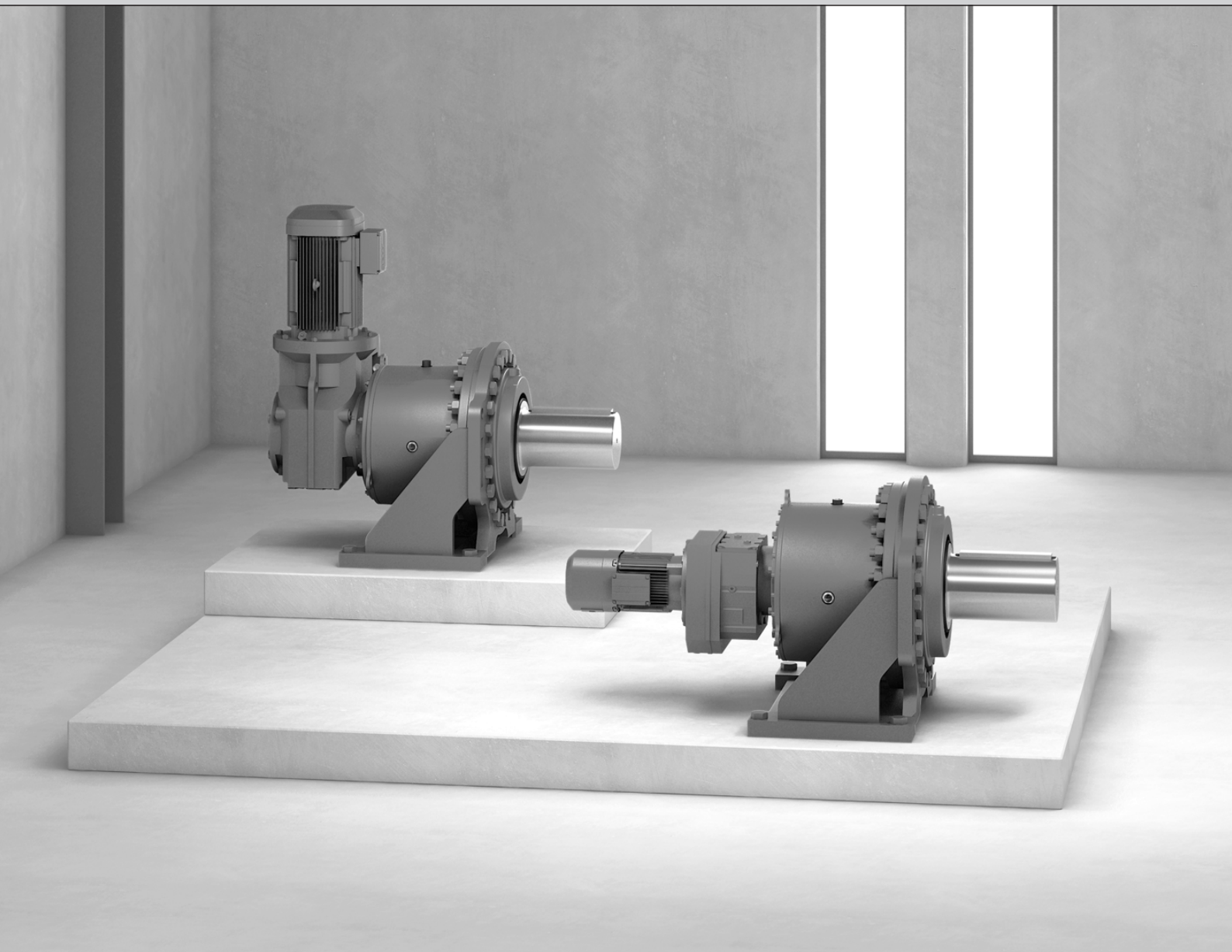




SEW
EURODRIVE

Assembly and Operating Instructions



Industrial Gear Units

P.002 – P.102 Series Planetary Gearmotors

Torque Classes from 24 – 631 kNm



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1 General information

1.1 About this documentation

The current version of the documentation is the original.

This documentation is an integral part of the product. The documentation is written for all employees who assemble, install, start up, and service this product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the machinery and its 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 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 grading and meaning of the signal words for safety notes.

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

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 hot surfaces
	Warning of risk of crushing
	Warning of suspended load
	Warning of automatic restart

1.2.3 Structure of embedded safety notes

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

This is the formal structure of an embedded safety note:

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

1.3 Rights to claim under limited warranty

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

1.4 Exclusion of liability

Read the information in this documentation, otherwise safe operation is impossible. You must comply with the information contained in this documentation to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, SEW-EURODRIVE assumes no liability for defects.

1.5 Copyright notice

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2 Safety notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The user must ensure that the basic safety notes are read and observed. Ensure that persons responsible for the machinery and its operation as well as persons who work on the unit 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, please contact SEW-EURODRIVE.

2.1 Preliminary remark

The following safety notes are primarily concerned with the use of gear units. If using gearmotors, also refer to the safety notes for motors in the corresponding operating instructions.

Also observe the supplementary safety notes in the individual sections of these operating instructions.

2.2 General



⚠ WARNING

During operation, the gear units can have movable or rotating parts and hot surfaces.

Severe or fatal injuries

- All work related to transportation, storage, installation, assembly, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of:
 - The relevant detailed operating instructions
 - Warning and safety signs on the gear unit
 - All other project planning documents, operating instructions and wiring diagrams related to the drive
 - The specific regulations and requirements for the system
 - The national/regional regulations governing safety and the prevention of accidents
- Never install damaged products.
- Report any damage to the shipping company immediately.
- Removing covers without authorization, improper use or incorrect installation and operation may result in severe injuries to persons or damage to machinery.

Refer to the documentation for additional information.

2.3 Target group

Specialist for mechanical work	<p>Any mechanical work may only be performed by adequately qualified specialists. Specialists in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting, and maintenance of the product who possess the following qualifications:</p> <ul style="list-style-type: none"> • Qualification in the mechanical area in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	<p>Any electrotechnical work may only be performed by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting, and maintenance of the product who possess the following qualifications:</p> <ul style="list-style-type: none"> • Qualification in the electrotechnical area in accordance with the national regulations • Familiarity with this documentation
Instructed persons	<p>All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately. The purpose of the instruction is that the persons are capable of performing the required tasks and work steps in a safe and correct manner.</p> <p>All qualified personnel must wear appropriate protective clothing.</p>

2.4 Designated use

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

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

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

2.5 Other applicable documentation

The following documentation and documents should also be observed:

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

2.6 Safety symbols on the gear unit













⚠ CAUTION









Safety symbols, nameplates, or information signs can become dirty or illegible over time.

Risk of injury due to illegible symbols.





- Always make sure that safety, warning, and operating notes are legible.
- Replace damaged safety symbols, nameplates, and information signs.





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

Safety symbol	Meaning
	Indicates the oil dipstick .
	Indicates the oil sight glass .
	Indicates the oil filling location . Also serves as proper venting during the oil change.
	Indicates the oil drain .
	Indicates the position of the breather . Serves to avoid mistaking the oil measuring position for the venting position.
	Indicates the positions for relubrication and makes it easier to find the locations to be lubricated. Helps avoid bearing damage.
	Indicates the water supply and serves to locate the connection option.
	Indicates the water return and serves to locate the connection option.
	Indicates the oil supply and serves to locate the connection option.
	Indicates the oil return and serves to locate the connection option.

Safety symbol	Meaning
	Indicates the position of the temperature sensor/temperature switch .
	Indicates the grease drain plug and serves to locate the grease drain. Helps avoid bearing damage.
	Helps avoid errors caused by lack of understanding. Read the information in the operating instructions.
	For pivoted mounting positions, this symbol on the information sign indicates the mounting position of the gear unit for checking the oil .
	Indicates the bleeder screw .
	Caution: Risk of burns caused by hot surface.
	Caution: Removing the dipstick during operation may result in damage to the gear unit.
	Caution: Risk of burns due to hot gear oil.













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

Meaning	
The coupling is supplied without grease.	
VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE	
  18977405	DE <p>Kupplung wird ohne Fett geliefert. Mögliche Sachschäden!</p> <ul style="list-style-type: none"> • Vor der Inbetriebnahme Kupplung mit Fett befüllen.
	EN <p>Coupling delivered without grease Possible damage to property.</p> <ul style="list-style-type: none"> • Fill coupling with grease prior to startup.
	FR <p>L'accouplement est livré sans graisse. Risque de dommages matériels !</p> <ul style="list-style-type: none"> • Avant la mise en service, remplir l'accouplement de graisse.
ES <p>El acoplamiento se suministra sin grasa. ¡Posibles daños materiales!</p> <ul style="list-style-type: none"> • Llenar el acoplamiento con grasa antes de la puesta en marcha. 	
NL <p>Koppeling wordt zonder vet geleverd. Mogelijke materiële schade!</p> <ul style="list-style-type: none"> • Koppeling vóór de inbedrijfstelling met vet vullen. 	
PL <p>Sprzęgło jest dostarczane bez smaru. Możliwe szkody materialne!</p> <ul style="list-style-type: none"> • Przed uruchomieniem należy wypełnić sprzęgło smarem. 	
9007204570573323	
The coupling is supplied without oil.	
VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE	
  18977413	DE <p>Kupplung wird ohne Öl geliefert. Mögliche Sachschäden!</p> <ul style="list-style-type: none"> • Vor der Inbetriebnahme Kupplung mit Öl befüllen.
	EN <p>Coupling delivered without oil Possible damage to property.</p> <ul style="list-style-type: none"> • Fill coupling with oil prior to startup.
	FR <p>L'accouplement est livré sans huile. Risque de dommages matériels !</p> <ul style="list-style-type: none"> • Avant la mise en service, remplir l'accouplement d'huile.
ES <p>El acoplamiento se suministra sin aceite. ¡Posibles daños materiales!</p> <ul style="list-style-type: none"> • Llenar el acoplamiento con aceite antes de la puesta en marcha. 	
NL <p>Koppeling wordt zonder olie geleverd. Mogelijke materiële schade!</p> <ul style="list-style-type: none"> • Koppeling vóór de inbedrijfstelling met olie vullen. 	
PL <p>Sprzęgło jest dostarczane bez oleju. Możliwe szkody materialne!</p> <ul style="list-style-type: none"> • Przed uruchomieniem należy wypełnić sprzęgło olejem. 	
9007204571876363	

Meaning		
The gear unit is protected against corrosion with VCI.		
VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE		
  18977421	<p>(DE) Getriebe ist mit VCI rostgeschützt. Nicht öffnen! Mögliche Sachschäden! • Vor der Inbetriebnahme Vorarbeiten gemäß Betriebsanleitung durchführen. • Keine offene Flamme!</p>	<p>(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!</p>
	<p>(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 !</p>	<p>(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.</p>
	<p>(NL) Tandwielkast is met VCI tegen corrosie beschermd. Niet openen! Mogelijke materiële schade! • Vóór de inbedrijfstelling voorbereidingen conform technische handleiding uitvoeren. • Geen open vuur!</p>	<p>(PL) Przekładnia zabezpieczona jest przed korozją za pomocą środka VCI. Nie otwierać! Możliwe szkody materiałne! • Przed uruchomieniem należy przeprowadzić czynności przygotowawcze zgodnie z informacjami zawartymi w instrukcji obsługi! • Unikać otwartych płomieni!</p>
9007204570575499		
Gear unit is supplied without oil.		
VORSICHT NOTICE ATTENTION PRECAUCIÓN VOORZICHTIG OSTROŻNIE		
  18977383	<p>(DE) Getriebe wird ohne Öl geliefert. Mögliche Sachschäden! • Vor der Inbetriebnahme Ölbefüllung gemäß Betriebsanleitung durchführen.</p>	<p>(EN) Gear unit is delivered without oil. Potential damage to property! • Prior to startup, fill in oil according to operating instructions.</p>
	<p>(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.</p>	<p>(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.</p>
	<p>(NL) Tandwielkast wordt zonder olie geleverd. Mogelijke materiële schade! • Vóór de inbedrijfstelling olie conform technische handleiding bijvullen.</p>	<p>(PL) Przekładnia jest dostarczana bez oleju. Możliwe szkody materiałne! • Przed uruchomieniem należy wlać olej zgodnie z informacjami zawartymi w instrukcji obsługi.</p>
9007204570577675		

2.7 Symbols on the dimension sheet

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

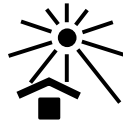
Safety symbol	Meaning
	Indicates the position of the oil dipstick .
	Indicates the position of the oil sight glass .
	Indicates the oil filling location .
	Indicates the oil drain .
	Indicates the position of the breather .
	Indicates the position(s) that need to be relubricated .
	Indicates the position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

2.8 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

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2.9 Transport

2.9.1 Notes on transport

Observe the following notes during transport.



⚠ WARNING

Suspended loads can fall.

Severe or fatal injuries.

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



⚠ WARNING

Lifted loads may fall over.

Severe or fatal injuries.

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



⚠ CAUTION

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

Potential risk of crushing due to falling parts.

- Secure the mount-on components.



⚠ CAUTION

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

Minor injuries.

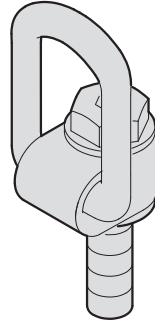
- Check the gear unit and mount-on components for leaking lubricant.
- The seals must not come in contact with cleaning agent as this may damage the seals.
- Protect the breather against damage.
- Make sure that there is not too much oil in the gear unit. If the oil level is too high and the temperature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

NOTICE

Improper transport can damage the gear unit.

Possible damage to property.

- Note the following information.
- Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. It may be necessary to suspend startup.
- The weight of the gear unit (without oil) is indicated on the nameplate or on the order documents. Observe the loads and regulations specified there.
- If possible, transport the gear unit without oil fill. If this is not possible, note that the weight indicated on the nameplate refers only to the no-load weight of the gear unit, and replace the breather with a screw plug.
- The gear unit must be transported in a manner that prevents damage to the gear unit and to mount-on components. For example, impacts against exposed shaft ends can damage the gear unit.
- Use only the prescribed suspension points [1] to transport the gear unit (see order documents). The load suspensions of the motor or mount-on components are provided for stabilization purposes only.
- The figures on the following pages are exemplary.
- Observe that the eyebolt are screwed in completely and must be flush to the contact surface. The following type of rotating lifting eyebolt is suitable for gear unit transport.



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

Preliminary work for transport

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

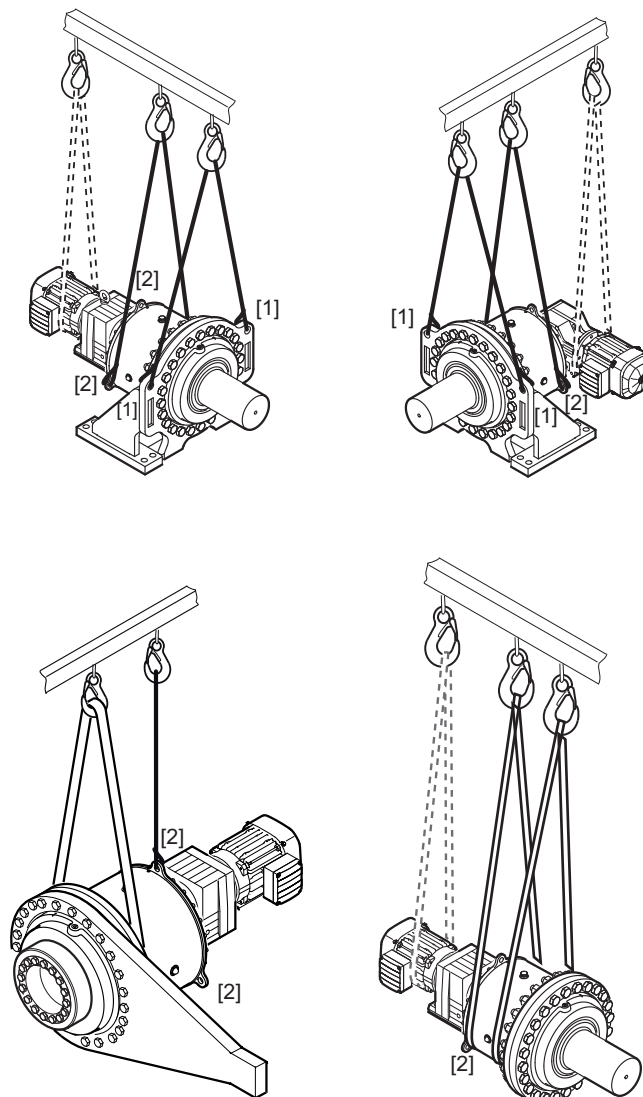
Transport

NOTICE

Danger due to improper transport protection.

Possible damage to property.

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



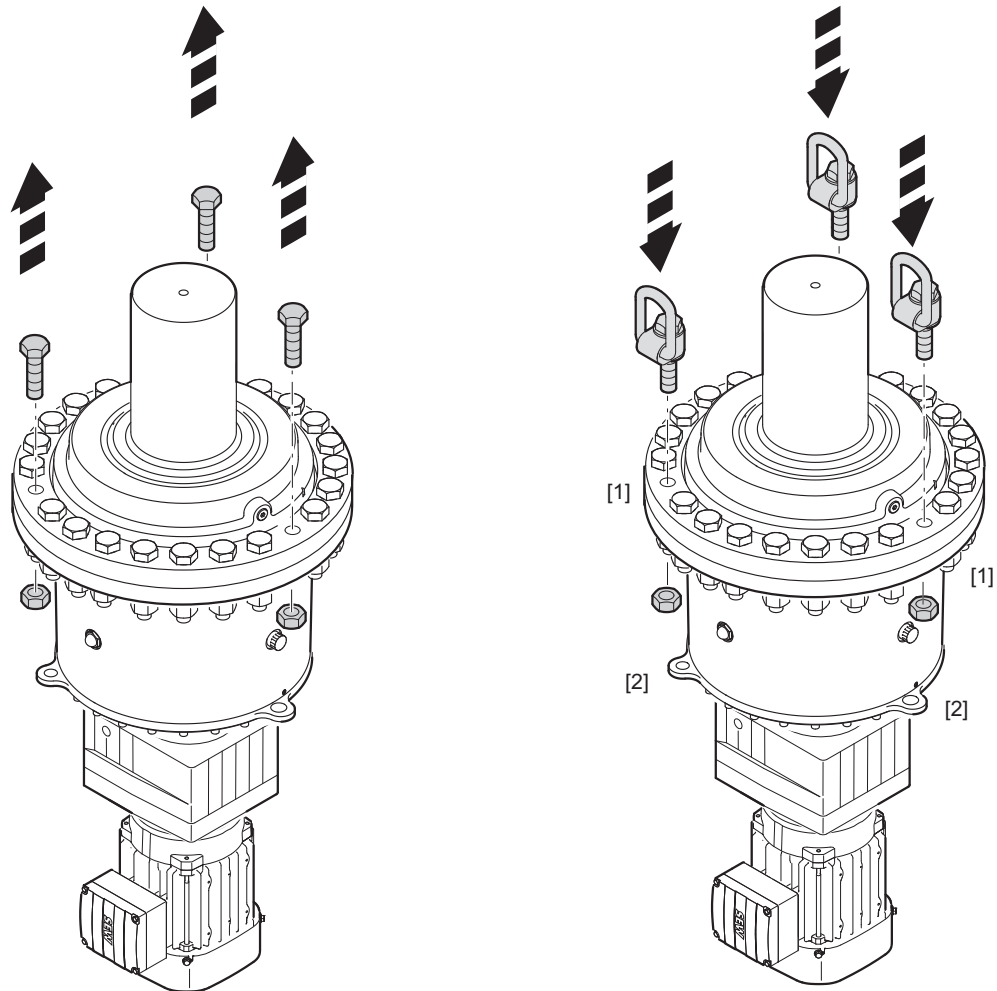
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2.9.3 Vertical mounting positions (M2/M4)

SEW-EURODRIVE recommends the following procedure.

Mounting position M2

Preliminary work for transport



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Observe the notes in chapter "Notes on transport" (→ 16).

1. Remove any 3 retaining screws at a distance of approx. 120° from the mounting flange.
2. Insert 3 lifting eyebolts in the through holes on the solid shaft side.
3. Screw one nut to each lifting eyebolt on the side of the primary gear unit. Tighten the nuts by hand.

Transport



▲ WARNING

Danger due to insufficient transport protection.

Severe or fatal injuries.

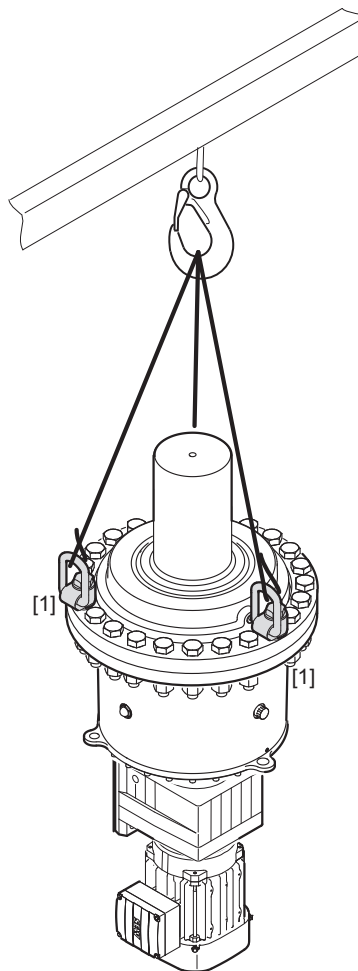
- Consider the center of gravity of the gear unit.
- Select the height of the attachment points in a way that guarantees stability of the gear unit during transport.

NOTICE

Danger due to improper transport protection.

Possible damage to property.

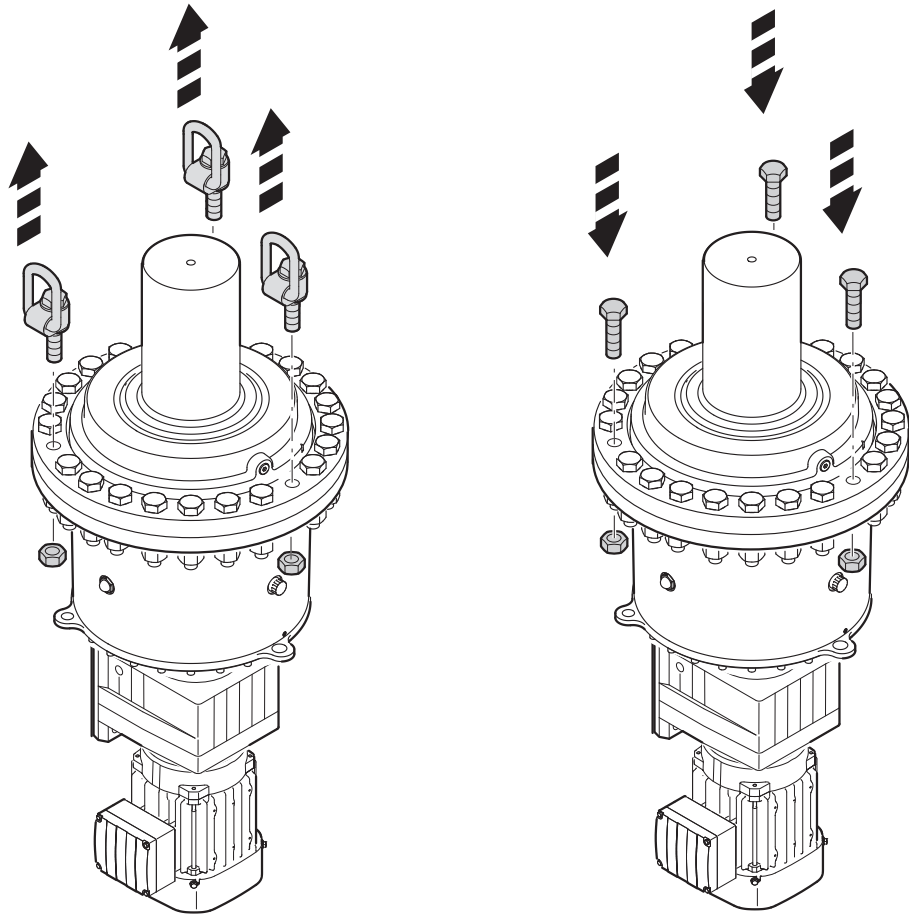
- Only use the main attachment points [1] for transport in mounting position M2.



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Work steps after transport

Perform the following tasks after transport.



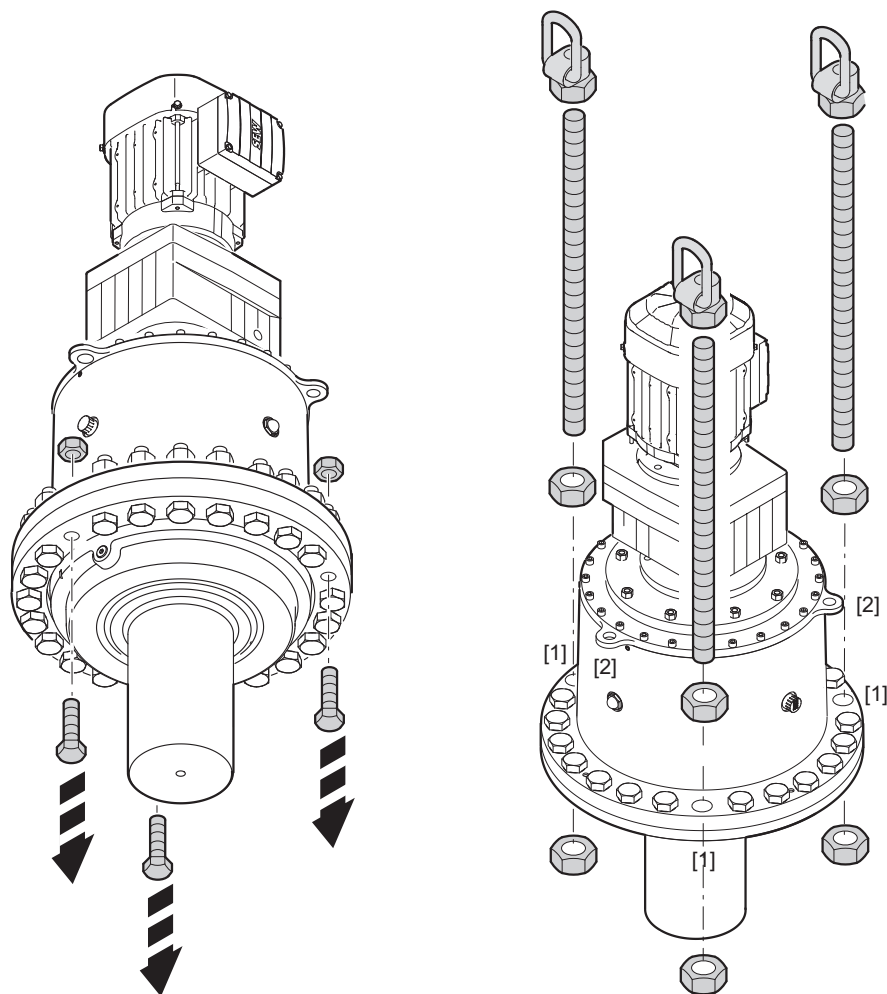
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Observe the notes in chapter "Notes on transport" (→ 16).

1. Remove the 3 lifting eyebolts.
2. Screw the retaining screws back into the mounting flange. Observe the tightening torques in chapter "Flange-mounted gear units" (→ 89).

Mounting position M4

Preliminary work for transport



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Observe the notes in chapter "Notes on transport" (→ 16).

1. Remove any 3 screws at a distance of approx. 120° from the mounting flange.
2. Screw a nut onto each threaded rod.
3. Insert the threaded rods in the through holes on the mounting flange.
4. Screw one nut to each threaded rod on the side of the solid shaft. Tighten the nut.
5. Tighten the nut on the side of the primary gear unit.
6. Screw one lifting eyebolt to each threaded rod.

INFORMATION

Please note:

Threaded rods are not included in the delivery.

Select sufficiently sized threaded rods to shift the gear unit center of gravity and stabilize the gear unit during transport.



Transport



▲ WARNING

Danger due to insufficient transport protection.

Severe or fatal injuries.

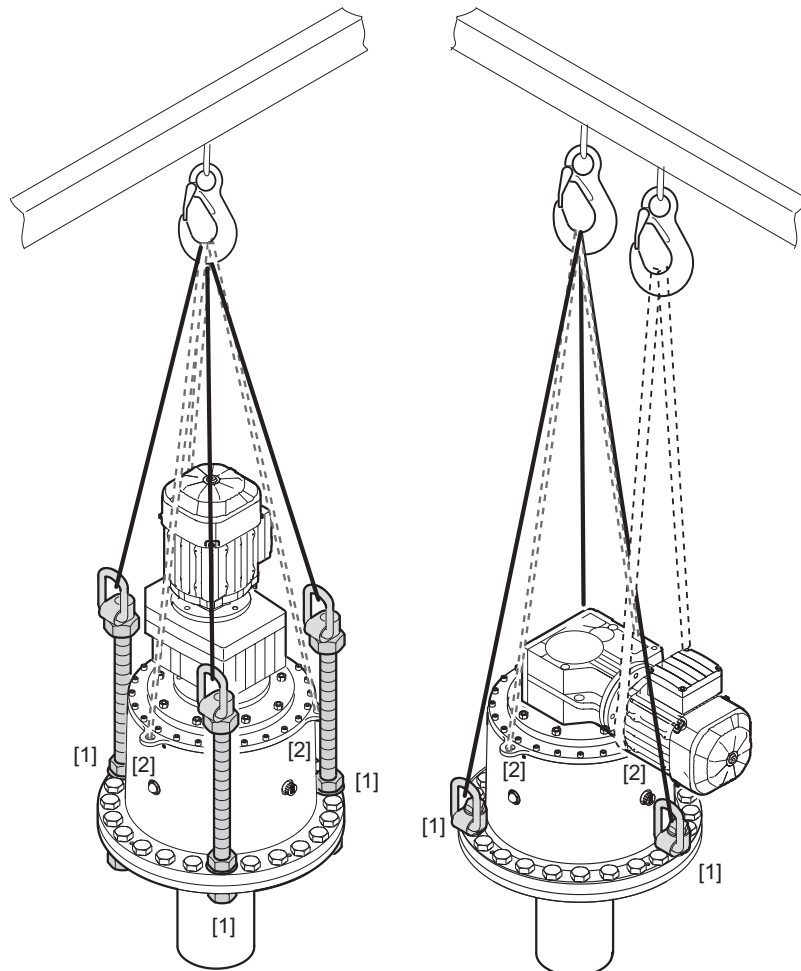
- Consider the center of gravity of the gear unit.
- Select the height of the attachment points in a way that guarantees stability of the gear unit during transport.

NOTICE

Danger due to improper transport protection.

Possible damage to property.

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

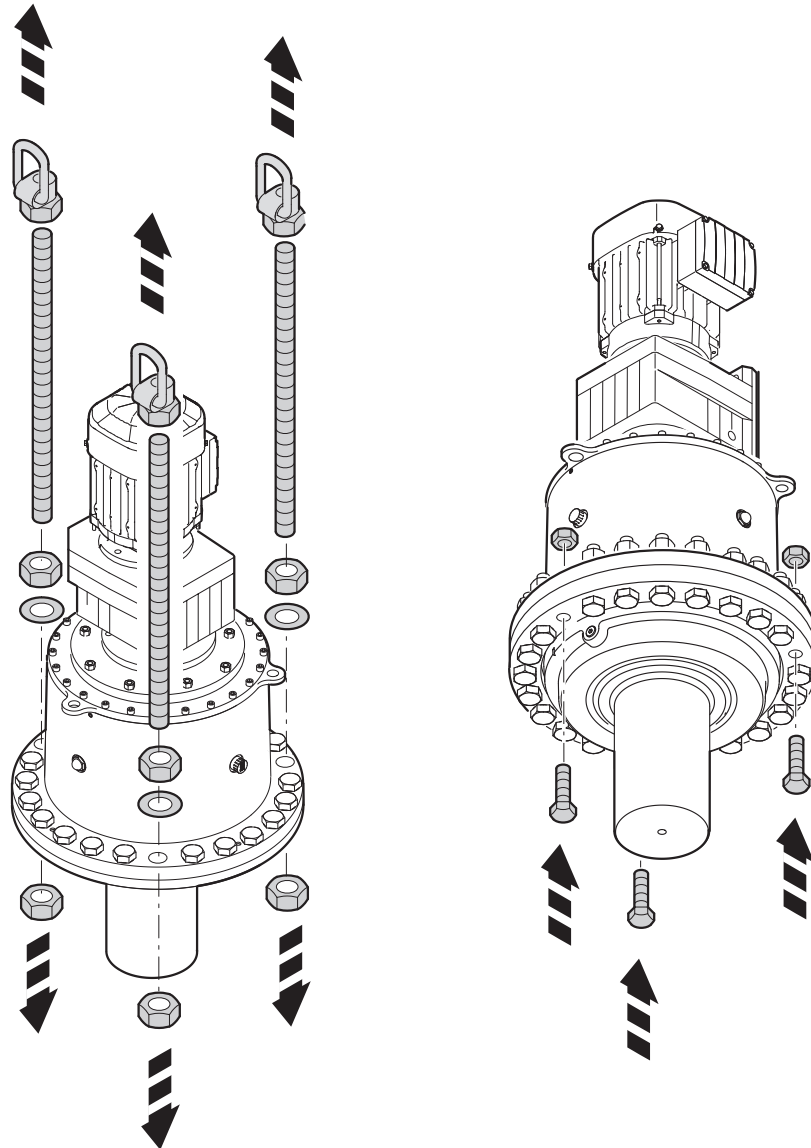


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Work steps after transport

Perform the following tasks after transport.



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Observe the notes in chapter "Notes on transport" (→ 16).

1. Remove the 3 lifting eyebolts and threaded rods.
2. Screw the retaining screws back into the mounting flange. Observe the tightening torques in chapter "Flange-mounted gear units" (→ 89).

2.10 Storage and transport conditions

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

2.10.1 Internal conservation

Standard corrosion protection

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

Long-term corrosion protection

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

2.10.2 Exterior corrosion protection

The following measures are taken for exterior corrosion protection:

- Anti-corrosion agent is applied to bare, non-painted functional surfaces of shafts, flanges, mounting and foot surfaces of the housing. The anti-corrosion agent must be removed with a suitable solvent that does not damage the oil seal.
- Small spare parts and loose pieces, such as bolts, nuts, etc., are packed in corrosion protection plastic bags (VCI corrosion protection bags).
- Threaded holes and blind holes are covered by 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 in which the protective coating and/or painting has been damaged may have to be repainted.

2.10.3 Packaging

Standard packaging

The gear unit is delivered on a pallet, securely attached and without cover.

Use: Land transport

Long-term packaging

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

Use: Sea transport and/or for extended storage

2.10.4 Storage conditions

NOTICE

Improper storage may result in damages to the gear unit.

Possible damage to property.

- During storage up to startup, the gear unit must be stored in a shock-free manner to prevent damage to the rolling bearing raceways.
- The output shaft must be rotated at least one full rotation every 6 months so that the position of the rolling elements in the bearings of the input and output shafts changes.

INFORMATION



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

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

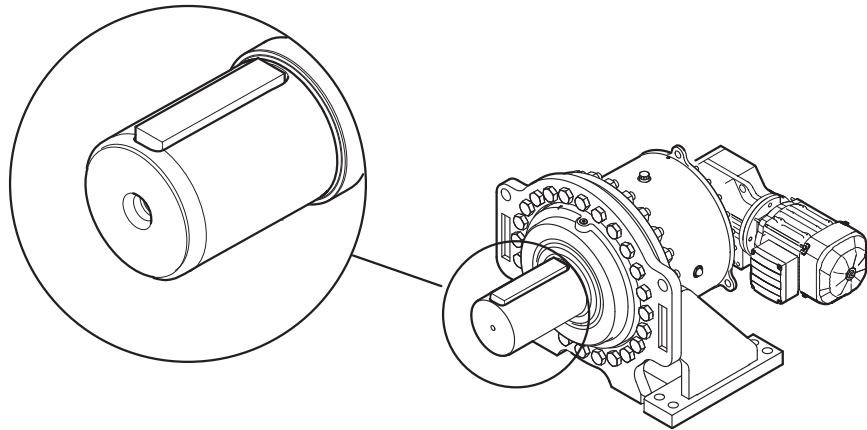
INFORMATION



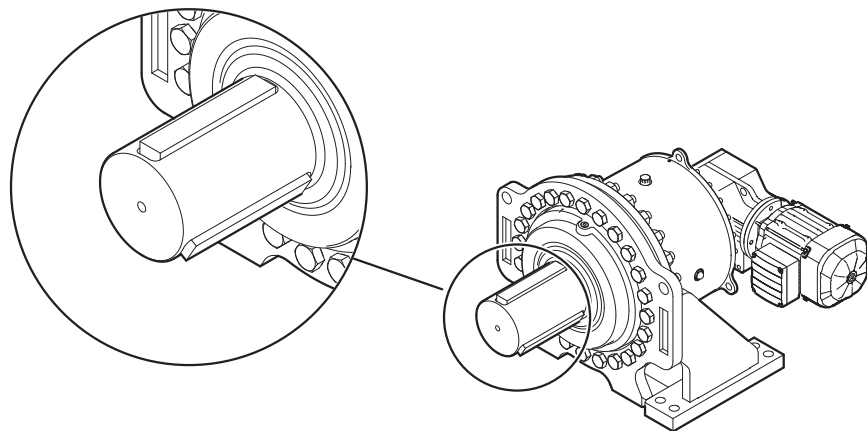
If stored in tropical zones, provide for sufficient protection against insect damage. Contact SEW-EURODRIVE for differing requirements.

3 Gear unit structure**3.1 Output shaft variants**

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

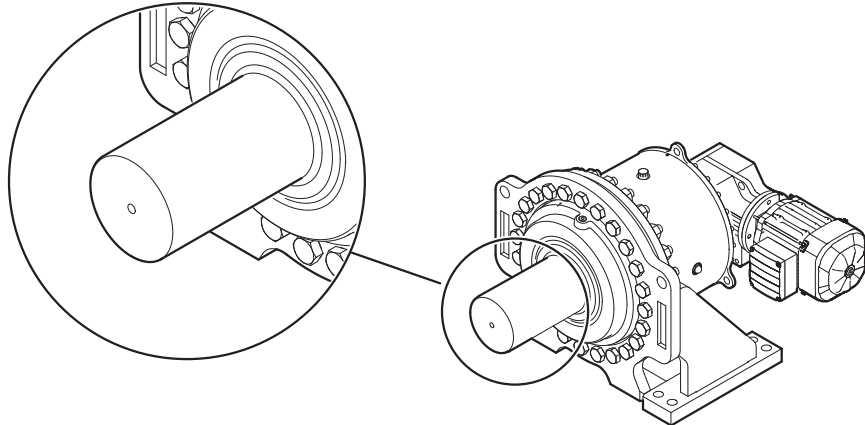
3.1.1 P.. Solid shaft with key

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3.1.2 P.. Solid shaft with 2 keys

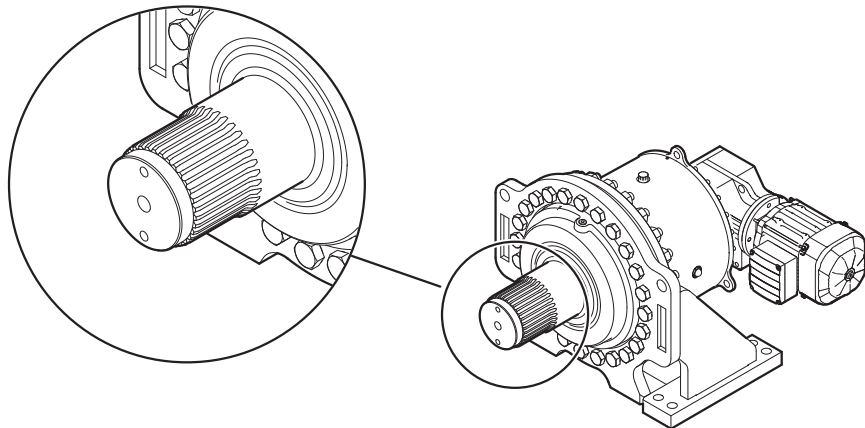
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3.1.3 PR.. Smooth solid shaft



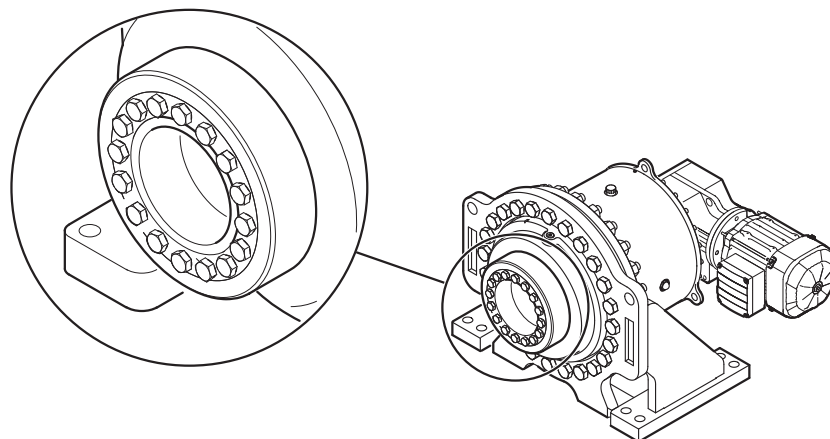
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3.1.4 PL.. Splined solid shaft

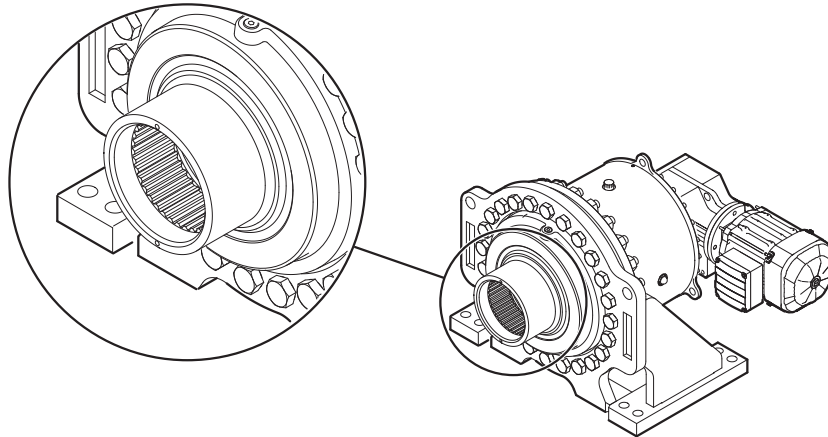


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3.1.5 PH.. Hollow shaft with shrink disk



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3.1.6 PV.. Splined hollow shaft

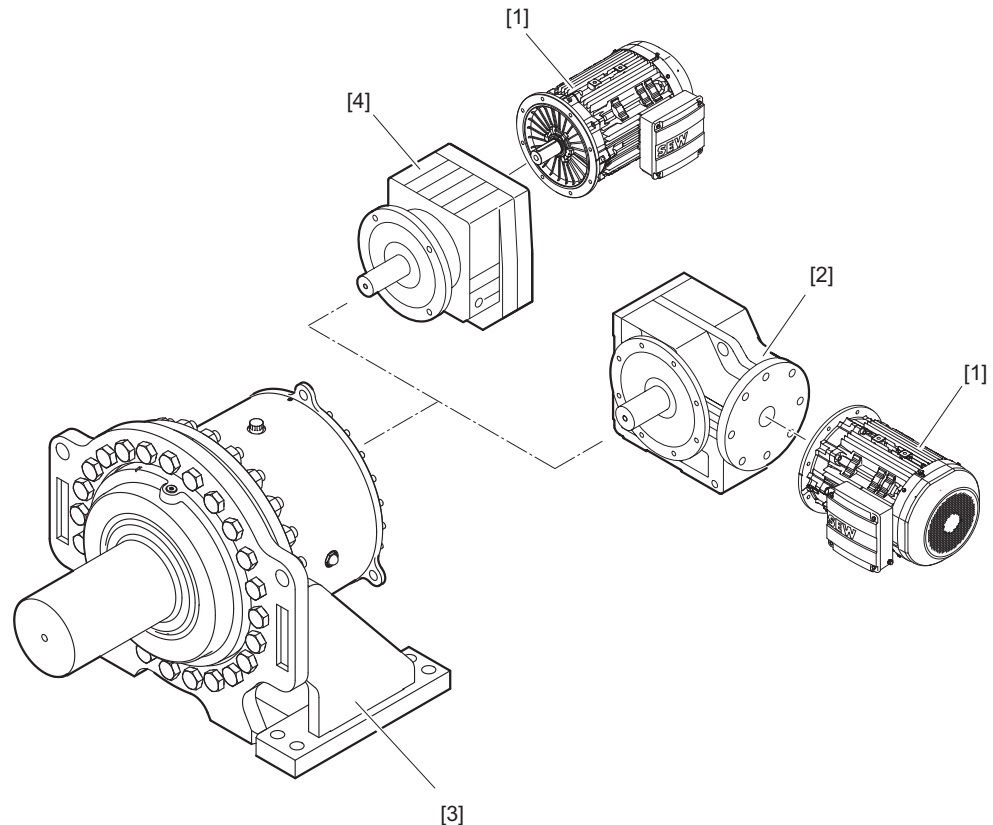
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3.2 Planetary gear unit with primary gear unit combination

The planetary gear units are a combination of

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

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




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


3.3 Nameplate

3.3.1 Planetary gear units

The following example shows the structure of the nameplate.

SEW-EURODRIVE		Bruchsal/Germany	
Type	PHF012KF87DRN112M4/BE5/TF/C		
Nr.	01.7346341401.0001.16		
	min.	norm.	max.
PK1 [kW]	1.20	3.58	3.5
Mk2 [Nm]	32768	32768	32768
n1 [1/min]	482	1464	1445
n2 [1/min]	0.34	1	1
			i 1433.00
			F _s 1.12
			PM1 [kW] 4.00
			T _a [°C] 0...40
IM	M1 F1		1743 897 7 D
Qty of greasing points	<input type="checkbox"/>	Fans	<input type="checkbox"/>
Mass [kg]	415	Year	2018
	CLP HC 680 Synth.Öl		~ 6.8 L

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

3.3.2 DRN.. gearmotor nameplate

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

SEW-EURODRIVE			
[1]	76646 Bruchsal/Germany		[1]
[2]	R67 DRN90L4/BE2		[2]
[3]	01.1207730226.0001.17	Inverter duty VWPM	3~IEC60034 [3]
[4]	Hz 50	r/min 1461/21	V 230/400 Δ/Y [4]
[5]	kW 1.5 s1	A 5.9/3.4	eff% 85.6 IE3 [5]
[6]	Cosφ 0.74		IP 65 [6]
[7]	Th.Kl. 155 (F)		
[8]			V _{br} 230 AC [8]
[9]	i 69.75	Nm 685	Nm 20 [9]
[10]	CLP 220 Miner. Öl / 1.11	IM M1	BG 1.5 [10]
[11]	kg 54.000	188 578 2	Made in Germany [11]

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- [1] • Address
- [2] • Type designation gearmotor
- [3] • Production number
 - Suitability for inverter operation
 - Number of phases and underlying rated and power standard
- [4] • Rated frequency /Hz
 - Rated speed of the motor/rotational speed of the gear unit output shaft /min⁻¹
 - Nominal voltage /V
- [5] • Rated power /kW and operating mode
 - Rated current /A
 - Efficiency /%
 - Energy efficiency class
- [6] • Power factor
 - Degree of protection according to IEC 60034-5
- [7] • Thermal class
- [8] • Brake voltage /V
- [9] • Gear unit ratio
 - Output torque /Nm
 - Mounting position
 - Nominal braking torque /Nm
- [10] • Oil type and oil fill volume /l
 - Brake control
- [11] • Mass /kg
 - Nameplate
 - Country of production

3.4 Type designations for gear units and options

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

Gear unit design	Abbreviation	Meaning
Foot-mounted design (solid shaft)	P..RF..	<ul style="list-style-type: none"> • Solid shaft with key • Solid shaft with 2 keys (optional)
	PR..RF..	Smooth solid shaft
	PL..RF..	Splined solid shaft
Flange-mounted design (solid shaft)	PF..RF..	<ul style="list-style-type: none"> • Solid shaft with key • Solid shaft with 2 keys (optional)
	PRF..RF..	Smooth solid shaft
	PLF..RF..	Splined solid shaft
Foot-mounted design (hollow shaft)	PH..RF..	Hollow shaft with shrink disk
	PV..RF..	Splined hollow shaft
Flange-mounted design (hollow shaft)	PHF..RF..	Hollow shaft with shrink disk
	PVF..RF..	Splined hollow shaft

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

Gear unit design	Abbreviation	Meaning
Foot-mounted design (solid shaft)	P..KF../ P..K..	<ul style="list-style-type: none"> • Solid shaft with key • Solid shaft with 2 keys (optional)
	PR..KF../ PR..K..	Smooth solid shaft
	PL..KF../ PL..K..	Splined solid shaft
Flange-mounted design (solid shaft)	PF..KF../ PF..K..	<ul style="list-style-type: none"> • Solid shaft with key • Solid shaft with 2 keys (optional)
	PRF..KF../ PRF..K..	Smooth solid shaft
	PLF..KF../ PLF..K..	Splined solid shaft
Foot-mounted design (hollow shaft)	PH..KF../ PH..K..	Hollow shaft with shrink disk
	PV..KF../ PV..K..	Splined hollow shaft
Flange-mounted design (hollow shaft)	PHF..KF../ PHF..K..	Hollow shaft with shrink disk
	PVF..KF../ PVF..K..	Splined hollow shaft

3.4.3 Additional features of gear units

Designation	
/T	With torque arm

3.4.4 Input shaft assembly

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

3.4.5 Adapters

Designation	
AM	Adapter for mounting IEC/NEMA motors
AQ	Adapter for mounting servomotors
AT	Adapter with hydraulic centrifugal coupling
.../RS	and backstop
.../BM(G)	and disk brake
.../HF	With manual brake release, lockable
.../HR	With manual brake release with automatic re-engaging function

3

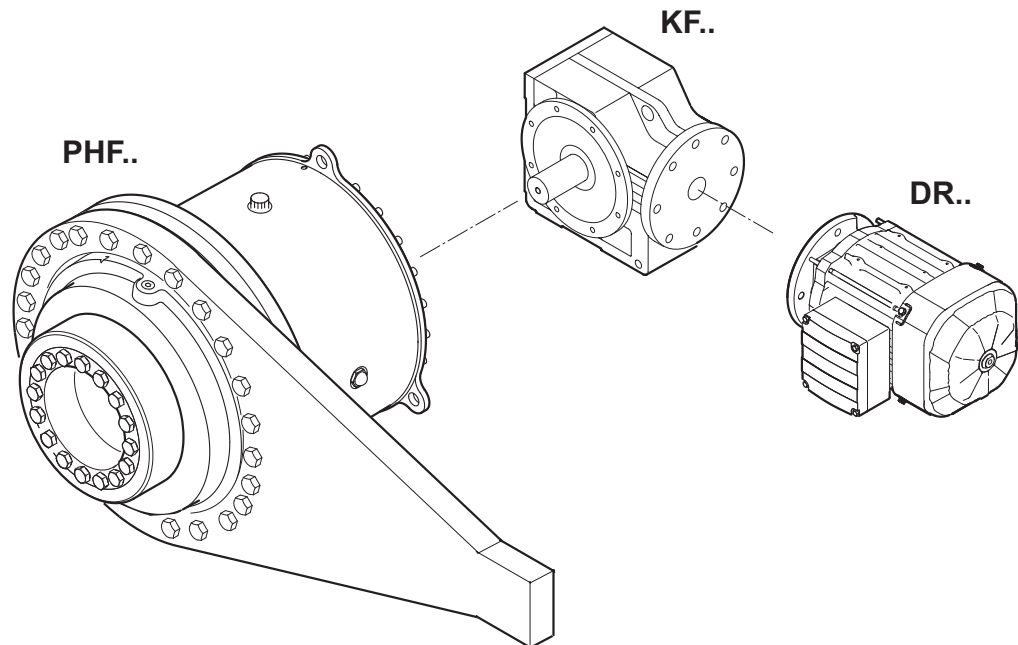
Gear unit structure

Type designations for gear units and options

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

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

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

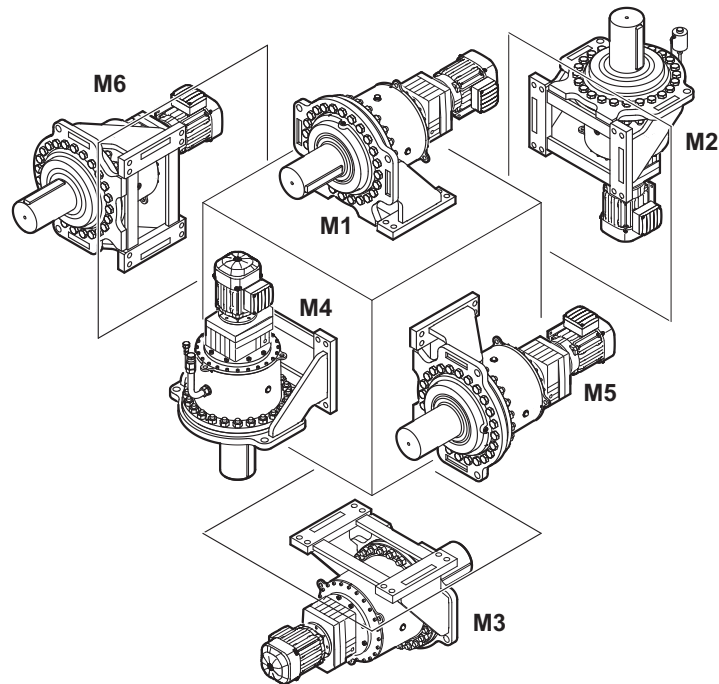


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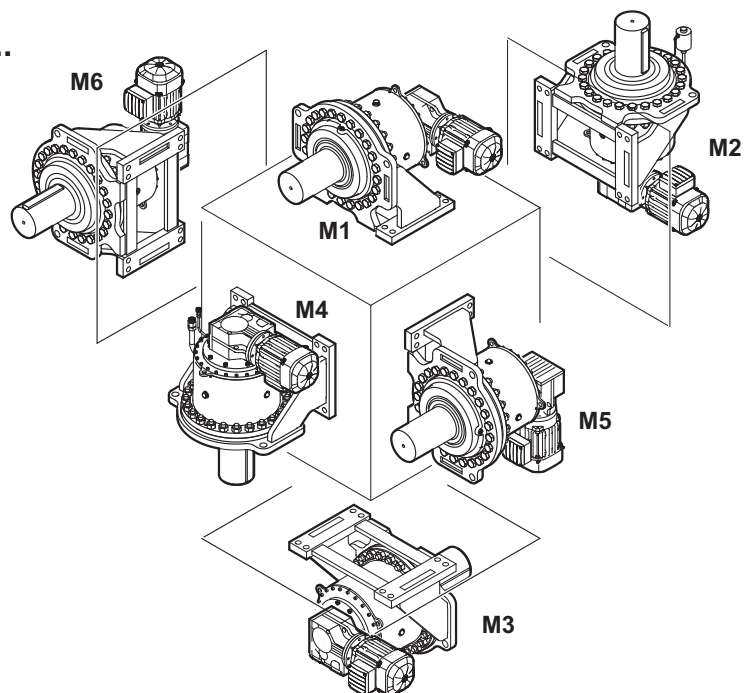
3.5 Mounting position

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

P..RF..



P..KF..



3.6 Pivoted mounting position: Fixed and variable mounting positions

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

Gear units with 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.

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

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

M1 - M2/20°/V

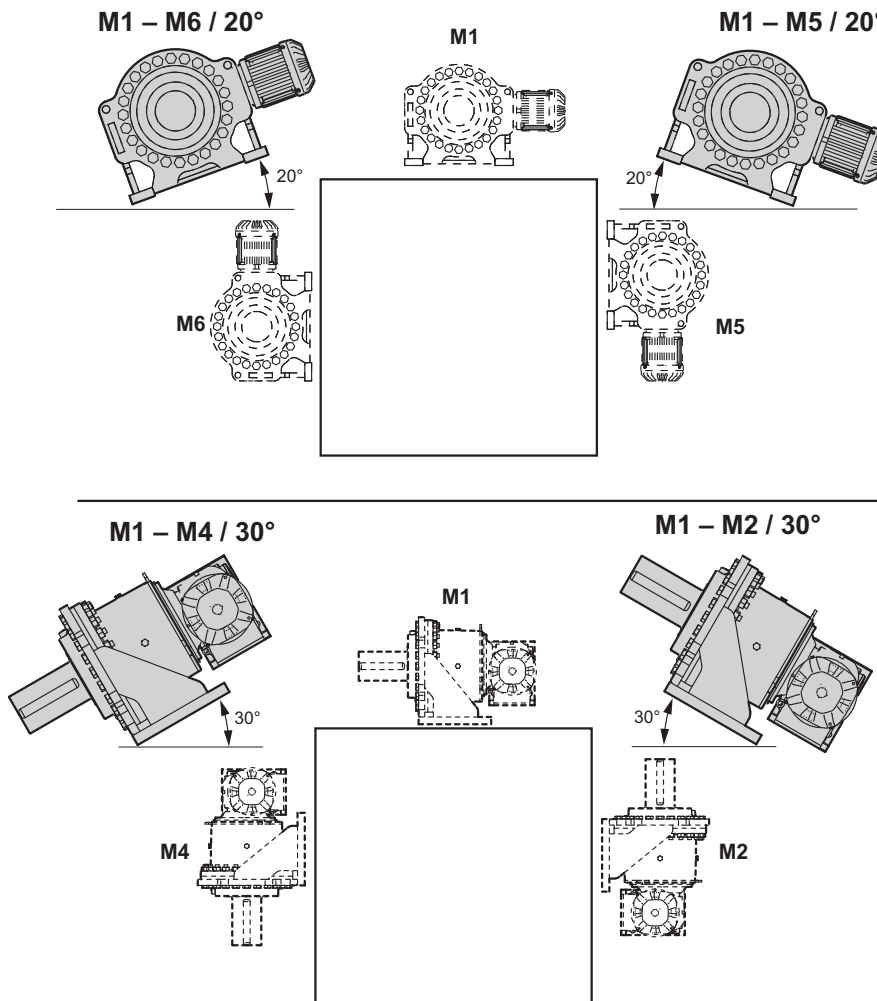
[1] [2] [3] [4]

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- [1] Initial mounting position
- [2] Required mounting position

- [3] Pivoting angle
- [4] F = Fixed end position
V = Variable end position

The following figure shows examples:



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

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

M1 - M2/20°/V - M4/20°/V - M5/30°/F

INFORMATION



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

3.7 Mounting positions of primary gear units

INFORMATION

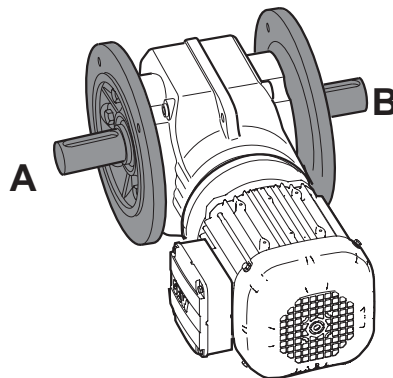


In addition to the mounting position, the following information is specified for planetary gearmotors.

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

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

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



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

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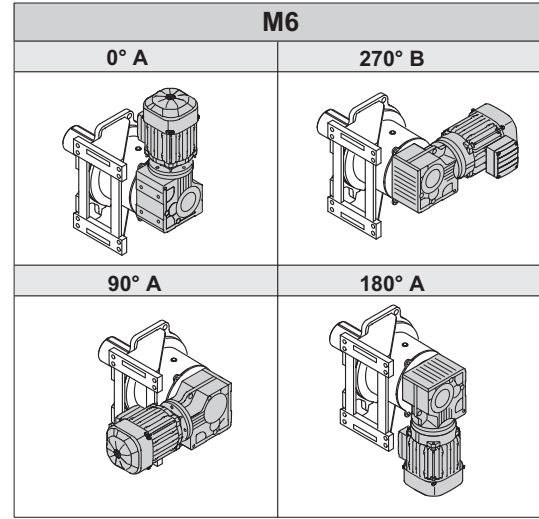
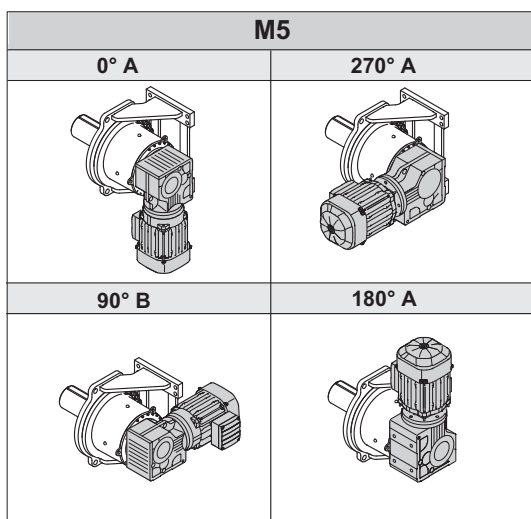
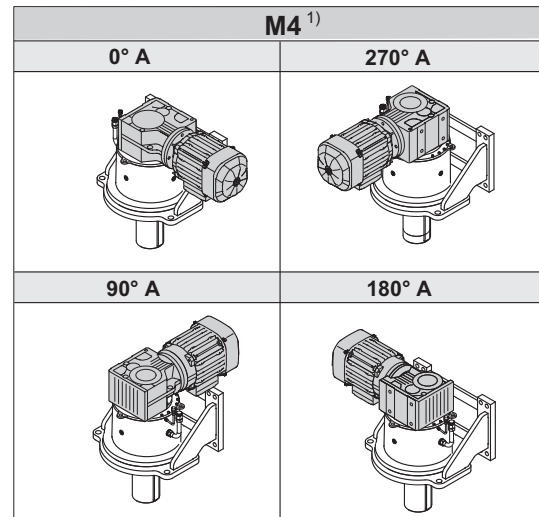
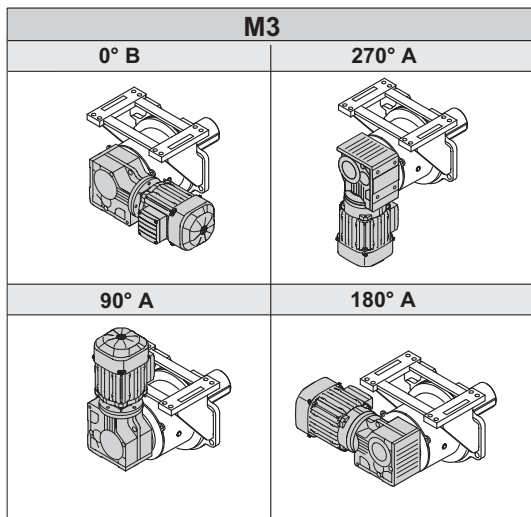
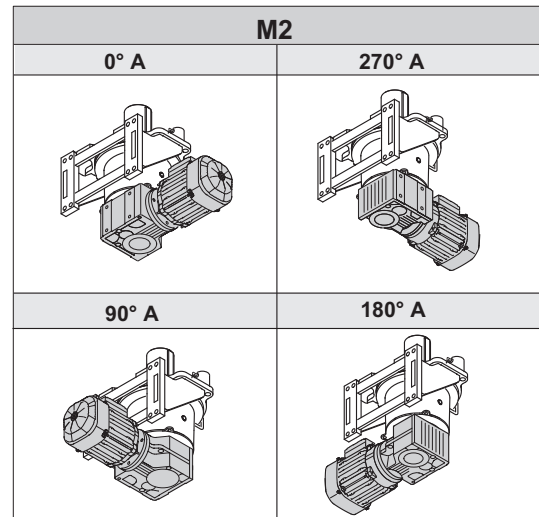
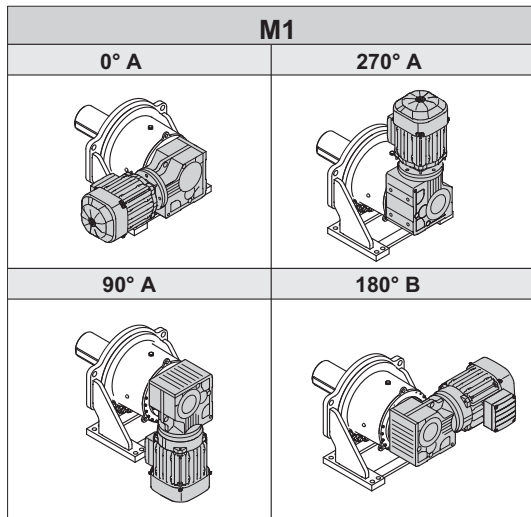


Contact SEW-EURODRIVE in case of deviating mounting conditions.

3

Gear unit structure

Mounting positions of primary gear units



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

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3.7.2 RF.. primary helical gear units

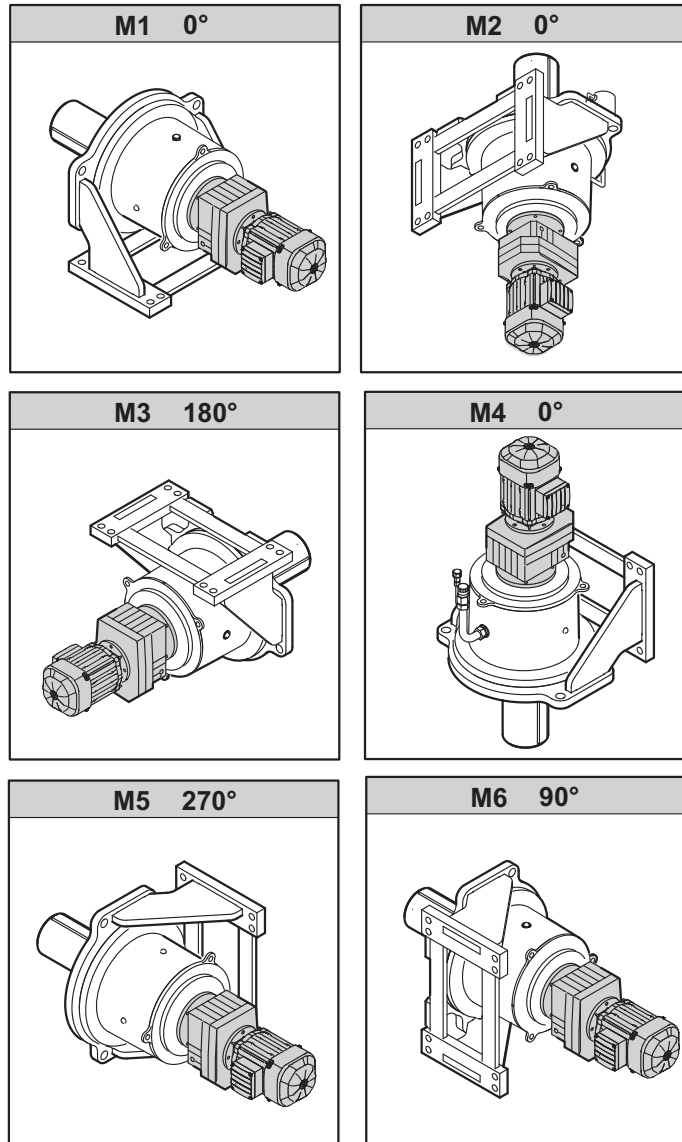
For the primary helical gear units RF.., positions **0**, **90**, **180** or **270** are fixed.

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

INFORMATION



Contact SEW-EURODRIVE in case of deviating mounting conditions.









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

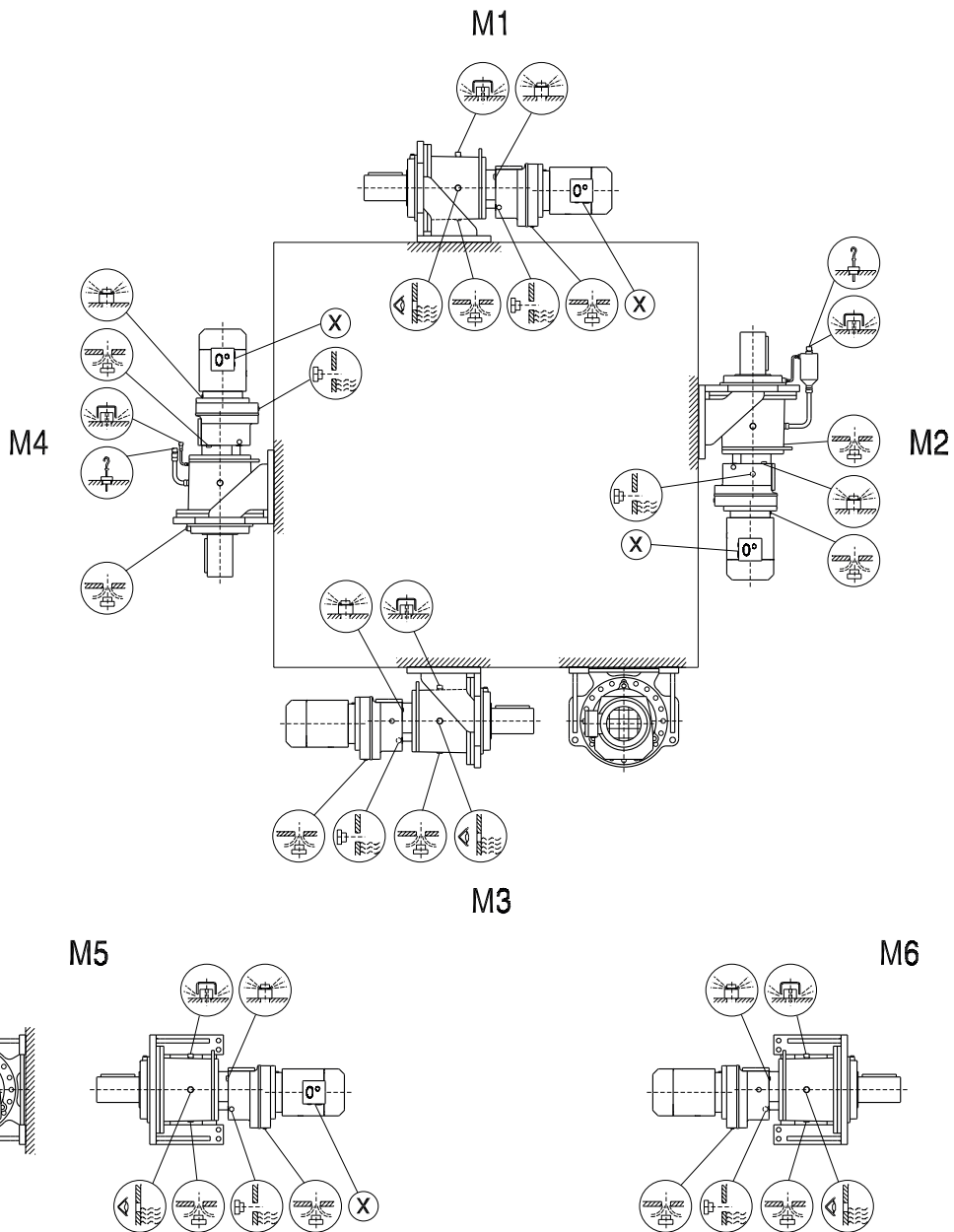
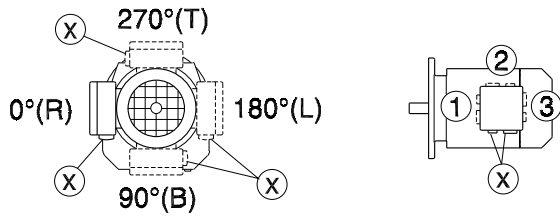
3.8 Mounting position sheets

The following table shows the symbols used in the mounting position sheets and their meaning:

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

3.8.1 P..RF..

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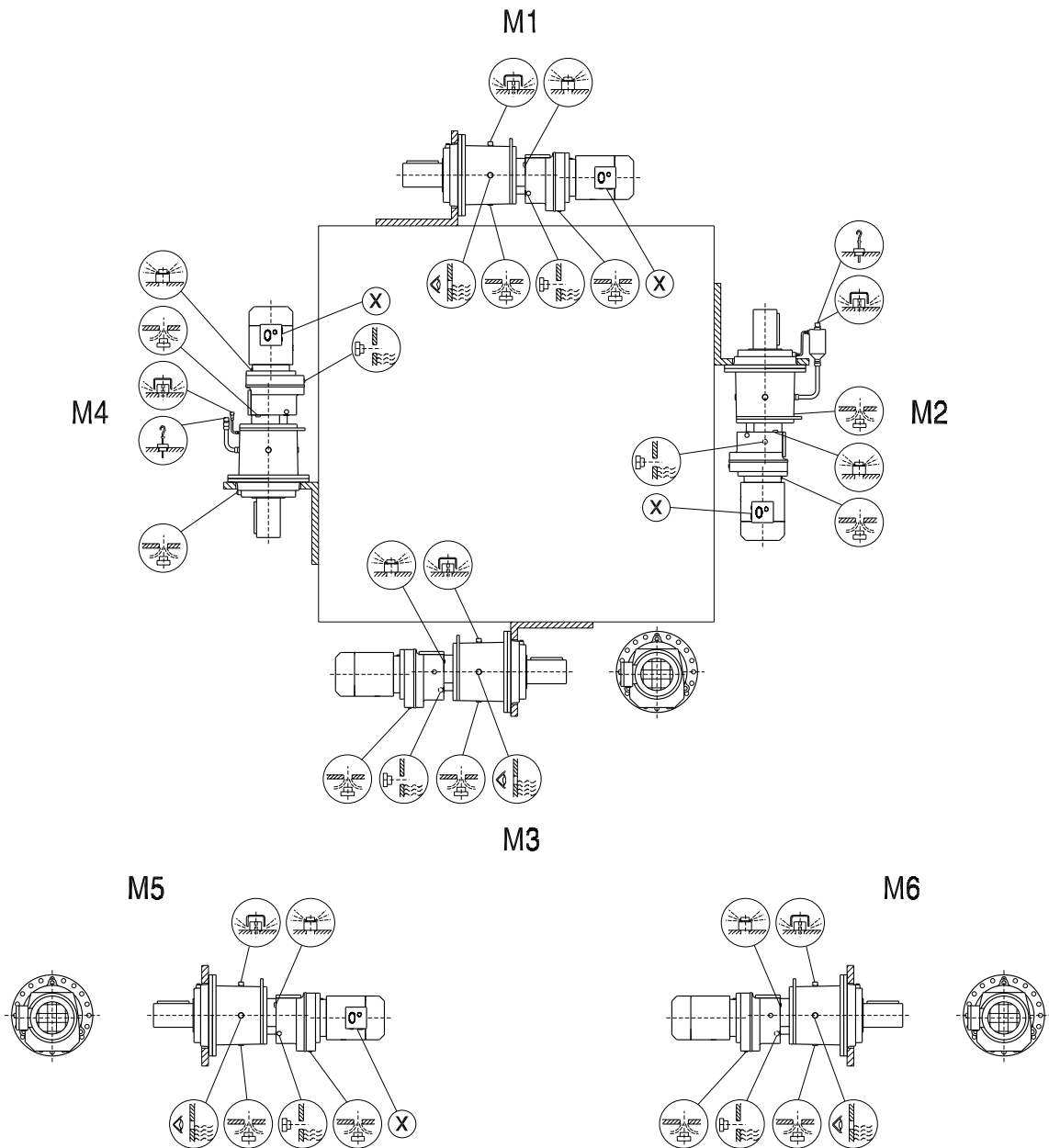
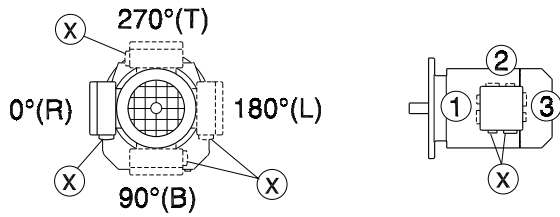
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Gear unit structure

Mounting position sheets

3.8.2 PF..RF..

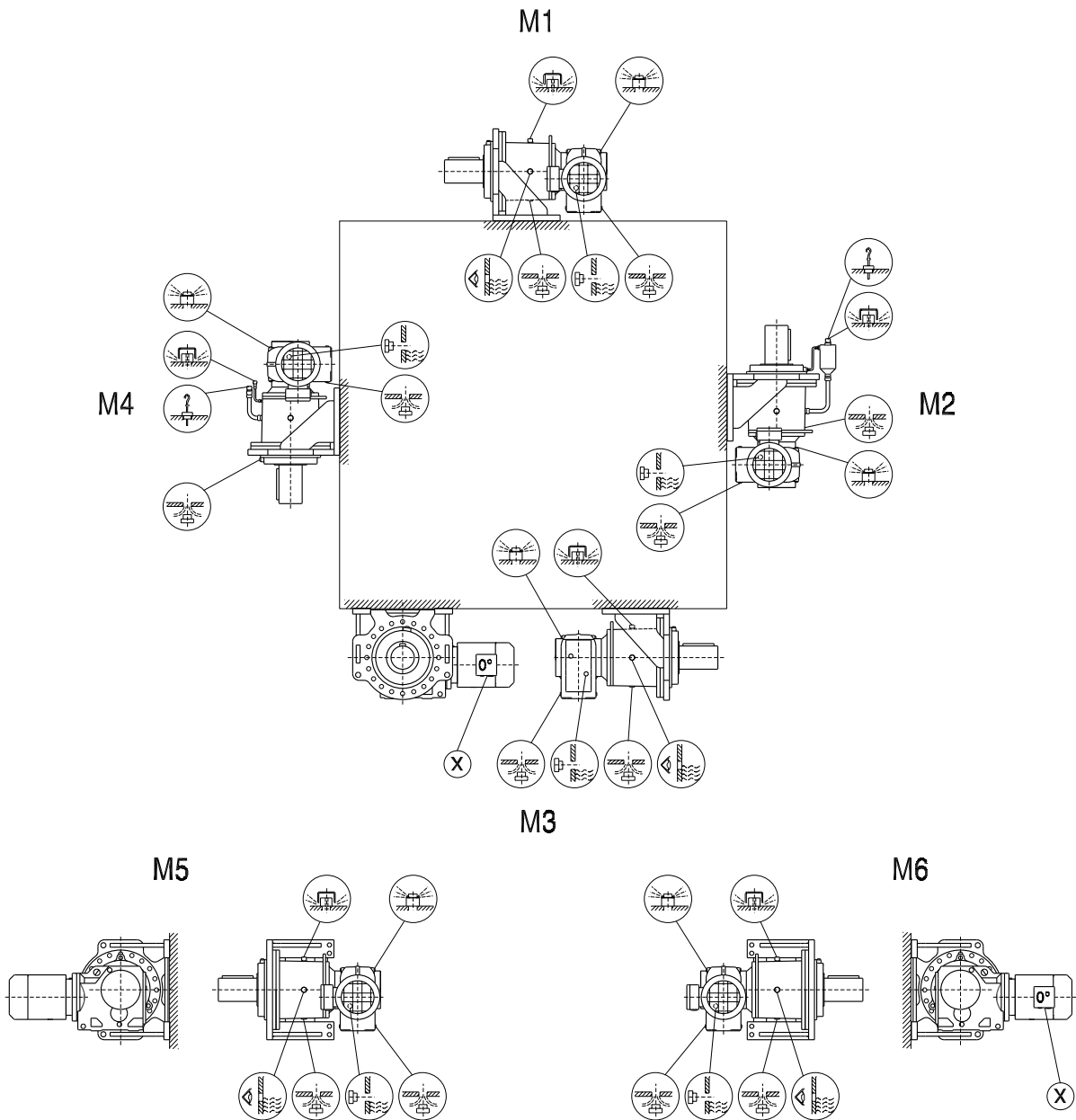
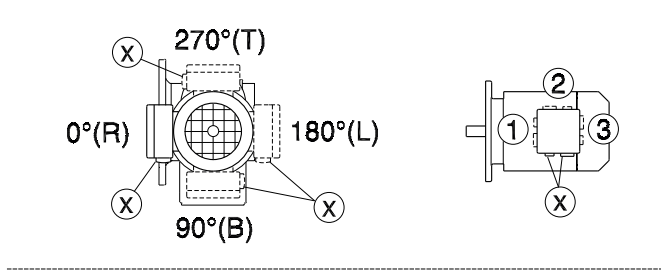
45 130 00 08



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3.8.3 P..KF../K..

45 131 00 08



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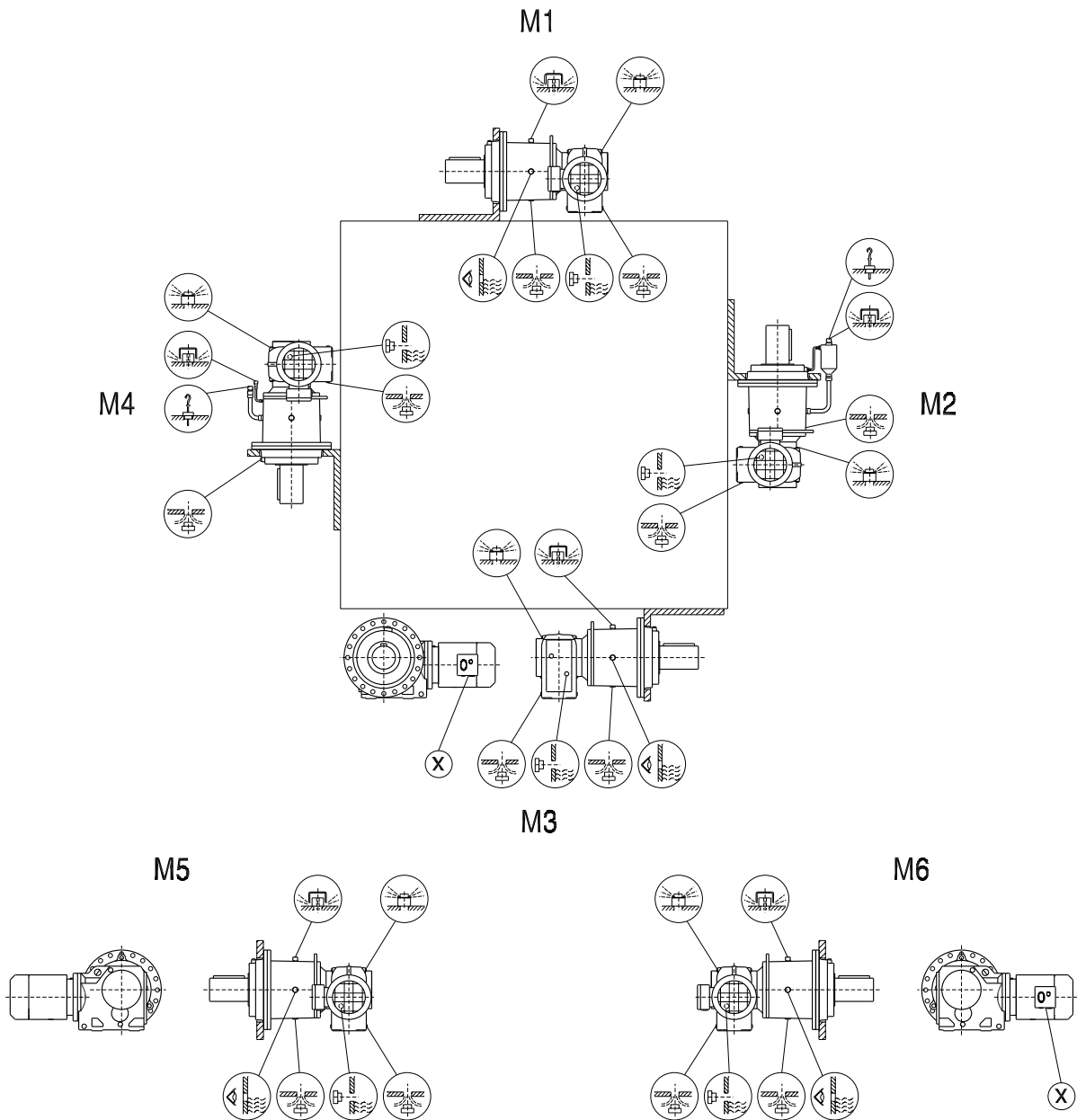
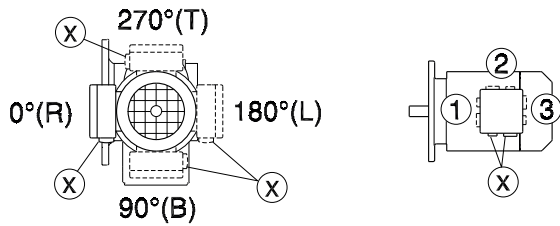
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Gear unit structure

Mounting position sheets

3.8.4 PF.KF../K..

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3.9 Oil expansion tank /ET

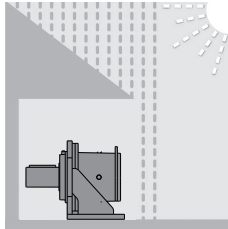
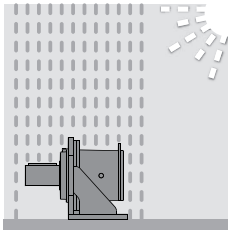
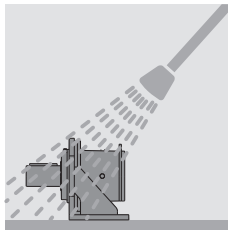
The oil expansion tank is designed to compensate for oil volume variations in the system caused by temperature fluctuations. When the gear unit temperature increases, the oil expansion tank absorbs some of the increasing oil volume and feeds it back to the gear unit as the temperature goes down, which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

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

3.10 Coating and surface protection systems

The following tables give an overview of coating and surface protection systems.

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

OS 1 low environmental pollution	
	Suited for environments prone to condensation and atmospheres with low humidity or contamination, such as outdoor applications under roof or with protection, unheated buildings where condensation can build up. According to corrosivity category: C2 (low)
Sample applications	<ul style="list-style-type: none"> • Systems in saw mills • Agitators and mixers
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	–
OS 2 medium environmental pollution	
	Suited for environments with high humidity or moderate atmospheric contamination, such as applications outdoors subject to direct weathering. According to corrosivity category: C3 (moderate)
Sample applications	<ul style="list-style-type: none"> • Applications in gravel plants • Cableways
Condensation test ISO 6270	120 h
Salt spray test ISO 7253	240 h
OS 3 high environmental pollution	
	Suited for environments with high humidity and occasionally severe atmospheric and chemical contamination. Occasional acidic or caustic wet cleaning. Also for applications in coastal areas with moderate salt load. According to corrosivity category: C4 (high)
Sample applications	<ul style="list-style-type: none"> • Port cranes • Sewage treatment plants • Mining applications
Condensation test ISO 6270	240 h
Salt spray test ISO 7253	480 h



INFORMATION

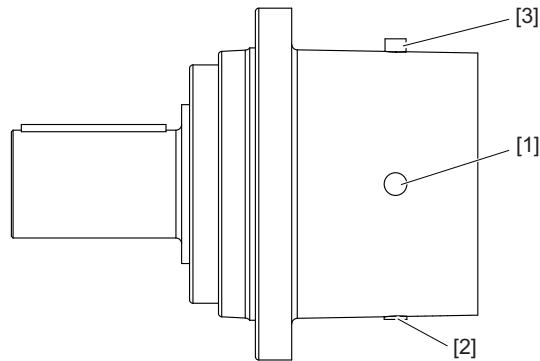
- Standard top coat color RAL 7031, can deviate depending on the order, see order documents.
- Colors according to RAL –Yes
- Water and hand perspiration repelling rust preventive for external preservation applied to uncoated parts, shaft ends/flanges.
- Sheet metal parts (such as protection covers) are painted in RAL 1003 as standard.
- Higher quality surface protection systems are available on request.

3.11 Types of lubrication

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

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

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



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3.11.2 Bath lubrication for vertical mounting positions: M2/M4

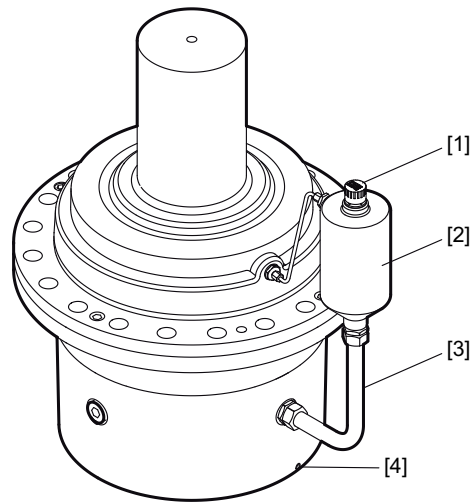
The gear unit is (almost completely) filled with oil. All tooth engagement or bearing points are immersed in the oil bath completely or partly.

Mounting position M2

Standard lubrication type with oil expansion tank:

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

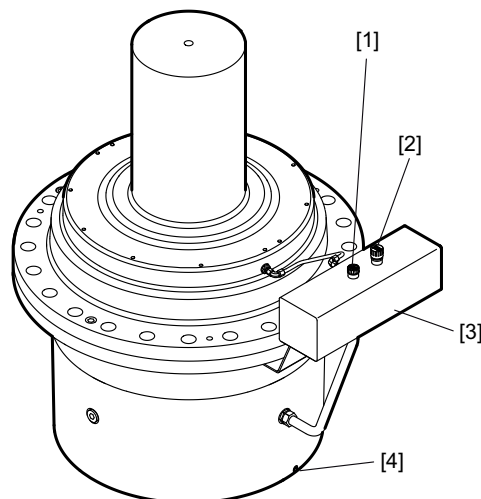
Sizes **P.002 – 082**:



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

Sizes **P.092 – P.102**:



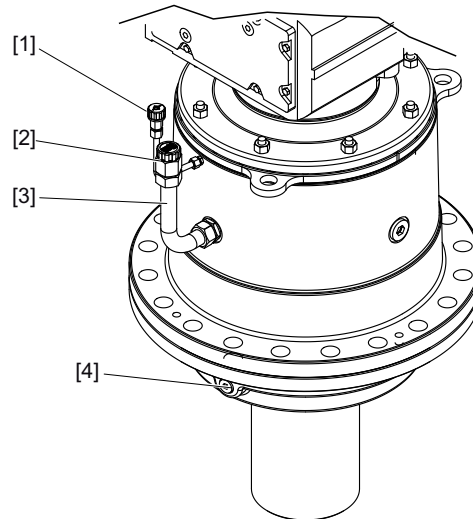
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- | | | | |
|-----|--------------|-----|--------------------|
| [1] | Oil dipstick | [3] | Oil expansion tank |
| [2] | Breather | [4] | Oil drain plug |

Mounting position M4

Standard lubrication type without oil expansion tank:

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



[1] Breather
[2] Oil dipstick

[3] Riser pipe
[4] Oil drain plug

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3.12 Accessories

3.12.1 Visual oil level check

As standard, planetary gear units in mounting position M1 and M3 are equipped with 2 oil sight glasses. For mounting position M5 and M6, the gear unit has 1 oil sight glass.

In the vertical mounting positions M2 and M4, the oil level check is performed using the oil dipstick.

3.12.2 Gear unit venting

The purpose of gear unit venting is to prevent that non-permitted pressure occurs from heating during operation. The gear units are normally equipped with a breather filter with a filter mesh of 2 µm.

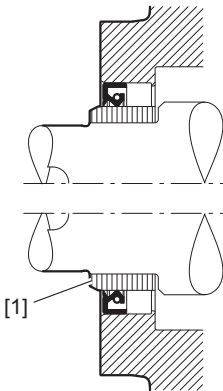
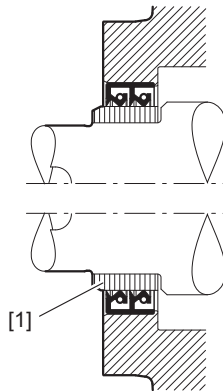
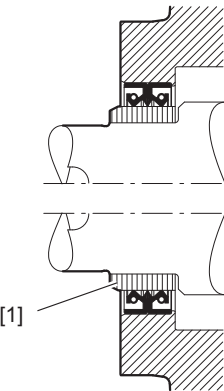
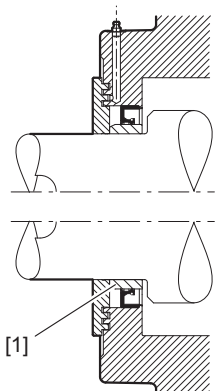
3.12.3 Oil drain

As standard, planetary gear units are equipped with an oil drain plug. As an alternative, magnetic oil drain plugs are available. For mounting positions M1, M3, M5, and M6, an oil drain valve is available as an option.

3.13 Sealing system

3.13.1 Output shaft

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

Standard for mounting positions M1/M3/M5/M6	Standard for mounting position M4 (optional for mounting positions M1/M3/M5/M6)	Standard for mounting position M2 (optional for mounting positions M1/M3/M5/M6)	Radial labyrinth seal Regreasable for mounting positions M1/M2/M3/M4/M5/M6
Single oil seal, inside sealing with dust protection lip on a hardened sleeve [1]	2 oil seals, inside sealing on a hardened sleeve [1]	1 oil seal, inside sealing, and 1 oil seal, outside sealing, on a hardened sleeve [1]	Single oil seal with radial labyrinth seal on a hardened sleeve [1]
<ul style="list-style-type: none"> • Normal environment 	<ul style="list-style-type: none"> • Medium dust load with abrasive particles 	<ul style="list-style-type: none"> • High dust load with abrasive particles and splash water load 	<ul style="list-style-type: none"> • Very high dust load with abrasive particles
			

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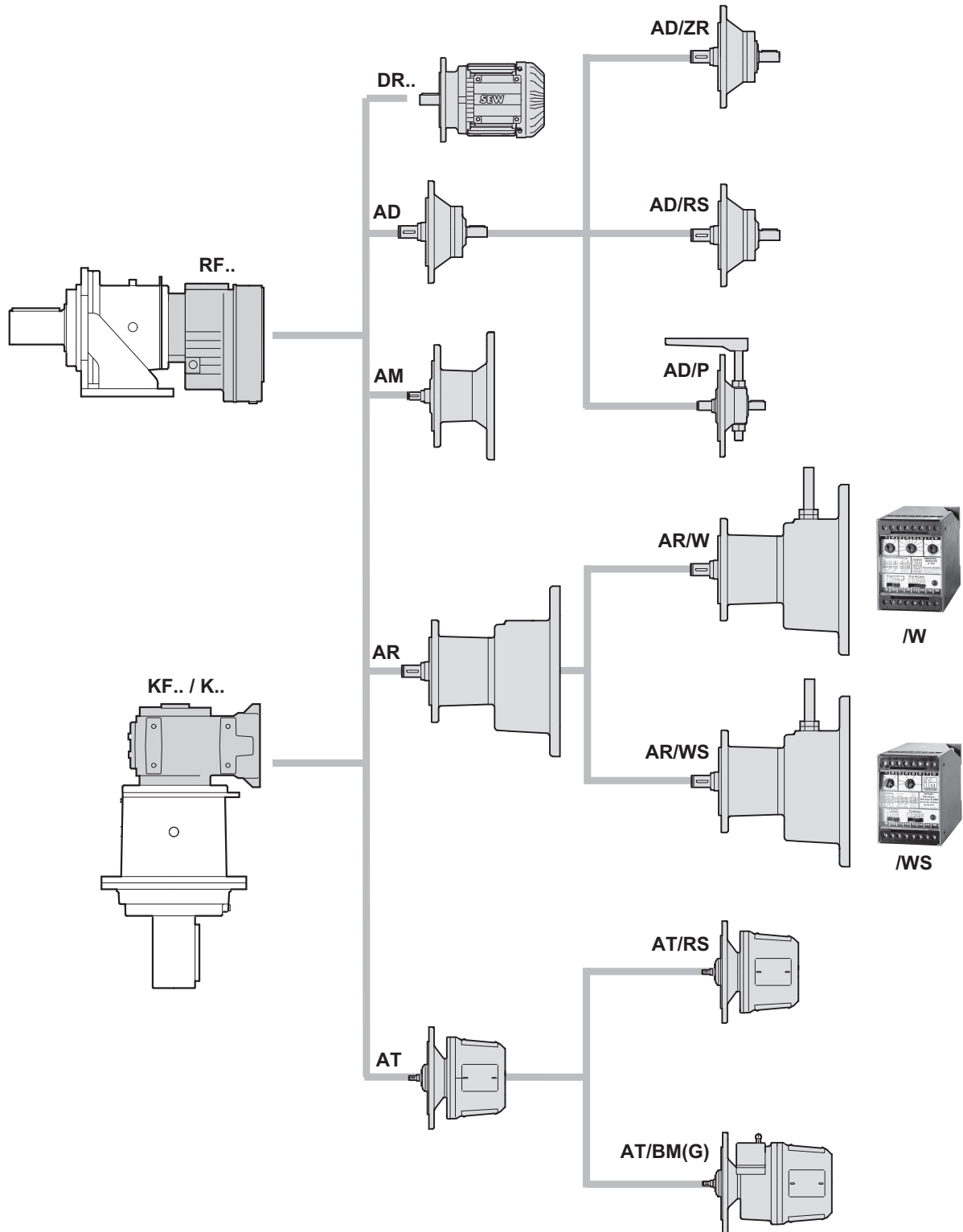
Structure of options

Components on the input side

4 Structure of options

4.1 Components on the input side

The following figure shows the components on the input side.



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4.2 Torque arm /T

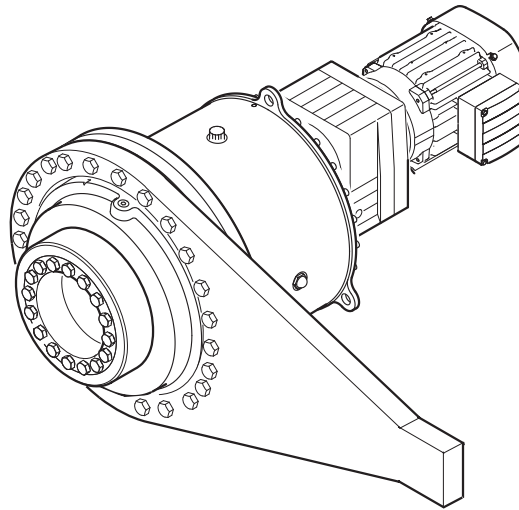
A torque arm is available to support the reaction torque of solid and hollow shaft gear units in the shaft-mounted design.

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

4.2.1 Single-sided torque arm

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

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



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4.3 Temperature sensor /PT100

The PT100 temperature sensor can be used to measure the temperature of the gear unit oil.

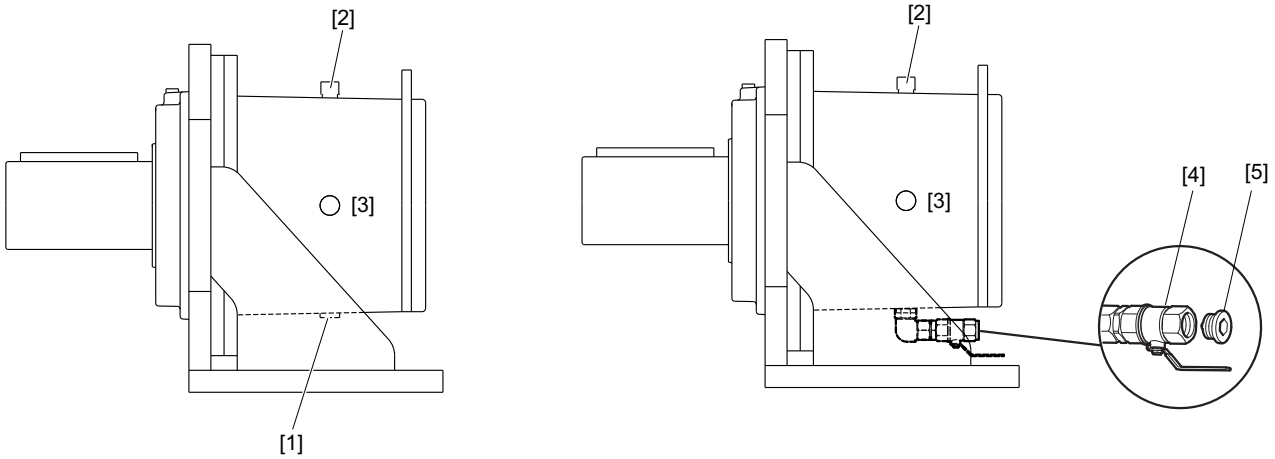
The temperature sensor is located in the oil sump of the gear unit. The exact position depends on the gear unit variant.

4 Structure of options

Oil drain

4.4 Oil drain

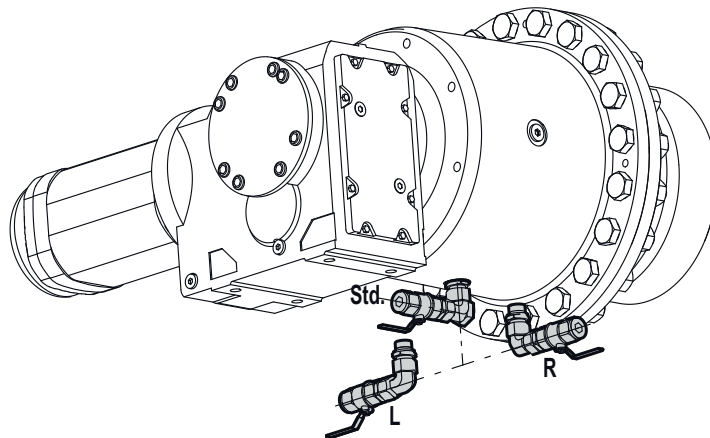
The gear unit is equipped with an oil drain plug [1] as standard. An oil drain valve [4] with screw plug [5] can optionally be added to mounting position M1, M3, M5, or M6. This valve allows for a drain pipe to be easily attached when changing the gear unit oil.



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4.4.1 Position of the oil drain valve

The following figure shows the installation options of the oil drain valve at the planetary gear unit.



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Std = Standard
R = Right
L = Left

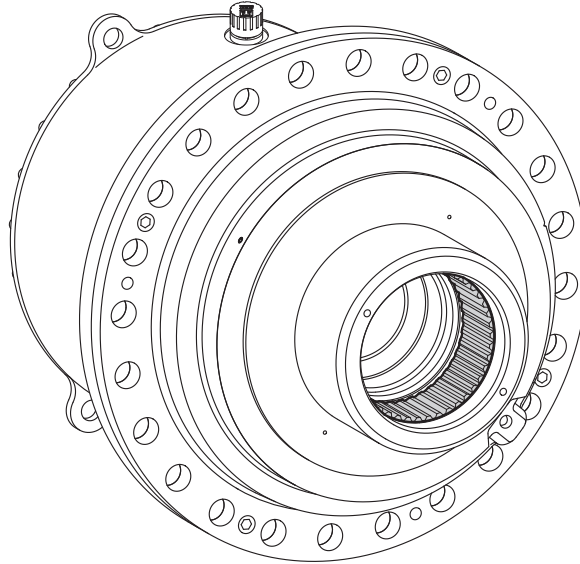
NOTICE

The oil drain valve might be damaged if it is not sufficiently secured.
Possible damage to property.

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

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

The hollow shaft has splining according to DIN 5480. There is a centering in front of and behind the splined shaft for absorbing radial loads as well as for easier assembly of the output element.



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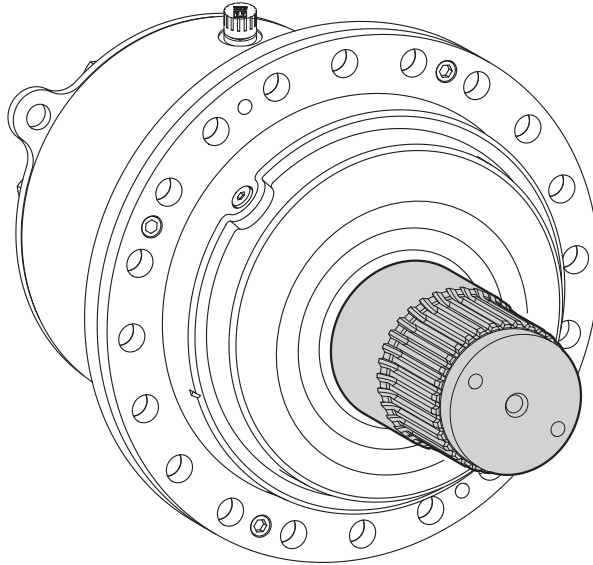
INFORMATION



Contact SEW-EURODRIVE regarding the permitted radial load.

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

The solid shaft has splining according to DIN 5480. There is a centering in front of and behind the splined shaft for absorbing radial loads as well as for easier assembly of the output element. There are threads for mounting an end plate at the front of the shaft.



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INFORMATION

Contact SEW-EURODRIVE regarding the permitted radial load.

5 Installation/assembly

5.1 Required tools/resources

Not included in the delivery:

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

5.2 Tolerances

Observe the following tolerances.

INFORMATION



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

5.2.1 Planetary gear unit P..

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

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

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

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

5.3 Important information

Read the following notes prior to installation/mounting.



▲ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

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



▲ WARNING

Danger due to mounting in impermissible mounting position.

Severe or fatal injuries.

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



▲ WARNING

Danger due to freely accessible, rotating parts.

Severe or fatal injuries.

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



▲ WARNING

A customer machine that is not appropriately secured can fall during gear unit installation or removal.

Severe or fatal injuries.

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



▲ WARNING

Danger due to installing impermissible components.

Severe or fatal injuries.

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



▲ WARNING

Danger due to using impermissible gear unit oil.

Severe or fatal injuries.

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



▲ WARNING

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

Serious injury.

- Let the gear unit cool down before you start working on it.
- Carefully remove the oil level plug and the oil drain plug.



▲ CAUTION

Danger due to unsecured mount-on components, such as keys.

Possible injury to persons due to falling parts.

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



▲ CAUTION

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

Minor injuries.

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



▲ CAUTION

Risk of injury due to protruding parts.

Minor injuries.

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

NOTICE

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

Possible damage to property.

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

NOTICE

Improper installation and assembly can damage the gear unit.

Possible damage to property.

- Observe the following notes.

- Strictly observe the safety notes in the individual chapters.
- The most important technical data is provided on the nameplate. Additional data relevant for operation is available in drawings, on the order confirmation or in an order-specific documentation.
- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have 2 separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- Note that the oil quantities on the nameplates are approximate values. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity.
- Do not change the mounting position without prior consultation of SEW-EURODRIVE. The warranty will become void without prior consultation. An oil expansion tank and/or an oil riser pipe are required if you change to a vertical mounting position. Adjust the lubricant fill quantities and the position of the breather accordingly.
- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Place an information sign near the ON switch to warn that the gear unit is being worked on.
- The oil level plug and the oil drain plug as well as the breather must be freely accessible.
- Use plastic inserts (2 to 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel). Also fit the bolts with plastic washers. Always ground the gear unit housing.
- It is important that only authorized personnel is allowed to assemble gear head units with motors and adapters. Contact SEW-EURODRIVE.
- Do not weld anywhere on the drive. Do not use the drive as a ground point for welding work. Welding may destroy gearing parts and bearings.
- Units installed outdoors must be protected from the sun. Suitable protection devices are required, such as covers or roofs. When using protective devices, avoid heat build-up. The user must ensure that 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 may cause water to accumulate in the oil.

- For the standard mounting positions, the breather on planetary gear units is mounted at the factory and activated if the gear unit is supplied without an oil fill. Check the correct mounting and the function of the breather.
- For planetary gear units that are filled with oil at the factory, check to see that the breather is installed before you start up the gear unit.
- The gear units are delivered with the ordered painting. Repair any damage to the paint work (e.g. on the breather).
- Do not modify the gear unit or the mount-on components without prior consultation of SEW-EURODRIVE.
- Adhere to the safety notes in the individual chapters.

5.4 Prerequisites for installation

Check that the following conditions have been met:

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

NOTICE

Danger due to insufficiently cleaned flange surfaces.

Possible damage to property.

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

5.4.1 Extended storage

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

Replace the breather with a screw plug.

5.5 Oil expansion tank enclosed (option)

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

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



▲ CAUTION

Risk of lubricant leaking from damaged seals.

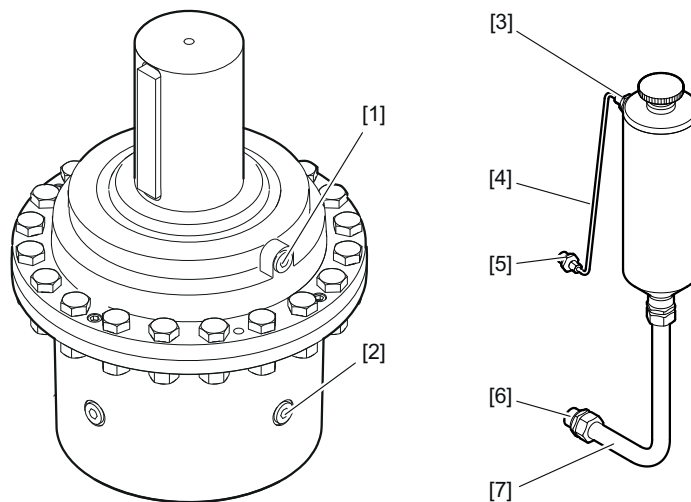
Minor injuries.

- Check the pipe fittings for leaking oil before taking the gear unit into operation.



INFORMATION

The gear unit must not be filled with oil while installing the oil expansion tank. Before installing the oil expansion tank, drain the oil of gear units that are delivered with oil fill. Gear units delivered without oil fill, must be filled with oil after having installed the oil expansion tank.



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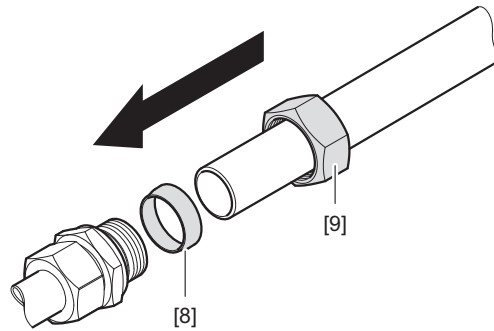
1. Remove the two screw plugs from the connection bores [1] and [2] of the planetary gear unit.
2. Loosen the pipe fitting of the fittings [5] and [6] on the enclosed oil expansion tank.
3. Screw the pipe fitting [5] and [6] into the connection bores [1] and [2] on the planetary gear unit.

5

Installation/assembly

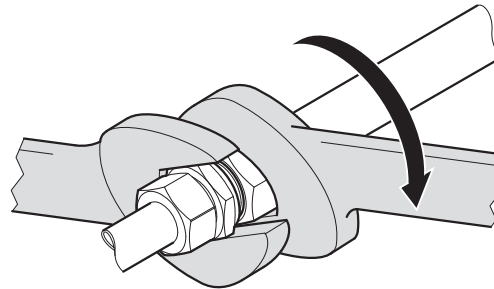
Oil expansion tank enclosed (option)

4. Mount the piping [4] and [7] with cutting ring [8] and union nut [9] to the screwed-in pipe fitting [5] and [6].



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5. If necessary, loosen the screw fitting [3] to being able to position the piping more easily. Tighten the screw fitting [3] again.
6. Screw the two pipes [4] and [7] to the planetary gear unit using the pipe fitting [5] and [6]. When doing so, hold the pipe fitting [5] and [6] using a wrench and tighten the union nut with a wrench for approx. $\frac{1}{4}$ turn after you feel a resistance.



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

▲ CAUTION



Risk of lubricant leaking from damaged seals.

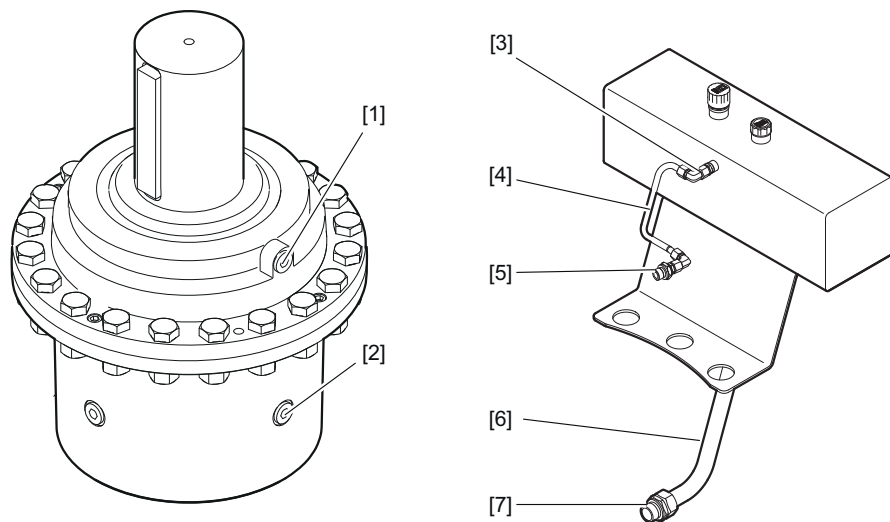
Minor injuries.

- Check the pipe fittings for leaking oil before taking the gear unit into operation.

INFORMATION

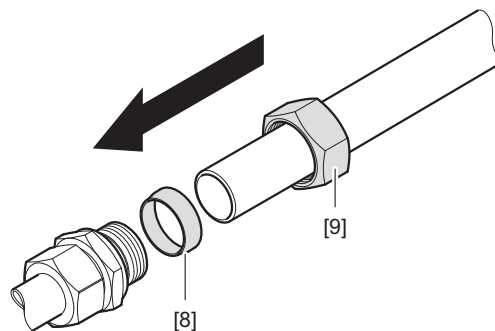


The gear unit must not be filled with oil while installing the oil expansion tank. Before installing the oil expansion tank, drain the oil of gear units that are delivered with oil fill. Gear units delivered without oil fill, must be filled with oil after having installed the oil expansion tank.



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



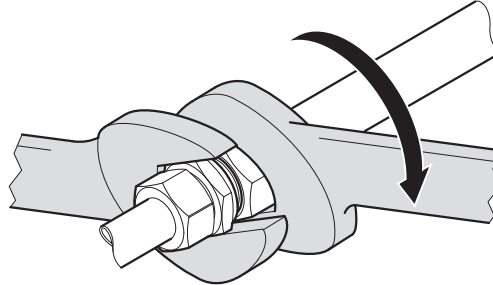
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5

Installation/assembly

Oil expansion tank enclosed (option)

5. If necessary, loosen the screw fitting [3] to being able to position the piping more easily. Tighten the screw fitting [3] again.
6. Screw the two pipes [4] and [6] to the planetary gear unit using the pipe fitting [5] and [7]. When doing so, hold the pipe fitting [5] and [7] using a wrench and tighten the union nut with a wrench for approx. $\frac{1}{4}$ turn after you feel a resistance.



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5.6 Planetary gear units delivered without oil fill (standard)

Observe the notes in chapter "Important information" (→ 60).

Planetary gear units are delivered without oil fill as standard. Observe the following information:



▲ 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.

NOTICE

Improper oil filling may cause damage to the gear unit.

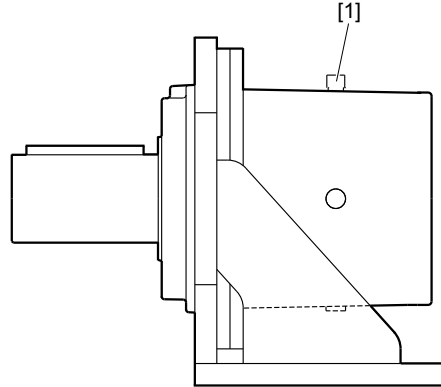
Possible damage to property.

- Note the following information.
- Fill the oil only when the gear unit is in the intended mounting position.
- Make sure the oil has ambient temperature when filling it into the gear unit.
- Observe the additional notes depending on the lubrication type in the following chapters.
- Fill the gear unit with the oil grade and oil quantity specified on the nameplate. The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity. When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the required oil fill quantity is higher. In this case, observe the respective SEW-EURODRIVE operating instruction: Oil supply system. For more information, refer to chapter "Changing the oil of planetary gear units" (→ 123).
- Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
- Check the oil level using the oil sight glass or oil dipstick. For additional information, refer to chapter "Checking the oil level of the planetary gear unit" (→ 119).

5.7 Gear units delivered with oil fill (option)

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

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



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1. Remove the closing plug.
2. Insert the breather [1].
3. Check the oil level. Observe chapter "Checking the oil level at the planetary gear unit" (→ 119).

5.8 Limit temperature for gear unit start

Check if the gear unit/gearmotor is designed for the ambient temperature. For the application limits refer to the technical documentation, the nameplate or the lubricant table (see chapter "Permitted lubricants" (→ 131)).

NOTICE

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

Possible damage to property.

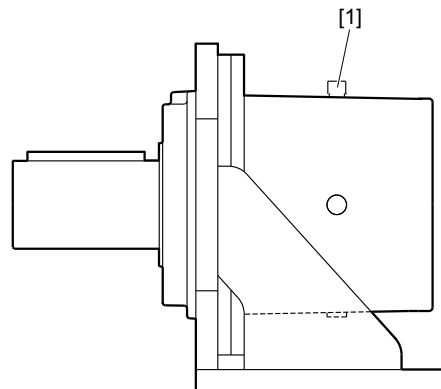
- Observe the specified start temperatures for gear unit startup.

5.9 Breather for planetary gear units

Observe the notes in chapter "Important information" (→ 60).

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

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



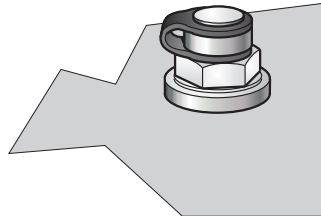
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1. Remove the closing plug.
2. Insert the breather [1].
3. Check the oil level. Observe the information in chapter "Checking the oil level of the planetary gear unit" (→ 119).

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

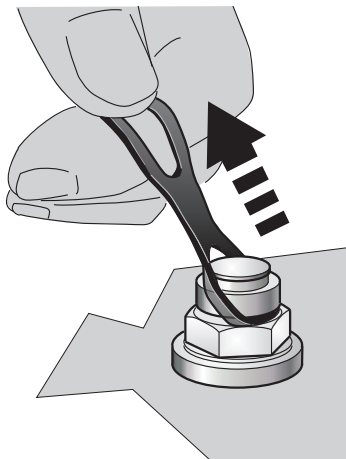
Check whether the breather is activated. If the breather has not been activated, you must remove the transport protection device from the breather before starting up the gear unit.

1. Breather with transport protection



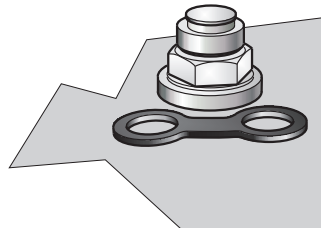
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2. Remove the transport protection



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3. Activated breather



211314699

5.11 Installing the gear unit



⚠ WARNING

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

Severe or fatal injuries.

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

NOTICE

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

Possible damage to property.

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

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

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

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

Tighten retaining screws or nuts to the specified torque. Use the screws and tightening torques specified in chapter "Gear unit mounting" (→ 73).

5.11.1 Foot-mounted gear units

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

Size	Screw/nut	Tightening torque screw/nut	Quantity
		Strength class 8.8	
		Nm	
P.002	M20	464	8
P.012			
P.022			
P.032	M24	798	
P.042	M30	1597	
P.052	M36	2778	
P.062			
P.072	M42	3995	
P.082			
P.092	M48	6022	
P.102			

INFORMATION

Do not lubricate the screw connection during installation.

5.11.2 Tightening torques for retaining screws

Tighten the screws of gear unit mount-on parts and protection covers using the following tightening torque.

INFORMATION

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

Screw/nut	Tightening torque
	Strength class 8.8 Nm
M5	6,5
M6	11
M8	27
M10	54
M12	93

INFORMATION

Do not lubricate the bolts connection during assembly.

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

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

INFORMATION

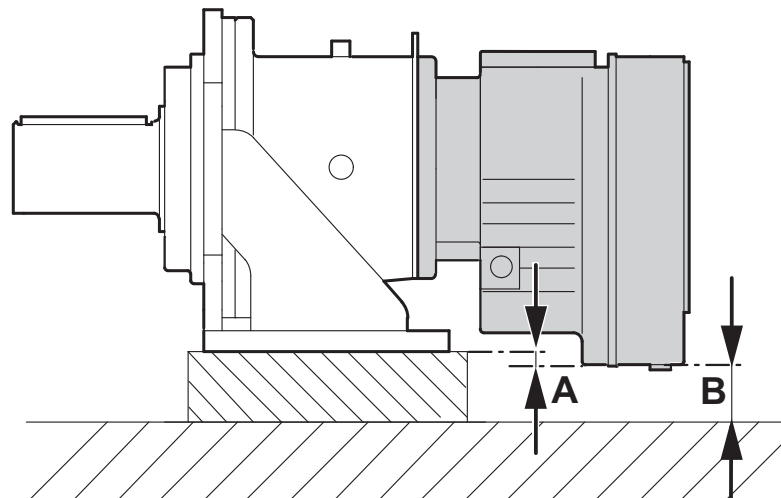


Observe **dimension A** for the following gear unit combinations. The customer base construction must be prepared accordingly.

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

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

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



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5.11.4 Aligning the shaft axis

WARNING

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

Severe or fatal injuries.

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

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

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

5.12 Gear units with solid shaft

INFORMATION



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

5.12.1 Assembling the input and output components

NOTICE

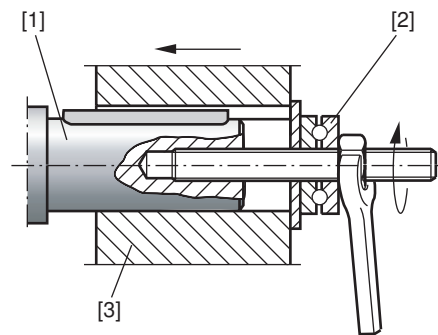
Bearings, housing or shaft may be damaged due to improper assembly.

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 the belt is tensioned correctly in accordance with the manufacturer's instructions.

Installation with mounting device

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

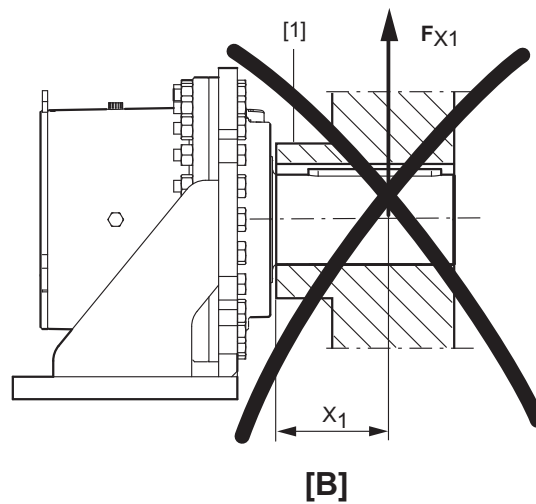
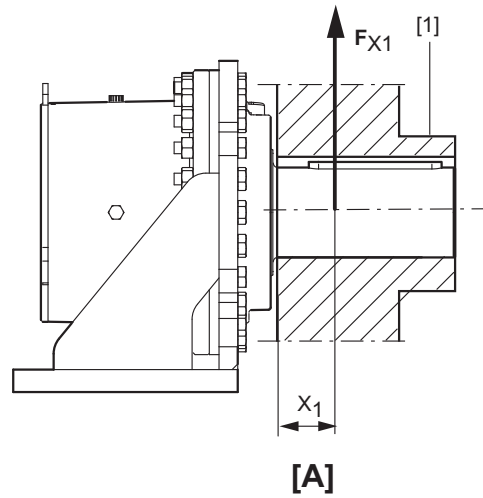


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- [1] Gear unit shaft end
- [2] Thrust bearing
- [3] Coupling hub

Avoid excessive overhung loads

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



- [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).

5.13 Output shaft as hollow shaft with shrink disk**INFORMATION**

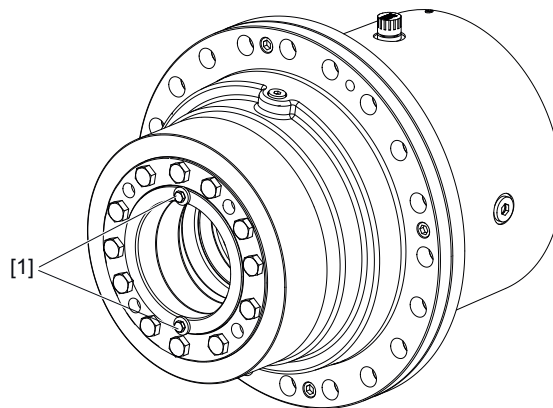
Ensure that the dimensions of the machine shaft correspond to the SEW-EURODRIVE specifications.

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.

INFORMATION

Note that the shrink disk is secured with 2 screws [1] on delivery. Remove the screws prior to assembly.

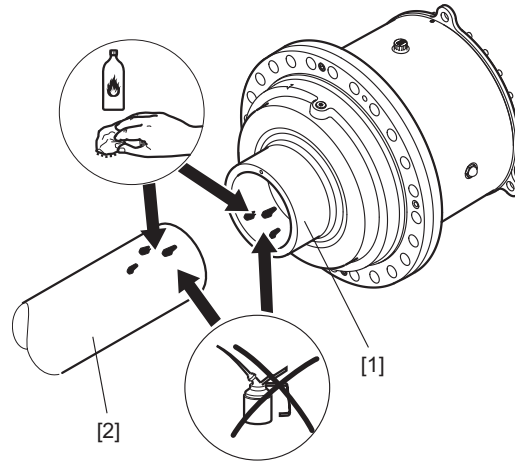


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5.13.1 Assembly

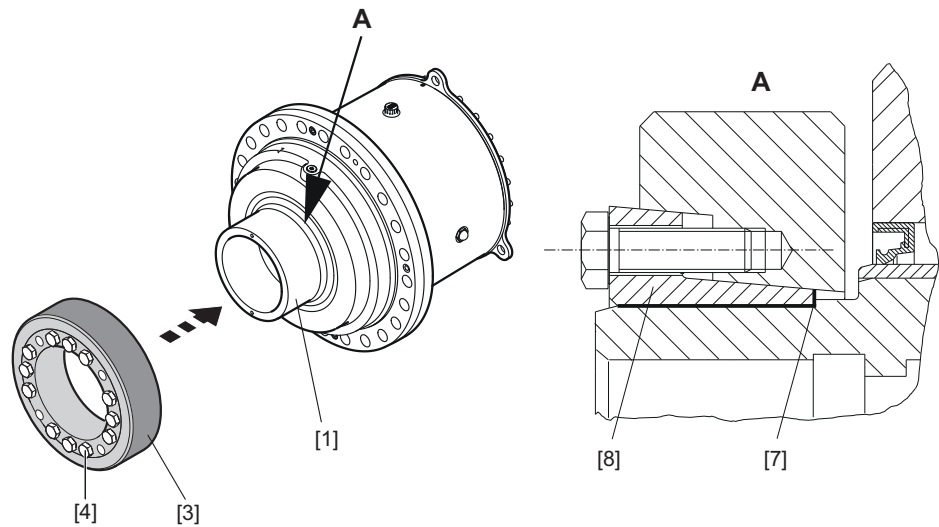
Observe the notes in chapter "Important information" (→ 60).

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



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2. **▲ CAUTION!** The loose shrink disk could slip. Risk of injury to persons and damage to property. Secure the shrink disk against slipping. Slide the shrink disk with untightened screws onto the hollow shaft [1] and position the inner ring of the shrink disk [8].
3. **NOTICE!** Tightening the locking screws [4] without installed shaft may result in the hollow shaft being deformed. Possible damage to property. Only tighten the locking screws [4] with the machine shaft [2] installed. Check for correct position of the shrink disk [3]. The shrink disk is positioned correctly when it is in contact with the shaft shoulder [7].



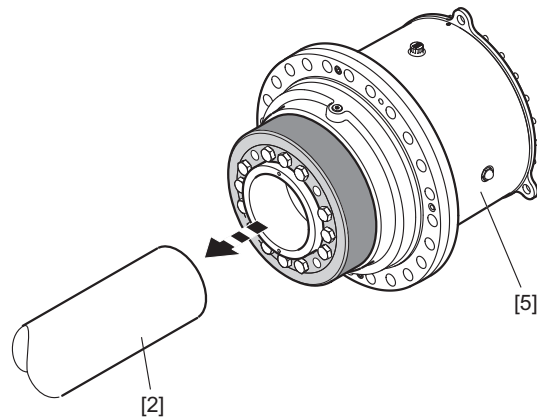
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5

Installation/assembly

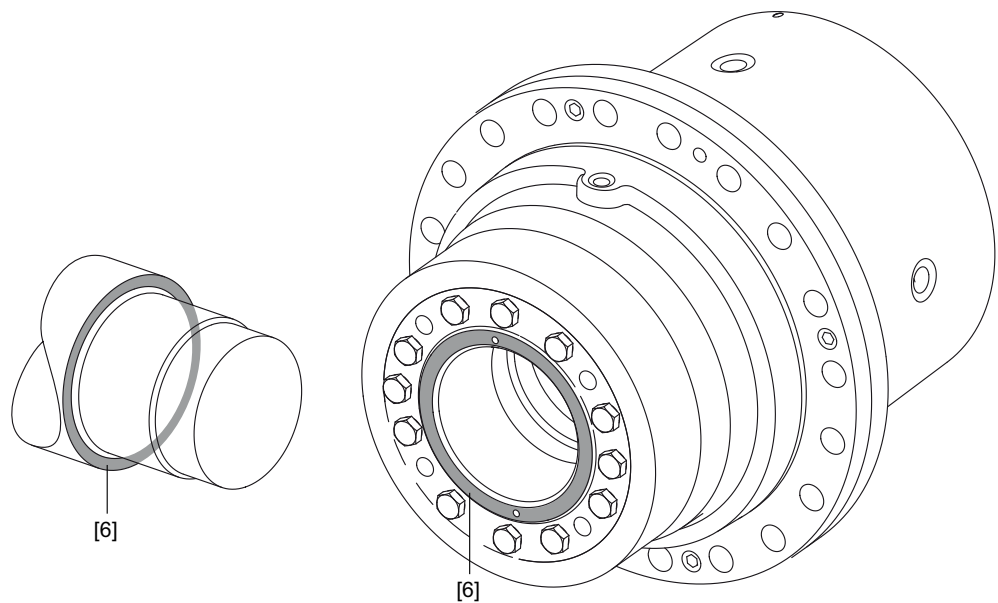
Output shaft as hollow shaft with shrink disk

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



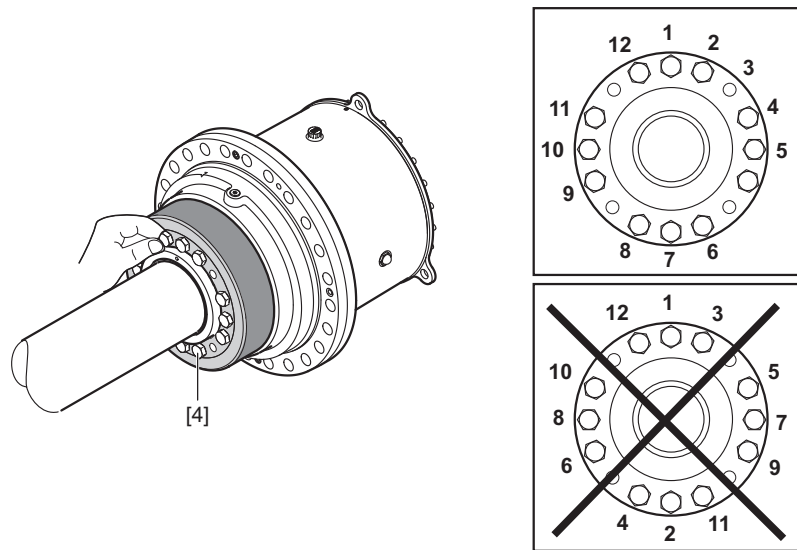
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5. To guarantee a complete torque transmission from the gear unit to the machine shaft, observe the following procedure during assembly. Push the gear unit onto the machine shaft until the contact surfaces [6] touch.



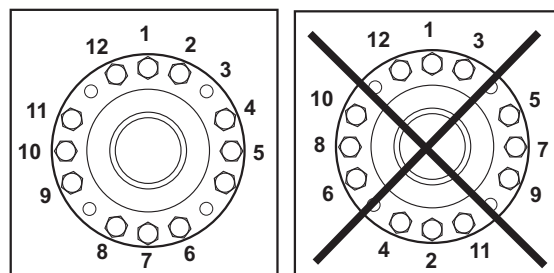
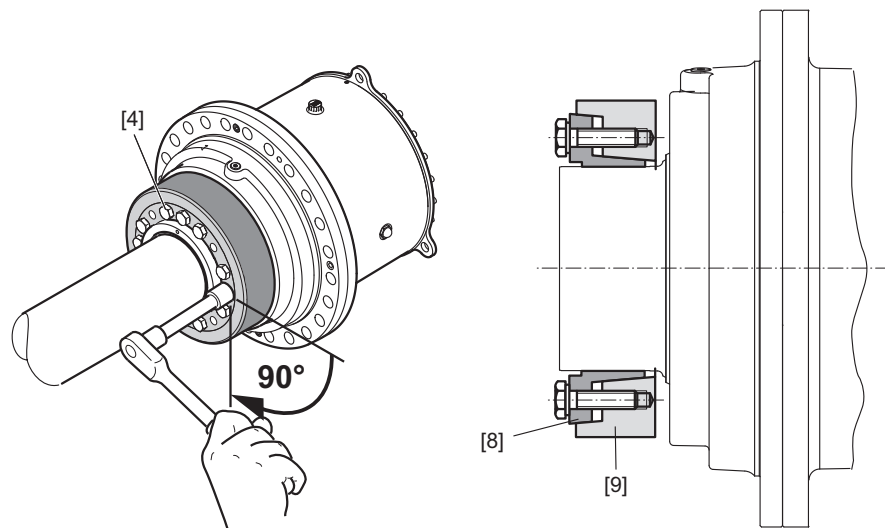
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6. First tighten the locking screws [4] manually. Then tighten all locking screws by working round equally (not in diametrically opposite sequence) in 1/4 turn increments.



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7. Adhere to the tightening torque in the table below. Continue to tighten the locking screws [4] evenly by working round in 1/4 turns until you reach the tightening torque.



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

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

INFORMATION



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

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

⚠ CAUTION



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

Possible injury to persons.

- Be sure to properly attach the protection cover after completing assembly.

5.13.2 Removal



⚠ WARNING

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

Serious injury.

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

NOTICE

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

Possible damage to property.

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

Observe the notes in chapter "Important information" (→ 60).

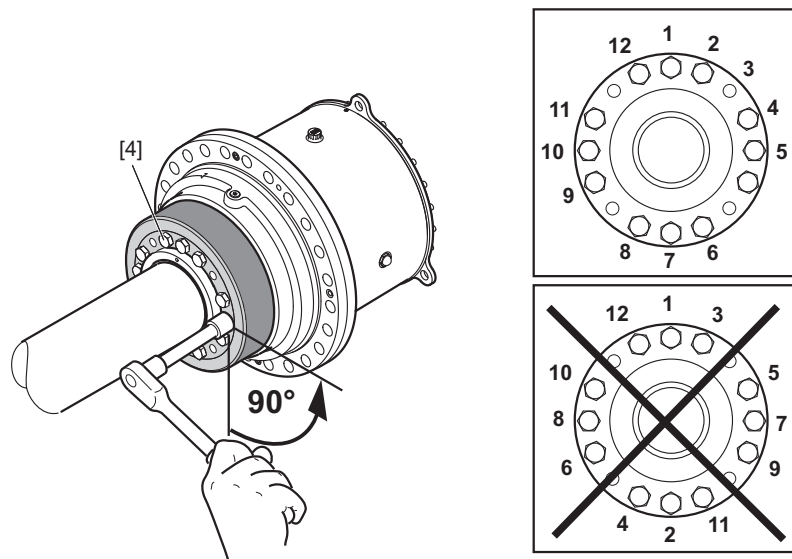
1. **NOTICE!** Improper loosening of the locking screws can lead to straining of the connecting surface. Possible damage to property.
Loosen the locking screws [4] by a quarter turn one after the other to avoid straining the connecting surface.

INFORMATION



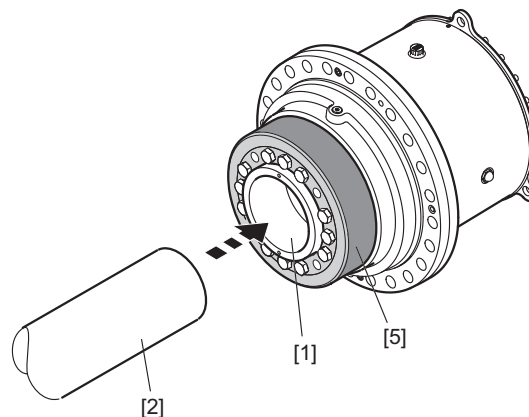
If the bevel (outer ring) [9] and the taper bushing (inner ring) [8] do not separate by themselves:

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



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



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

5.13.3 Cleaning and lubrication**INFORMATION**

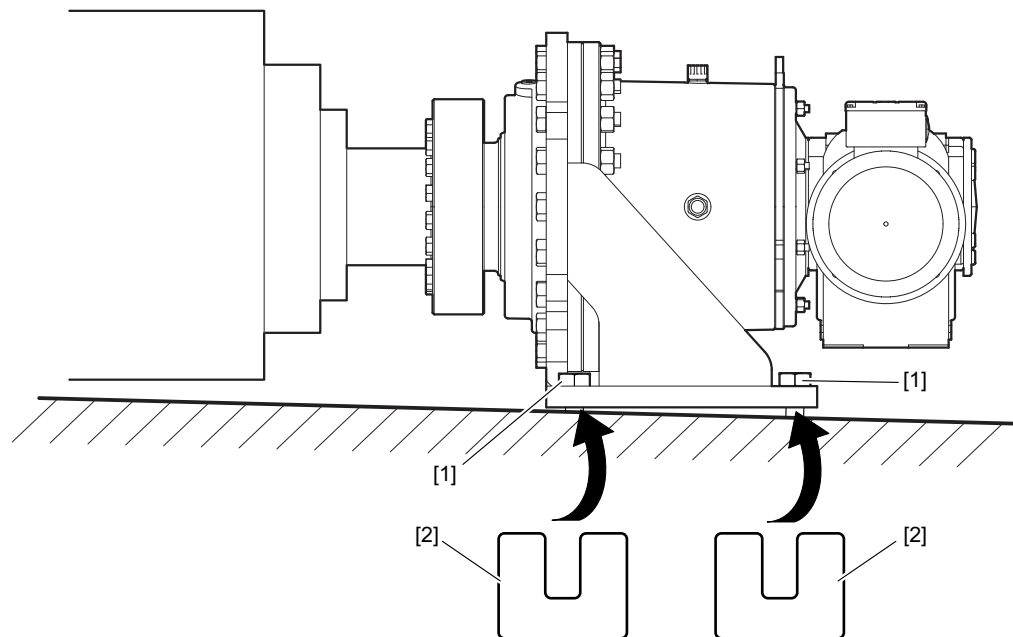
You must perform the following steps carefully to ensure proper functioning of the shrink disk. Use only products that are comparable to the specified solid lubricant.

- If the tapered surfaces of the shrink disk are damaged, the shrink disk can no longer be used and must be replaced.
- Used shrink disks have to be disassembled and cleaned. The manufacturer has applied a solid lubricant to the tapered surfaces. Regrease undamaged tapered surfaces. Grease screw threads with solid lubricant.
- Use a solid lubricant with a friction factor of $\mu = 0.04$.

Solid lubricant	Sold as
Weicon "Anti-Seize"	Spray or paste
Molykote 321 R (lube coat)	Spray
Molykote spray (powder spray)	Spray
Molykote G Rapid	Spray or paste
Aemasol MO 19R	Spray or paste
Molykombin UMFT 1	Spray
Unimoly P5	Powder

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

1. Mount the hollow shaft with shrink disk onto the machine shaft as described in chapter "Output shaft as hollow shaft with shrink disk".
2. If there is a gap between foundation and mounting surface of the gear unit foot, compensate with shims [2] before tightening the retaining screws [1] at the gear unit foot.
3. Tighten the retaining screws [1] at the gear unit foot. Observe the tightening torques in chapter "Foot-mounted gear units" (→ 73).



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NOTICE

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

Possible damage to property.

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

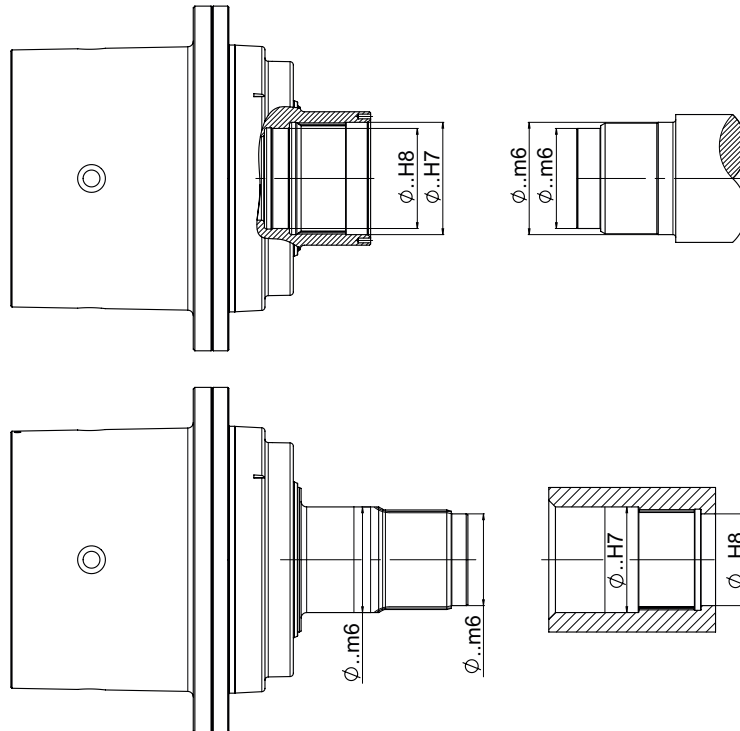
5.15 Gear unit with splining

5.15.1 Notes for mounting the gear unit

INFORMATION



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



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

NOTICE

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

Possible damage to property.

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

5.15.2 Mounting the gear unit onto the machine shaft

INFORMATION

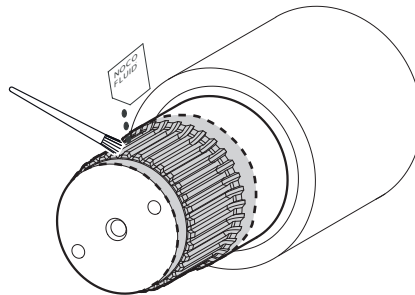


Make sure the dimensions of the machine shaft correspond to SEW-EURODRIVE specifications → see dimension sheet in your order documents.

Output shaft as a splined hollow shaft /..V

Observe the notes in chapter "Important information" (→ 60).

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



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

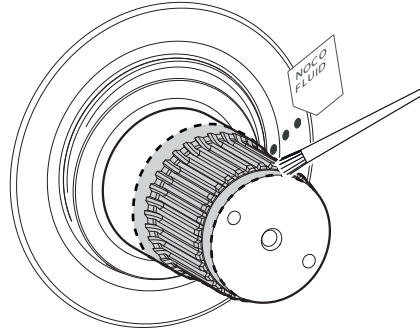
5 Installation/assembly

Gear unit with splining

Output shaft as a splined solid shaft /..L

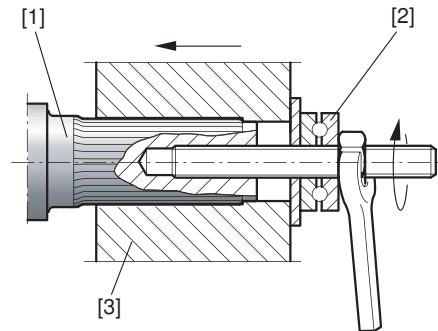
Observe the notes in chapter "Important information" (→ 60).

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



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



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

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

5.15.3 Disassembling the gear unit from the machine shaft

NOTICE

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

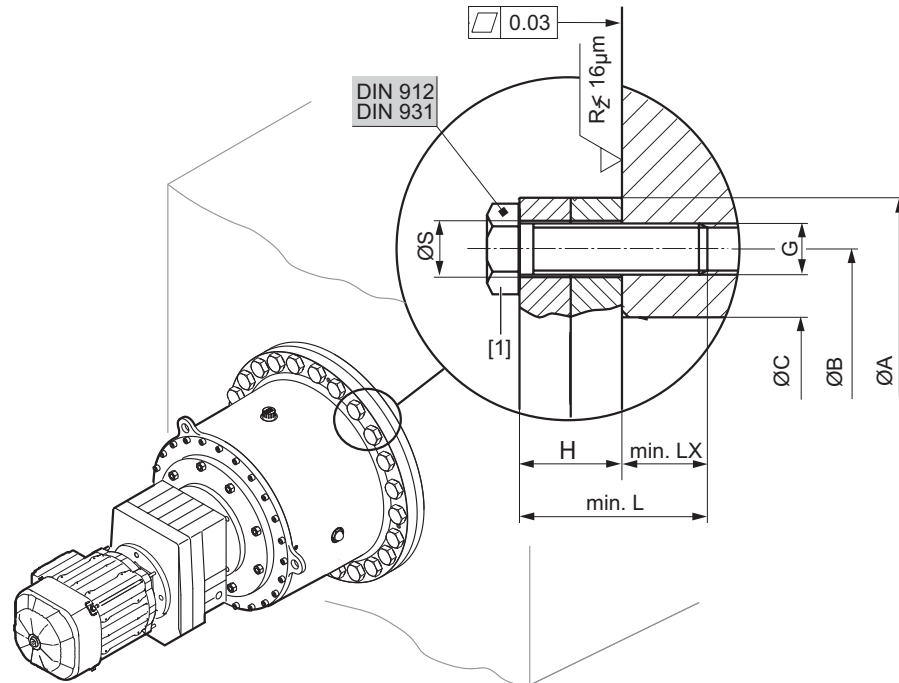
Possible damage to property.

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

5.16 Flange-mounted gear units

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

Retaining screws 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 mounting surface of $\mu = 0.11$.

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

Only use the following tools for the installation:

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

5

Installation/assembly

Flange-mounted gear units

The following values in the table apply to steel constructions.

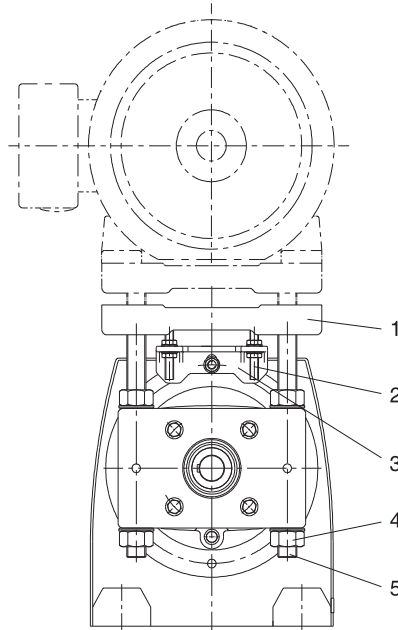
Size	Thread	Quantity	Tightening torque	Dimensions in mm						Strength classes	Screws EN ISO	
				Nm	Ø S	H	min. L	min. LX	Ø A			Ø B
P.002	M20	16	555	22	39.5	73.5	34	410	370	330 _{f9}	10.9	4017 4762
P.012	M20	20	555	22	41.5	73.5	32	450	410	370 _{f9}		
P.022	M20	24	555	22	48	84	36	500	460	410 _{f9}		
P.032	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}		

5.17 AD input shaft assembly

Observe chapter "Assembling the input and output components" (→ 76) when installing input components.

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

Mounting the motor and adjusting the motor platform.



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

Observe the notes in chapter "Important information" (→ 60).

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

5.17.2 Only AD6/P and AD7/P

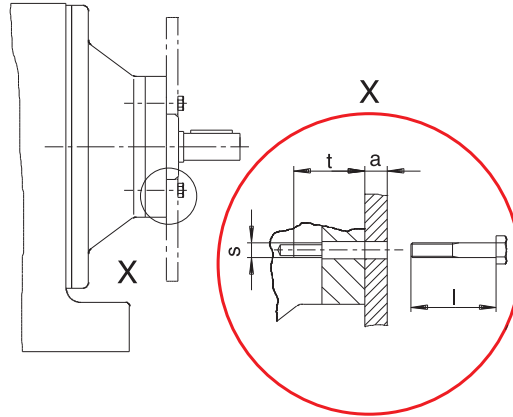
Unscrew the nuts on the stud bolts before adjustment to allow the stud bolts to move axially in the support without restriction. Do not tighten the nuts until the final adjustment position has been reached. Do not adjust the motor platform using the support.

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

Mounting components on the input shaft assembly with centering shoulder.

Observe the notes in chapter "Important information" (→ 60).

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



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

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

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

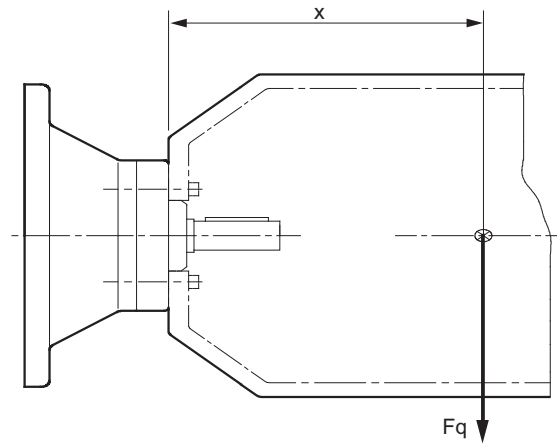
Type	Screw-in depth t mm	Retaining thread s	Tightening torque T_A for connection screws of strength class 8.8 Nm
AD2/ZR	25.5	M8	27
AD3/ZR	31.5	M10	54
AD4/ZR	36	M12	93
AD5/ZR	44	M12	93
AD6/ZR	48.5	M16	230
AD7/ZR	49	M20	464
AD8/ZR	42	M12	93

Permitted loads

NOTICE

Impermissibly high loads may occur when mounting a motor.
Possible damage to property.

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



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Type	$x^{1)}$ mm	$F_{q^{1)}$ N
AD2/ZR	193	330
AD3/ZR	274	1400
AD4/ZR ²⁾	361	1120
AD4/ZR		3300
AD5/ZR	487	3200
AD6/ZR	567	3900
AD7/ZR	663	10000
AD8/ZR	516	4300

- 1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced linearly as the center of gravity distance x increases. When this distance x is reduced, F_{qmax} cannot be increased.
- 2) Diameter of the adapter output flange: 160 mm

5.17.4 Cover with backstop AD../RS

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

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

NOTICE

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

Possible damage to property.

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

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

5.18 Torque arm

5.18.1 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 might break the housing.

Possible damage to property.

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



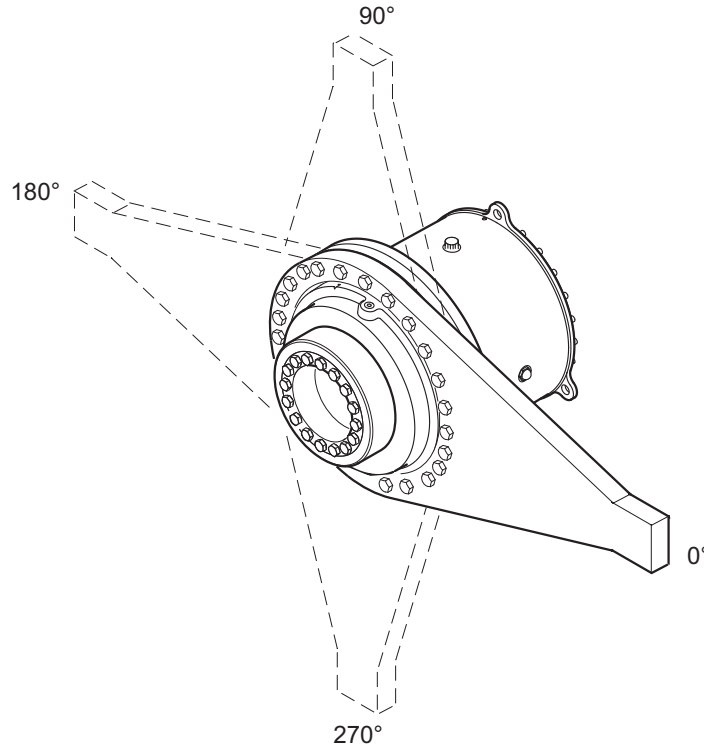
INFORMATION

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

5.18.2 Single-sided torque arm (standard)

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

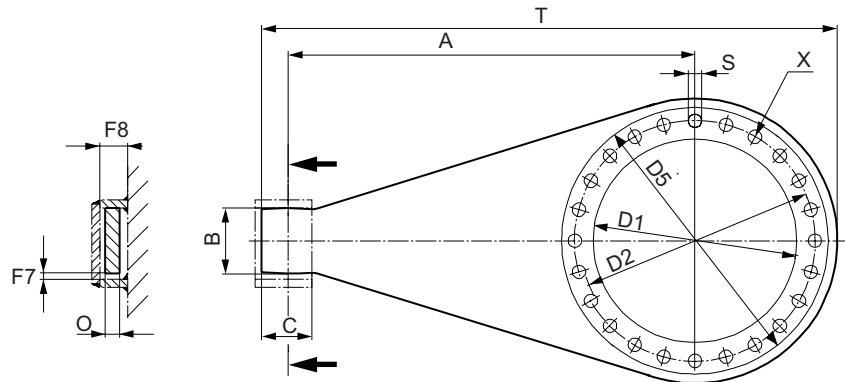
The following figure shows a sample torque arm with dimensions.

NOTICE

Mounting elements may be damaged by to high impacts.

Possible damage to property

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



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

INFORMATION



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

Tightening torques



INFORMATION

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

When you use other screws than the screws included in the delivery, the tightening torques must be adjusted to the new friction conditions.

Only use the following tools for the 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		

5.19 Coupling

5.19.1 Mounting tolerances

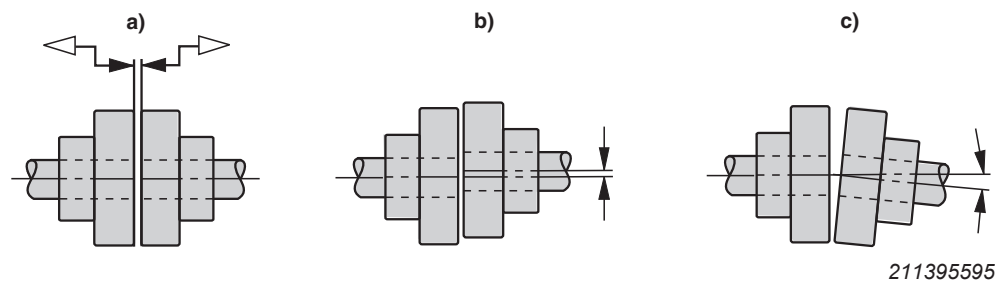
INFORMATION



Observe the operating instructions of the respective coupling manufacturer.

Adjust the following misalignments according to the coupling manufacturer's specifications when mounting couplings.

- a) Axial misalignment
- b) Radial misalignment
- c) Angular misalignment

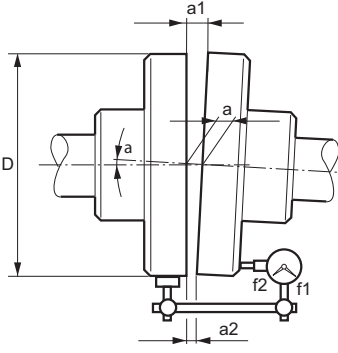
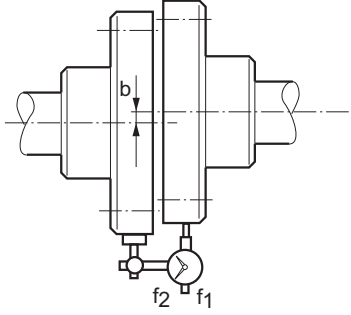


The following table shows various methods for measuring the differing tolerances.

Measuring instruments	Angular offset	Axis offset
Feeler gauge		
	<p>This method only achieves an accurate result when the deviation of the coupling faces is eliminated by turning both coupling halves by 180° and then calculating the mean value from the difference (a1 – a2).</p>	<p>The following figure shows the measurement of axial offset using a straight-edge. Permissible values for axial offset are usually so small that the best measurement results can be achieved with a micrometer dial. If you rotate one coupling half together with the micrometer dial and divide the deviation by two, the deviation displayed on the dial indicator indicates the offset (dimension "b") that includes the axial offset of the other coupling half.</p>

5 Installation/assembly

AM adapter coupling

Measuring instruments	Angular offset	Axis offset
Micrometer dial	 <p style="text-align: center;">899597451</p>	
	<p>A prerequisite for this measuring method is that there is no axial play in the shaft bearings when the shafts rotate. If this condition is not fulfilled, the axial play between the faces of the coupling halves must be eliminated. As an alternative, you can use two micrometer dials positioned on the opposite sides of the coupling (to calculate the difference of the two dial indicators when rotating the coupling).</p>	<p>The following figure shows the how to measure axial offset using a more accurate measuring method, as described above. The coupling halves are rotated together without letting the point of the dial indicator slide onto the measuring surface. The axial offset is obtained by dividing the deviation displayed on the dial indicator (dimension "b").</p>

5.20 AM adapter coupling

NOTICE

Moisture might enter the adapter when mounting a motor to the adapter.

Possible damage to property.

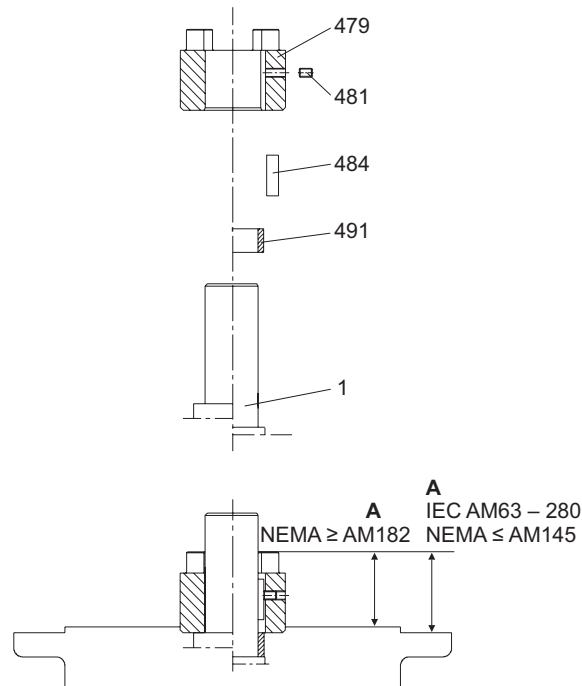
- Seal adapter with anaerobic fluid seal.

INFORMATION



To avoid contact corrosion, we recommend applying NOCO® Fluid to the motor shaft before mounting the coupling half.

5.20.1 IEC adapter AM63 – 280 / NEMA adapter AM56 – 365



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- [1] Motor shaft
- [479] Coupling half
- [481] Set screw
- [484] Key
- [491] Spacing ring

Observe the notes in chapter "Important information" (→ 60).

1. Clean the motor shaft and flange surfaces of the motor and the adapter.
2. Remove the key from the motor shaft and replace it with the supplied key [484] (not AM63 and AM250).
3. Heat the coupling half [479] to approx. 80 – 100 °C and push the coupling half onto the motor shaft. Position as follows:
 - IEC adapter AM63 – 225 until stop at motor shaft shoulder.
 - IEC adapter AM250 – 280 to dimension A
 - NEMA adapter with spacer tube [491] to dimension A
4. Secure the key and coupling half using the set screw [481] and tightening torque T_A according to the table on the motor shaft.
5. Check the dimension A.
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Mount the motor on the adapter. Ensure that the coupling claws of the adapter shaft are engaged in the plastic cam ring.

IEC AM	63/71	80/90	100/112	132	160/180	200	225	250/280
A	24.5	31.5	41.5	54	76	78.5	93.5	139
T_A	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10

NEMA AM	56	143/145	182/184	213/215	254/256	284/286	324/326	364/365
A	46	43	55	63.5	78.5	85.5	107	107

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5

Installation/assembly

AM adapter coupling

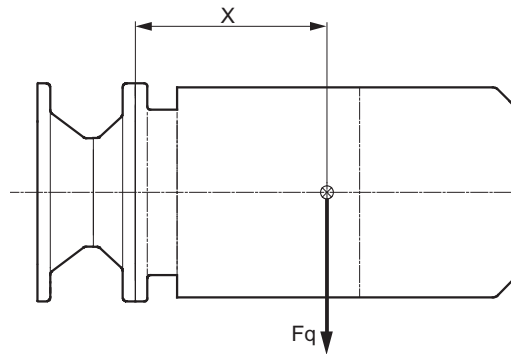
NEMA AM	56	143/145	182/184	213/215	254/256	284/286	324/326	364/365
T _A	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10

Permitted loads

NOTICE

Impermissibly high loads may occur when mounting a motor.
Possible damage to property.

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



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Adapter type		x ¹⁾ mm	F _q ¹⁾ N	
IEC	NEMA		IEC adapter	NEMA adapter
AM63/71	AM56	77	530	410
AM80/90	AM143/145	113	420	380
AM100/112	AM182/184	144	2000	1760
AM132 ²⁾	AM213/2152 ²⁾	186	1600	1250
AM132..	AM213/215		4700	3690
AM160/180	AM254/286	251	4600	4340
AM200/225	AM324-AM365	297	5600	5250
AM250/280	-	390	11200	-

- 1) The maximum permitted weight of the attached motor F_{qmax} must be reduced linearly as the center of gravity distance x increases. If this distance x is reduced, the maximum permitted weight F_{qmax} cannot be increased.
- 2) Diameter of the adapter output flange: 160 mm

AM adapter with AM../RS backstop

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

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

NOTICE

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

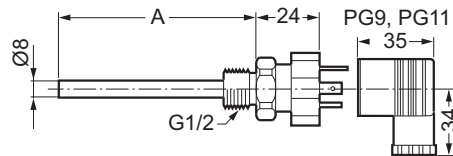
Possible damage to property.

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

Type	Maximum locking torque of the backstop Nm	Minimum lift-off speed 1/min
AM80/90/RS, AM143/145/RS	45	800
AM100/112/RS, AM182/184/RS	200	670
AM132/RS, AM213/215/RS	470	660
AM160/180/RS, AM254/286/RS	630	550
AM200/225/RS, AM324-365/RS	1430	600

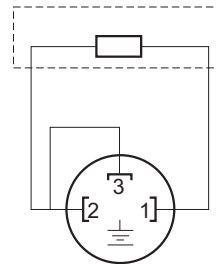
5.21 Temperature sensor /PT100

5.21.1 Dimensions



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5.21.2 Electrical connection



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[1] [2] Resistor element connection

5.21.3 Technical data

- Design with thermowell and changeable measuring insert
- Sensor tolerance $K \pm (0.3 + 0.005 \times T)$, (corresponds to DIN IEC 751 class B),
T = Oil temperature °C
- Plug connector: DIN EN 175301-803 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 0.25 Nm.

6 Startup

6.1 Important information

Read the following notes prior to startup.



⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

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



⚠ WARNING

Danger due to freely accessible, rotating parts.

Severe or fatal injuries.

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



⚠ WARNING

Danger due to using impermissible gear unit oil.

Severe or fatal injuries.

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



⚠ CAUTION

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

Possible injury to persons due to falling parts.

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



⚠ CAUTION

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

Minor injuries.

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

NOTICE

Improper startup may result in damage to the gear unit.

Possible damage to property.

- Note the following information.

- Before startup, always check to see that the oil level is correct. Refer to the unit's nameplate for lubricant fill quantities.

Check the oil level again after a few operating hours, see chapter "Checking the oil level at the planetary gear unit" (→ 119).

- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have 2 separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- Fill the gear unit with the oil grade specified on the nameplate. The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity. When the gear unit is equipped with an oil dipstick and an oil sight glass, refer to the oil dipstick for the correct oil level. For additional information, refer to chapter "Checking the oil level at the planetary gear unit" (→ 119) and chapter "Changing the oil at the planetary gear unit" (→ 123).

When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the required oil fill quantity is higher. In this case, observe the respective SEW-EURODRIVE "Oil Supply System" operating instructions.

- Check the thermal rating/heating for the following operating conditions:
 - High ambient temperatures (over 45 °C).
 - Mounting position M2/M4 and/or motor speed above 1800 1/min.

Contact SEW-EURODRIVE.

- The most important technical data is provided on the nameplate. Additional data relevant for operation is available in drawings, the order confirmation or any order-specific documentation.
- After having installed the gear unit, check to see that all retaining screws are tight.
- Make sure that the alignment has not changed after tightening the mounting elements.
- It is essential that there is no open fire or risk of sparks when working on the gear unit.
- If there are any oil drain valves, ensure that they cannot be opened unintentionally.
- Protect the oil sight glass against damage.
- Protect the gear unit from falling objects.
- Make sure that the gear unit is grounded. Electrical mount-on components, such as motors, frequency inverters, etc. must be grounded separately.

- For gear units with long-term protection: Replace the screw plug at the location indicated on the gear unit with a breather (position → see order documents).
- Make sure that the monitoring devices (pressure switch, temperature switch etc.) are fully operational prior to and during startup.
- Observe the safety notes in the individual chapters.

6.2 Run-in period

SEW-EURODRIVE recommends running in the gear unit as the first phase of startup. Increase the load and speed of revolutions in two to three steps up to maximum level. The run-in phase takes approximately 10 hours.

Note the following during the running-in phase:

- Verify the power values specified on the nameplate because their frequency is a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noises?
- Are there signs of leakage (lubricants) on the gear unit?
- Check to be sure that the additional devices (such as oil pump, cooler, etc.) are functioning properly.

INFORMATION



For further information and troubleshooting measures, refer to the "Malfunctions" chapter.

6.3 Startup of gear units with long-term protection

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

6.3.1 Anti-corrosion agent

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

NOTICE

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

Possible damage to property.

- Do not let the solvent come into contact with the sealing lips.

6.3.2 Breather

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

6.4 Backstop

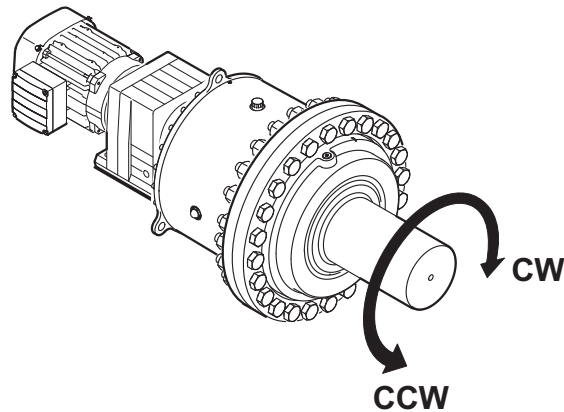
NOTICE

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

Possible damage to property.

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

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



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

- CW rotation
- CCW rotation

The permitted direction of rotation is indicated on the housing.

6.5 Measuring surface and oil temperature

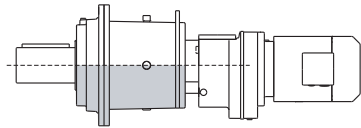
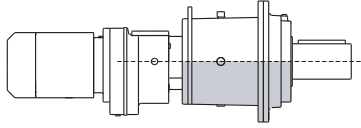
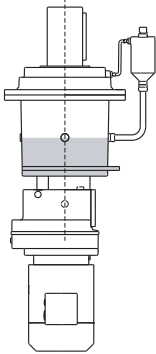
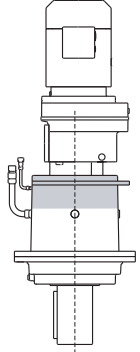
6.5.1 Measuring the surface temperature

It is essential to measure the surface temperature at maximum load when starting up the gear unit.

The measurement can be made using standard thermometers. The surface temperature must be measured in a steady-state condition. The temperature must not exceed 100 °C (synthetic oil) and 90 °C (mineral oil).

Stop the drive immediately if the temperature is above this value. Contact SEW-EURODRIVE.

The measuring of the surface temperature depends on the mounting position of the planetary gear unit. The area marked in gray shows where the surface temperature of the gear unit must be measured.

Mounting position	Measuring point of the surface temperature
M1	
M3 M5 M6	
M2	
M4	

 = Area for measuring points

6.5.2 Measuring the oil temperature

The oil temperature must be measured to determine the oil change intervals. See chapter "Lubricant change intervals" (→ 118) 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.

6.6 Gear unit shutdown / gear unit conservation



⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

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



INFORMATION

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

Additional conservation measures are required if the gear unit is to be shut down for a longer period. Depending on the location, the ambient conditions, and the lubrication state, even a few weeks of downtime might require conservation measures.

6.6.1 Internal conservation

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

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

 - Replace the breather with a screw plug and close the gear unit so that it is air tight. 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 conservation. Observe the notes in chapter "Changing the oil" (→ 123). The inside of the gear unit can then be conserved as described above.

INFORMATION



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

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

Prior to startup, re-install the breather. Observe the information on the nameplate regarding the oil grade and oil quantity.


6.6.2 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 the chapter "Startup" (→  106) before re-starting the gear unit.

7 Inspection/maintenance

7.1 Preliminary work regarding inspection/maintenance

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



⚠ WARNING

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

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



⚠ WARNING

A customer machine that is not appropriately secured can fall during gear unit installation or removal.

Severe or fatal injuries.

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



⚠ WARNING

Danger due to using impermissible gear unit oil.

Severe or fatal injuries.

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



⚠ WARNING

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

Serious injury.

- Let the gear unit cool down before you start working on it.
- Carefully remove the oil level plug and the oil drain plug.



⚠ CAUTION

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

Minor injuries.

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



⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.

NOTICE

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

Possible damage to property.

- Do not mix different synthetic lubricants and do not mix synthetic and mineral lubricants.

NOTICE

Improper maintenance may result in damage to the gear unit.

Possible damage to property.

- Observe the following notes.
- Strict adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions.
- Adhere to the tightening torques.
- Replace any damaged seals.
- For primary gear units, also observe the safety notes for motor and primary gear unit in the "Gear Unit Series R..7, F..7, K..7, K..9, S..7 SPIROPLAN® W" operating instructions.
- For the position of the oil level plug, oil drain plug and breather, refer to the "mounting position sheets" (→ 42).
- Use only original spare parts according to the delivered spare and wearing parts list.
- Prevent foreign particles from entering into the gear unit when performing the following work.
- Never clean the gear unit with a high-pressure cleaning system. If one is used, water may enter into the gear unit and the seals may be damaged.
- Perform a safety and functional check following all maintenance and repair work.
- Note that planetary gear units and primary gear units have 2 separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- Observe the safety notes in the individual chapters.

7.2 Inspection and maintenance intervals

7.2.1 P.. planetary gear unit

Time interval	What to do?
<ul style="list-style-type: none"> • Daily 	<ul style="list-style-type: none"> • Check the housing temperature: <ul style="list-style-type: none"> – Mineral oil: max 90 °C – Synthetic oil: max 100 °C • Check for gear unit noise.
<ul style="list-style-type: none"> • Monthly 	<ul style="list-style-type: none"> • Check the gear unit for signs of leakage • Check the oil level
<ul style="list-style-type: none"> • After 500 operating hours 	<ul style="list-style-type: none"> • First oil change after initial startup
<ul style="list-style-type: none"> • Every 3000 operating hours, at least every 6 months 	<ul style="list-style-type: none"> • Check the oil consistency
<ul style="list-style-type: none"> • Depending on the operating conditions, at least every 6 months 	<ul style="list-style-type: none"> • Fill regreasable sealing systems with grease
<ul style="list-style-type: none"> • Depending on the operating conditions, at least every 12 months 	<ul style="list-style-type: none"> • Check whether retaining screws are tightly secured • Clean the oil filter, replace filter element if necessary • Check the breather, replace it if necessary • Check the alignment of the input and output shaft
<ul style="list-style-type: none"> • Depending on the operating conditions, at least every 3 years 	<ul style="list-style-type: none"> • Change mineral oil
<ul style="list-style-type: none"> • Depending on the operating conditions, at least every 5 years 	<ul style="list-style-type: none"> • Change synthetic oil
<ul style="list-style-type: none"> • Varying (depending on external factors) 	<ul style="list-style-type: none"> • Touch up or renew the surfaces/anti-corrosion coating • Check installed hose pipes • Clean the outer gear unit housing

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

Frequency	What is to be done?
<ul style="list-style-type: none"> • Every 3000 operating hours, at least every 6 months 	<ul style="list-style-type: none"> • Check oil and oil level • Check running noise for possible bearing damage • Visual inspection of the seals for leakage
<ul style="list-style-type: none"> • Depending on the operating conditions, at the latest every 3 years • According to oil temperature 	<ul style="list-style-type: none"> • Change mineral oil • Replace rolling bearing grease (recommendation) • Replace oil seal (do not install it in the same track)
<ul style="list-style-type: none"> • Depending on the operating conditions, at the latest every 5 years • According to oil temperature 	<ul style="list-style-type: none"> • Change synthetic oil • Replace rolling bearing grease (recommendation) • Replace oil seal (do not install it in the same track)
<ul style="list-style-type: none"> • Varying (depending on external factors) 	<ul style="list-style-type: none"> • Touch up or renew the surfaces/anti-corrosion coating

7.2.3 AL/AM adapter

Frequency	What is to be done?
<ul style="list-style-type: none"> • Every 3000 operating hours, at least every 6 months 	<ul style="list-style-type: none"> • Check rotational clearance • Visually check the elastic spider • Check running noise for possible bearing damage • Visually check the adapter for leakage
<ul style="list-style-type: none"> • After 25000 - 30000 operating hours 	<ul style="list-style-type: none"> • Renew the rolling bearing grease • Replace oil seal (do not install it in the same track) • Change the elastic spider

7.2.4 Cover AD

Time interval	What to do?
<ul style="list-style-type: none"> • Every 3000 operating hours, at least every 6 months 	<ul style="list-style-type: none"> • Check running noise for possible bearing damage • Visually check the adapter for leakage
<ul style="list-style-type: none"> • After 25000 to 30000 operating hours 	<ul style="list-style-type: none"> • Renew the rolling bearing grease • Change the oil seal

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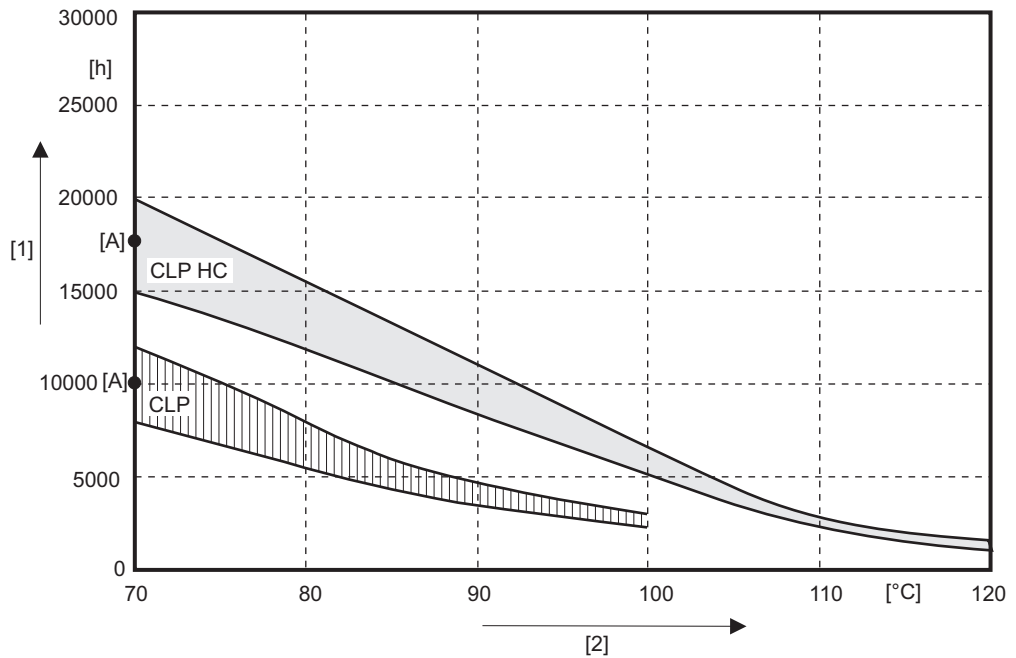
7.3 Lubricant change intervals

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

INFORMATION



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



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- [1] Operating hours
- [2] Sustained oil bath temperature
- [A] Average value per oil type at 70 °C

INFORMATION



SEW-EURODRIVE recommends that the gear unit oil is analyzed regularly (see chapter "Checking the oil consistency" (→ 122)) to optimize the lubricant change intervals.

7.4 Checking the oil level at the planetary gear unit

Note the following when checking the oil level.

7.4.1 General information



NOTICE

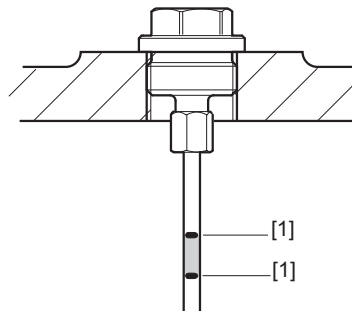
Improper checking of the oil level may result in damage to the gear unit.

Possible damage to property.

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

7.4.2 Oil dipstick

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).



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INFORMATION



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

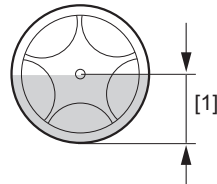
1. Unscrew the oil dipstick/oil dipstick with breather and remove it.
2. Clean the oil dipstick/oil dipstick with breather.
3. Re-insert the oil dipstick/oil dipstick with breather by turning it hand-tight into the gear unit up to the stop.
4. Remove the oil dipstick/oil dipstick with breather and check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

- Open the oil fill plug.
 - Fill in oil of the same oil grade until the oil level is between the markings [1].
6. If you filled in too much oil, proceed as follows:
 - Place a suitable container underneath the oil drain plug.
 - Remove the oil drain plug or open the oil drain valve.
 - Drain oil, until the oil level is between the markings [1].
 - Re-insert the oil drain plug or close the oil drain valve.
 7. Screw in the oil fill plug.
 8. Screw in the oil dipstick/oil dipstick with breather.

7.4.3 Oil sight glass

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

1. Check the oil level on the oil sight glass as shown in the following figure.



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2. Proceed as follows if the oil level is too low:
 - Open the oil fill plug.
 - Fill in new oil of the same type via the oil fill plug up to the mark [1].
 - Screw in the oil fill plug.

INFORMATION



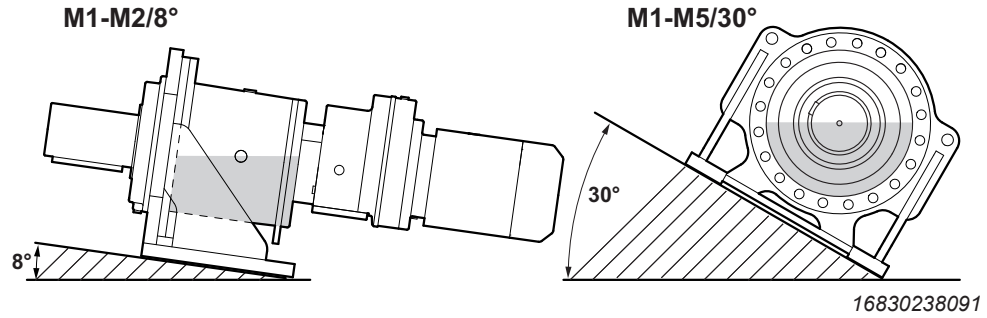
The oil fill quantity must not exceed the upper edge of the oil sight glass.

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

Observe the information on the nameplate.

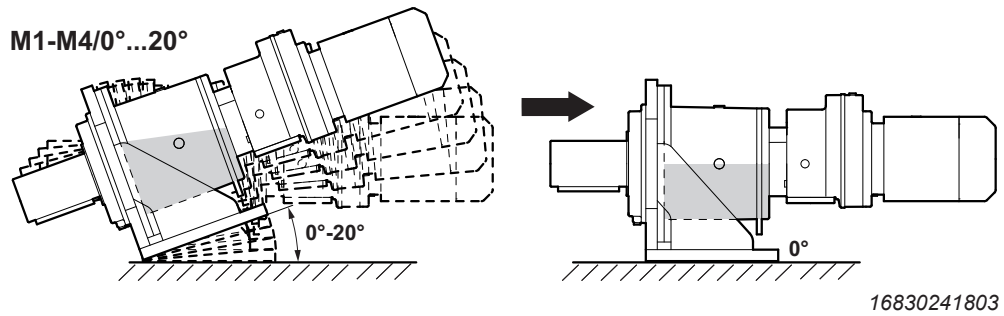
Fixed pivoted mounting positions

Check the oil level in the fixed, intended position.




Variable pivoted mounting positions

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



7.5 Checking the oil consistency

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→  114).

Proceed as follows to check the oil consistency:

1. Start the gear unit for a short time for the oil to mix with suspended particles.
2. Determine the oil drain position and place a container underneath.
3. **▲ WARNING!** Risk of burns due to hot gear unit and hot gear unit oil. Serious injury. Let the gear unit cool down before you start working on it. Remove the oil level plug and oil drain plug carefully.
Open the oil drain carefully and drain some oil.
4. Close the oil drain valve.
5. Check the oil consistency:
 - Check the drained oil for appearance, color, and contamination.
 - If the oil sample is severely contaminated (e.g. water, color, dirt), consult a specialist to find out the cause.
 - For more detailed information on checking the oil for water content and viscosity, contact your lubricant manufacturer.

7.6 Changing the oil at planetary gear units

7.6.1 Important information

Observe the following when changing the oil.



⚠ WARNING

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

Serious injury.

- Let the gear unit cool down before you start working on it.
- Carefully remove the oil level plug and the oil drain plug.

NOTICE

Improper oil change may result in damage to the gear unit.

Possible damage to property.

- Observe the following information.

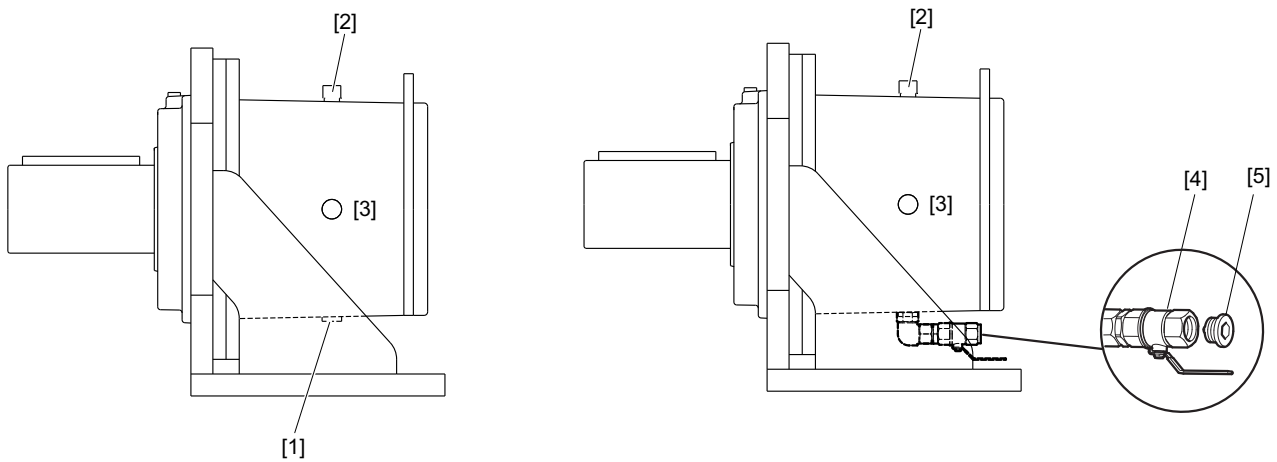
- Planetary gear units are delivered without oil fill as standard.
- As standard, RF../KF../K.. primary gear units are with oil fill. Refer to the order documents for discrepancies.
- Note that planetary gear units and primary gear units have 2 separate oil chambers. Before startup, make sure that both gear units are filled with the correct oil fill quantity.
- In exceptional cases, planetary gear unit and primary gear unit can be delivered with a shared oil chamber. Refer to the order documents for further information. Note that with separate as well as with shared oil chambers, a nameplate is attached to the planetary gear unit and to the primary gear unit. The oil specifications on the nameplates must be added in case of a shared oil chamber.
- The oil grade and oil viscosity are listed on the nameplate of the gear unit. Note that the oil quantities on the nameplates are approximate values. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity.
When additional attachments, e.g. an oil supply system, are mounted to the gear unit, the required oil fill quantity is higher. Observe the operating instructions of the oil supply system.
- An oil level above the max marking might indicate that foreign liquids (e.g. water) have entered. An oil level below the min marking might indicate a leakage. Find out and eliminate the cause before you fill in new oil.
- Perform the oil change quickly after you have switched off the gear unit to prevent solids from settling. You should drain the oil while it is still warm. Avoid oil temperatures well above 50 °C.
- Remove the screw plug before draining the oil.
- Always fill the gear unit with the same oil grade as before. Mixing oils of different grades and/or manufacturers is not permitted. Synthetic oils in particular must not be mixed with mineral oils or other synthetic oils. When switching from mineral oil and/or when switching from synthetic oil of one basis to synthetic oil of another basis, thoroughly flush the gear unit with the new oil grade.

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

- When changing the oil, flush the gear unit interior thoroughly with oil to remove oil sludge, oil residue, and abrasion. Use the same oil grade you use to operate the gear unit. Fill in fresh oil only after all residues have been removed.
- For the position of the oil level plug, oil drain plug and the breather, refer to the order documents.
- If required, empty accessories e.g. filters and pipes.
- Replace any damaged gaskets of the oil drain plug.
- If present, clean the magnetic oil drain plug and the oil dipstick with magnet tip.
- Empty the oil-bearing system of gear units with circulation lubrication and oil supply systems according to the manufacturer's maintenance instructions.
- Elements for controlling the oil level, oil drain, and oil fill openings are indicated by safety symbols on the gear unit.
- Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
- Remove any dripping oil immediately with oil binding agent. Dispose of the used oil in accordance with applicable regulations.

7.6.2 Procedure

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



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Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

1. Place a suitable container underneath the oil drain plug [1].
2. Remove the oil drain plug [1]/screw plug [5].
3. Remove the oil fill plug or the breather [2]. With gear units that are not equipped with an oil fill plug due to their mounting position, the breather is used as oil filling hole.
4. Open the oil drain valve [4] if required.
5. Drain all of the oil.
6. Close the oil drain valve [4] if required.
7. Screw in the oil drain plug [1]/screw plug [5] again.
8. Fill in new oil of the same grade through the oil filling hole.
 - Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
 - The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass [3] or the oil dipstick is the decisive indicator of the correct oil quantity, see chapter "Checking the oil level of the planetary gear unit" (→ 119).
9. Insert the oil fill plug or the breather [2].

⚠ CAUTION

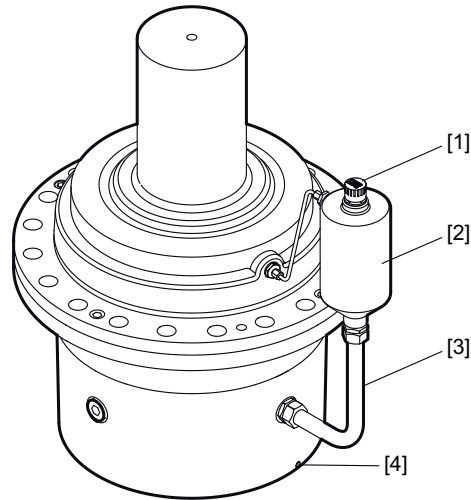
Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.



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



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

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick/breather [1].
4. Drain all of the oil.
5. Screw in the oil drain plug [4] again.
6. Fill in new oil of the same grade through the oil filling hole [1].
 - Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
 - The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 119).
7. Screw in the oil dipstick/breather [1].

⚠ CAUTION

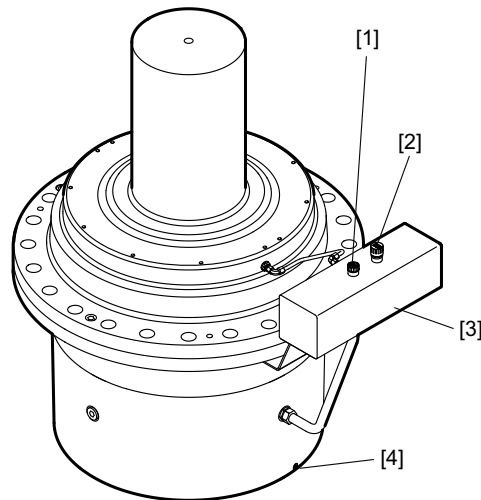
Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.



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



18014402998269195

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

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick [1].
4. Drain all of the oil.
5. Screw in the oil drain plug [4] again.
6. Fill in new oil of the same grade through the oil filling hole [1].
 - Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
 - The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 119).
7. Screw in the oil dipstick [1].

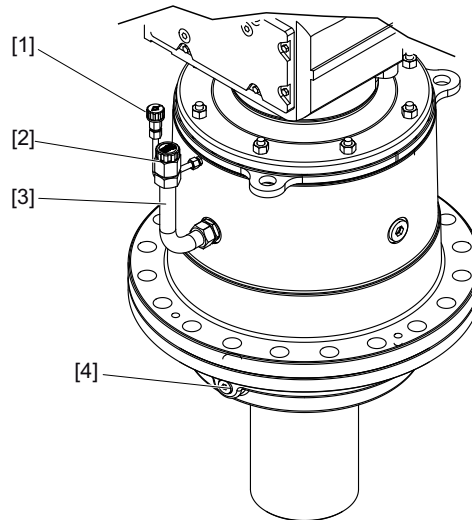
▲ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.



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


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

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

1. Place a suitable container underneath the oil drain plug [4].
2. Remove the oil drain plug [4].
3. Remove the oil dipstick [2].
4. Drain all of the oil.
5. Screw in the oil drain plug [4] again.
6. Fill in new oil of the same grade through the oil filling hole [2].
 - Use a filling filter to fill the oil into the gear unit (max. filter mesh 25 µm).
 - The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or oil dipstick is the decisive indicator of the correct oil quantity, see "Checking the oil level at the planetary gear unit" (→ 119).
7. Screw in the oil dipstick [2].

⚠ CAUTION

Danger due to leakage of lubricant.

Injuries.

- Remove any dripping oil immediately with oil binding agent.



7.7 Refilling sealing grease

⚠ WARNING



Risk of crushing due to rotating parts.

Severe or fatal injuries.

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

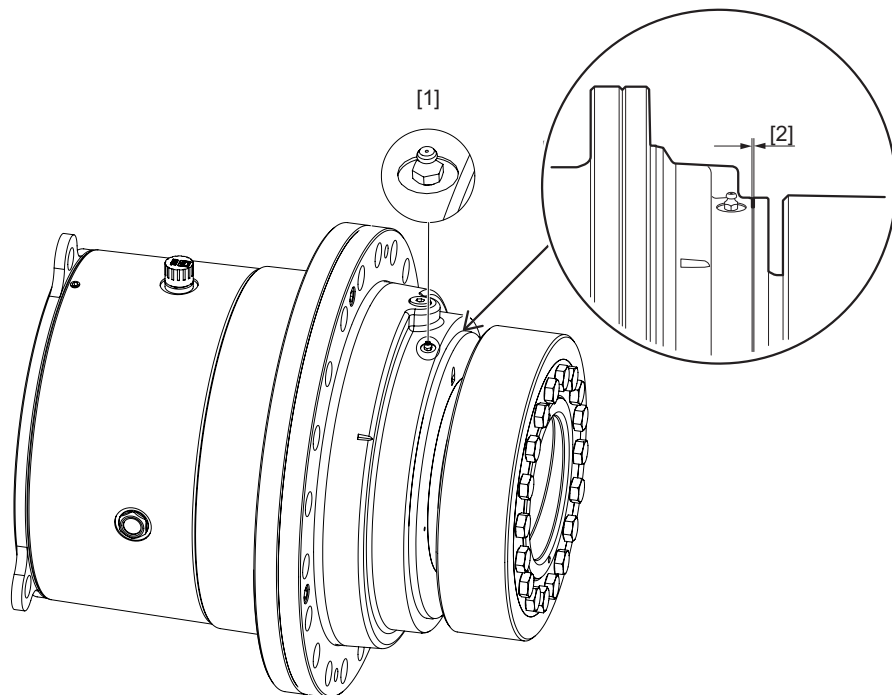
INFORMATION



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

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).

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



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INFORMATION



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

7.8 Checking and cleaning the breather

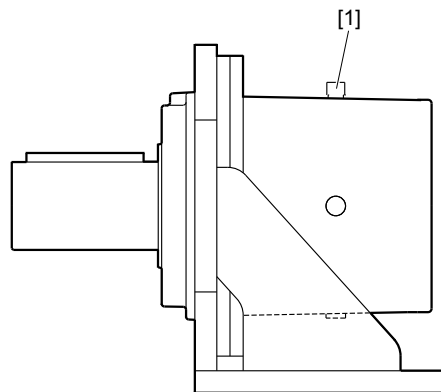
**NOTICE**

Improper cleaning may result in damages to the gear unit.

Possible damage to property.

- Prevent foreign objects from entering into the gear unit.

Observe the notes in chapter "Preliminary work regarding inspection and maintenance" (→ 114).



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

8 Permitted lubricants

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

8.1 Lubricant selection

Note the following when selecting the lubricants.

NOTICE

Selecting improper lubricants may damage the gear unit.

Possible damage to property.

- Observe the following notes.

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

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


The lubricant recommendation in the lubricant table in no way represents a guarantee regarding the quality of the lubricant delivered by each respective supplier. Each lubricant manufacturer is responsible for the quality of its product.

- Oils of the same viscosity class from different manufacturers do not have the same characteristics. In particular, the minimum permitted oil bath temperatures are manufacturer-specific. These temperatures are specified in the lubricant tables.
- The minimum permitted oil bath temperatures depend on the lubrication type used. These temperatures are specified in the lubricant tables. The values correspond to the maximum viscosity of the individual lubricants.
- The values specified in the lubricant tables apply as of the time of printing of this document. The data of the lubricants are subject to dynamic change on the part of the lubricant manufacturers. For up-to-date information about the lubricants, visit:

www.sew-eurodrive.de/lubricants

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

8.2 Structure of the tables and abbreviations





DIN (ISO) API	ISO,SAE NLGI					
[1]	VG 150 ¹⁾	-20	+65	-20	+65	
		-5		-5		
		+5		+5		
		Optigear BM 150	Alpha SP 150			
		S0	S0			
	[2]	VG 220	-15	+75	-15	+75
			0		0	
			+10		+10	
			Optigear BM 220	Alpha SP 220		
		S0	S0			
CLP		VG 320	-10	+85	-10	+80
			+5		+5	
			+15		+15	
			Optigear BM 320	Alpha SP 320		
		S0	S0			

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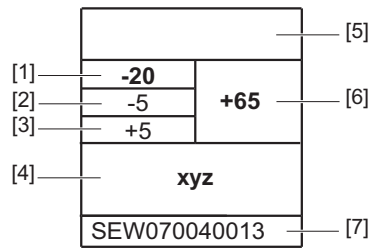
[1] Viscosity class

[2] Lubricant type

Abbreviations

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

8.3 Explanation of the various lubricants



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- [1] Lowest cold start temperature in °C for splash lubrication*
- [2] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 5000 cSt*
- [3] Lowest cold start temperature in °C for drives with pumps up to a max. oil viscosity of 2000 cSt*
- [4] Trade name
- [5] Manufacturer
- [6] Highest oil bath temperature in °C. MUST NOT BE EXCEEDED.
- [7] Approvals

*In case of low temperatures, the oil must be heated to the specified minimum temperature, for example by using an oil heater. The maximally permitted oil viscosity per pump type is specified in the following chapter.

8.4 Lubricant tables

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

DIN (ISO) API	ISO,SAE NLGI	Castrol	FUCHS	Mobil®	LIQUI MOLY	Shell	TEXACO	TOTAL
CLP	VG 150 ¹⁾	-20	-20	-20	-20	-20	-20	-20
		+65	+65	+65	+65	+65	+65	+65
		Alpha SP 150	Renolin HighGear 150	Mobilgear 600 XP 150	Klüberoil GEM 1-150 N	Shell Omala Oil F 220	Meropa 150	
		SO	SO	SEW070030013	SO	SO	SO	
	VG 220	-15	-15	-15	-15	-15	-15	-15
		0	0	0	0	0	0	0
		Alpha SP 220	Renolin HighGear 220	Mobilgear 600 XP 220	Klüberoil GEM 1-220 N	Shell Omala Oil F 220	Meropa 220	Carter EP 220
		SO	SO	SEW070030013	SO	SO	SO	SO
	VG 320	-10	-10	-10	-10	-10	-10	-10
		+5	+5	+5	+5	+5	+5	+5
		Alpha SP 320	Renolin HighGear 320	Mobilgear 600 XP 320	Klüberoil GEM 1-320 N	Shell Omala Oil F 320	Meropa 320	Carter EP 320
		SO	SO	SEW070030013	SO	SO	SO	SO
	VG 460	-5	-5	-5	-5	-5	-5	-5
		+90	+90	+90	+90	+90	+90	+90
		Alpha SP 460	Renolin HighGear 460	Mobilgear 600 XP 460	Klüberoil GEM 1-460 N	Shell Omala Oil F 460	Meropa 460	Carter EP 460
		SO	SO	SEW070030013	SO	SO	SO	SO
	VG 680	0	0	0	0	0	0	0
		+90	+90	+90	+90	+90	+90	+90
		Alpha SP 680	Renolin HighGear 680	Mobilgear 600 XP 680	Klüberoil GEM 1-680 N	Shell Omala Oil F 680	Meropa 680	Carter EP 680
		SO	SO	SEW070030013	SO	SO	SO	SO
	VG 1000	+5						
		+20						
		Optigear BM 1000						
		SO	SO	SEW070030013	SO	SO	SO	SO

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

DIN (ISO) API	ISO,SAE NLGI	Castrol	FUCHS	Mobil®	KÜBBER LUBRICATION	Shell	TEXACO	TOTAL	
CLP HC	VG 32 ¹⁾								
	VG 68 ¹⁾								
	VG 150 ¹⁾								
	VG 220								
VG 320									
VG 460									
VG 680									
VG 1000									

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

DIN (ISO) API	ISO,SAE NLGI				
CLP HC NSF H1	VG 68 ¹⁾	-35	-40		-35
		-20	-25		-20
		-10	-15		-10
		+45	+45		+45
			Optileb HY 68		Klüberoil 4UH1-68 N
		S0	S0		S0
	VG 220 ¹⁾	-20	-25		-25
		-5	-5		-5
		+5	+5		+5
		+75	+75		+75
			Optileb GT 220		Klüberoil 4UH1-220 N
		S0	S0		S0
VG 460 ¹⁾	-15	-15		-15	
	+5	+5		+5	
	+20	+20		+15	
	+90	+95		+95	
		Optileb GT 460		Klüberoil 4UH1-460 N	
	S0	S0		S0	
E	VG 460			-15	-15
				+5	+5
				+15	+15
				+95	+95
				Plantogear 460 S	Klüberbio CA2-460
					ISO

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8.5 Lubricant fill quantities

Observe the notes in chapter "Lubricant selection" (→ 131).

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

Observe the following information:

INFORMATION



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

8.5.1 P.. planetary gear unit

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

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

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

8.5.2 Primary gear units

Bevel (KF/K) primary gear units

INFORMATION



- The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the KF.. and K.. primary gearmotor.
- For notes on the mounting positions of KF.. and K.. primary gear units, see chapter "KF../K.. primary bevel gear unit" (→ 39).
- The oil level of primary gear units is checked using the oil level plug.

The table below shows the lubricant fill quantities.

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

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

Key:

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

Helical (RF) primary gear units

INFORMATION



- The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the RF primary gear unit.
- For information on the mounting positions of the RF.. primary gear unit, refer to chapter "RF.. primary helical gear units" (→ 41)
- The oil level of primary gear units is checked using the oil level plug.

The table below shows the lubricant fill quantities.


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


Legend:

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

8.6 Sealing greases/bearing greases: Planetary gear unit

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

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

Area of operation	Manufacturer	Grease	Lower limit temperature °C
	Fuchs	Plantogel 2 ¹⁾	-40

1) Grease used by the factory should be preferred.



INFORMATION



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

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

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

	Ambient temperature	Manufacturer	Type
Gear unit rolling bearings	-40 °C to +80 °C	Fuchs	Renolit CX-TOM 15 ¹⁾
	-40 °C to +80 °C	Klüber	Petamo GHY 133 N
	-40 °C to +40 °C	Bremer & Leguil	Cassida Grease GTS 2
	-20 °C to +40 °C	Fuchs	Plantogel 2S

1) Bearing grease based on semi-synthetic base oil

INFORMATION



The following grease quantities are required:

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

9 Malfunctions/remedy

9.1 Troubleshooting information

Read the following notes before you proceed with troubleshooting.



⚠ WARNING

Risk of crushing if the drive starts up unintentionally.
Severe or fatal injuries.

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



⚠ WARNING

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

- Let the gear unit cool down before you start working on it.
- Carefully remove the oil level plug and the oil drain plug.

NOTICE

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

- Only qualified personnel is permitted to separate drive and motor and to carry out repair work on drives by SEW-EURODRIVE.
- Please contact the SEW-EURODRIVE Service.

9.2 Service

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

- Complete nameplate data
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- A digital photograph, if possible

9.3 Malfunctions of P.. planetary gear units

Fault	Possible cause	Measure
Unusual, regular running noise	<ul style="list-style-type: none"> Meshing/grinding noise: Bearing damage Knocking noise: Irregularity in the gearing Deformation of the housing upon tightening Noise generated by insufficient stiffness of the gear unit foundation 	<ul style="list-style-type: none"> Check oil consistency, change bearings Consult SEW-EURODRIVE Check the gear unit mounting for possible deformation and correct if necessary Reinforce the gear unit foundation
Unusual, irregular running noises	<ul style="list-style-type: none"> Foreign objects in the oil 	<ul style="list-style-type: none"> Check the oil consistency Stop the drive, contact SEW-EURODRIVE
Unusual noise in the area where the gear unit is mounted	<ul style="list-style-type: none"> Gear unit mounting has loosened 	<ul style="list-style-type: none"> Tighten retaining screws and nuts to the specified torque Replace the damaged/defective retaining screws or nuts
Operating temperature too high	<ul style="list-style-type: none"> Too much oil Oil too old The oil is heavily contaminated Ambient temperature too high 	<ul style="list-style-type: none"> Check 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)
Temperature at bearing points too high	<ul style="list-style-type: none"> Not enough oil Oil too old Bearing damaged 	<ul style="list-style-type: none"> 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 ¹⁾ <ul style="list-style-type: none"> From oil seal 	<ul style="list-style-type: none"> Too much oil Sealing lip of the oil seal turned up Oil seal damaged/worn 	<ul style="list-style-type: none"> Check oil level, correct if necessary Vent the gear unit, observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking. Check oil seals; replace if necessary

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

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

Fault	Possible cause	Measure
Unusual, regular running noise	<ul style="list-style-type: none"> • Meshing/grinding noise: Bearing damage • Knocking noise: Irregularity in the gearing • Deformation of the housing upon tightening • Noise generated by insufficient stiffness of the gear unit foundation 	<ul style="list-style-type: none"> • Check oil consistency, change bearings • Consult SEW-EURODRIVE • Check the gear unit mounting for possible deformation and correct if necessary • Reinforce the gear unit foundation
Unusual, irregular running noises	<ul style="list-style-type: none"> • Foreign objects in the oil 	<ul style="list-style-type: none"> • Check the oil consistency • Stop the drive, contact SEW-EURODRIVE
Oil leaking <ul style="list-style-type: none"> • From cover plate • From inspection cover • From bearing cover • From mounting flange 	<ul style="list-style-type: none"> • Seal not tight at: <ul style="list-style-type: none"> – Cover plate – Inspection cover – Bearing cover – Mounting flange 	<ul style="list-style-type: none"> • Tighten the bolts on the respective cover. Observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking
Oil leaking ¹⁾ <ul style="list-style-type: none"> • From oil seal 	<ul style="list-style-type: none"> • Too much oil • Sealing lip of the oil seal turned up • Oil seal damaged/worn 	<ul style="list-style-type: none"> • Check oil level, correct if necessary • Vent the gear unit, observe the gear unit. Contact SEW-EURODRIVE if oil is still leaking. • Check oil seals; replace if necessary
Oil leaking <ul style="list-style-type: none"> • At the gear unit breather 	<ul style="list-style-type: none"> • Too much oil • Drive not installed in proper mounting position • Frequent cold starts (oil foaming) and/or high oil level 	<ul style="list-style-type: none"> • Check oil level, correct if necessary • Install gear unit breather correctly and adjust the oil level • Install oil expansion tank
Output shaft does not turn although the motor is running or the input shaft is rotated.	<ul style="list-style-type: none"> • Shaft-hub connection in the gear unit interrupted. 	<ul style="list-style-type: none"> • Send in the gear unit/gearmotor for repair.
Operating temperature at backstop too high, no blocking function	<ul style="list-style-type: none"> • Damaged/defective backstop 	<ul style="list-style-type: none"> • Check the backstop, replace it if necessary • Contact SEW-EURODRIVE

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

9.5 Malfunctions of AM/AL adapters

Fault	Possible cause	Measure
Unusual, regular running noise	<ul style="list-style-type: none"> Meshing/grinding noise: Bearing damage 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.
Oil leaking.	<ul style="list-style-type: none"> Seal defective 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.
Output shaft does not turn although the motor is running or the input shaft is rotated.	<ul style="list-style-type: none"> Shaft-hub connection in the gear unit interrupted. 	<ul style="list-style-type: none"> Send in the gear unit/gearmotor for repair.
Change in running noise and/or vibrations	<ul style="list-style-type: none"> Spider wear, short-term torque transmission through metal contact 	<ul style="list-style-type: none"> Change the spider.
	<ul style="list-style-type: none"> Screws to secure hub axially are loose 	<ul style="list-style-type: none"> Tighten the screws
Premature wear of spider	<ul style="list-style-type: none"> Contact with aggressive fluids/oils; ozone influence; excessive ambient temperatures, etc. that can change the physical properties of the spider. 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.
	<ul style="list-style-type: none"> Impermissibly high ambient/contact temperature for the spider; maximum permitted temperature: -20 °C to +80 °C. 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.
	<ul style="list-style-type: none"> Overload 	<ul style="list-style-type: none"> Contact SEW-EURODRIVE.

9.6 Motor malfunctions

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

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

9.7 Brake malfunctions

Fault	Possible cause	Measure
Brake does not release	Incorrect voltage on brake control unit	Apply correct voltage
	Brake control unit failed	Install a new brake control system, check internal resistance and insulation of brake coil, check switchgear
	Max. permitted working air gap exceeded because brake lining worn down	Measure and set working air gap
	Voltage drop along supply cable > 10%	Ensure correct connection voltage; check cable cross section
	Inadequate cooling, brake overheats	Replace type BG brake rectifier with type BGE
	Brake coil has interturn short circuit or a short circuit to frame	Replace complete brake and brake control system (specialist workshop), check switchgear
	Rectifier defective	Replace the rectifier and brake coil
Motor does not brake	Working air gap not correct	Measure and set working air gap
	Brake lining worn	Replace entire brake disk
	Incorrect braking torque	Change the braking torque (→ chapter "Technical data") <ul style="list-style-type: none"> by changing the type and number of brake springs BG 05 brake: by installing the same brake coil body design as in the BMG 1 brake BG 2 brake: by installing the same brake coil body design as in the BMG 4 brake
	BM(G) only: Working air gap so large that setting nuts come into contact	Set the working air gap
	BR03, BM(G) only: Manual brake release device not set correctly	Set the setting nuts correctly
Brake is applied with time lag	Brake is switched on AC voltage side	Switch on DC and AC voltage sides (e.g. BSR); observe wiring diagram
Noise in vicinity of brake	Gearing wear caused by jolting start-up	Check project planning
	Alternating torques due to incorrectly set frequency inverter	Check/correct setting of frequency inverter according to operating instructions

9.8 Disposal

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

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

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

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

10 Address list

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Latvia			
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Lebanon

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Luxembourg

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	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 30 Lodestar Avenue, Wigram Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Nigeria			
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Norway			
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Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
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	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878 sewtwn@ms63.hinet.net http://www.tingshou.com.tw
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Vietnam

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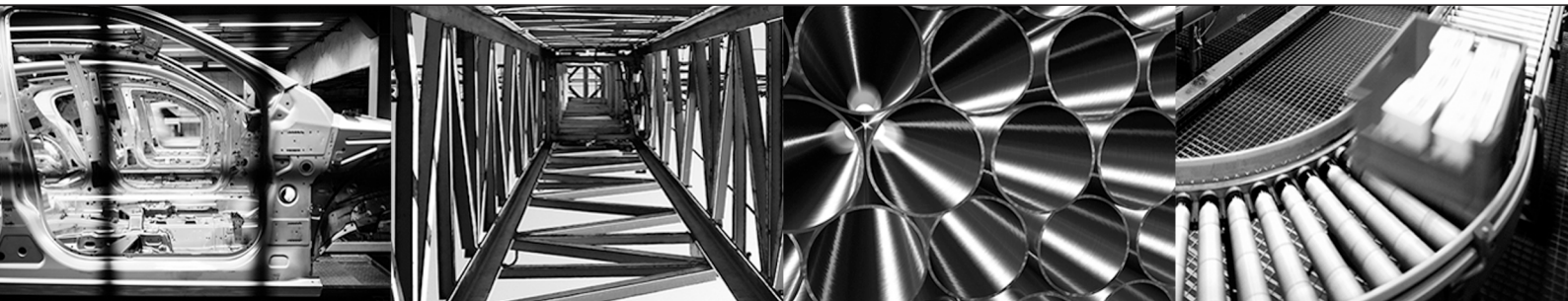
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