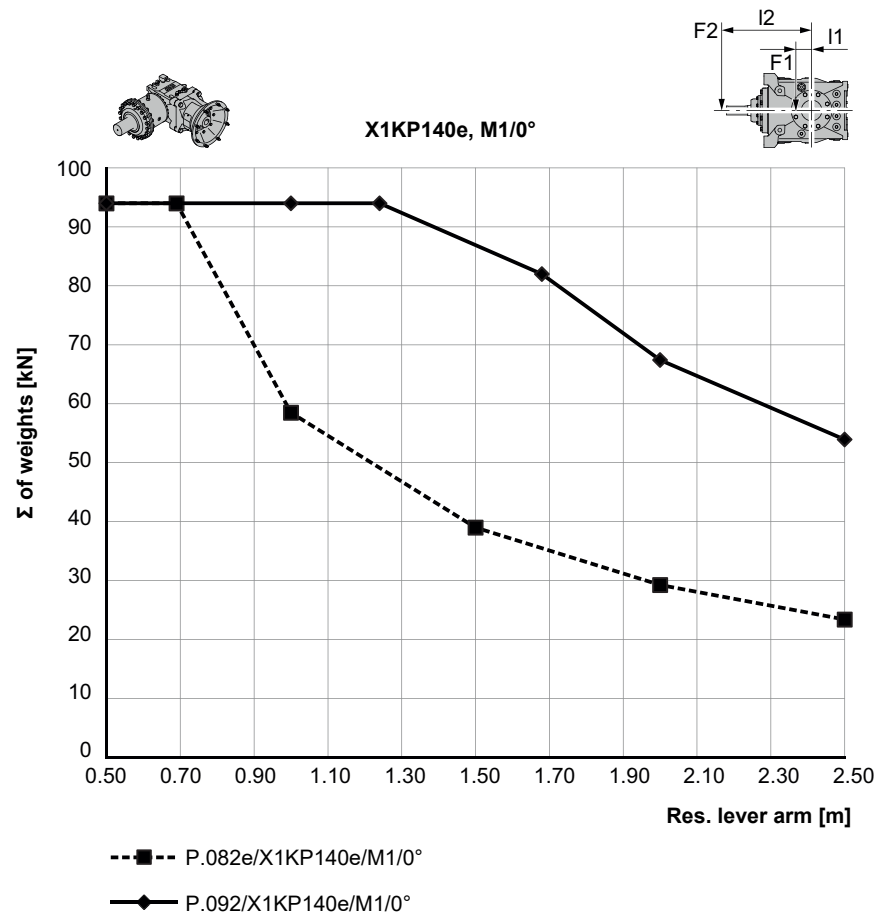
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6 Installation/assembly

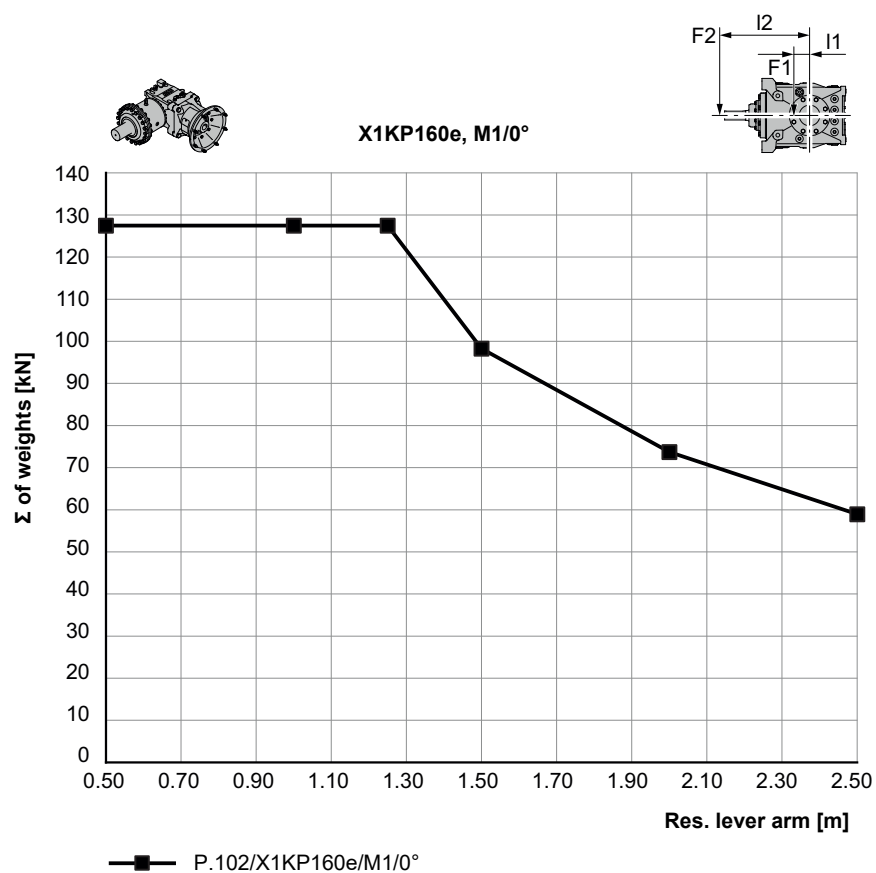
Motor mounting on a gear unit



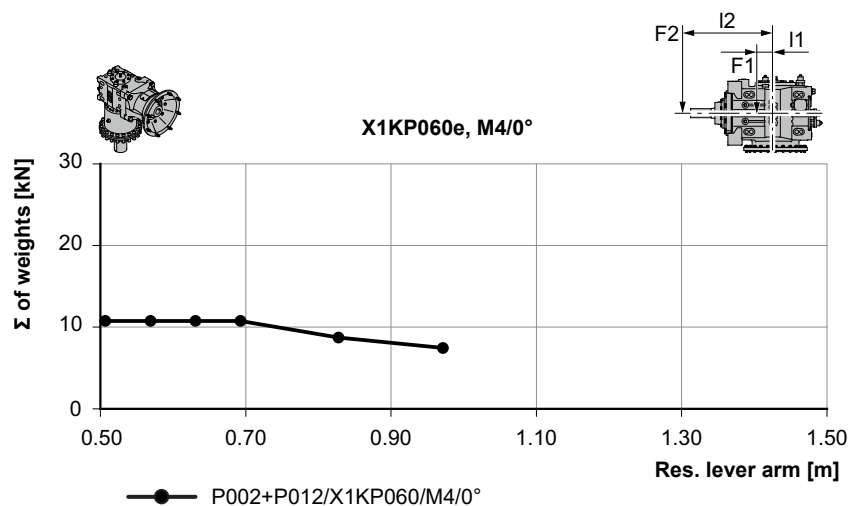
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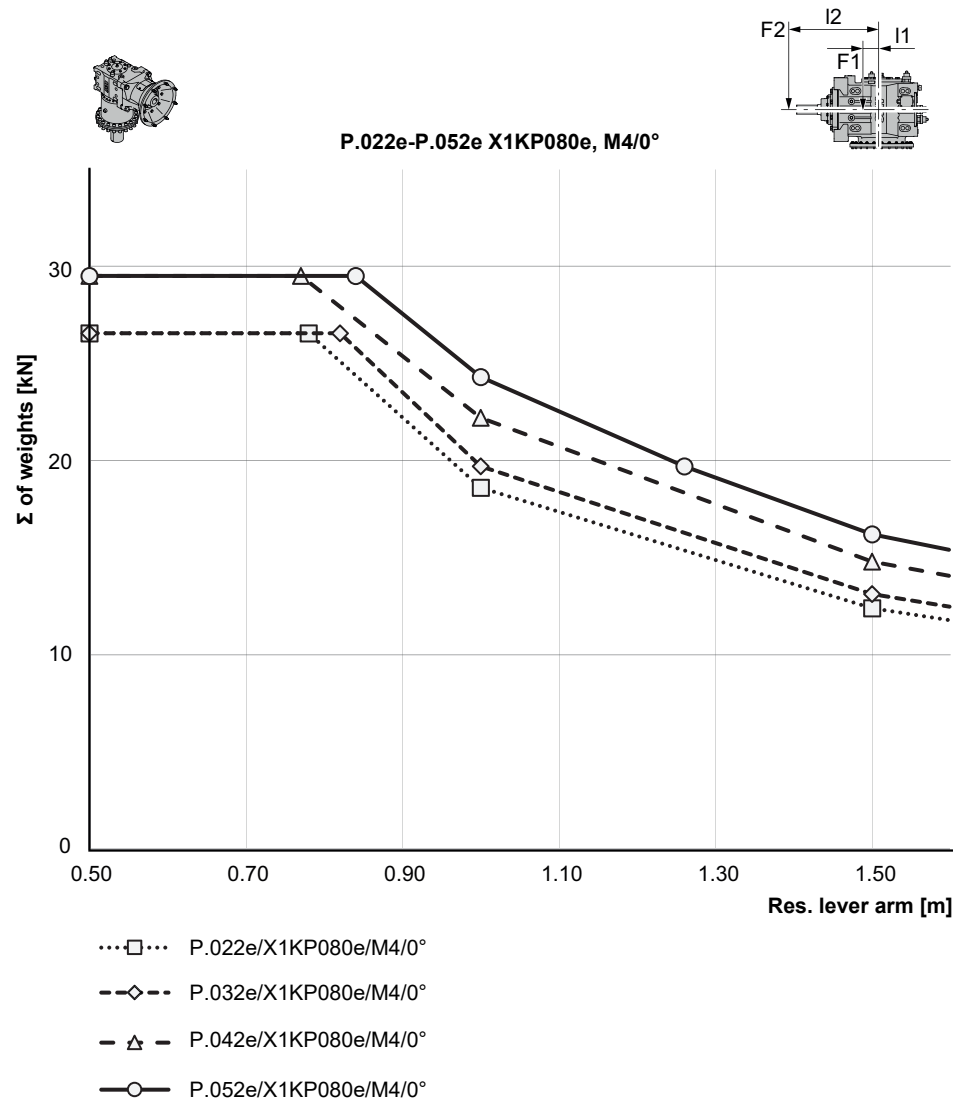
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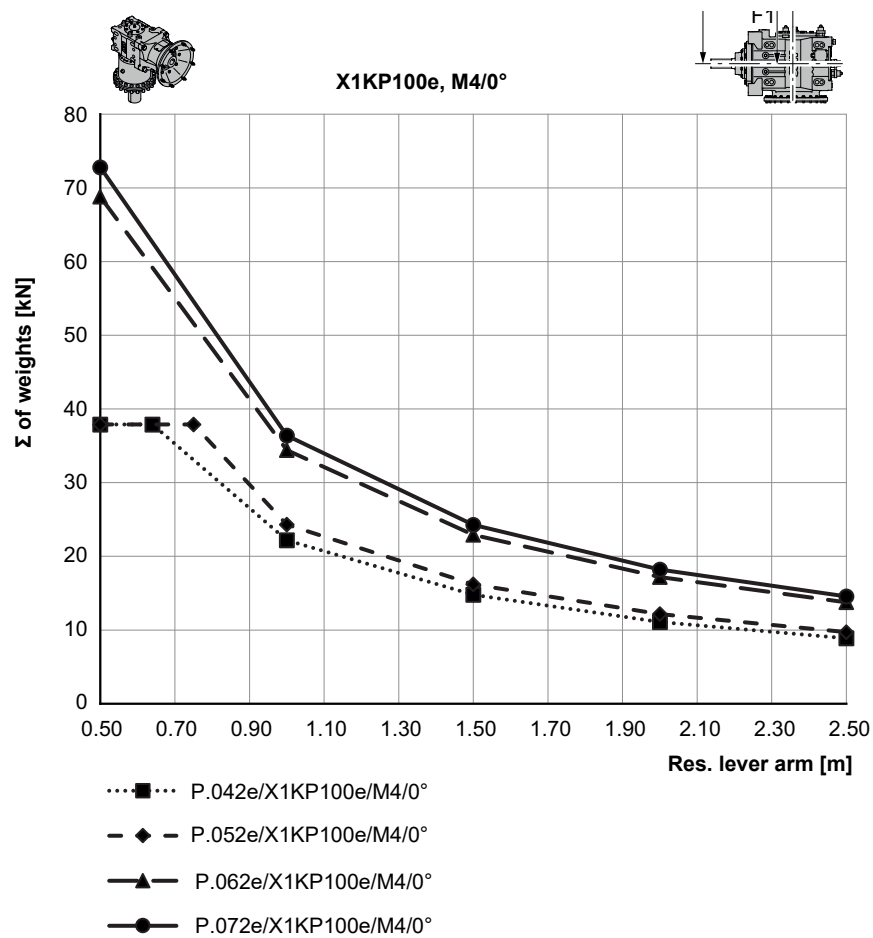
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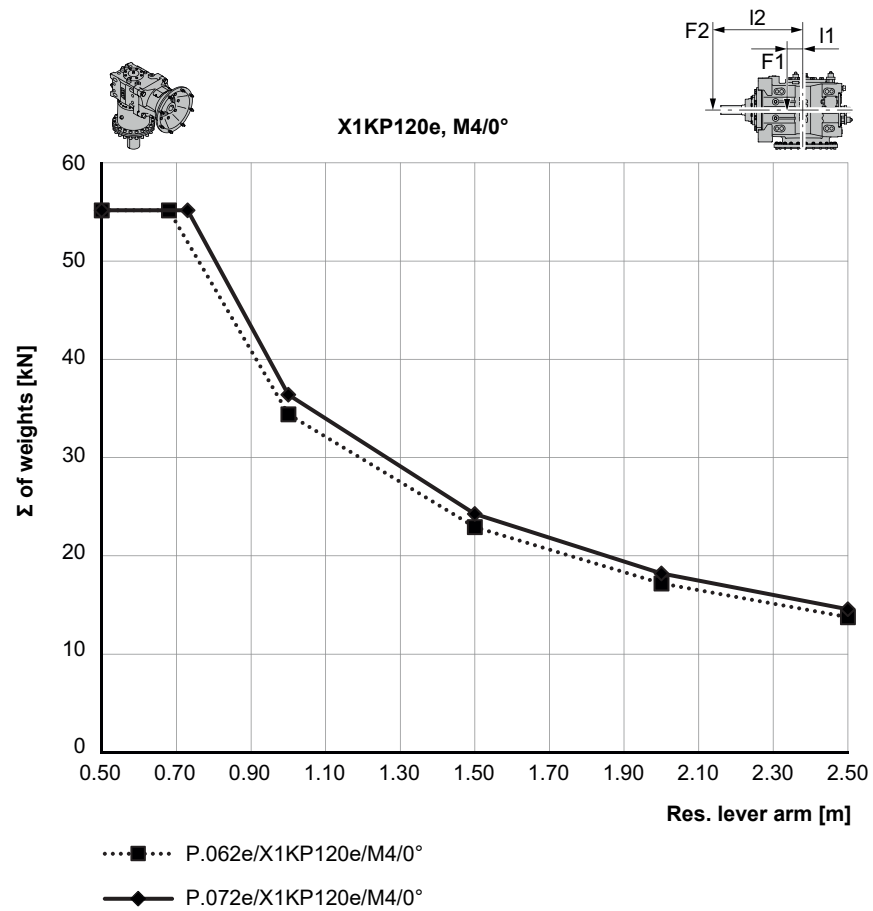
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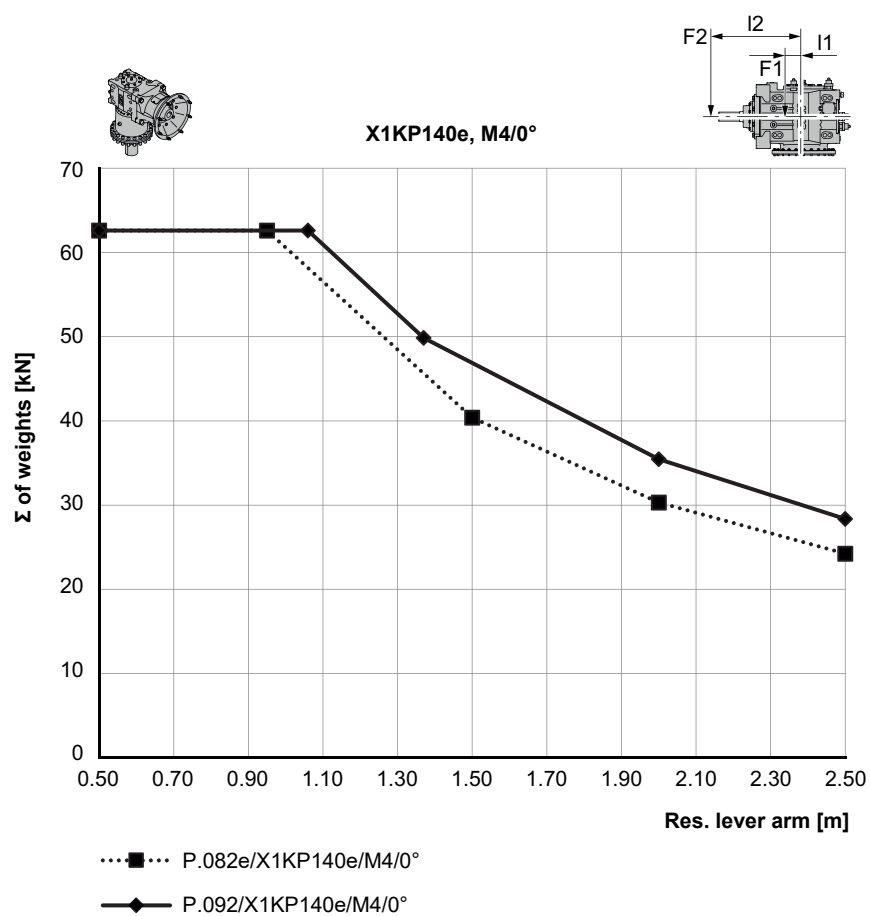
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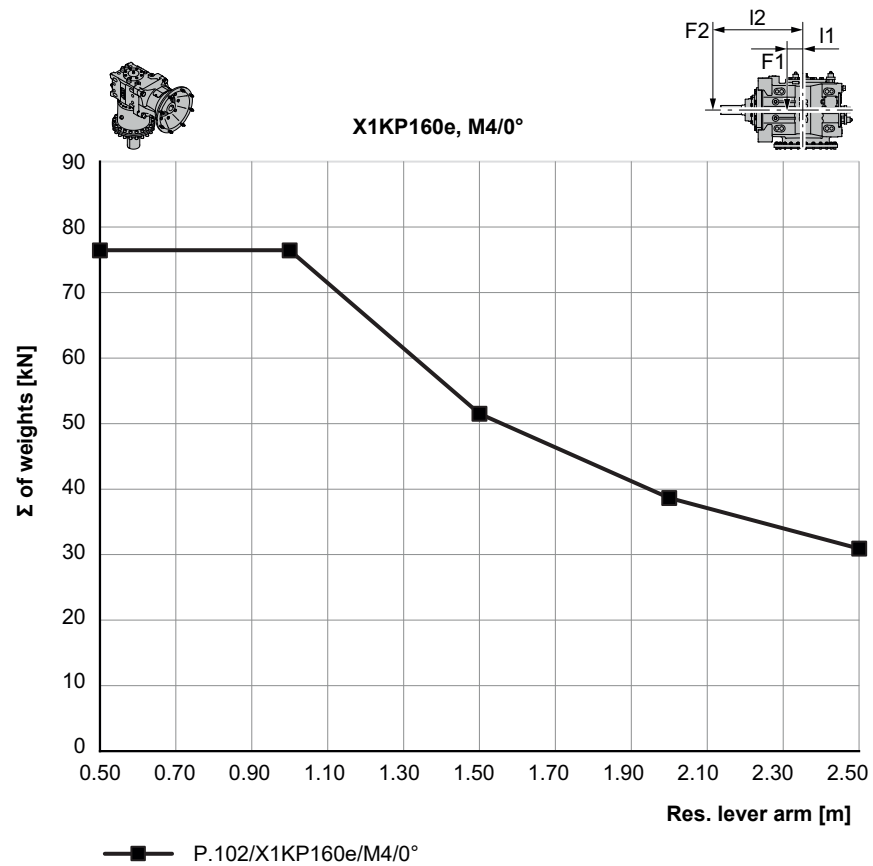
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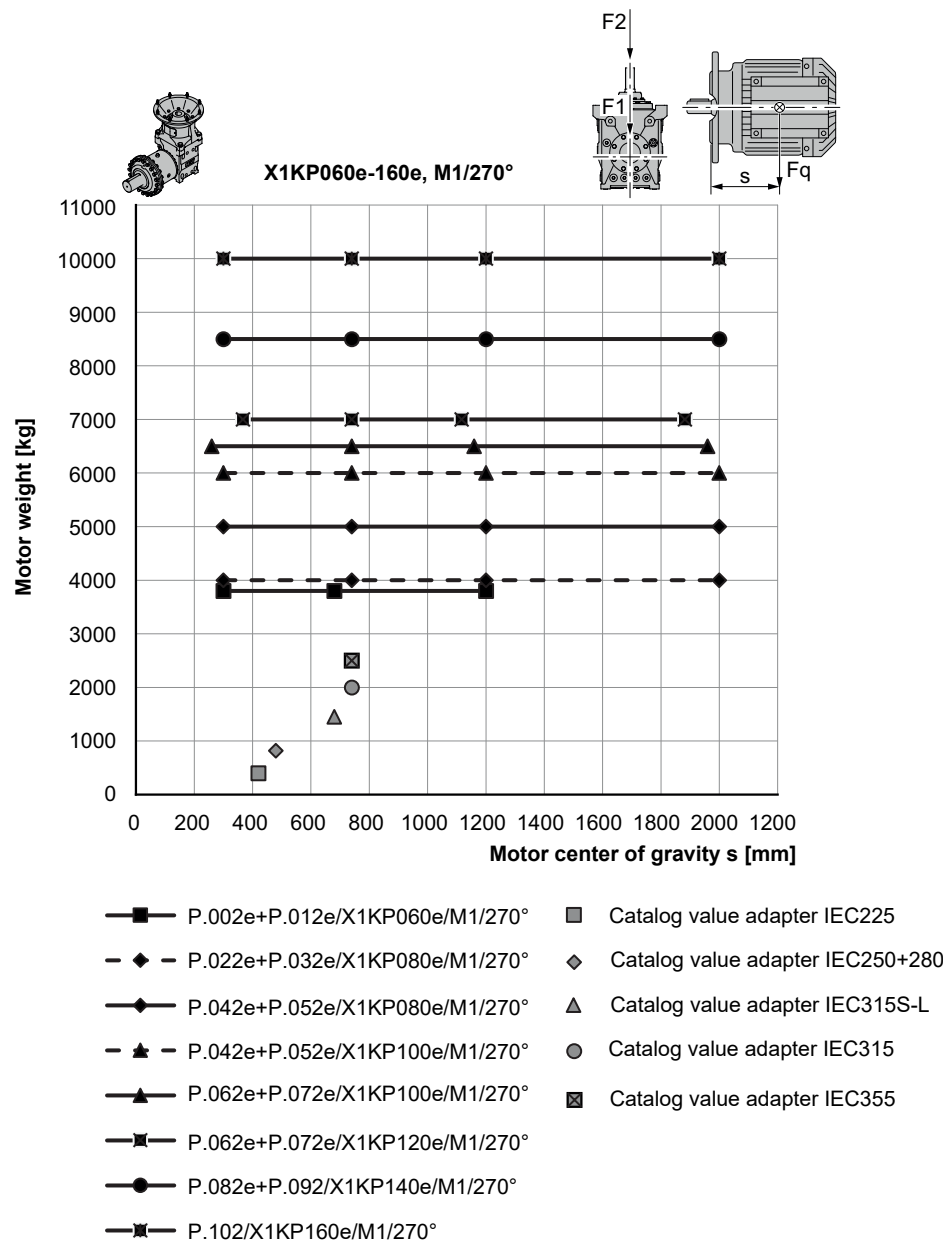


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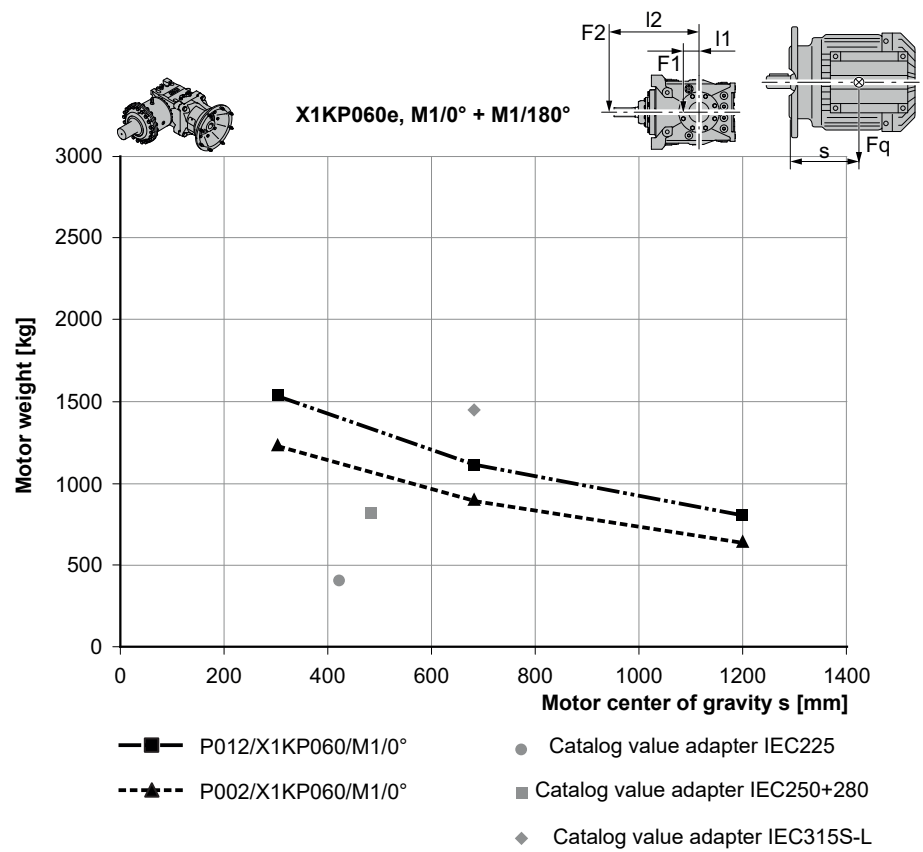


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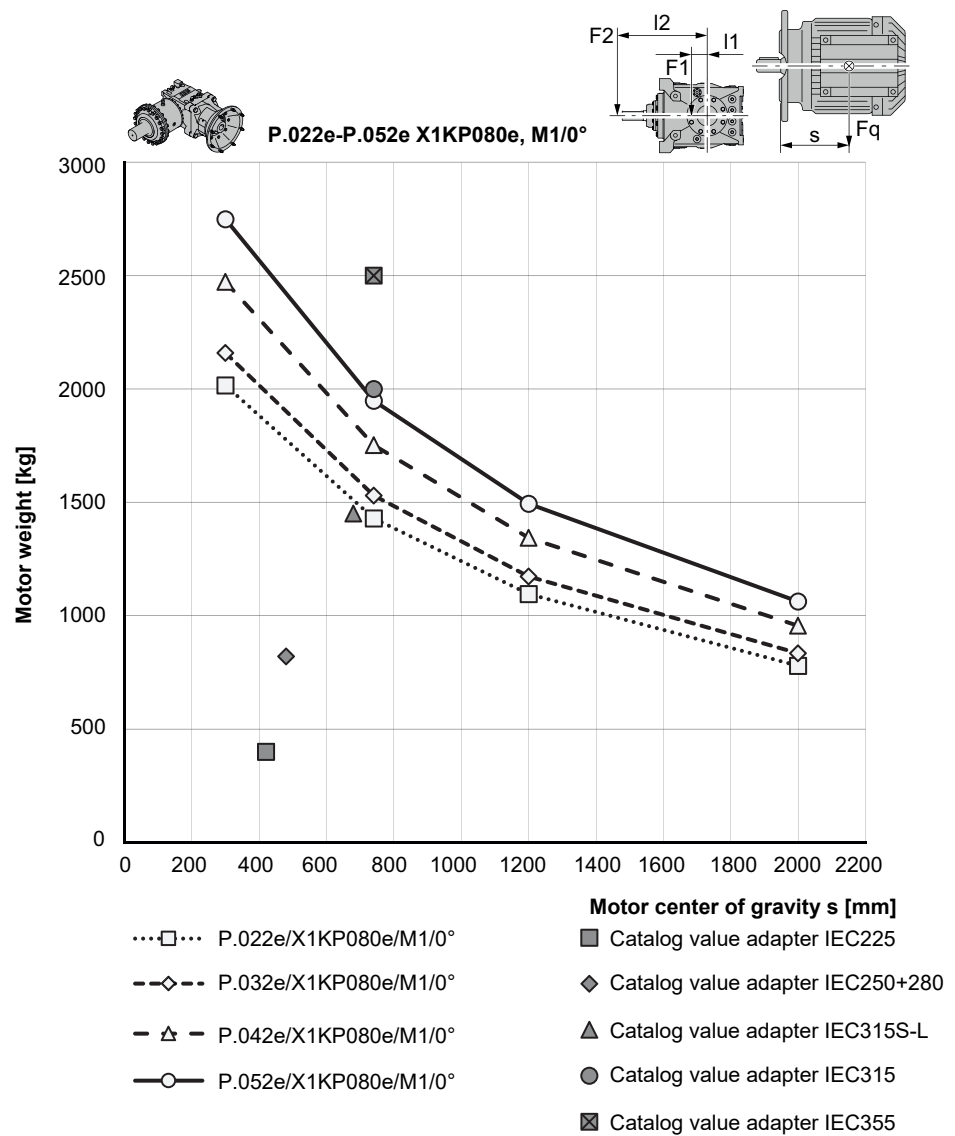
Motor weight/motor center of gravity



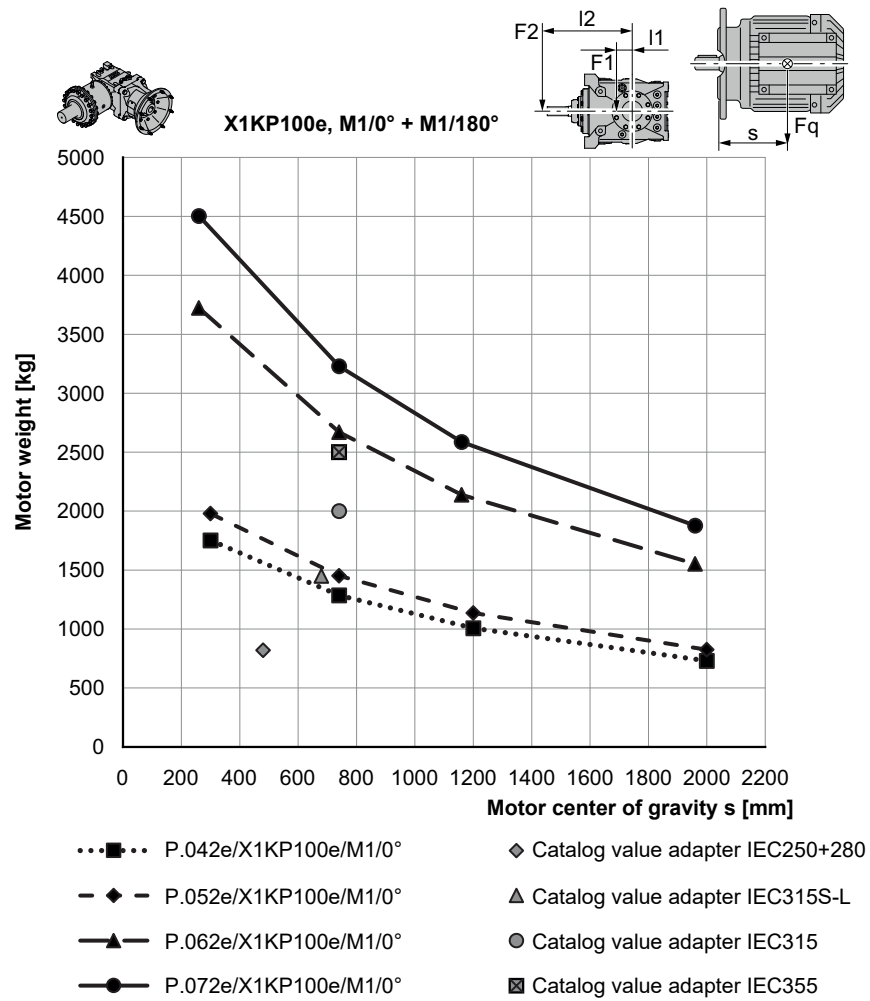
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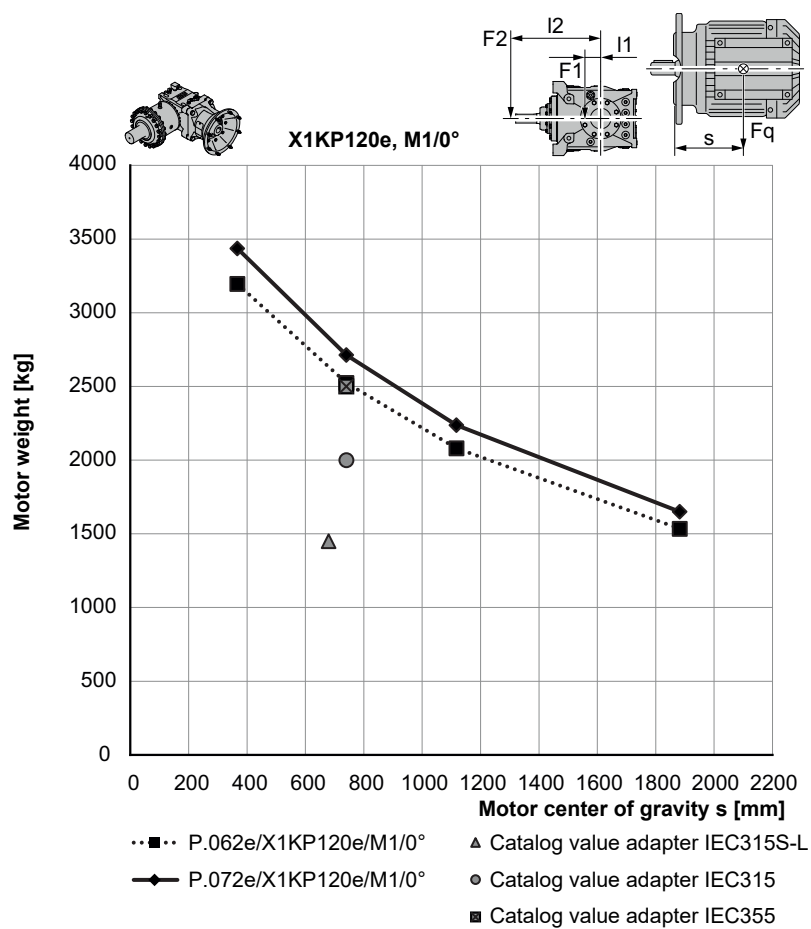
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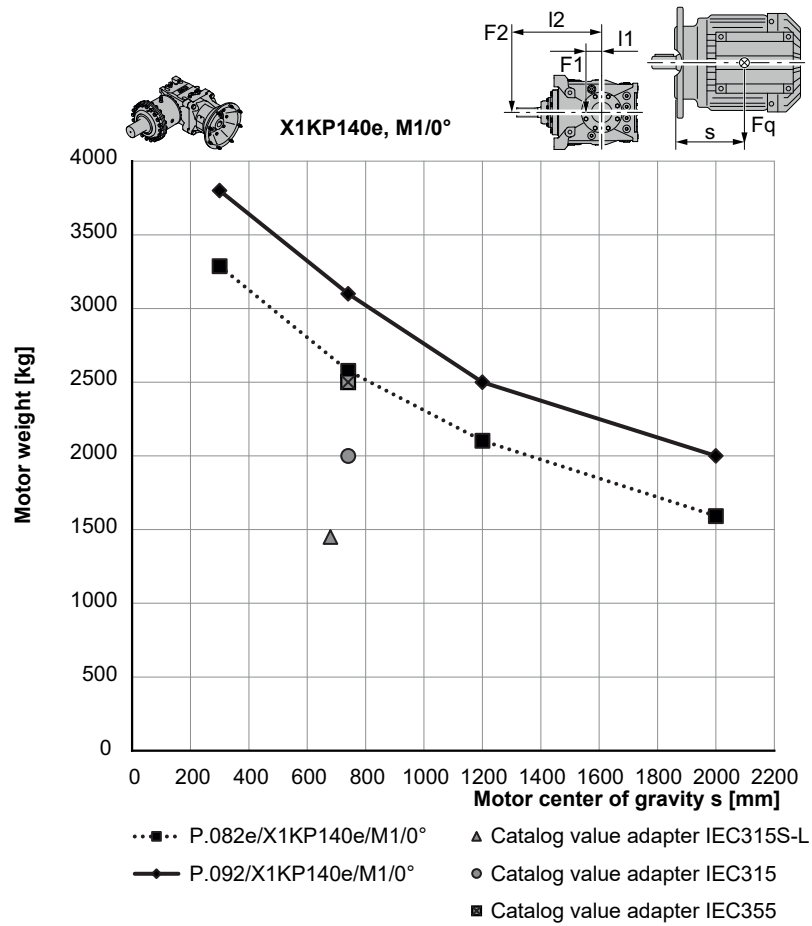
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6 Installation/assembly

Motor mounting on a gear unit



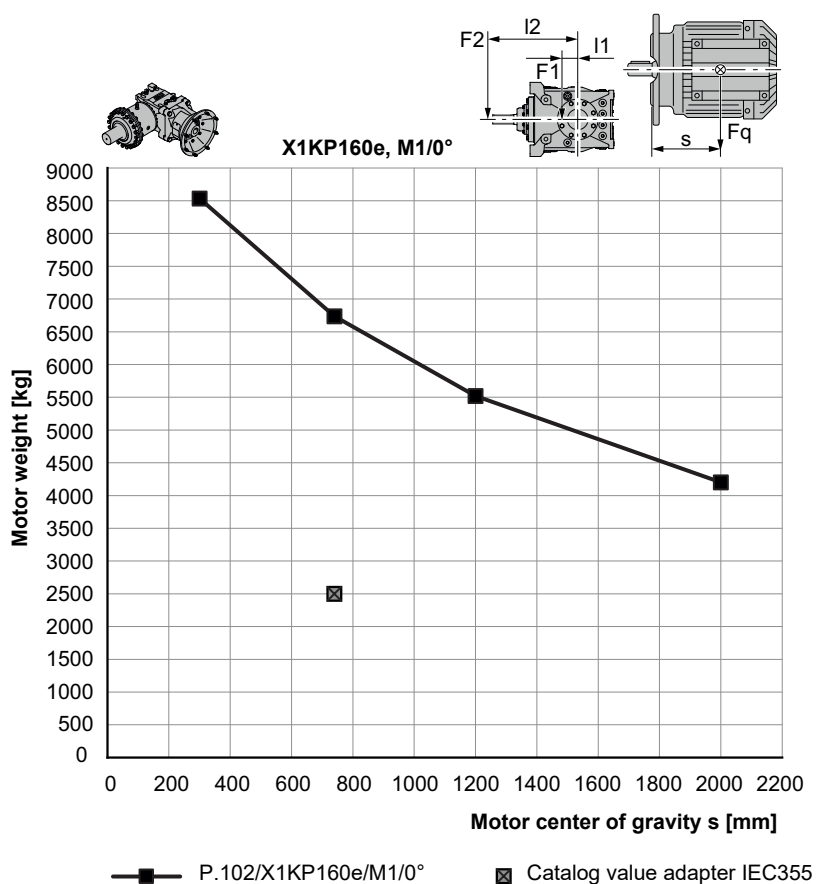
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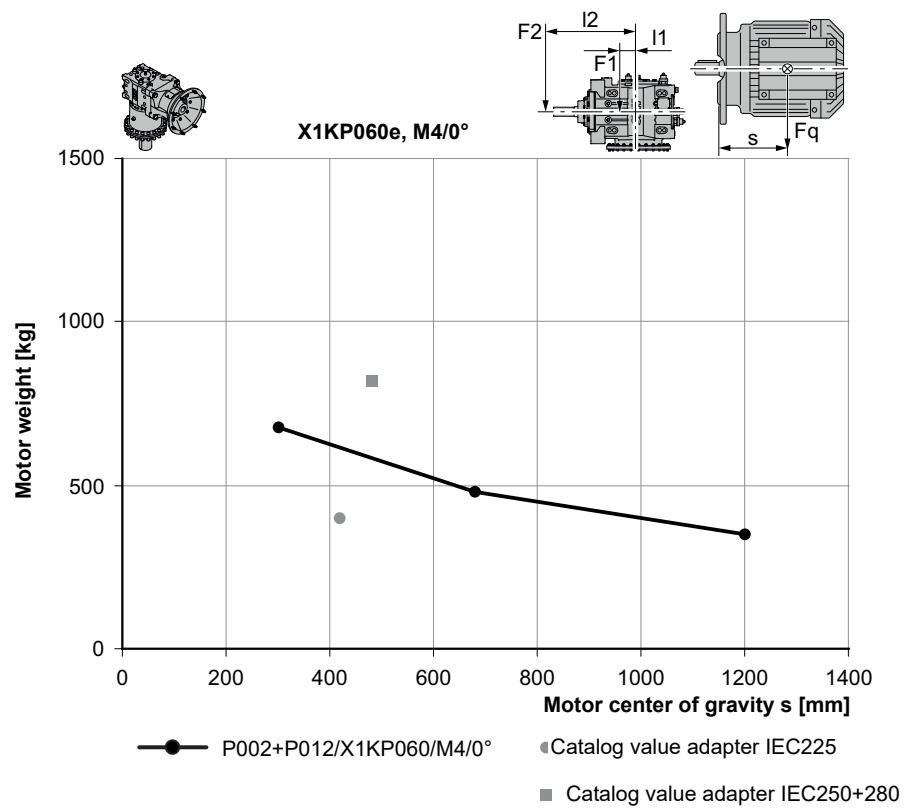
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6 Installation/assembly

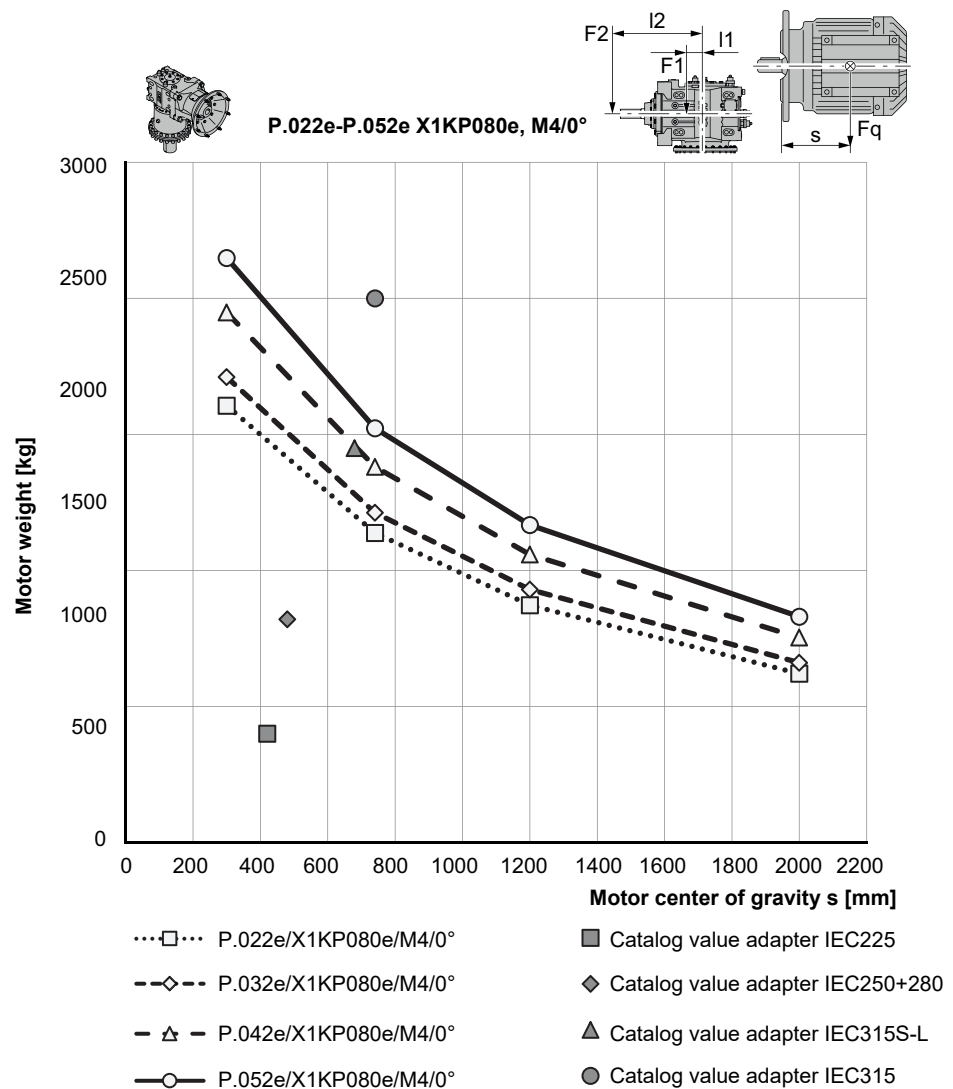
Motor mounting on a gear unit



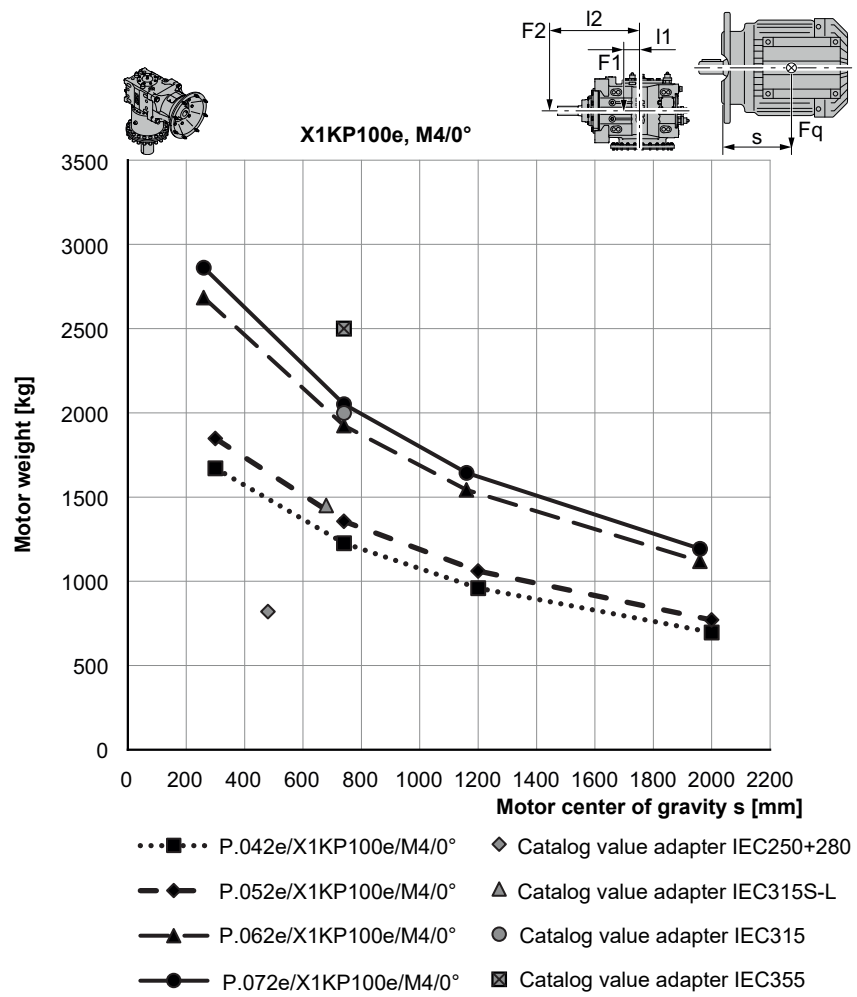
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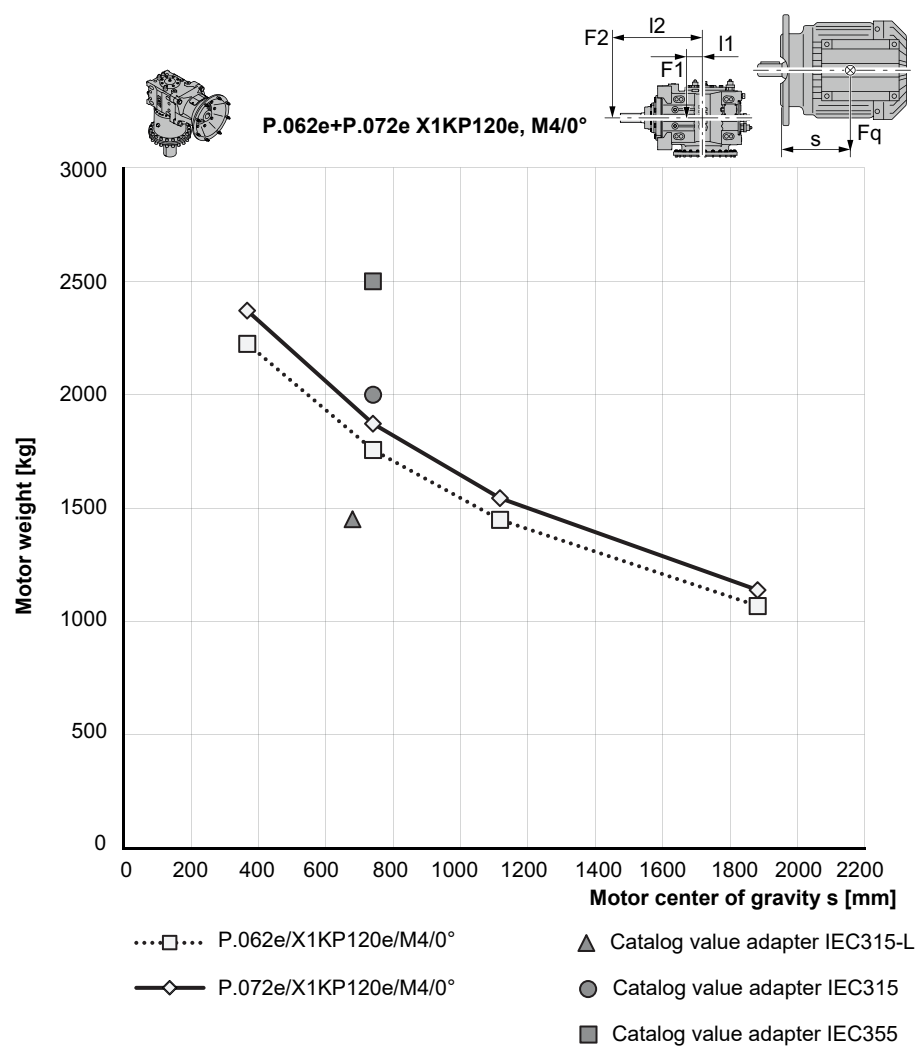
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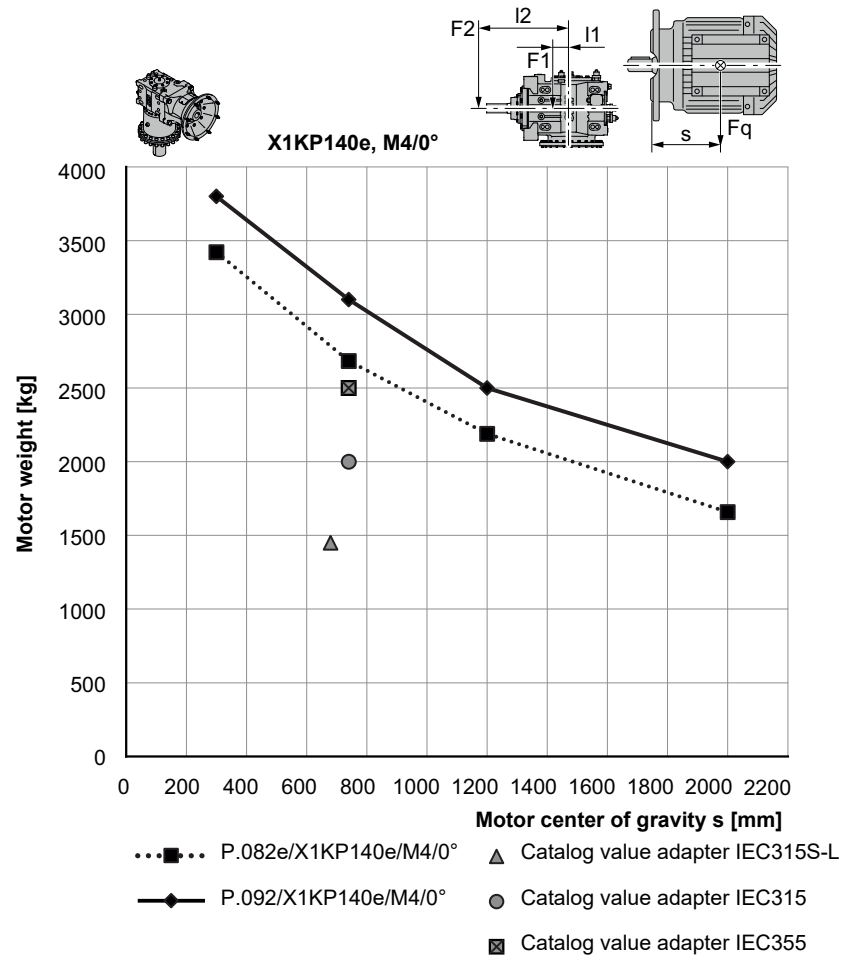
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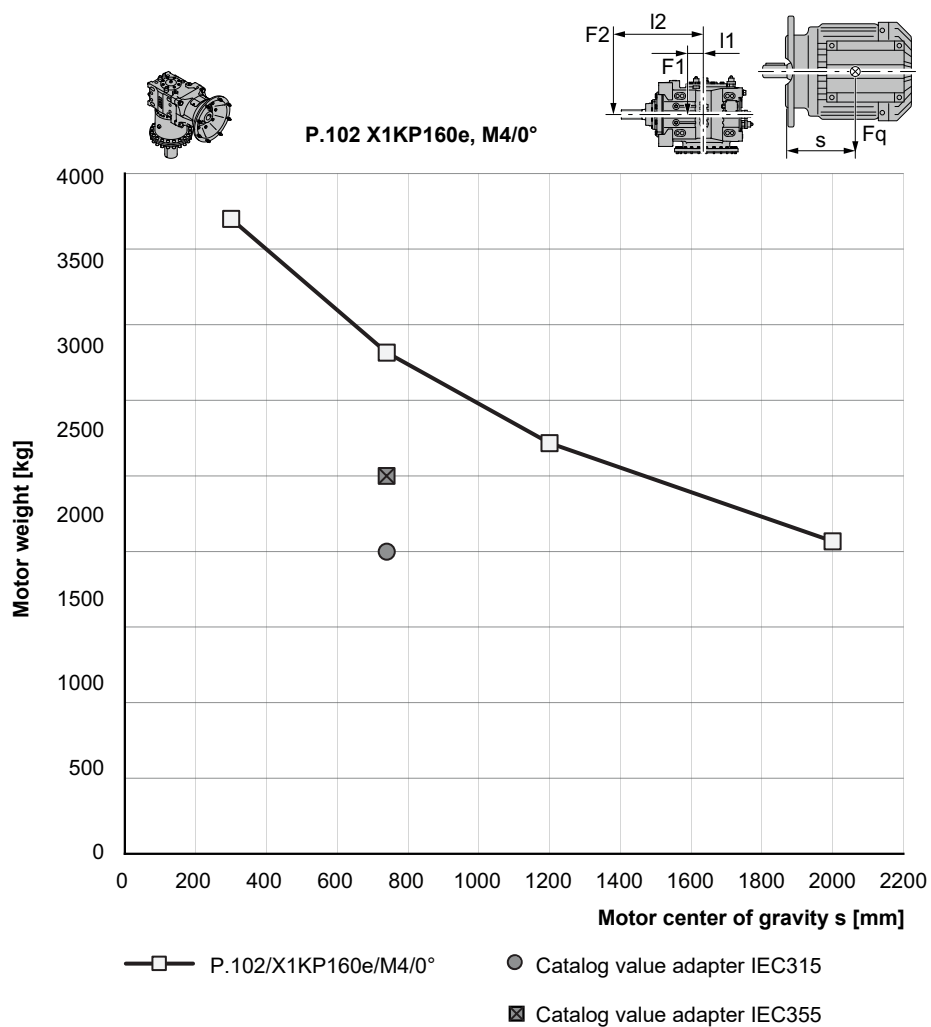
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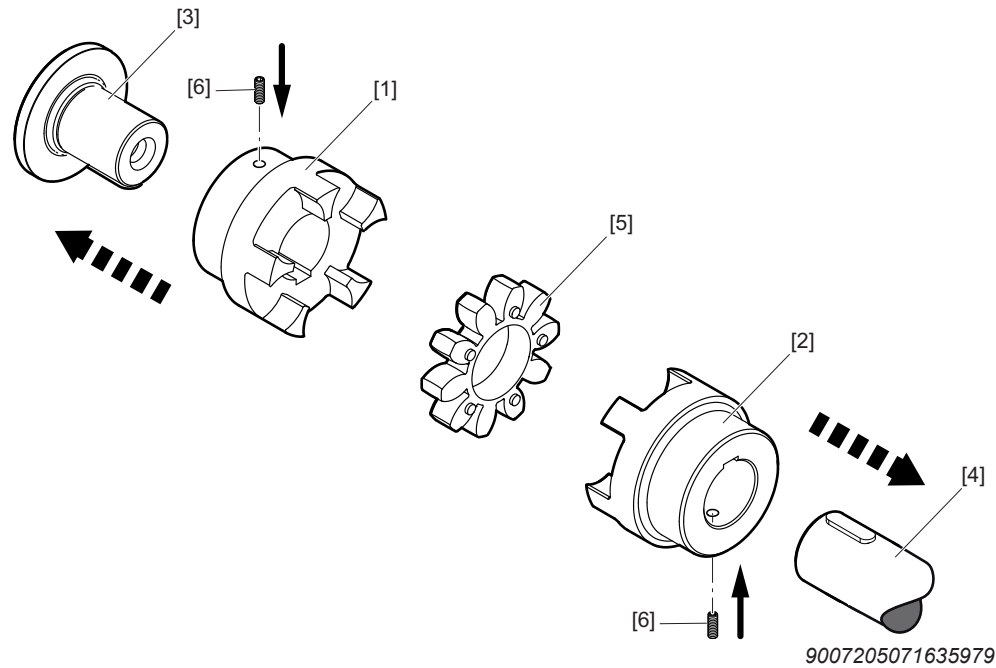
6.14.2 Claw coupling

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.

Torsionally flexible jaw-type coupling

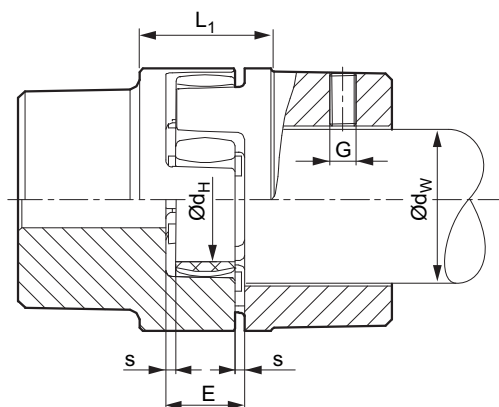
Mounting the coupling



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.

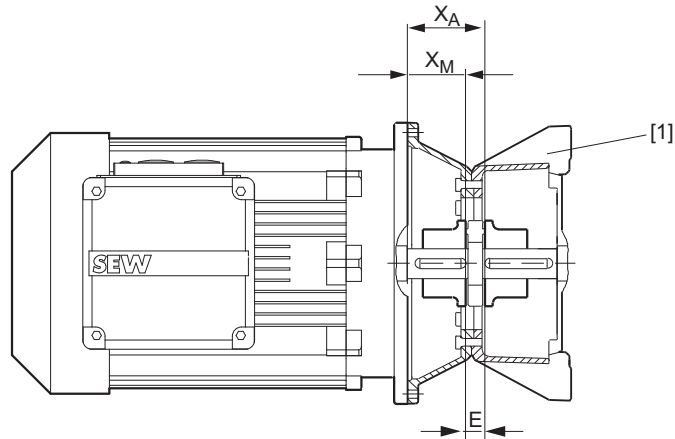
Offset values

The following table shows the offset values:

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

6.14.3 Attaching the motor to the motor adapter

1. Clean the motor shaft and flange surfaces of the motor and the motor adapter. These must be dry and free of grease!
2. To avoid contact corrosion, apply some assembly paste, for example NOCO®-Paste to the motor shaft.
3. Push the coupling half onto the motor shaft and position it. When doing this, observe the information in chapter "Claw coupling" (→ 119) 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	Distance of the coupling to the flange surface of the motor
$\rightarrow XM = XA - E$			

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.

6.15 Water cooling cartridge /CCT

6.15.1 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 over-pressure.
- Filtering to 100 µm is recommended.

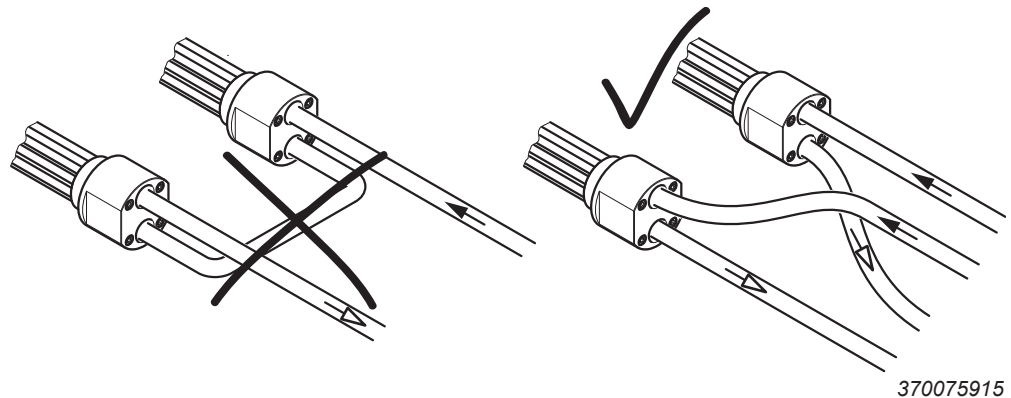
6.15.2 Technical data

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

Size	Connection	Max. water pressure	Max. cooling water flow rate (per water cooling cartridge) l/min
X1KP60e – 120e	G 1/4"	10	11
X1KP140e – 160e	G 1/2"	10	28

6.15.3 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.



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

6.15.4 Removal

Observe the notes in chapter "Cleaning the water cooling cartridge /CCT" (→ 154).

6.15.5 Requirements on the water quality

INFORMATION



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

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

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

Water hardness

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

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

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

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

pH value

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

- Corrosion issues when **pH value is < 6**
- The following applies to alkaline water:
→ Corrosion problems when **water hardness is < 6°dH**.

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

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

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

Cooling water assessment based on water substances

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

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

+ = Usually good resistance

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

– = Use is not recommended

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.

6.16 Oil heater /OH



⚠ WARNING

Danger of electric shock.

Severe or fatal injuries.

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

NOTICE

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

Possible damage to property.

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

NOTICE

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

Possible damage to property.

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

6.16.1 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" (→ 139).

At this temperature, the thermostat switches off the oil heater, see chapter "Limit temperature for gear unit startup" (→ 139). 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" (→ 130).

6.16.2 Thermostat

Electrical connection

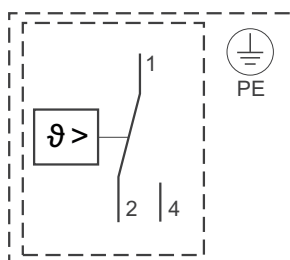
**⚠ WARNING**

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.



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- 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% $\cos\varphi = 1$ (0.6)	10 A
	DC 230 + 10%	0.25 A

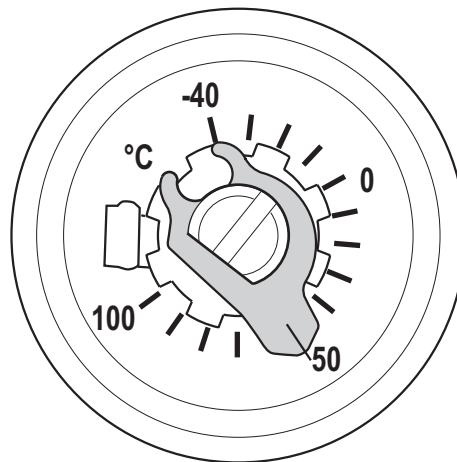
Contact reliability:

To ensure greatest possible contact reliability, the manufacturer recommends a minimum load of AC/DC 24 V, 100 mA for silver contacts.

Nominal impulse voltage:	2500 V
Overvoltage category II	(via the switching contacts 400 V)
Required fusing:	See maximum switching current

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

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



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6.16.3 Connection power

The table shows the power of the installable heating elements.

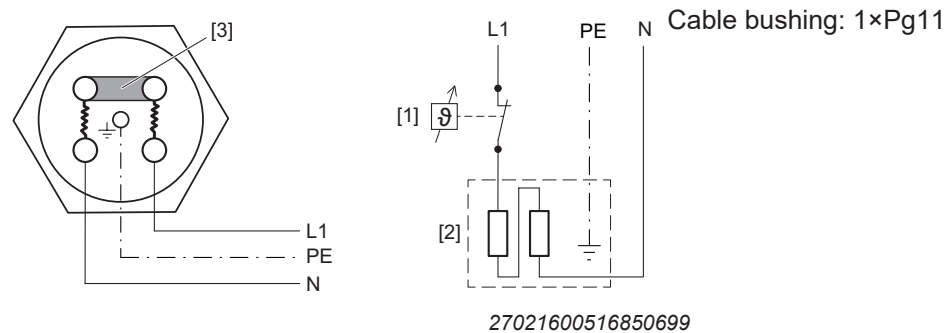
Size	Mounting position X1KP	Number of heating elements	P _{inst} power of an installed heating element in watts
P2P.002e X1KP060e P2P.012e X1KP060e	M1	1 – 3	270
	M3	1 – 3	
	M4	1 – 2	
	M5	1 – 6	
P2P.022e X1KP080e P2P.032e X1KP080e P2P.042e X1KP080e P2P.052e X1KP080e	M1	1 – 3	320
	M3	1 – 3	
	M4	1 – 3	
	M5	1 – 6	
P2P.042e X1KP100e P2P.052e X1KP100e P2P.062e X1KP100e P2P.072e X1KP100e	M1	1 – 3	440
	M3	1 to 3	
	M4	1 – 3	
	M5	1 – 6	
P2P.062e X1KP120e P2P.072e X1KP120e	M1	1 – 5	550
	M3	1 – 5	
	M4	1 – 5	
	M5	1 – 8	
P2P.082e X1KP140e P.092 X1KP140e	M1	1 – 5	1050
	M3	1 – 5	
	M4	1 – 5	
	M5	1 – 8	
P.102 X1KP160e	M1	1 – 5	1050
	M3	1 – 5	
	M4	1 – 5	
	M5	1 – 8	

6.16.4 Connection power and electrical connection of resistor element

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

AC voltage / 1-phase / 230 V / parallel connection

The following figure shows the wiring ex works (as viewed into the connection space):

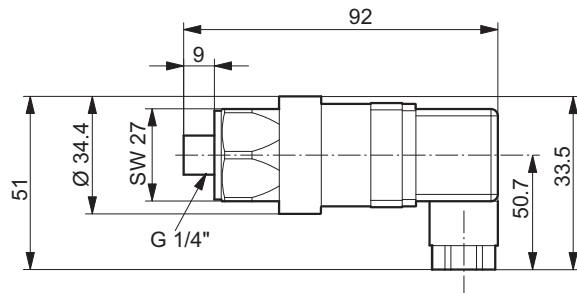


- [1] Thermostat
- [2] Heating element
- [3] Jumper

Size	Heating element
X1KP060 - X1KP120	G1"
X1KP140 - X1KP160	G1.5"

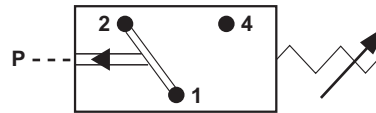
6.17 Pressure switch /PS

6.17.1 Dimensions



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6.17.2 Electrical connection



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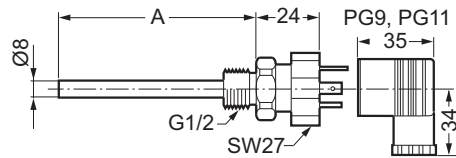
- [1] [2] NC contact
[1] [4] NO contact

6.17.3 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.

6.18 Temperature sensor /Pt100

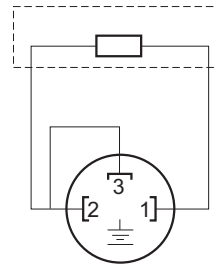
6.18.1 Dimensions



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A in mm
50

6.18.2 Electrical connection



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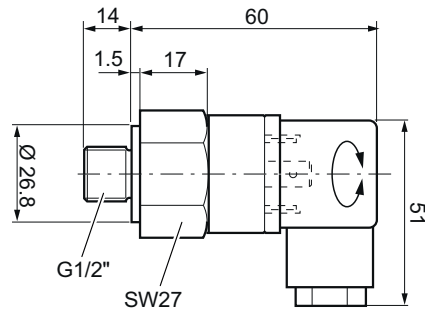
[1] [2] Resistor element connection

6.18.3 Technical data

- Design with thermowell and changeable measuring insert
- Sensor tolerance $K \pm (0.3 + 0.005 \times T)$, (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.

6.19 Temperature switch /NTB

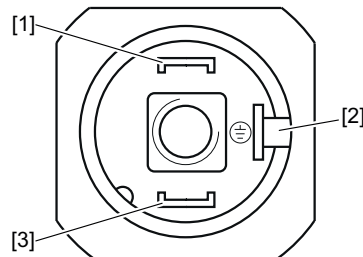
6.19.1 Dimensions



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6.19.2 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

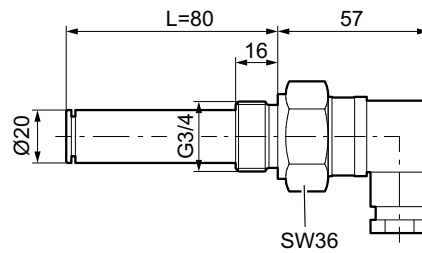
[2] Grounding terminal 6.3 x 0.8

6.19.3 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.

6.20 Temperature switch /TSK

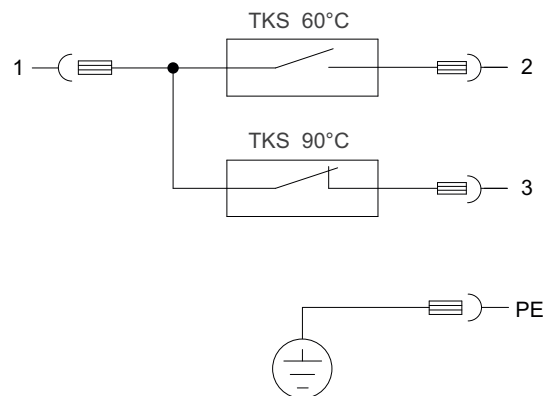
6.20.1 Dimensions



56786717195

6.20.2 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

6.20.3 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.

7 Startup

7.1 Before startup

Ensure that the following requirements have been met:

NOTICE

Improper startup may result in damage to the gear unit.

Possible damage to property.

- For gear units with extended storage option, observe the information in chapter "Gear unit shutdown / gear unit preservation" (→ 28).
- Remove present transport protection.
- Secure the existing oil drain valves against unintended opening.
- For operation at low ambient temperatures, ensure that the limit temperature is adhered to, see chapter "Limit temperature for gear unit startup" (→ 139). Ensure that the heating time is sufficient.

7.2 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 $\geq 400 \text{ min}^{-1}$ 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" (→ 158).
- Observe the notes in chapter "Gear units with shaft end pump /SEP" (→ 71).

7.3 Water cooling cartridge /CCT

NOTICE

Risk of power loss due to contamination.

Possible damage to property.

- A loss of power can be caused by scale deposits on the inside of the pipe. Proceed as described in chapter "Cleaning the water cooling cartridge / CCT" (→ 154).

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

Perform the following checks:

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

7.4 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 lubricant table in chapter "Permitted lubricants".

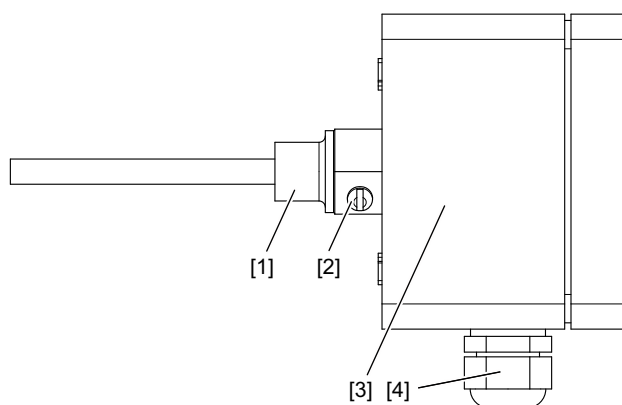
7.5 Oil heater /OH

7.5.1 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.

7.6 Measuring the oil temperature

The oil temperature must be measured to determine the oil change intervals.

See chapter "Lubricant change intervals" (→ 144) for a description. Measure the temperature at the bottom of the gear unit. If the gear unit has an oil drain plug, measure the temperature on this screw. Add 10 K to the measured value. This value is the basis for the oil change intervals.

8 Inspection/maintenance

8.1 Information

Ensure that the following requirements have been met.



⚠ WARNING

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

Severe or fatal injuries.

- Protect the operator's machine against unintentional movement when installing or removing the gear unit.
- Before loosening the shaft connections, make sure that the system is no longer strained.

NOTICE

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

Possible damage to property.

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

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

8.2 Inspection and maintenance intervals

Adhere to the following inspection and maintenance intervals:

Time interval	Required steps
Daily	- Check the housing temperature: - Mineral oil: max. 90 °C - Synthetic oil: max. 100 °C - Check the gear unit noise.
Monthly	- Check the gear unit for signs of leakage. - Check the oil level.
After 500 operating hours	First oil change after initial startup.
Every 6 months	Check all the screw fittings and piping for leakage.
Every 3000 operating hours, at least every 6 months	- Check the oil consistency. - Fill regreasable sealing systems with grease. In dusty environments, regrease every 3 months. - Refill sealing grease of the lower bearing on the output shaft with drywell sealing systems. In dusty environments, regrease every 3 months.
Depending on the operating conditions, at least every 12 months	- Check whether the retaining screws are tightly secured. - Check whether the gear unit surface is free of dust and dirt to ensure optimal cooling of the gear unit. - 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-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.
Depending on the operating conditions (see figure in the following chapter)	Change the oil. Observe the specifications of the oil manufacturer.

Time interval	Required steps
Varies (depending on external factors)	• Check the installed hose pipes. • Clean the outer gear unit housing. • Touch up or renew the surface/corrosion protection paint. • Check the water cooling cartridge /CCV for deposits. • Replace damaged seals. • 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.

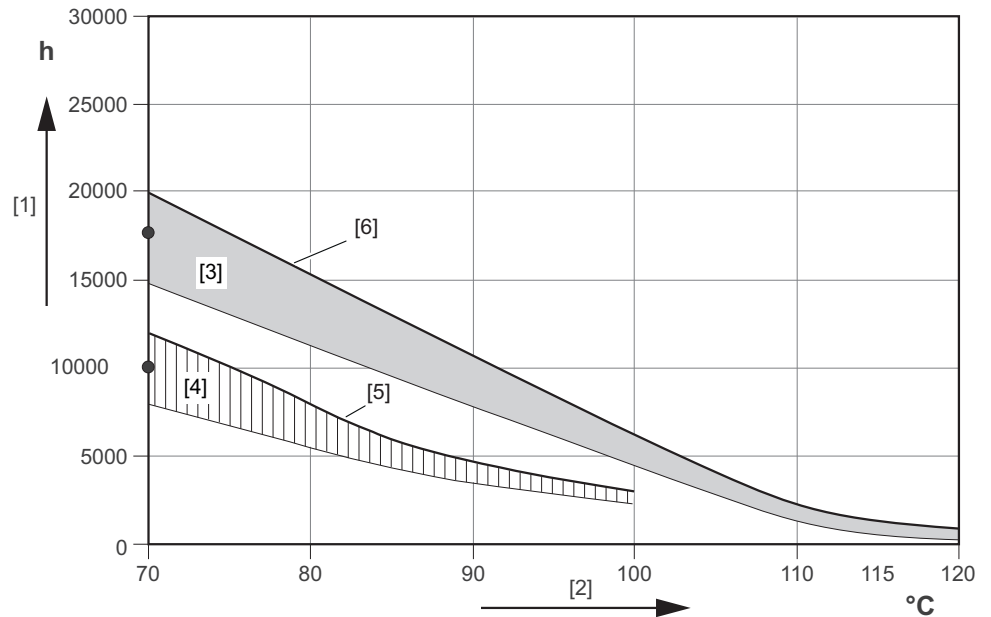
8.3 Lubricant change intervals

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

INFORMATION



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



- [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" (→ 149)) to optimize the lubricant change intervals.

8.4 Checking the oil level

8.4.1 General information



NOTICE

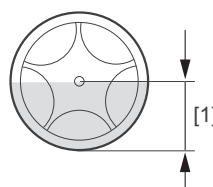
Improper checking of the oil level may result in damage to the gear unit.

Possible damage to property.

- Check the oil level only when the gear unit is cooled down to room temperature.
- Check the oil level again after a few operating hours.
- When the gear unit is equipped with an oil dipstick and an oil sight glass, refer to the oil dipstick for the correct oil level. The value of the oil sight glass is only a guide value.

8.4.2 Oil sight glass

1. Check the oil level at the oil sight glass according to the following figure. The oil level must be within the marked range [1].



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2. If the oil level is too low, proceed as follows:
 - Unscrew the breather from the splash guard adapter.
 - Fill in new oil of the same type via the splash guard adapter until the oil level reaches the center of the oil sight glass.
 - The oil fill quantity must not exceed the upper edge of the oil sight glass.
 - Screw in the breather.

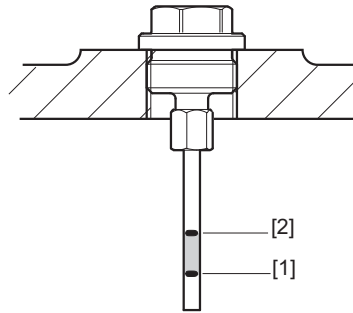
INFORMATION



You can fill small quantities of oil directly into the gear unit via the splash guard adapter. For larger amounts of oil, e.g. in case of an oil change, remove the splash guard adapter.

Observe chapter "Installing the splash guard adapter" (→ 72) for mounting the splash guard adapter.

8.4.3 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.

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

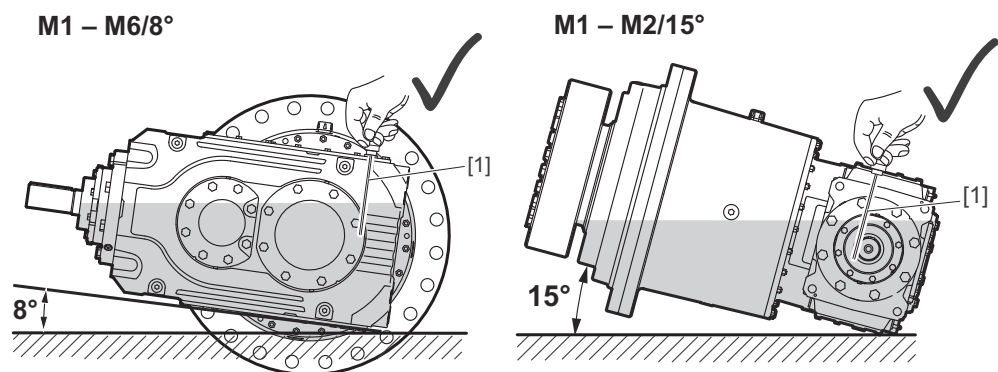
Observe the information on the nameplate and in the order documents. The following figures are merely examples.

Fixed pivoted mounting positions

Procedure

Check the oil level in the fixed end position. Observe the information in chapter "Standard procedure" (→ 145).

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



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[1] Oil dipstick

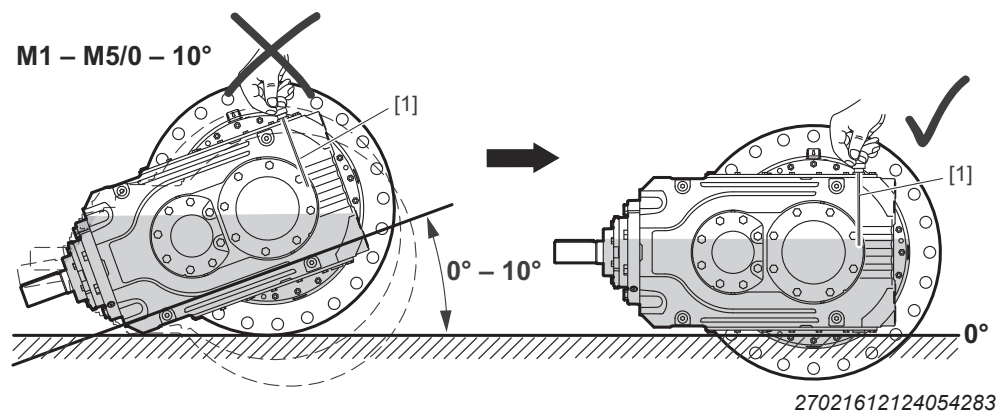


Variable pivoted mounting positions

Procedure

Before checking the oil level of gear units with variable pivoted mounting position, position the gear unit in the mounting position defined in the order documents. Observe the information in chapter "Standard procedure" (→ 145).

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



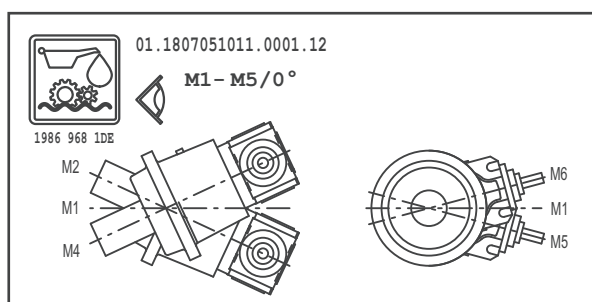
[1] Oil dipstick



Information sign

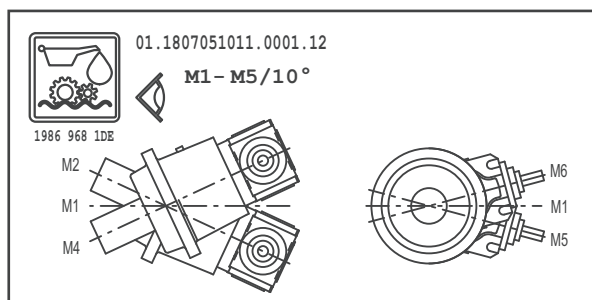
Observe the additional **information sign on the gear unit**. Check the oil level in the test mounting position specified on the information sign.

The following figure shows an example of the information sign for control mounting position 0°:



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The following figure shows an example of the information sign for control mounting position 10°:



9007213877908107

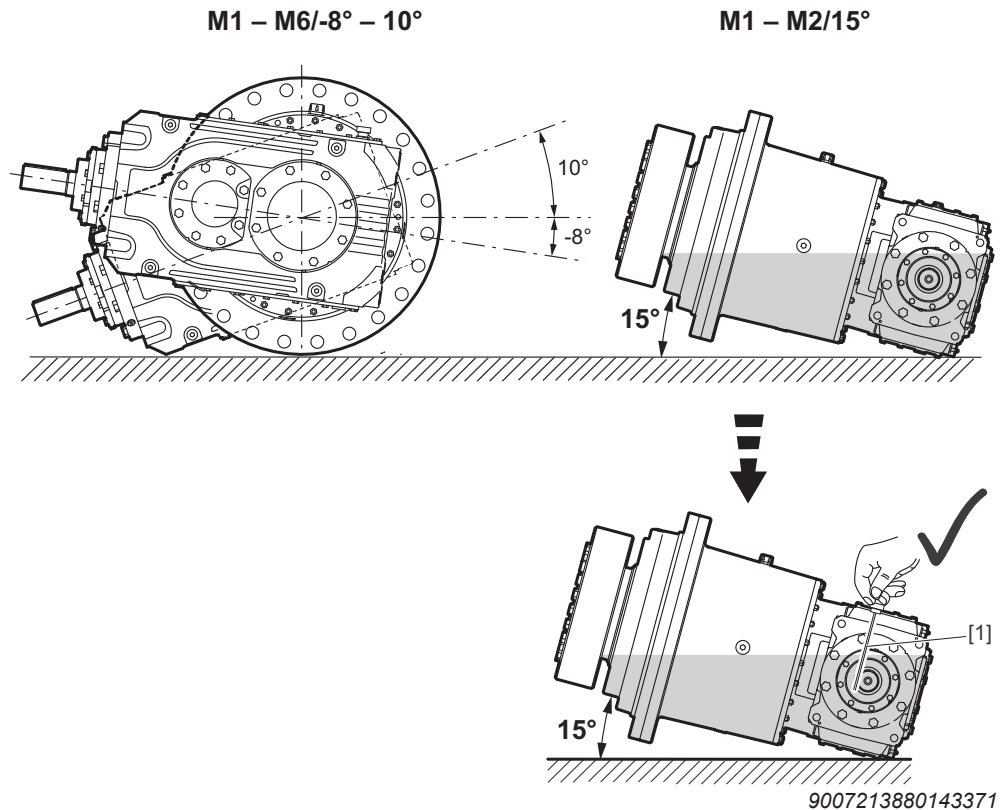
Combination of fixed and variable pivoted mounting positions

Procedure

Observe the following procedure for a combination of **fixed and variable pivoted mounting position**.

Before checking the oil level of gear units with fixed and variable pivoted mounting position, position the gear unit in the mounting position defined in the order documents. Observe the information in chapter "Standard procedure" (→ 145).

The following figure shows an example of the position that must be used to check the oil level:



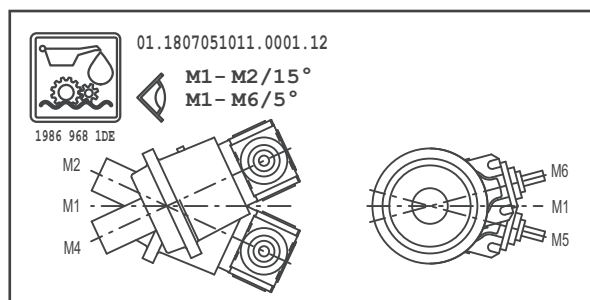
[1] Oil dipstick



Information sign

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

The following figure shows an example of the information sign for control mounting position M1 – M2/15° at M1 – M6/5°:



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8.5 Checking the oil consistency



INFORMATION

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

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

Proceed as follows to check the oil consistency:

1. **▲ WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Severe injuries.
Allow the gear unit to cool down below 50 °C before you start working on it.
2. Start the gear unit for a short time for the oil to mix with suspended particles.
3. Determine the oil drain and place a clean and dry container underneath.
4. Slowly open the oil drain and drain some oil.
5. Close the oil drain valve.
6. Check the oil consistency:
 - Check the drained oil for appearance, color, and contamination.
 - If the oil sample is severely contaminated, e.g. water, cloudiness, change in color, dirt, consult a specialist to find out the cause.

8.6 Changing the oil

8.6.1 Notes

Observe the following information when changing the oil:

- Perform the oil change immediately after you have switched off the gear unit to prevent solids from settling. If possible, you should drain the oil while it is still warm. Avoid oil temperatures above 50 °C.
- The oil grade and oil viscosity are listed on the nameplate of the gear unit.

When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the oil fill quantity is higher. Observe the operating instructions of the oil supply system.

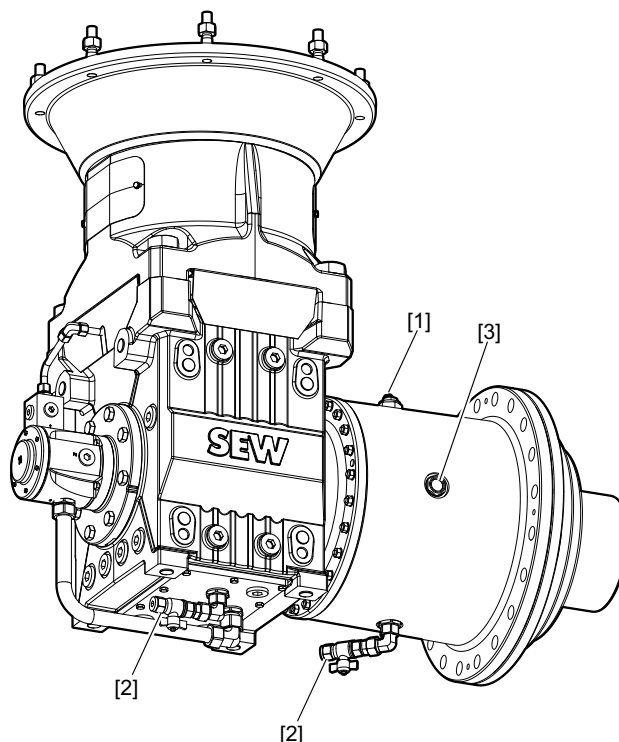
- Always fill the gear unit with the same oil grade that was used before. Mixing oils of different grades and/or manufacturers is not permitted. In particular, synthetic oils must not be mixed with mineral oils or other synthetic oils. When switching from mineral oil to synthetic oil and/or from synthetic oil of a certain basis to synthetic oil of a different basis, you must flush the gear unit thoroughly with the new oil grade.

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

- When changing the oil, flush the interior of the gear unit thoroughly with oil to remove oil sludge, wear debris, and oil residues. Use the same oil grade that is used for operating the gear unit. Fill in the fresh oil only after all residues have been removed.
- An oil level above the max. marking might indicate that foreign liquids (e.g. water) have entered. An oil level below the min. marking might indicate a leakage. Find out and eliminate the cause before you fill in new oil.
- Replace any damaged gaskets of the oil drain plug.
- 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.

8.6.2 Procedure

The gear units are equipped with an oil drain plug or optionally with an oil drain valve.



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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. Remove the breather [1].
3. Remove the splash guard adapter.
4. Place a suitable container underneath the oil drain [2].
5. Only open the oil drain [2] with caution. Drain all the oil into the container.
6. Close the oil drain [2] again.
7. Pour in new oil of the same grade through the oil fill opening [1].
 - The oil quantity specified on the nameplate is an approximate quantity. The required oil quantity depends on the respective marks on the oil sight glass, see chapter "Checking the oil level" (→ 145).
 - Use a clean filling aid without zinc coating (plastic funnel or similar).
8. Re-insert the splash guard adapter [1]. Observe chapter "Installing the splash guard adapter" (→ 72).
9. Screw in the breather [1] again.
10. **▲ CAUTION!** Danger due to leakage of lubricant. Possible risk of slipping.
Immediately remove any oil that has escaped with oil binder.

8.7 Checking and cleaning the breather

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

8.8 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.

8.8.1 Disposal

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

8.9 Refilling sealing grease



⚠ WARNING

Risk of crushing due to rotating parts.

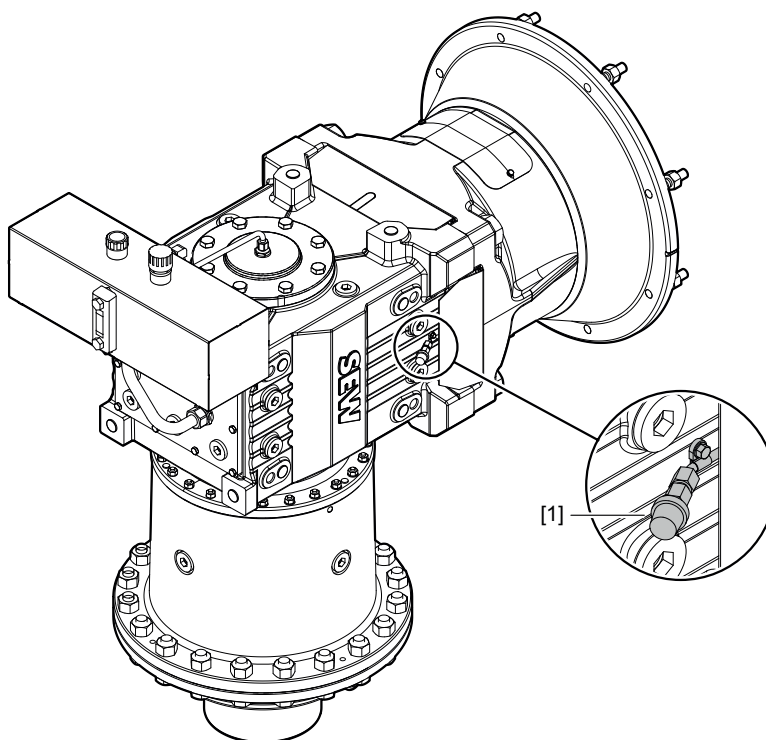
Severe or fatal injuries.

- When re-lubricating, make sure that sufficient safety measures have been taken.



INFORMATION

- Slowly turn the shaft when you re-lubricate the gaskets to ensure a better spreading of the grease.
 - Immediately remove the old grease that has leaked out.
1. For the exact lubrication position, refer to the order-specific dimension sheet.
 2. Use moderate pressure to force grease into each lubrication point [1] until new grease leaks out of the sealing gap. Observe the information in chapter "Sealing greases/rolling bearing greases" (→ 166).
 3. The used grease is pressed out of the sealing gap together with any contaminants it has absorbed.



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INFORMATION

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

8.10 Cleaning the water cooling cartridge /CCT

INFORMATION



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

8.10.1 Maintenance intervals

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

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

8.10.2 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.

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.

8.10.3 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 lime 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.
11. Re-connect the cooling water supply and return pipes to the water cooling cartridge.
12. Pour in new oil of the same grade through the oil fill opening.
 - The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil dipstick or the oil level glass is the decisive indicator of the correct oil quantity, see chapter "Checking the oil level".
 - Use a clean filling aid without zinc coating (plastic funnel or similar).
13. Before restarting the system, vent the pipes.
14. Check the tightness.

8.11 Cleaning the oil heater /OH



▲ WARNING

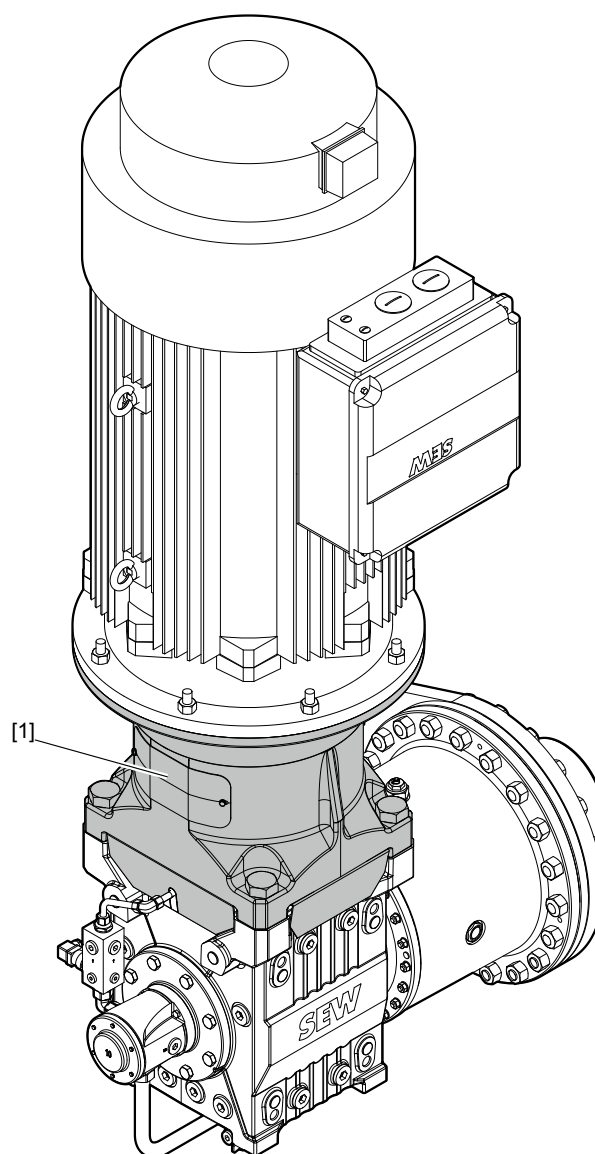
Danger of electric shock.

Severe or fatal injuries.

- De-energize the oil heater before you start working on the unit.
- Secure the oil heater against unintended power-up.

1. Remove the cabling of the heating element.
2. Before disassembling the heating element, drain the oil (→  150).
3. **NOTICE!** Improper cleaning may damage the heating elements. Possible damage to property.
Clean the tubular heating elements with solvent. Replace the defective heating elements.
4. Screw the heating element out of the gear unit housing.
5. Apply LOCTITE® 577 to the 2 threads of the heating element.
6. Fasten the heating element by applying torque only to the head of the hex screw.
7. Close the oil drain valve.
8. Fill new oil of the same type as the old oil through the oil filling hole (if you want to change the oil type, contact SEW-EURODRIVE Service).
 - Fill in the oil quantity according to the information on the nameplate. The oil quantity specified on the nameplate is a guide value.
 - Use a clean filling aid (plastic funnel or similar). Avoid using galvanized filling aids.
 - Check to see that the oil level is correct, refer to chapter "Checking the oil level" (→  145).
9. Connect the heating element.

8.12 Cleaning the fan



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1. Remove the fan guard [1].
2. Remove any dirt from the fan wheel, fan guard, and protective grid using a hard brush, for example.
3. Before restarting the fan, make sure the fan guard [1] is mounted properly. The fan must not touch the fan guard.

9 Permitted lubricants

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

9.1 Lubricant selection

Note the following when selecting the lubricants.

NOTICE

Improper lubricant selection can damage the gear unit.

Possible damage to property.

- The oil viscosity and type (mineral/synthetic) to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate. If other lubricants are used in the gear units and/or in other temperature ranges than those recommended, the right to claim under warranty will become invalid. Exceptions are 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

9.2 Structure of the tables and abbreviations

					
[2]				-20	
				-5	
				+5	+65
			VG 150 ¹⁾		
				SEW GearOil	
				Base 150 E1	
				SEW070040013	
				-15	
				0	
				+10	+75
[1]			VG 220		
				SEW GearOil	
				Base 220 E1	
				SEW070040013	
				-10	
				+5	
				+15	+85
			VG 320		
				SEW GearOil	
				Base 320 E1	
				SEW070040013	

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- [1] Lubricant type
- [2] Viscosity class

Abbreviations

Icons	Designation
CLP	= mineral oil
CLP HC	= synthetic polyalphaolefin (PAO)
E	= ester-based oil
	= mineral lubricant
	= synthetic lubricant
	= lubricant for the food industry (NSF H1 -compliant)
	= biodegradable oil (lubricant for agriculture, forestry, and water management)
1)	= lubricants may only be used if service factor $F_s \geq 1.3$

9.3 Explanation of the various lubricants

			[5]
[1]	-20		
[2]	-5	+65	[6]
[3]	+5		
[4]	xyz		
	SEW070040013		[7]

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- [1] Lowest cold start temperature in °C for splash lubrication¹⁾
- [2] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 5000 cSt¹⁾
- [3] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 2000 cSt¹⁾
- [4] Trade name
- [5] Manufacturer
- [6] Highest oil bath temperature in °C²⁾
- [7] Approvals

1) In case of lower temperatures, the oil must be heated to the specified minimum temperature, for example, by using an oil heater. For the maximum permitted oil viscosity per pump type, refer to chapter "Explanations on the oil supply system / oil cooling systems and oil viscosity".

2) Service life is significantly reduced when exceeded. Observe chapter "Lubricant change intervals".

9.4 Lubricant compatibility with oil seals

Approval	Explanation
SEW07004__13:	A lubricant especially recommended with regard to compatibility with the approved oil seals. The lubricant exceeds the state-of-the-art requirements regarding elastomer compatibility.

Permitted application temperature range of the oil seals

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

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

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

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

Examples:

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

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

9.5 Lubricant tables

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

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

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[1]	[2]								
	VG 32 ¹⁾				-40 -30 -25 +30 SHC 624				
	VG 68 ¹⁾			-35 -20 -10 +50 Renolin Unisyn CLP 68		-35 -20 -10 +50 Klübersynth GEM 4-68 N			
	VG 150 ¹⁾	-35 -15 -5 +75 GearOil Synth 150 E1	-25 -10 0 +70 AlphaSyn EP 150	-30 -10 0 +70 Optigear Synthetic X 150	-30 -10 0 +75 SHC 629	-35 -15 -5 +75 SHC Gear 150	-25 -10 0 70 Klübersynth GEM 4-150 N	-35 -15 -5 +75 Carter SH 150	
	VG 220	-30 -10 0 +85 GearOil Synth 220 E1	-25 -5 +5 +80 AlphaSyn EP 220	-25 -5 +5 +80 Optigear Synthetic X 220	-25 -5 +5 +85 SHC 630	-30 -10 +5 +85 SHC Gear 220	-25 -5 +5 +80 Klübersynth GEM 4-220 N	-25 -5 +5 +80 Carter SH 220	
	VG 320	-25 -5 +5 +100 GearOil Synth 320 E1	-20 0 +10 +90 AlphaSyn EP 320	-20 0 +10 +90 Optigear Synthetic X 320	-20 0 +10 +95 SHC 632	-25 -5 +10 +95 SHC Gear 320	-20 0 +10 +95 Klübersynth GEM 4-320 N	-20 0 +10 +90 Carter SH 320	
	VG 460	-20 0 +15 +110 GearOil Synth 460 E1	-15 +5 +15 +100 AlphaSyn EP 460	-15 +5 +15 +100 Optigear Synthetic X 460	-15 +5 +105 +105 SHC 634	-20 0 +15 +110 SHC Gear 460	-15 +5 +20 +105 Klübersynth GEM 4-460 N	-15 +5 +15 +100 Carter SH 460	
	VG 680	-15 +5 +20 +110 GearOil Synth 680 E1		-10 +10 +25 +110 Optigear Synthetic X 680	-10 +10 +25 +110 Renolin Unisyn CLP 680	-10 +10 +25 +110 SHC 636	-15 +10 +25 +110 SHC Gear 680	-10 +10 +25 +110 Klübersynth GEM 4-680 N	-10 +10 +25 +110 Carter SH 680
	VG 1000	SEW 070040313			-10 +15 +30 +110 SHC 639	-10 +15 +30 +110 SHC Gear 1000	0 +20 +30 +110 Klübersynth EG4-1000		
CLP HC									

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[1]	[2]	[3]	SEW EURODRIVE	bremser & leguit	Castrol	FUCHS	KLÜBER LUBRICATION
		VG 68 ¹⁾		-35 -20 -10 +45 Cassida Fluid HF 68	-40 -25 -15 +45 Optileb HY 68	-35 -20 -10 +45 Cassida Fluid HF 68	-35 -20 -10 +45 Klüberoil 4UH1-68 N
	CLP HC ₂ NSF H1	VG 220 ¹⁾	-30 -5 0 +80 SEW GearOil Synth 220 H1 E1 SEW 070040313	-20 -5 +5 +75 Cassida Fluid GL 220	-25 -5 +5 +75 Optileb GT 220 SEW 0700403113	-20 -5 +5 +75 Cassida Fluid GL 220	-25 -5 +5 +75 Klüberoil 4UH1-220 N
		VG 460 ¹⁾	-20 0 +15 +100 SEW GearOil Synth 460 H1 E1 SEW 070040313	-15 +5 +20 +90 Cassida Fluid GL 460	-15 +5 +20 +90 Optileb GT 460 SEW 070040313	-15 +5 +20 +90 Cassida Fluid GL 460	-15 +5 +15 +95 Klüberoil 4UH1-460 N
		VG 680 ¹⁾		-10 +10 +25 +105 Cassida Fluid GL 680		-10 +10 +25 +105 Cassida Fluid GL 680	-10 +10 +25 +105 Klüberoil 4UH1-680 N
		VG 320				-20 0 +10 +8a5 Plantogear 320 S	-20 0 +10 +85 Plantogear 320 S
	E	VG 460				-15 +5 +15 +95 Plantogear 460 S	-15 +5 +15 +95 Plantogear 460 S

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- 1) Lubricants may only be used if the service factor F_s and peak load factor $F_F \geq 1.6$.
The peak output torque M_{K2per} is limited as follows: $F_F \geq 1.6 \rightarrow M_{K2per} \leq 1.25 \times M_{N2}$ (nominal torque) $\rightarrow M_{K2per} \leq 2 \times M_{N2} / F_F = 2 / 1.6 \times M_{N2}$.
In case of deviations, contact SEW-EURODRIVE.
- 2) NSF-H1 registered oils for the food processing industry cannot be combined with the gear unit option "Extended storage" (a VCI anti-corrosion agent is added).

NOTICE:

Also observe the thermal application limits of the oil seal materials, see chapter "Lubricant compatibility with oil seals" ($\rightarrow$ 161).

9.6 Lubricant fill quantities

The specified lubricant fill quantities are guide values. Also observe the information provided on the nameplate or in the technical specification.

The mark on the oil dipstick or the oil level glass is the decisive indicator of the correct oil quantity.

The stated lubricant fill quantity may deviate for pivoted mounting positions.

The definition of the mounting positions can be found in chapter "Mounting position" (→ 34).

Size	Oil quantities for mounting position P / mounting angle X1KP		
	M1/0° (M1/180°) M3/180° (M3/0°) M5/270° (M5/90°) M6/90° (M6/270°)	M1/270° M3/90° M5/180° M6/0°	M2 M4
P2002e X1KP60e	20	21	41
P2012e X1KP60e	22	23	45
P2022e X1KP80e	31	29	62
P2032e X1KP80e	33	31	67
P2042e X1KP80e	38	35	77
P2052e X1KP80e	40	38	81
P2042e X1KP100e	61	58	124
P2052e X1KP100e	64	60	129
P2062e X1KP100e	73	70	150
P2072e X1KP100e	82	76	165
P2062e X1KP120e	99	90	201
P2072e X1KP120e	107	96	217
P2082e X1KP140e	216	197	436
P092 X1KP140e	231	211	465
P102 X1KP160e	281	262	569

9.7 Sealing greases/rolling bearing greases

INFORMATION



- Do not mix permitted greases from different areas of application.
- If users want to use a grease that is not listed, it is their responsibility to ensure that the grease is suitable for the intended application.

The table shows the greases recommended by SEW-EURODRIVE with the "lower operating temperature".

The permitted operating temperature of the lubricant used must be taken into account for the lower and upper operating temperature. For further information, refer to chapter "Lubricant table" (→ 162).

Area of application	Manufacturer	Grease	Lower service temperature
Standard	SEW-EURODRIVE	SEW Grease HL 2 E1¹⁾	-40 °C
	Fuchs	Renolit CX TOM 15 OEM	-40 °C
	BP	Energrease LS EP-2	-30 °C
	Castrol	Longtime PD 2/ Tribol GR 100-1 PD	-35 °C
		Spheerol EPL 2	-20 °C
	Klüber	Centoplex EP 2	-20 °C
		Petamo GHY 133 N	-40 °C
	Mobil	Mobilux EP 2	-20 °C
	Shell	Gadus S2 V220 2	-20 °C
	Total	Multis EP 2	-20 °C
	SEW	SEW Grease HL 2 H1 E1¹⁾	-40 °C
	Bremer & Leguil	Cassida Grease GTS2	-40 °C
	Fuchs	Plantogel 2 S¹⁾	-40 °C

1) Use the greases used at the factory if possible.

10 Malfunctions/remedy

Before you begin, read the following notes in chapter "Creating a safe working environment" (→ 16).

10.1 Possible malfunctions/remedy

Fault	Possible cause	Measure
Operating temperature too high	- Too much oil - Oil too old - Oil is heavily contaminated - Ambient temperature too high - Gear units with fan: Air intake opening/gear unit housing contaminated - Malfunction of the oil-air or oil-water 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 oil level; correct if necessary - Check when the oil was last changed; change the oil, if necessary - Analyze the oil to determine the cause; take measures, if necessary; change the oil - Protect the gear unit from external heat sources (e.g. provide shade) - Check air intake openings, clean them if necessary; clean the gear unit housing - Observe the separate operating instructions for the oil-water or oil-air 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 - Knocking noise: Irregularity in the gearing - Deformation of the housing upon tightening - Noise generation caused by insufficient rigidity of the gear unit foundation	- Check the oil consistency; change bearings - Contact SEW-EURODRIVE. For a better assessment of the failure, send an audio recording of the noise - Check the gear unit mounting for possible deformation and correct if necessary - 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

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Fault	Possible cause	Measure
Temperature at bearing points too high	- Not enough oil - Oil too old - Bearing damaged	- Check oil level; correct if necessary - Check when the oil was last changed; change the oil if necessary - Check the bearing and replace it if necessary. Contact SEW-EURODRIVE
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 - Venting sealed - Oil seal damaged/worn	- Check the oil level and correct, if necessary - Check the venting and replace the breather if necessary - Check the oil seals and replace if necessary
Oil leaking At the gear unit breather	- Too much oil - Drive not installed in proper mounting position - Frequent cold starts (oil foaming) and/or high oil level	- Check oil level, correct if necessary - Install gear unit breather correctly and adjust the oil level - Install oil expansion tank
Oil leaking - From the screw plug - From the oil drain valve	- Gasket not tight - Fittings loosened	- Retighten screw - Retighten the fitting and screw. Secure screw fitting with Loctite®
No oil pump suction	- Air in the suction line of the oil pump - Oil pump defective	- Fill oil into the suction line and the oil pump, vent the pump at the pressure side - Consult SEW-EURODRIVE
Pressure switch not switching	- Air in the suction line of the oil pump - Pressure switch connected incorrectly - Pressure switch defective - Oil pump defective	- Fill suction pipe and oil pump with oil - Vent the pump at the pressure side - Check the connection - Replace pressure switch - 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

Fault	Possible cause	Measure
Gear unit does not reach cold start temperature	• Thermostat set incorrectly • Oil heater faulty or connected incorrectly • Heat dissipation too great due to unfavorable climatic conditions	• Check the setting of the thermostat • Check if the oil heater is connected and working correctly and replace it if necessary • Prevent the gear unit from cooling off during the warm-up phase

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).

10.2 Service

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

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

10.3 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Aluminum
- Copper
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

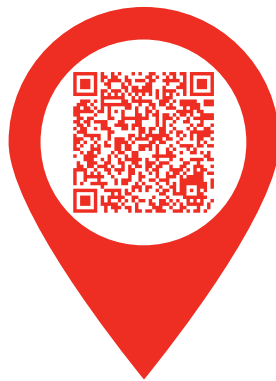
- Oil and grease

Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.

11 Contacting SEW-EURODRIVE

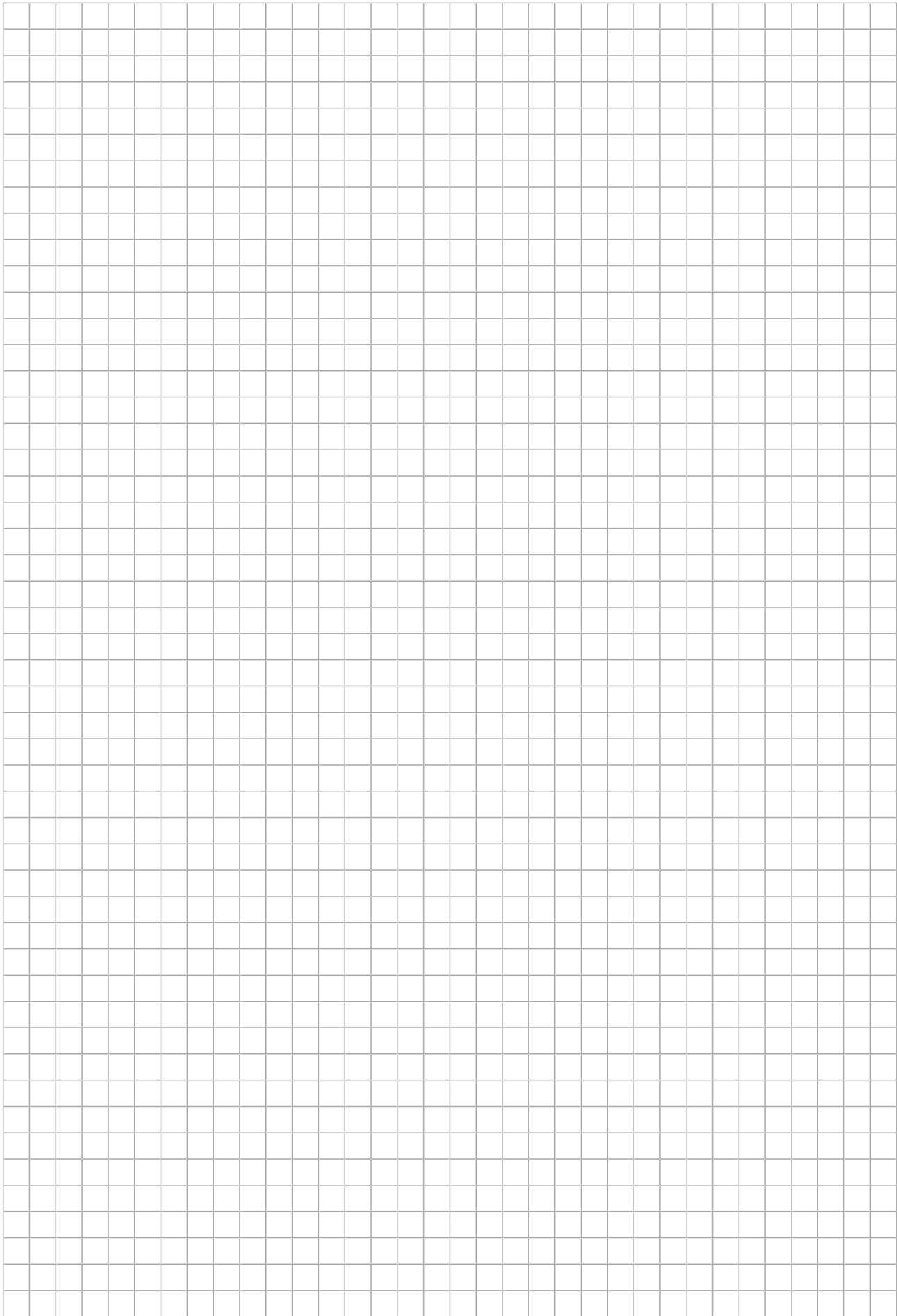
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

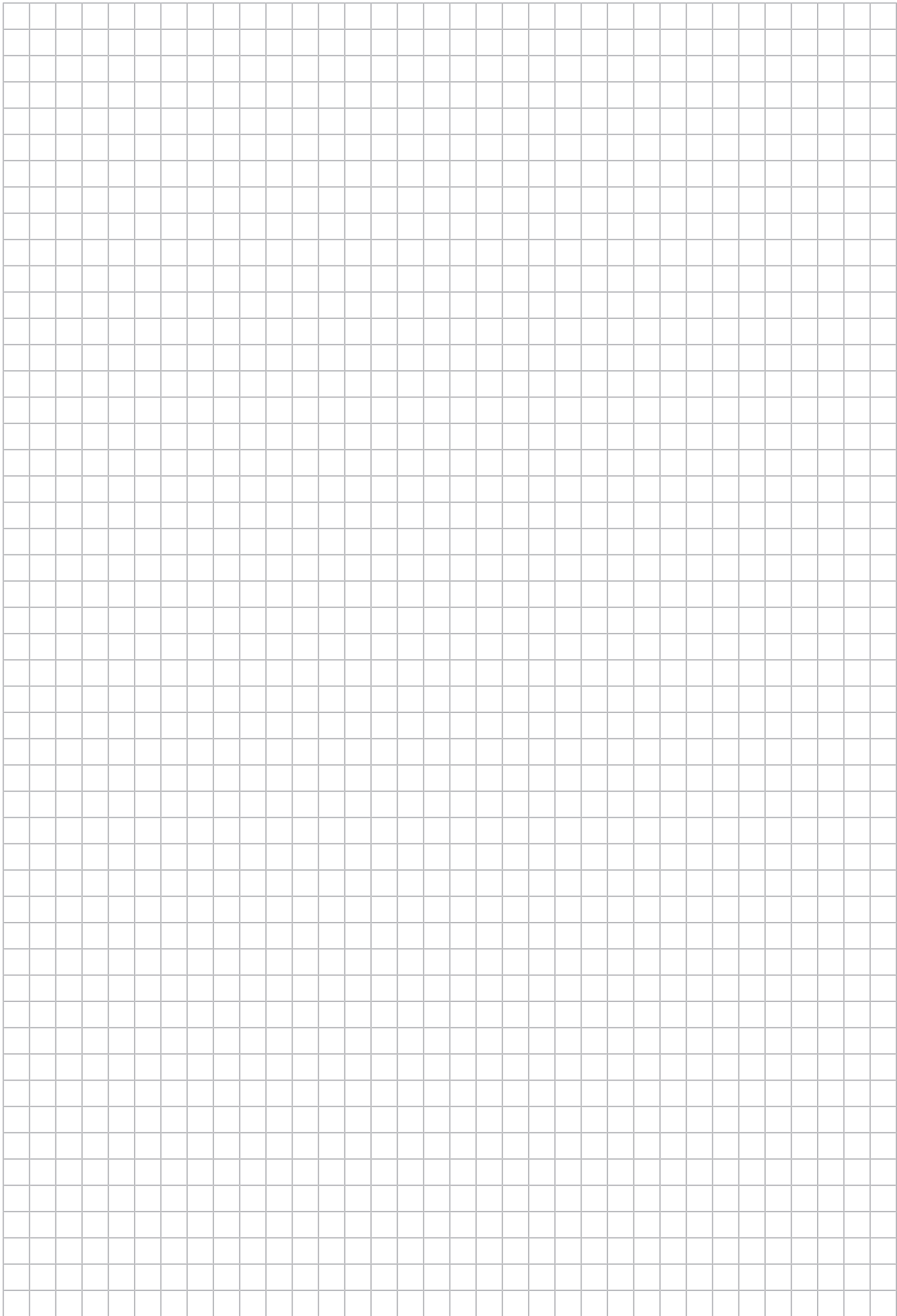
<https://www.sew-eurodrive.de/contacts-worldwide>

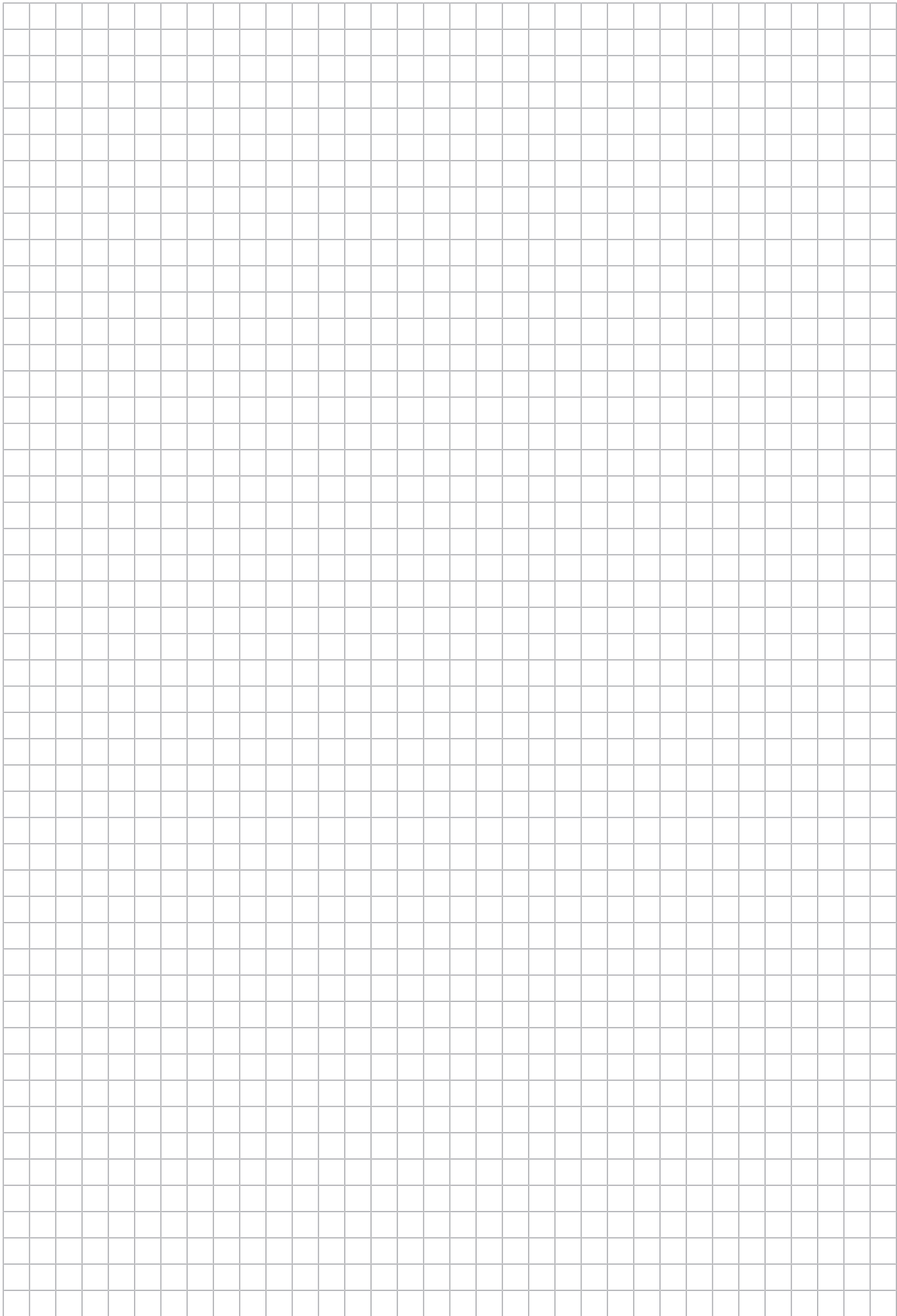


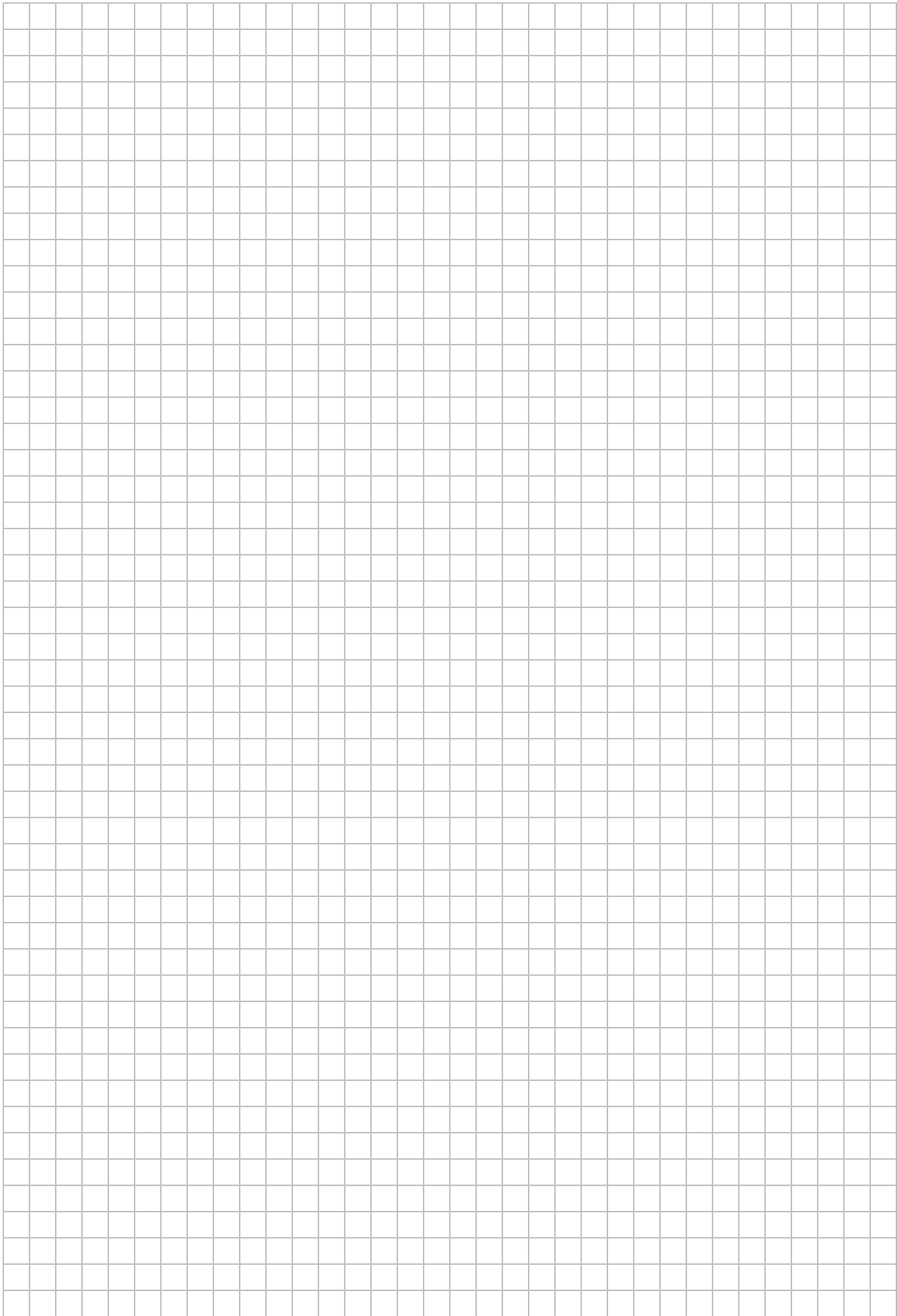
SEW
EURODRIVE

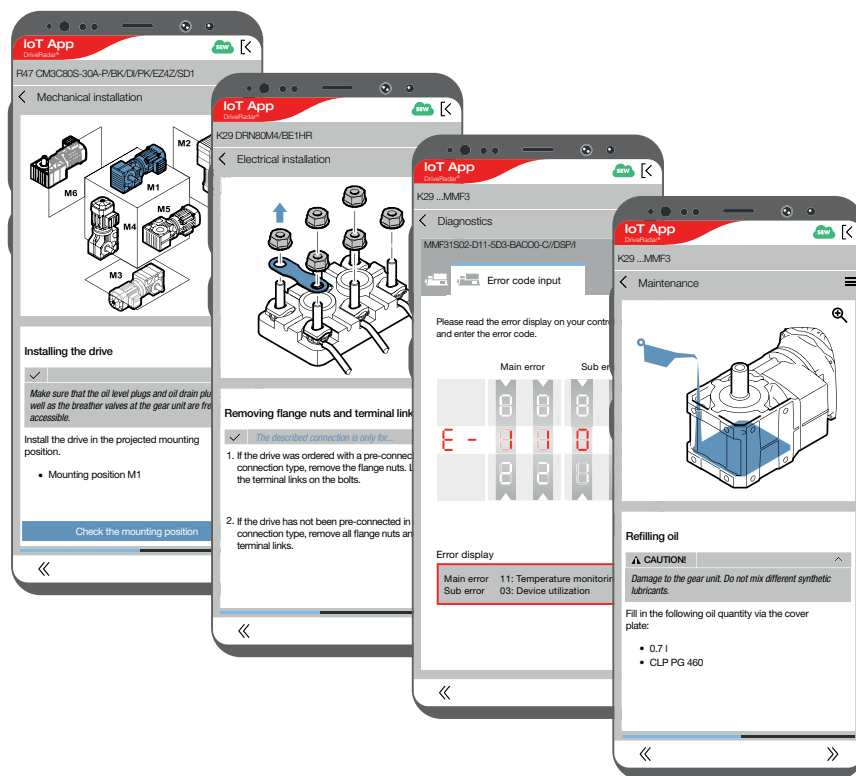












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