

# Planetary gear unit

**FLENDER SIP**  
**Types RC, RP, RR**  
**Sizes 30 to 60**

Assembly and operating instructions  
BA 9300 EN 07/2011

**FLENDER gear units**

**SIEMENS**

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Types RC, RP, RR  
Sizes 30 to 60

### Assembly and operating instructions

Translation of the original assembly and operating instructions

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## Notes and symbols in these assembly and operating instructions

**Note:** The term "Assembly and operating instructions" will in the following also be shortened to "instructions" or "manual".

### Legal notes

#### Warning note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 94/9/EC), those only for preventing material damage with a "STOP" sign.



**WARNING! Imminent explosion!**

The notes indicated by this symbol are given to prevent **explosion damage**.  
Disregarding these notes may result in serious injury or death.



**WARNING! Imminent personal injury!**

The notes indicated by this symbol are given to prevent **personal injury**.  
Disregarding these notes may result in serious injury or death.



**WARNING! Imminent damage to the product!**

The notes indicated by this symbol are given to prevent **damage to the product**.  
Disregarding these notes may result in material damage.



**NOTE!**

The notes indicated by this symbol must be treated as general **operating information**.  
Disregarding these notes may result in undesirable results or conditions.



**WARNING! Hot surfaces!**

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed.  
Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

### Qualified personnel

The product or system to which these instructions relate may be handled only by persons qualified for the work concerned and in accordance with the instructions relating to the work concerned, particularly the safety and warning notes contained in those instructions. Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products or systems and to avoid possible hazards.

# Intended use of Siemens products

## Observe also the following:



Siemens products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Siemens. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

## Trademarks

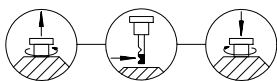
All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

## Exclusion of liability

We have checked the content of the instructions for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in these instructions is regularly checked, and any necessary corrections are included in subsequent editions.

## Symbols

Earth connection point		Air relief point		yellow	
Oil-filling point		yellow	Oil-draining point		white
Oil level		red	Oil level		red
Oil level		red	Connection for vibration-monitoring device		
Lubrication point		red	Apply grease		
Lifting eye		Eye bolt			
Do not unscrew					
Alignment surface, horizontal		Alignment surface, vertical			



These symbols indicate the oil-level checking procedure using the oil dipstick.



These symbols indicate that the oil dipstick must always be firmly screwed in.

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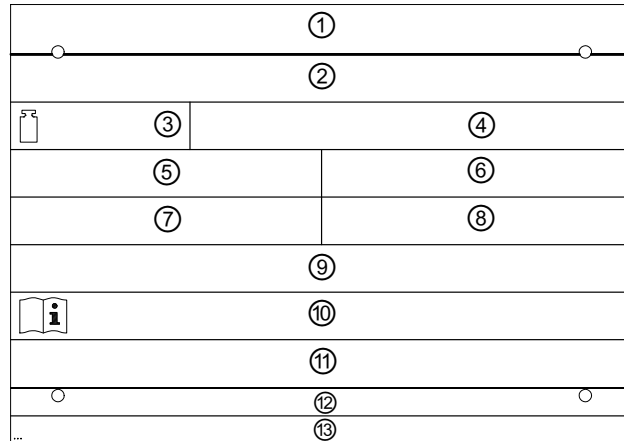
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# 1. Technical data

## 1.1 General technical data

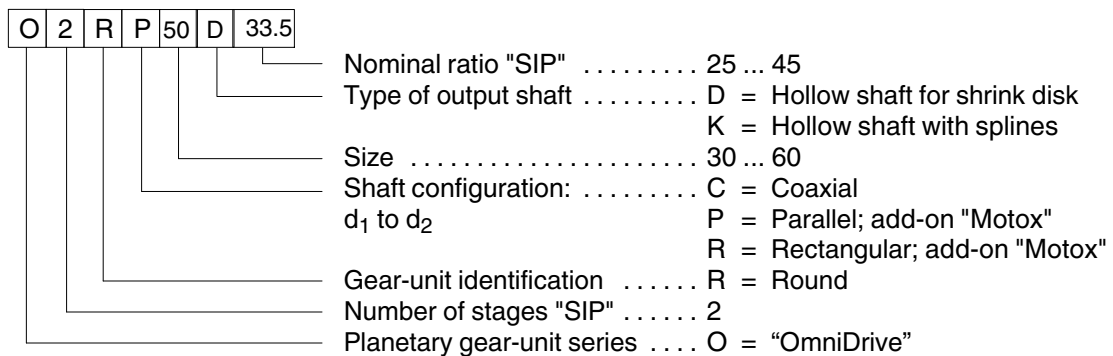
The most important technical data are shown on the rating plate. For further data please refer to the drawings, these operating instructions and a Technical Data Sheet, if any.



**Fig. 1:** Rating plate gear unit

- |   |   |   |   |
|---|---|---|---|
| ① | Company logo                                    | ⑧ | Speed $n_2$                             |
| ② | Order number, item, sequence number, year built | ⑨ | Oil data                                |
| ③ | Total mass in kg                                |   | (oil type, oil viscosity, oil quantity) |
| ④ | Special information                             | ⑩ | Instructions number(s)                  |
| ⑤ | Type, size *)                                   | ⑪ | Special information                     |
| ⑥ | Power rating $P_2$ in kW or torque $T_2$ in Nm  | ⑫ | Manufacturer and place of manufacture   |
| ⑦ | Speed $n_1$                                     | ⑬ | Country of origin                       |

\*) Example 1

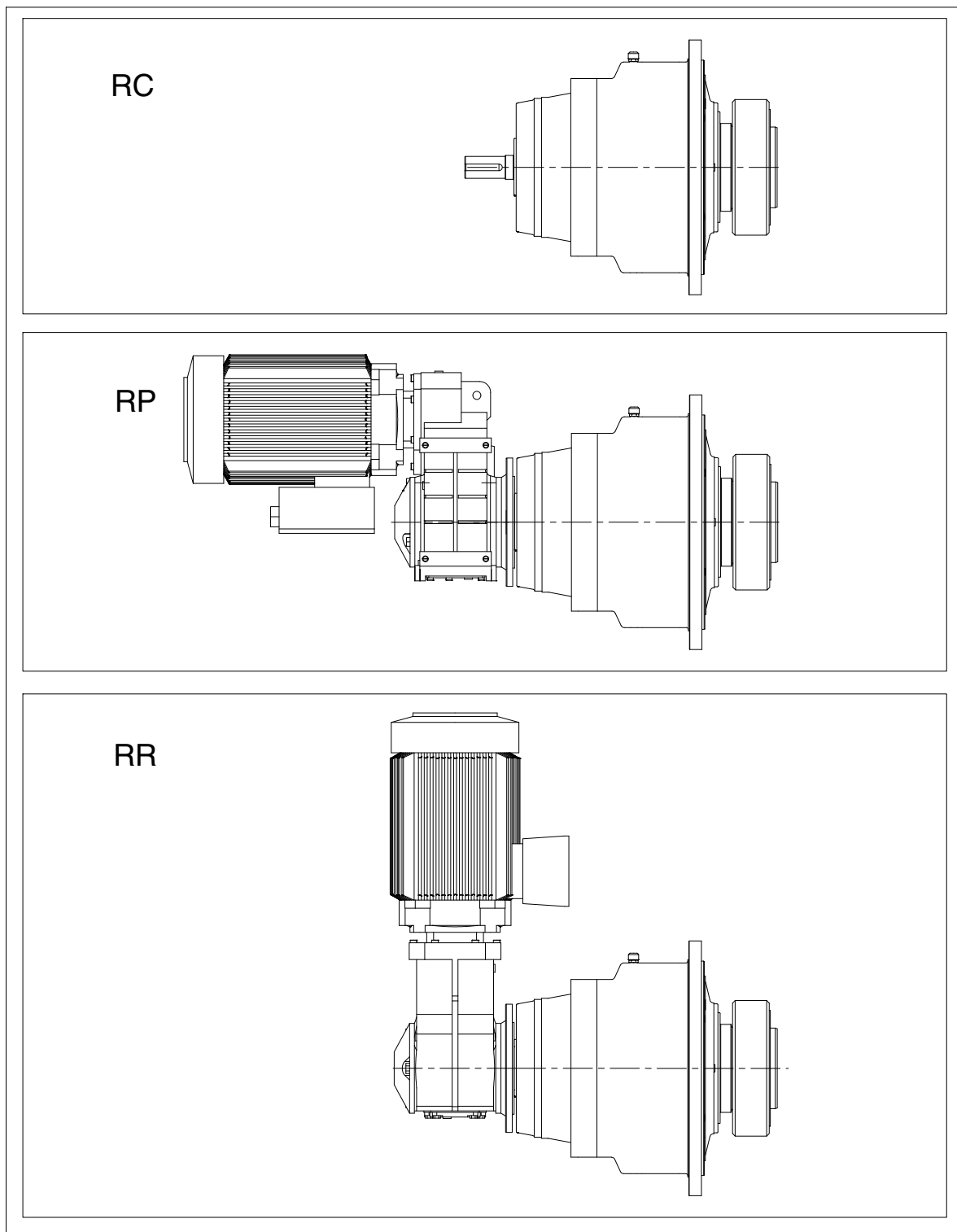


Data on masses and measuring-surface sound-pressure levels of the various gear types are given in items 1.1.1 and 1.1.2.

For further technical data, refer to the drawings in the gear-unit documentation.

1.1.1 Types and mass specifications

1.1.1.1 Standard types



**Table 1:** Mass specifications (approx. values for 2-stage gear unit)

Type	Approx. mass (kg) for sizes (including shrink disk)							
	30	35	37	40	45	50	55	60
O2RC*	101	131	167	186	211	333	498	591

\*) In case of types RP and RR the masses of the geared motor will result in higher total-mass values.



### 1.1.2 Measuring-surface sound-pressure level

The gear unit has a measuring-surface sound-pressure level at a distance of 1 m, which can be found in table 2.

The measurement is carried out to DIN EN ISO 9614 Part 2, using the sound-intensity method.

The workplace of the operating personnel is defined as the area on the measuring-surface at a distance of 1 metre in the vicinity of which persons may be present.

The sound-pressure level applies to the warmed-up gear unit at input speed  $n_1$  and output power  $P_2$  stated on the rating plate, as measurement obtained on the Siemens test bench. If several figures are given, the highest speed and power values apply.

If repeat measurements on site do not produce conclusive results with regard to measuring technology, the measurement obtained on the Siemens test bench will apply.

The sound-pressure levels stated in the table were obtained by statistical calculation by our Quality Control Dept. The gear unit can be statistically expected to comply with these sound-pressure levels.

**Table 2:** Measuring-surface sound-pressure level  $L_{pA}$  in dB(A)

Type	$i_N$	Gear-unit size							
		30	35	37	40	45	50	55	60
O2RC	25 ... 45	83	83	83	83	83	84	84	84
O2RP	275 ... 12 000	see operating instructions for the geared motor							
O2RR	350 ... 10 000	see operating instructions for the geared motor							



The measuring-surface sound-pressure levels shown apply with a tolerance of + 3 dB(A) for  $n_1 = 1500$  1/min.

## 2. General notes

### 2.1 Introduction

These instructions are an integral part of the gear unit supplied and must be kept in its vicinity for reference at all times.



**All persons carrying out work on the gear unit must have read and understood these instructions and must adhere to them. Siemens accepts no responsibility for damage or disruption caused by disregard of these instructions.**

The "**FLENDER planetary gear unit**" dealt with in these instructions has been developed for driven machines in the most various industry areas. Possible areas of use for gear units of this type include sewage treatment, excavators, chemical industry, iron and steel industry, conveyor systems, crane systems, foodstuffs industry, paper machinery, cableways, cement industry.

The gear unit described in these instructions reflects the state of technical development at the time these instructions went to print.

In the interest of technical progress we reserve the right to make changes to the individual assemblies and accessories which we regard as necessary to preserve their essential characteristics and improve their efficiency and safety.

The gear unit has been manufactured in accordance with the generally recognised state of the art and is delivered in a condition for safe and reliable use.

The gear unit must be used and operated strictly in accordance with the conditions laid down in the contract governing performance and supply agreed by Siemens and the customer.

### 2.2 Copyright

The copyright to these instructions is held by **Siemens AG**.

These instructions must not be wholly or partly reproduced for competitive purposes, used in any unauthorised way or made available to third parties without our agreement.

Technical enquiries should be addressed to the following works

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09322 Penig

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Fax: +49 (0)37381 / 80286

### 3. Safety instructions



**Entry to the gear unit and its add-on components is not permitted!  
Caution! Risk of falling!**



**Any changes on the part of the user are not permitted. This applies equally to safety features designed to prevent accidental contact.**

#### 3.1 Obligations of the user

- The operator must ensure that everyone carrying out work on the gear unit has read and understood these instructions and is adhering to them in every point in order to:
  - avoid injury or damage,
  - ensure the safety and reliability of the unit,
  - avoid disruptions and environmental damage through incorrect use.
- During transport, assembly, installation, dismantling, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.
- The gear unit may only be operated, maintained and/or repaired by persons qualified for the work concerned (see "Qualified personnel" on page 3 of this manual).
- The outside of the gear unit must not be cleaned with high-pressure cleaning equipment.
- All work must be carried out with great care and with due regard to safety.



**All work on the gear unit must be carried out only when it is not in operation. The drive unit must be secured against being switched on accidentally (e.g. by locking the key switch or removing the fuses from the power supply). A notice should be attached to the start switch stating clearly that work is in progress.**

- No electrical welding work must be done at all on the drive. The drives must not be used as an earthing point for welding operations. Toothed parts and bearings may be irreparably damaged by welding.
- A potential equalisation in accordance with the applying regulations and/or directives must be carried out, if it is not possible to ensure, that voltages possibly occurring can be equalised by way of the complete machinery, the machine frame, or the like. To this purpose free threaded holes on the gear unit must be used. If no threaded holes for earth connection are available on the gear unit, other appropriate measures must be taken. This work must always be done by specialist electricians.



**If any inexplicable changes are noticed during operation of the gear unit, such as an important increase in temperature or unusual noises, the drive assembly must be switched off immediately.**



**Rotating and/or movable drive components must be fitted with suitable safeguards to prevent contact.**



**When the gear unit is incorporated in plant or machinery, the manufacturer of such plant or machinery must ensure that the contents of these instructions are incorporated in his own instructions.**

- Removed safety equipment must be re-installed prior to starting up.
- Notices attached to the gear unit, e.g. rating plate, direction arrows etc., must always be observed. They must be kept free from dirt and paint at all times. Missing plates must be replaced.
- Screws which have been damaged during assembly or disassembly work must be replaced with new screws of the same strength class and type.
- Spare parts should always be obtained from Siemens (refer also to section 11).

### 3.2 Environmental protection

- Dispose of any packing material in accordance with regulations or separate it for recycling.
- When changing oil, the used oil must be collected in suitable containers. Any pools of oil which may have collected should be removed at once with an oil-binding agent.
- Preservative agents should be stored separately from used oil.
- Used oil, preservative agents, oil-binding agents and oil-soaked cloths must be disposed of in accordance with environmental legislation.
- Disposal of the gear unit after its useful life:
  - Drain all the operating oil, preservative agent and/or cooling agent from the gear unit and dispose of in accordance with regulations.
  - Depending on national regulations, gear-unit components and/or add-on parts may have to be disposed of or sent for recycling separately.

### 3.3 Special dangers and personal protective equipment

- Depending on operating conditions, the surface of the gear unit may heat up or cool down to extreme temperatures.



**In case of hot surfaces (> 55 °C) there is a risk of burns!**



**In case of cold surfaces (< 0 °C) there is a risk of frost injury (pain, numbness, frostbite)!**



**During oil changes there is a risk of scalding from escaping oil!**



**Small foreign matter such as sand, dust, etc. can get into the cover plates of the rotating parts and be thrown back by these.  
Risk of eye injury!**



In addition to any generally prescribed personal safety equipment (such as safety shoes, safety clothing, helmet) handling the gear unit requires wearing **suitable safety gloves** and **suitable safety glasses**!



**The gear unit is not suitable for operation in explosion hazard locations. It must under no circumstances be used in such locations because of the risk to life and limb.**

## 4. Transport and storage

Observe the instructions in section 3, "Safety instructions"!



For transport and storage of the add-on geared motors the operating instructions of the geared motor concerned must be observed.

### 4.1 Scope of supply

The products supplied are listed in the despatch papers. Check immediately on receipt to ensure that all the products listed have actually been delivered. Parts damaged and/or missing parts must be reported to Siemens in writing immediately.



**If there is any visible damage, the gear unit must not be put into operation.**

If the unit is fitted with a shrink disk, this will be shipped as a loose component.

### 4.2 Transport

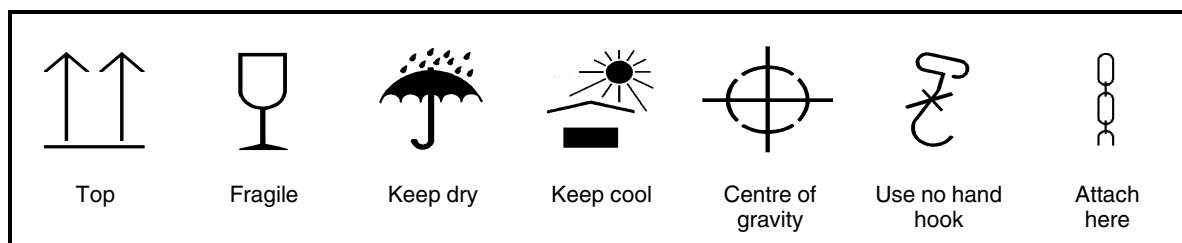


**When transporting our products, use only lifting and handling equipment of sufficient load-bearing capacity!  
Wedges or rails must be used to prevent rolling.**

The gear unit is delivered in the fully assembled condition. Additional items are delivered separately packaged, if applicable.

Different forms of packaging may be used, depending on the size of the unit and method of transport. Unless otherwise agreed, the packaging complies with the **HPE Packaging Guidelines**.

The symbols marked on the packing must be observed at all times. These have the following meanings:



**Fig. 2:** Transport symbols



**Transport of the gear unit or combined gear unit must be carried out so as to avoid personal damage and damage to the gear unit.  
If, for example, the free shaft ends are knocked, this may damage the gear unit.**



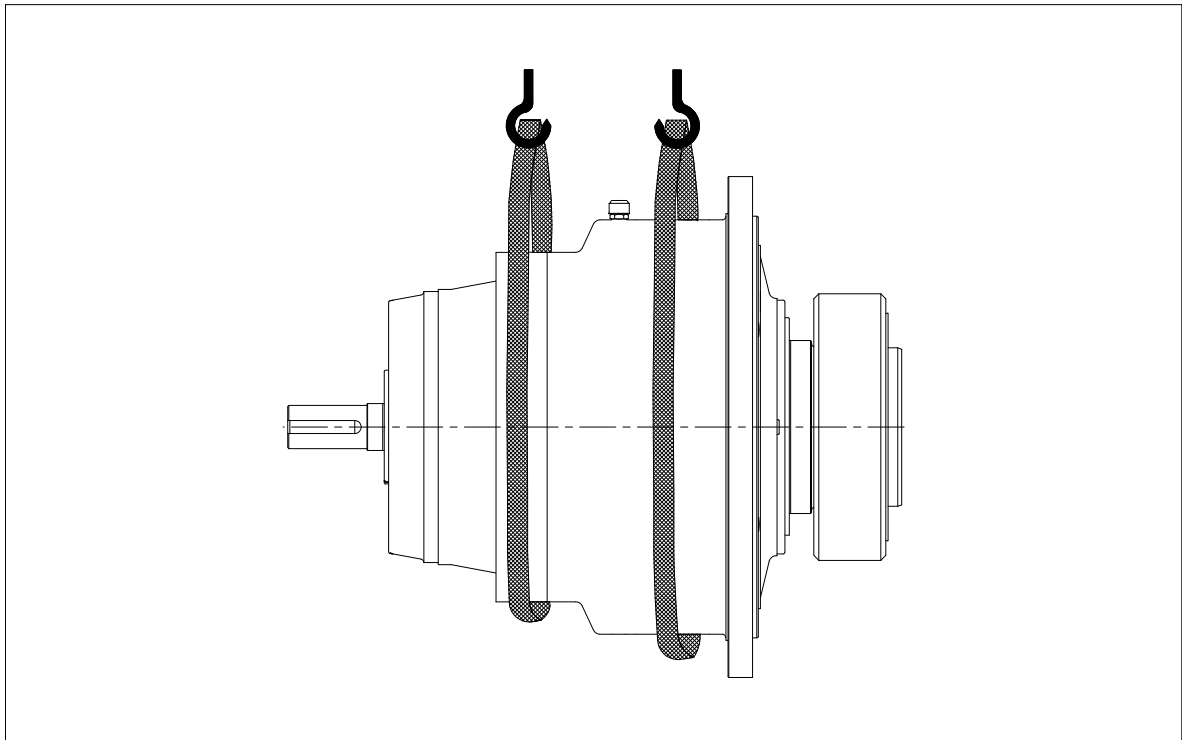
The gear unit or combined gear unit must be transported using suitable equipment only. During transport the gear unit or combined gear unit should be left without oil filling and on the transport packing.



**Use only the eyes and/or other attachment points provided to attach lifting equipment to the gear unit or combined gear unit. All the attachment points must be used.  
Handling of the gear unit by attaching it to the piping is not permitted.  
The pipework must not be damaged.  
Do not use the front threads at the shaft ends to attach slinging and lifting gear for transport.  
Slinging equipment must be adequate for the weight of the gear unit or combined gear unit.**



**If fitted with a shrink disk, the shrink disk must be secured axially before handling.**



**Fig. 3:** Attaching standard types



A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

#### 4.3 Storing the gear unit

The gear unit must be stored in the position of use in a sheltered place. It must be placed on a vibration-free base and covered over.



**When temporarily storing the gear unit and any single components supplied with it, the preservative agent should be left on them. It must not be damaged, otherwise there is a risk of corrosion.**



**Do not stack gear units on top of one another.**



**If the gear unit is being stored out of doors, it must be particularly carefully covered, and care must be taken that neither moisture nor foreign material can collect on the unit. Waterlogging should be avoided.**



Unless otherwise agreed by contract, the gear unit must not be exposed to harmful environmental factors such as chemically aggressive products.

Provision for special environmental conditions during transport (e.g. transport by ship) and storage (climate, termites, etc.) must be contractually agreed.

#### 4.4 Standard coating and preservation

The gear unit is provided with an interior preservative agent; the free shaft ends are painted for protection.

The characteristics of the external coat depend on the ambient conditions stipulated in the order relating to method of transport and area of application.



**The gear unit is normally delivered completely ready, with a priming and a finish coat.**

**Where gear units are delivered with a priming coat only, it is necessary to apply a finishing coat in accordance with directives applying to the specific application. The priming coat alone is not suitable to provide a sufficient long-term corrosion protection.**



**Ensure that the coat is not damaged!  
Any damage may cause failure of the external protective coating and corrosion.**



Unless otherwise contractually agreed, the interior preservation is guaranteed for 24 months, and the exterior preservation for 24 months, provided that storage is in dry, frostfree sheds.

The guarantee period starts on the date of delivery or that of the notice that the item is ready for shipment.

For longer periods of storage (> 24 months) we advise regular checking and, if necessary, renewal of the interior and exterior preservation (see items 7.4.1 and 7.4.2).

The output shaft must then be rotated at least one turn to change the position of the rolling element in the bearings. The input shaft must not be in the same position as before rotation.

This procedure must be repeated and documented every 24 months until start-up.

##### 4.4.1 Interior preservation with preservative agent

**Table 3:** Durability period and measures for interior preservation when using mineral oil or PAO-based synthetic oil

Duration of protection	Preservative agent	Special measures
up to 6 months	Castrol Alpha SP 220 S	none
up to 24 months		<ul style="list-style-type: none"> <li>- Close all holes in the gear unit.</li> <li>- Replace the air filter with the screw plug. (Prior to start-up replace screw plug with air filter.)</li> </ul>
For storage periods longer than 24 months, renew the preservative agent. For storage periods longer than 36 months, Siemens should be consulted before.		

**Table 4:** Durability period and measures for interior preservation when using PG-based synthetic oil

Duration of protection	Preservative agent	Special measures
up to 6 months	Special anti-corrosion oil TRIBOL 1390 <sup>1)</sup>	none
up to 36 months		- Close all holes in the gear unit. - Replace the air filter with the screw plug. (Prior to start-up replace screw plug with air filter.)
For storage periods longer than 36 months, Siemens should be consulted before.		

1) Resistant to tropical conditions and sea water; max. ambient temperature 50 °C

#### 4.4.2 Exterior preservation

**Table 5:** Durability period for exterior preservation of shaft ends and other bright machined surfaces

Duration of protection	Preservative agent	Layer thickness	Remarks
in case of indoor storage up to 36 months <sup>1)</sup>	Tectyl 846 K19	approx. 50 µm	Long-term wax-based preservative agent: - resistant to seawater - resistant to tropical conditions - (soluble with CH compounds)
in case of outdoor storage up to 12 months <sup>2)</sup>			

1) The gear unit must be stored in the position of use in a sheltered place; it must be placed on a vibration-free, dry base and covered over.

2) If the gear unit is being stored out of doors, it must be particularly carefully covered, and care must be taken that neither moisture nor foreign material can collect on the unit. Waterlogging should be avoided.



The procedure for interior and exterior preservation treatment is described in section 7 (see items 7.4.1.3 and 7.4.2.1)!



## 5. Technical description

Observe the instructions in section 3, "Safety instructions"!

### 5.1 General description

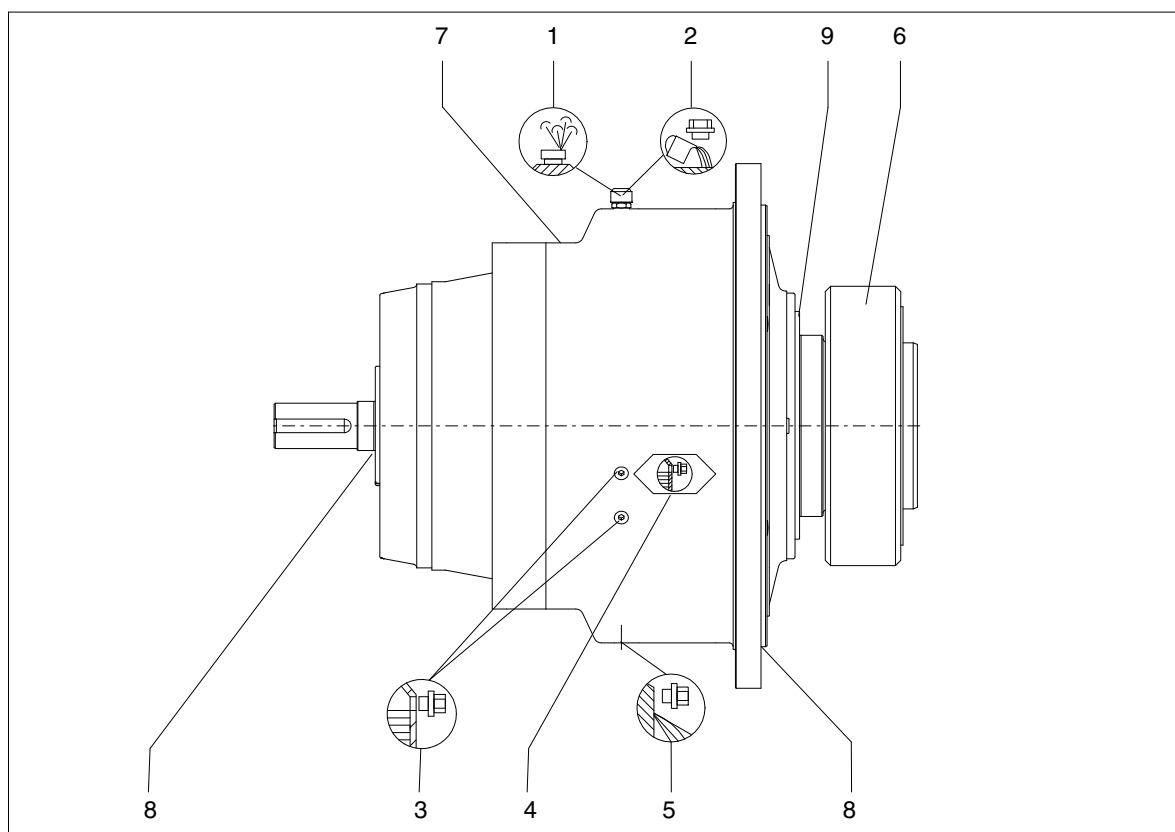
#### 5.1.1 Basic type

The gear unit is supplied as a two-stage planetary gear unit. It is designed for installation in the horizontal mounting position. If necessary, it can also be designed for installation in a different position.



**The gear unit can be operated in both directions of rotation. However, it is possible that a certain direction of rotation has been specified in the order which is realised by adding-on a backstop or overrunning clutch.**

Depending on type and size, the gear units of the standard range can be fitted with motor bell housing, oil cooler, angular oil-level indicator, temperature sensor, backstop etc.



**Fig. 4:** Gear-unit features, shown on type O2RC as an example

- |   |                      |   |  |
|---|----------------------|---|--|
| 1 | Housing ventilation  | 6 | Shrink disk                              |
| 2 | Oil inlet            | 7 | Rating plate                             |
| 3 | Oil-level screw      | 8 | Centring for flange provided by customer |
| 4 | Plate for oil level* | 9 | Shaft seal                               |
| 5 | Oil drain            |   |  |

\*) Marks the decisive oil-level screw.



A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.







## 5.2 Housing

The gear-unit housing is made of high-grade cast materials.

The gear-unit housing comes with the following equipment:

- Oil-level screw
- Oil-drain plug (for oil drain)
- Oil-sight glass (for oil-level check, optional)
- Air filter or breather screw (for venting)

Colour codes for ventilating, oil inlet, oil level and oil drainage:

Air-relief point: yellow		Oil-draining point: white	
Oil-filling point: yellow		Lubrication point: red	
Oil level: red		Oil level: red	

## 5.3 Toothed components

The externally toothed components of the gear unit are case-hardened. Helical-gear teeth are ground. The internal teeth of the internal gear are of quenched and tempered steel. The gear teeth are shaped. The high quality of the teeth leads to a significant noise reduction and ensures safe and reliable running.

## 5.4 Lubrication

The teeth and rolling bearings of the gear units are adequately supplied with oil by splash lubrication. For special mounting positions and/or gear units requiring additional cooling it may be necessary to provide pressure-feed or oil circuit lubrication.



For safety reasons, the gear unit is supplied without oil filling for transport. In special cases supply can also be with oil filled in.

Depending on the mounting position, it is possible that the bearings are not lubricated by the gear-unit oil. In such cases, these bearings are lubricated with lithium-base grease.



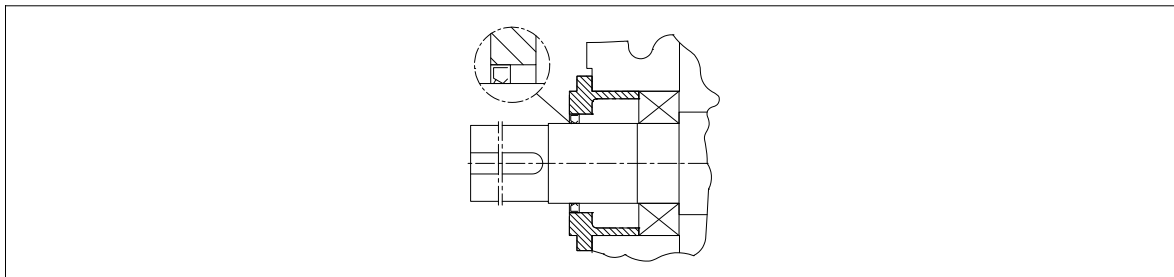
Do not mix greases of different soap bases when relubricating.

## 5.5 Shaft bearings

All shafts are mounted in rolling bearings.

## 5.6 Shaft seals, static seals

As a rule radial shaft-sealing rings are used as standard seals. They are fitted with an additional dust lip to protect the actual sealing lip from external contamination.



**Fig. 5:** Radial shaft-sealing ring

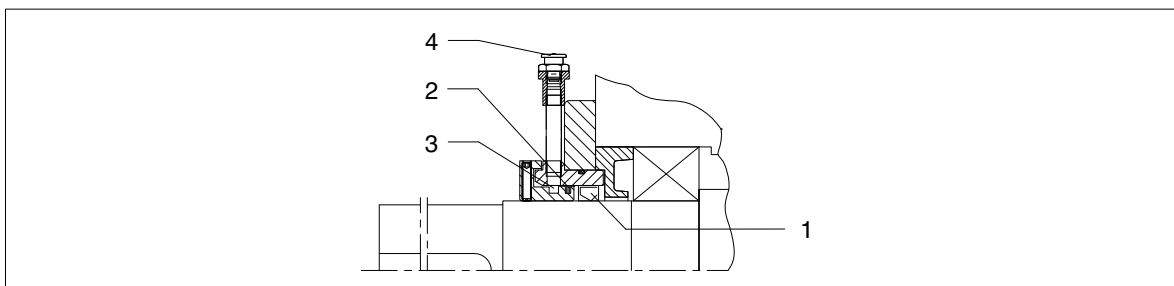
Alternatively it is also possible to provide the gear units with regreasable labyrinth seals to prevent the penetration of dust (Taconite seal).

The individual housing components are sealed statically with Loctite 128068 to prevent leakages.

### 5.6.1 Taconite seals



**Taconite seals were specially developed for use in a dusty environment. The penetration of dust is prevented by a combination of three seal elements (radial shaft-sealing ring, lamellar seal and grease-charged labyrinth seal).**



**Fig. 6:** Taconite seal

- |   |                           |   |  |
|---|---------------------------|---|--|
| 1 | Radial shaft-sealing ring | 3 | Grease-charged labyrinth seal, re-chargeable |
| 2 | Lamellar seal             | 4 | Flat grease nipple AM10x1 to DIN 3404        |



**For re-charging the labyrinth seals with grease, the specified frequency must be observed (see table 11 in item 10.1).**

## 5.7 Couplings, clutches

As a rule, flexible couplings are provided for the input and output drive sides of the gear unit.

If rigid couplings or other in and/or output elements, which create additional radial or axial forces, (e.g. gear wheels, belt pulleys, disk flywheels, hydraulic couplings) are used, these must be agreed by contract.

## 5.8 Shrink disk

In the case of a shaft-mounting gear unit, a shrink disk should be used as a frictional clamping connection between the gear-unit hollow shaft and the machine.

## 6. Fitting

Observe the instructions in section 3, "Safety instructions"!

### 6.1 General information on fitting

When transporting the gear unit observe the notes in section 4.

Fitting work must be done with great care by authorised, trained and qualified personnel. The manufacturer cannot be held liable for damage caused by incorrect assembly and installation.

During the planning phase sufficient space must be allowed around the gear unit for later care and maintenance work.



Free convection through the surface of the housing must be ensured by suitable measures.

Adequate lifting equipment must be available before beginning the fitting work.



**During operation the unit must not be allowed to heat up through exposure to heat from external sources such as sunlight, and suitable measures must be taken to prevent this!**

**Such measures may be:**

- fitting a sunshade roof,  
or
- fitting an additional cooling unit,  
or
- fitting the oil sump with a temperature-monitoring device with a cut-out function.



**If a sunshade roof is fitted, heat must be prevented from building up!  
If a temperature-monitoring device is fitted, a warning signal must be emitted when the maximum permitted oil-sump temperature is reached. If the maximum permitted oil-sump temperature is exceeded, the drive must be shut off.  
Such shutting off may cause the operator's system to stop!**



**The operator should ensure that no foreign bodies affect the proper function of the gear unit (e.g. falling objects or heaping over).**

**No electrical welding work must be done at all on the drive.  
The drives must not be used as an earthing point for welding operations. Toothed parts and bearings may be irreparably damaged by welding.**

**All the fastening points provided by the design of the unit must be used.  
Screws which have been damaged during assembly or disassembly work must be replaced with new screws of the same strength class and type.**



To ensure proper lubrication during operation, the mounting position specified on the drawings must always be observed.

## 6.2 Unpacking

The products supplied are listed in the despatch papers. Check immediately on receipt to ensure that all the products listed have actually been delivered. Parts damaged and/or missing parts must be reported to Siemens in writing immediately.



The packaging must not be opened or damaged, when this is part of the preservation method!

- Remove packaging material and transporting equipment and dispose of in accordance with regulations.
- Perform a visual check for any damage and contamination.



**If there is any visible damage, the gear unit must not be put into operation. The instructions in section 4, "Transport and storage", must be observed.**

## 6.3 Gear-unit installation

### 6.3.1 Foundation



**The foundation must be horizontal and level. The gear unit must not be excessively stressed when tensioning the fastening bolts.**

The foundation should be designed in such a way that no resonance vibrations are created and that no vibrations are transmitted from adjacent foundations. The structure on which the unit is to be mounted must be rigid. It must be designed according to the weight and torque, taking into account the forces acting on the gear unit.



For dimensions, space requirement, arrangement of supply connections (e.g. with separate oil-cooling units), refer to the drawings in the gear-unit documentation.

### 6.3.2 Couplings, clutches

- Fit and secure input and output drive elements (e.g. coupling components) on the shafts.  
If these are to be heated before mounting, refer to the dimensioned drawings in the coupling documentation for the correct joining temperatures.

Unless otherwise specified, the components may be heated inductively, with a burner, or in a furnace.



**Take precautions to avoid burns from hot parts!  
Wear suitable protective gloves!**



**Protect shaft-sealing rings from damage and heating to over + 100 °C (use heat-protective screens to protect against radiant heat.)**

The elements must be pulled smartly onto the shaft as far as stated in the dimensioned drawing prepared in accordance with the order.



**Couplings with peripheral velocities on the outer diameter of up to 30 m/s must be statically balanced. Couplings with peripheral velocities over 30 m/s must be dynamically balanced.**



For maintenance and operation of the couplings, refer to the specific operating instructions for the couplings.



**Fit the coupling with the aid of suitable fitting equipment. The parts must not be driven on by abrupt force, as this may damage the gear unit.  
The shaft-sealing rings and running surfaces of the shaft must not be damaged when pulling in the coupling parts.**



**When installing the drives, make absolutely certain that the individual components are accurately aligned in relation to each other. Inadmissibly large errors in the alignment of the shaft ends to be connected due to angular and/or axial misalignments result in premature wear and/or material damage. Insufficiently rigid base frames or sub-structures can also during operation cause a radial and/or axial misalignment, which cannot be measured when the unit is at a standstill.**



Gear units whose weight requires the use of lifting gear must be attached at the points shown in section 4, "Transport and storage". If the gear unit is to be transported with add-on parts, additional attachment points may be required. The position of these attachment points is shown in the order related dimensioned drawing.

#### 6.4 Attachment of IEC Motors

When attaching IEC motors, the operating instructions for the motors are to be observed.



**Do not use a motor with a motor speed exceeding the specified speeds of the gear unit shown on the rating plate, as otherwise the gear unit may be damaged.**

#### 6.5 Brake

If required, the gear unit can be specially fitted with an hydraulically or electromagnetically releasing blocking brake. This is fitted to the gear unit on the gear-unit input side or integrated in the motor.



For the blocking brake the special operating instructions or the manual of the motor must be observed.

#### 6.6 Attachment of torque arms and/or flanges on the output side

Before fitting, the screw-on faces of these parts must be degreased and smeared with Loctite 640. This Loctite 640 agent increases the friction coefficient of the torque-carrying faces and protects against corrosion at the same time.

#### 6.7 Shrink disk

The shrink disk realizes a press-fit connection between a hollow shaft and a stub/machine shaft (in the following called "stub shaft"). The interference fit can transfer torques, bending moments and forces. The jointing pressure between the hollow and stub shafts generated by the shrink disk is essential for the torque and force transmission.

The shrink disk is delivered ready for installation.



**The shrink disk must not be dismantled before mounting for the first time.**

**Fitting and start-up must be carried out by properly trained specialist personnel. Prior to start-up these instructions must be read, understood and adhered to. We accept no liability for personal injury or damage due to non-observance.**

##### 6.7.1 Fitting the shrink disk

- Before beginning installation, the hollow shaft and the stub shaft must be carefully cleaned.



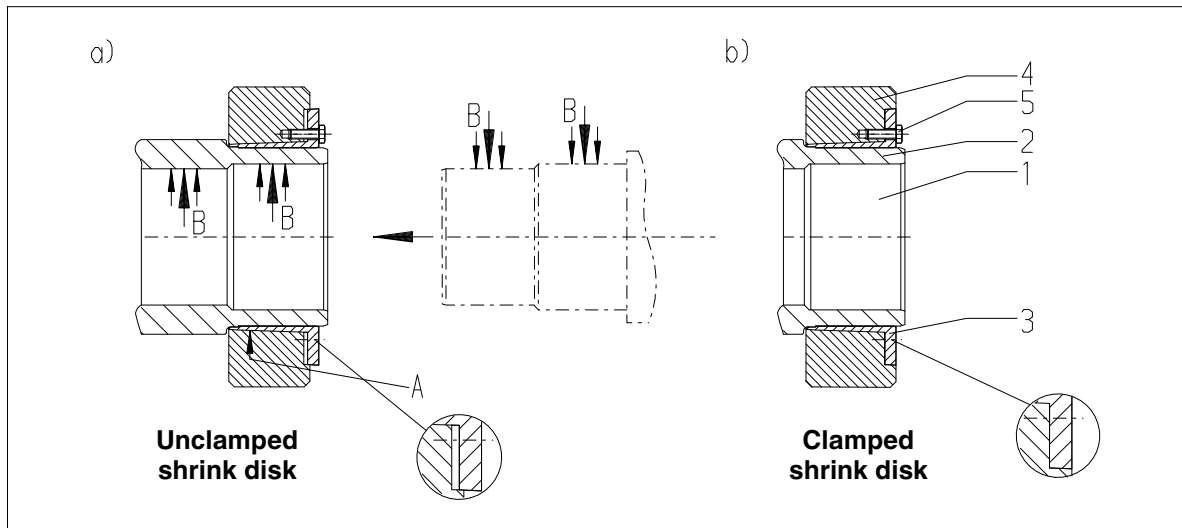
**Observe manufacturer's instructions for handling lubricants and solvents.**



**Do not allow cleansing agent or solvent to affect surfaces with paint coating.**



**The bore of the hollow shaft and the stub shaft must be absolutely clean, free of grease and oil in the area of the shrink disk seat. This is essential for safe and reliable torque transmission. Do not use contaminated solvents or dirty cloths nor cleansing agents containing oil (such as paraffin or turpentine) for removing grease.**



**Fig. 7:** Fitting the shrink disk

**A** Greased

**B** Absolutely grease- and oil-free

1 Stub shaft

3 Inner ring

5 Tensioning bolt

2 Hollow shaft

4 Outer ring



The outer surface of the hollow shaft must be lightly greased in the area of the shrink disk seat.

For a detailed view, refer to the dimensioned drawing in the gear-unit documentation.

- Place the shrink disk on the hollow shaft and fasten, if required. For the exact fitting position (W) of the shrink disk, refer to the dimensioned drawing.



**For transporting and lifting the shrink disk it may be required to use a suitable lifting device!**

**Make sure that the shrink disk cannot slip off the hollow shaft.**

- Fitting the stub shaft or sliding the hollow shaft onto the stub shaft



**Do not tighten the tensioning bolts (5) until the stub shaft is installed too.**

- Tighten the tensioning bolts (5) gradually one after the other, working round several times by quarter turns.
- Tighten all tensioning bolts (5) until the end faces of the inner ring (3) and the outer ring (4) are flush and the maximum tightening torque of the tensioning bolts has been achieved. The correct alignment is to be checked using a ruler. The max. tolerance is  $\pm 0.2$  mm.



The correct clamping condition can thus be checked visually.



**To avoid overloading the individual bolts, the maximum tightening torque (see table 6) must not be exceeded. If, when tightening the clamping bolts at max. tightening torque, the inner and outer ring are not aligned, Siemens must be consulted.**

**Table 6:** Maximum torques for tensioning bolts

Tensioning-bolt thread	max. tightening torque per bolt Strength class 12.9 Nm	Tensioning-bolt thread	max. tightening torque per bolt Strength class 12.9 Nm
M 8	35	M 20	570
M 10	70	M 24	980
M 12	120	M 27	1450
M 14	193	M 30	1970
M 16	295	M 33	2650



The shrink disk has been identity-marked on the outer ring (4). In case of contacting Siemens this identification must be referred to.



**For safety reasons, a protective cover should be mounted to prevent contact! This cover must be applied after completion of all works on the shrink disk.**



**Only the complete shrink disks supplied by the manufacturer may be used. Combining components from different shrink disks is not permitted.**



**Tightening the fastening bolts using an impact screwdriver is not permitted!**

#### 6.7.2 Demounting the shrink disk

- Remove the protective cover.
- Remove any rust deposits from the shaft and the hollow shaft.



**Under no circumstances must the tensioning bolts be unscrewed one after the other.**



**The hollow shaft of the gear unit can have been provided with an additional oil hole for injecting oil for demounting the stub shaft. When using this hole, observe the maximum permissible pressures shown in the drawings of the gear-unit documentation.**

- Undo all tensioning bolts one after the other by approx. 1/4 turn.



The stored energy of the outer ring is slowly loosened during disassembly via the bolts to be loosened. In order that this is carried out correctly, the procedure described here must be carefully adhered to!

- All tensioning bolts should now be further loosened one after the other by approx. 1 turn.



The outer ring should now release of its own accord from the inner ring. If this is not the case, the outer ring can be detensioned with the forcing threads. To this purpose screw some of the adjacent fastening bolts into the forcing threads. The now releasing outer ring is braced against the remaining bolts. This operation must be carried out until the outer ring completely releases of its own accord.

- The shrink disk is to be secured against axial shifting.
- Draw the stub shaft out of the hollow shaft.
- Pull the shrink disk off the hollow shaft.



**For transporting and lifting the shrink disk it may be required to use a suitable lifting device!**



### 6.7.3 Cleaning and greasing the shrink disk



Only dirty shrink disks must be disassembled and cleaned.

- Inspection of all parts for any damage.



**Damaged parts must be replaced with new ones! The use of damaged parts is not permissible!**



**Only the complete shrink disks supplied by the manufacturer may be used. Combining components from different shrink disks is not permitted.**

- Thoroughly clean all parts.



**Do not use contaminated solvents or dirty cloths nor cleansing agents containing oil (such as paraffin or turpentine) for removing grease.**

- The conical surfaces of the inner and outer rings (3 and 4, see Fig. 7) must be free of grease and oil.
  - A thin layer of grease must be applied evenly to the conical surfaces of the inner and outer rings (3 and 4, see Fig. 7).
  - Provide the tensioning bolts (5, see Fig. 7) on the contact surface and on the thread with lubricant.
  - Use a solid lubricant paste with a **high MoS<sub>2</sub>-based molybdenum disulphide content** which will not slide during fitting work and which shows the following characteristics:
    - friction coefficient " $\mu$ " = 0.04
    - resistant to pressure up to a maximum pressure of 300 N/mm<sup>2</sup>
    - ageing-resistant

**Table 7:** Recommended lubricants for shrink disks after their cleaning <sup>1)</sup>

Lubricant	Form	Manufacturer
Molykote G Rapid	Spray or paste	DOW Corning
Aemasol MO 19 P	Spray or paste	A. C. Matthes
Unimoly P 5	Powder	Klüber Lubrication
gleitmo 100	Spray or paste	Fuchs Lubritec

<sup>1)</sup> Other lubricants may be used if they have the same characteristics.

- Join inner ring (3) and outer ring (4).
- Place the tensioning bolts and screw in some threads by your fingers.



**Observe the manufacturer's instructions for handling lubricants!**

**Fitting and start-up must be carried out by properly trained specialist personnel.**

### 6.7.4 Re-mounting the shrink disk



For re-fitting the shrink disk the procedure described in item 6.7.1 must be adhered to.

### 6.7.5 Inspection of the shrink disk



In all cases the inspection relating to the shrink disk should be carried out simultaneously with the examination of the gear unit, **however at least every 12 months.**

Inspection of the shrink disk is limited to a visual assessment of its condition. The following must be observed when carrying out this work:

- loose screws
- damage caused by force
- flush position of the inner ring (3) in relation to outer ring (4)

### 6.8 Fitting a torque arm



For all shaft-mounting gear units, the reaction torque corresponding to the torque of the driven-machine shaft and acting in an opposite direction on the housing must be absorbed.

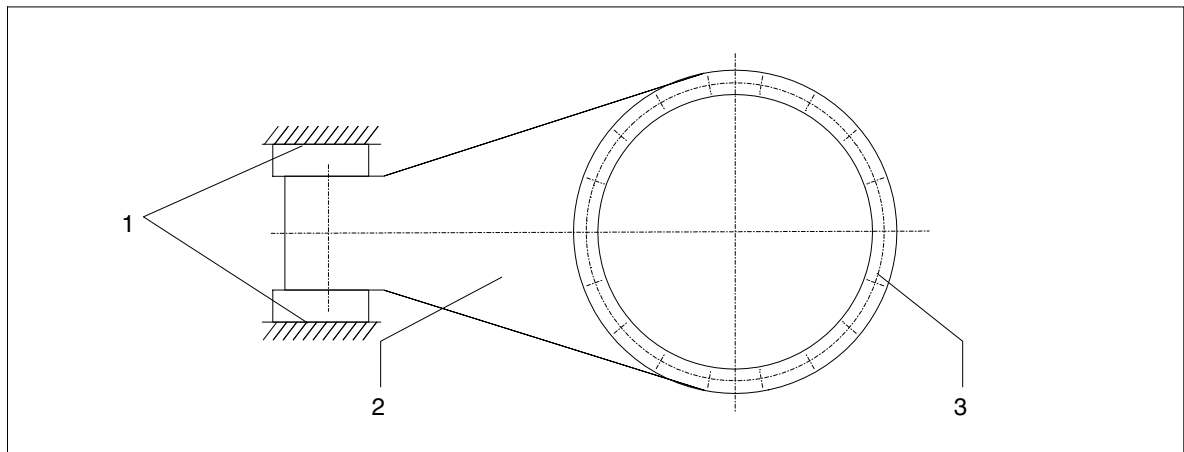
#### 6.8.1 One-sided torque arm (optional)

A one-sided torque arm is provided for sizes 45 to 60 only. The use of a one-sided torque arm must have been agreed by contract.

The one-sided torque arm must be fixed between the contact surfaces (see position 1 in figure 8) of the adjacent connection structure.



**The screw-on surface of the torque arm on the gear-unit housing must be degreased and smeared with Loctite 640. This increases the reliability of the torque transmission and protects against corrosion.**



**Fig. 8:** One-sided torque arm

- |   |  |   |                      |
|---|--|---|----------------------|
| 1 | Contact surfaces of the connection structure | 2 | One-sided torque arm |
|   |  | 3 | Flange connection    |

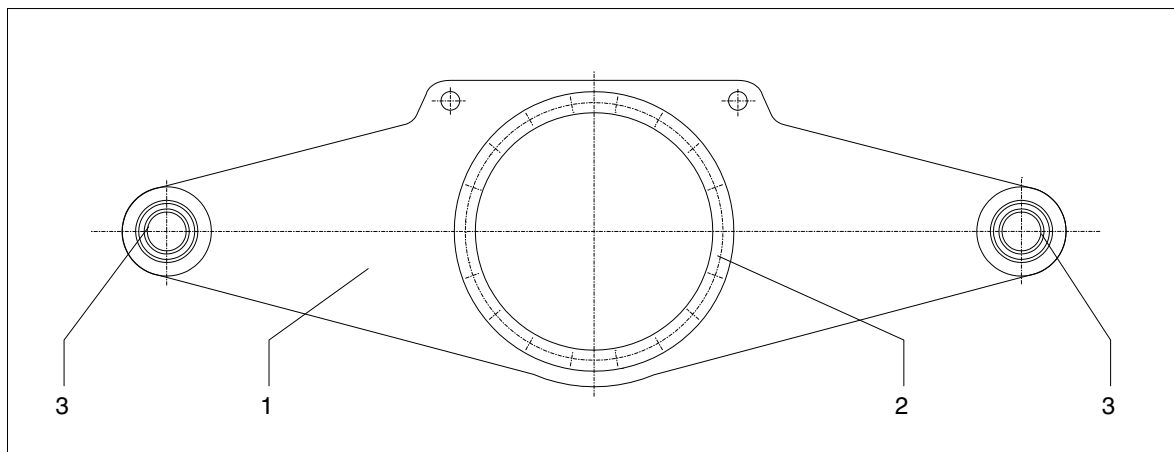


For a detailed view, refer to the drawings in the gear-unit documentation.

### 6.8.2 Double-sided torque arm (optional)

In case of a double-sided torque arm the support of the torque on the connecting structure takes place by way of supporting bearings. The screw-on surface of the torque arm on the gear unit should be treated as described under 6.8.1.

This type of construction ensures that the machine bearings are nearly completely freed from any shearing forces, except for the weights. Figure 9 shows a possible variant.



**Fig. 9:** Double-sided torque arm

- |   |                         |   |                    |
|---|-------------------------|---|--------------------|
| 1 | Double-sided torque arm | 3 | Supporting bearing |
| 2 | Flange connection       |   |                    |



For a detailed view, refer to the drawings in the gear-unit documentation.

### 6.9 Final work

- After installation of the gear unit check all screw connections for tight fit.
- Check the alignment after tightening the fastening elements (the alignment must not have been changed).
- Check that all the devices which have been demounted for transport reasons have been refitted.
  - For this refer to the details in the data sheet, the list of equipment and the associated drawings.
- Oil-drain cocks, if any, must be secured against accidental opening.
- The gear unit must be protected against falling objects.
- Protective devices for rotating parts must be checked for correct seating. Contact with rotating parts is not permitted.
- A potential equalisation in accordance with the applying regulations and directives must be carried out! If no threaded holes for earth connection are available on the gear unit, other appropriate measures must be taken. This work must always be done by specialist electricians.
- Cable entries should be protected against moisture.

6.10 Screw-connection classes, tightening torques and initial-tensioning forces

6.10.1 Screw-connection classes

The specified screw connections are to be fastened applying the tightening torques specified in the table below.

**Table 8:** Screw-connection classes

Screw-connection class	Distribution of emitted torque on the tool	Tightening procedure (Usually the tightening processes lie within the stated tool distribution)
C	± 5 % up to ± 10 %	<ul style="list-style-type: none"> <li>- Hydraulic tightening with mechanical screwdriver</li> <li>- Torque-controlled tightening with torque wrench, signal-emitting torque wrench</li> <li>- Tightening with precision mechanical screwdriver with dynamic torque measuring</li> </ul>
D	± 10 % up to ± 20 %	<ul style="list-style-type: none"> <li>- Torque-controlled tightening with mechanical screwdriver</li> </ul>
E	± 20 % up to ± 50 %	<ul style="list-style-type: none"> <li>- Tightening with pulse screwdriver or impact wrench without adjustment checking device</li> <li>- Tightening by hand, using a spanner without torque measuring device</li> </ul>



**Foundation bolts, hub bolts and bearing-cover bolts must always be tightened in accordance with screw-connection class "C"!**

6.10.2 Tightening torques and initial-tensioning forces



The tightening torques apply to friction coefficients of  $\mu_{total} = 0.14$ . The friction coefficient  $\mu_{total} = 0.14$  applies here to lightly oiled steel bolts, black-annealed or phosphatised and dry, cut mating threads in steel or cast iron. Lubricants which alter the friction coefficient must not be used and may overload the screw connection.

**Table 9:** Initial-tensioning forces and tightening torques for screw connections of strength classes **8.8; 10.9; 12.9** with a common friction coefficient of  $\mu_{total} = 0.14$

Nominal thread diameter d mm	Strength class of the bolt	Initial-tensioning force for screw-connection classes from table 8			Tightening torque for screw-connection classes from table 8		
		C	D	E	C	D	E
		$F_{M \min.}$ N			$M_A$ Nm		
M10	8.8	18000	11500	7200	44.6	38.4	34.3
M12	8.8	26300	16800	10500	76.7	66.1	59.0
M16	8.8	49300	31600	19800	186	160	143
M20	8.8	77000	49200	30800	364	313	280
M24	8.8	109000	69600	43500	614	530	470
M30	8.8	170000	109000	68000	1210	1040	930
M36	8.8	246000	157000	98300	2080	1790	1600
M42	8.8	331000	212000	132000	3260	2810	2510



Damaged bolts must be replaced with new bolts of the same type and strength class.

## 7. Start-up

Observe the instructions in section 3, "Safety instructions"!



**The gear unit must not be started up, if the required instructions are not available.**

### 7.1 Procedure before start-up



When starting a add-on geared motor, the operating instructions for this geared motor must be observed.

#### 7.1.1 Removal of preservative agent

The location of the oil-draining points is marked by an appropriate symbol in the dimensioned drawing in the gear-unit documentation.

Oil-draining point:



- Place suitable containers under the oil-draining points.
- Unscrew the oil-drain plug or open the oil-drain cock.
- Remove remaining preservative agent and/or running-in oil from the gear unit using a suitable container, unscrew any existing residual-oil drain plugs, to do so.
- Dispose of remaining preservative agent and/or running-in oil in accordance with regulations.



**Remove any oil spillage immediately with an oil-binding agent.  
The oil must not come into contact with the skin (e.g. the operator's hands).  
The safety notes on the data sheets for the oil used must be observed here!**

- Screw in oil-drain plug or reclose oil-drain cock.
- Screw in any unscrewed residual-oil-drain plugs again.



A detailed view of the gear unit can be obtained from the drawings in the gear-unit documentation.

## 7.2 Filling with lubricant

- Unscrew the oil-filling screw or air filter.



**Fill the gear unit with fresh oil of the grade specified on the rating plate, using a filter (max. mesh 25 µm).**



The quality of the oil used must meet the requirements of the separately supplied BA 7300 EN operating instructions, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in BA 7300 EN, because they have been tested and meet the requirements.

Information on the type, quantity and viscosity of the oil is given on the rating plate on the gear unit.

The oil quantity shown on the rating plate is to be understood as an approximate quantity. The marks on the oil sight glass indicate the prescribed oil quantity to be put in.

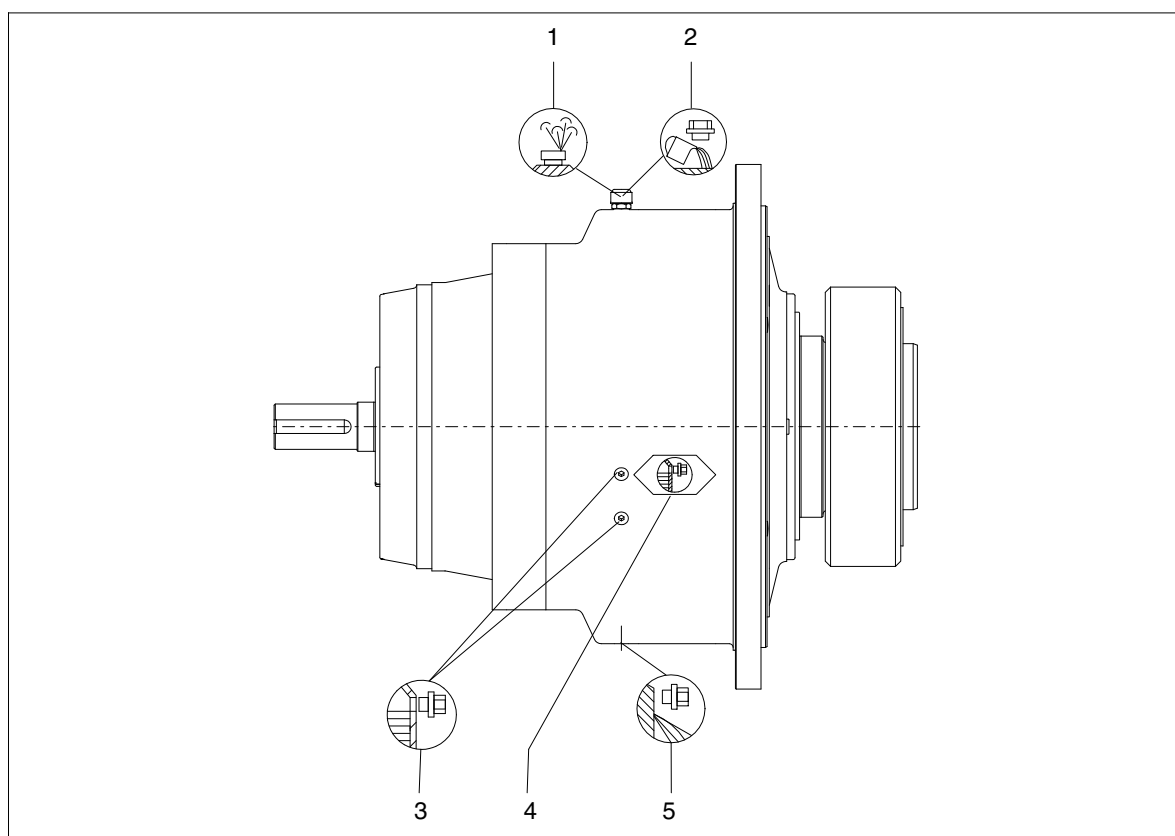
- Check the oil level in the gear-unit housing.

Depending on the type the following oil levels apply:

- Lower edge of the oil-level screw.
- Middle of the oil-sight glass (optional).



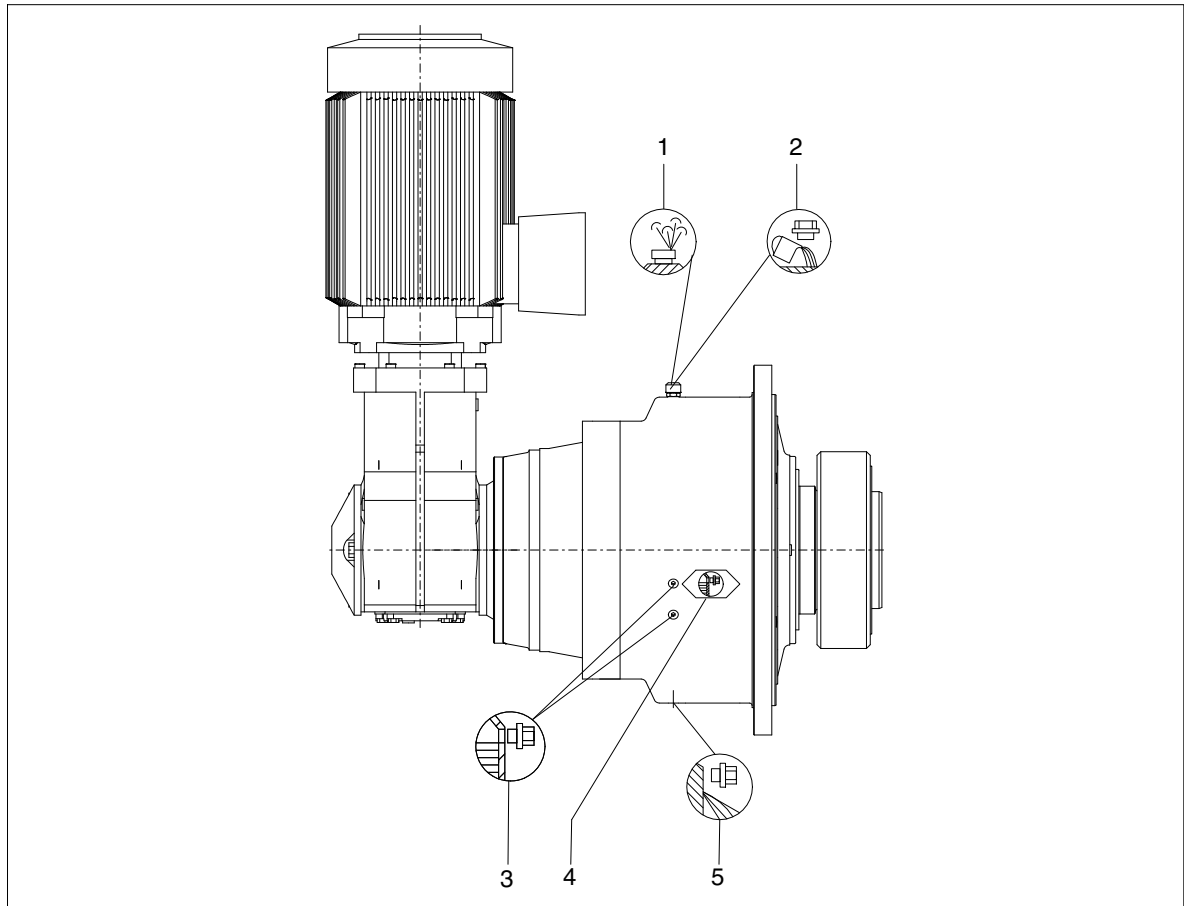
**Remove any oil spillage immediately with an oil-binding agent.**



**Fig. 10:** Gear-unit features on gear unit of type O2RC

- |   |                     |   |                      |
|---|---------------------|---|----------------------|
| 1 | Housing ventilation | 4 | Plate for oil level* |
| 2 | Oil-filler plug     | 5 | Oil drain            |
| 3 | Oil-level screw     |   |                      |

\*) Marks the decisive oil-level screw.



**Fig. 11:** Gear-unit features on gear unit of type O2RR

- |   |                     |   |                      |
|---|---------------------|---|----------------------|
| 1 | Housing ventilation | 4 | Plate for oil level* |
| 2 | Oil-filler plug     | 5 | Oil drain            |
| 3 | Oil-level screw     |   |                      |

\*) Marks the decisive oil-level screw.



The add-on geared motors of types O2RP and O2RR are delivered ex works with oil filled in. The oil chambers of the geared motor and the main gear unit are not interlinked.

### 7.3 Start-up



**Before start-up, replace the yellow plastic screw plug with the air filter (see also notice on gear unit).**

- Check the oil level in the gear unit.



The oil level specified in item 7.2 should be adhered to. When the oil is hot, the marks may be slightly exceeded. It must in no case be allowed to fall below the mark. If necessary, top up to the correct level.

## 7.4 Removal from service

- Switch off drive unit.



**Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.**

- With gear units fitted with water oil-coolers, close the stop valves on the water in- and outflow pipes. To prevent freezing, drain the water from the cooling coil or the water oil-cooler.
- Start the gear unit and allow it to run briefly (5 to 10 minutes) approx. every 3 weeks (during a shut-down period no longer than 6 months).
- Treat the gear unit with preservative, see items 7.4.1 and 7.4.2 (before a shut-down period exceeding 6 months).

### 7.4.1 Interior preservation during longer disuse

Depending on the type of lubrication and/or shaft sealing, the following types of interior preservation can be applied.

#### 7.4.1.1 Interior preservation with gear oil

Gear units with splash-lubrication systems and non-contacting shaft seals can be filled with the correct type of oil up to a point just below the air filter or breather screw.

#### 7.4.1.2 Interior preservation with preservative agent

Before longer shut-down periods gear units with forced-lubrication systems, oil circulation cooling and/or non-contacting shaft seals should be filled with preservative agent and run without load.

#### 7.4.1.3 Interior-preservation procedure

- Stop the gear unit.
- Drain oil into a suitable container (see section 10, "Maintenance and Repair").
- Unscrew the air filter including the reducing screw.
- Pour in the preservative agent through the hole up to the lower edge of the oil-level screw or the upper mark on the oil-sight glass.



For preservative agent see table 3 or 4 in item 4.4.1!

- Screw in the air filter including reducing screw.
- Start the gear unit and allow it to idle briefly.
- Unscrew the oil-drain plug.
- Drain preservative agent into a suitable container.
- Dispose of preservative agent in accordance with regulations.



**There is a risk of scalding from the hot preservative agent draining from the gear unit. Wear protective gloves!**

- Screw in the oil-drain plug.
- Replace the air filter with the screw plug.



**Before re-starting the gear unit, replace the screw plug with the air filter. Observe the instructions in item 7.1.1.**



## 7.4.2 Exterior preservation

### 7.4.2.1 Exterior-preservation procedure

- Clean the surfaces.



For separation between the sealing lip of the shaft-sealing ring and the preservative agent, the shaft should be brushed with grease in way of the sealing lip.

- Apply preservative agent.



For preservative agent see table 5 in item 4.4.2!

## 8. Operation

Observe the instructions in section 3, "Safety instructions", in section 9, "Faults, causes and remedy", and in section 10, "Maintenance and repair"!

### 8.1 General

To achieve a satisfactory and trouble-free operation of the equipment, be certain to observe the working values specified in section 1, "Technical Data".

During operation the gear unit must be monitored for:

- Operating temperature The gear unit is designed for a maximum operating temperature in continuous operation of:  
**90 °C** (applies to mineral oil)  
**100 °C** (applies to synthetic oil)
- Changes in gear noise
- Possible oil leakage at the housing and shaft seals
- Correct oil level (see section 7, "Start-up")

### 8.2 Oil level



To check the oil level, stop operation of the gear unit.

Depending on the type the following oil levels apply when the motor has cooled down:

- Lower edge of the oil-level screw
- Middle of the oil-sight glass

When the oil is hot, the oil-level marks may be slightly exceeded. It must in no case be allowed to fall below the mark. If necessary, top up to the correct level.

### 8.3 Irregularities



**The drive unit must be switched off at once,  
if irregularities are found during the operation**

**Determine the cause of the fault, using table 10, "Faults, causes and remedy" (see item 9.2).**

**Table 10, "Faults, causes and remedy", contains a list of possible faults, their causes and suggested remedies.**

**If the cause cannot be found, a specialist from one of our customer-service centres should be called in (see section 2).**

## 9. Faults, causes and remedy

Observe the instructions in section 3, "Safety instructions", and in section 10, "Maintenance and repair"!



For possible malfunctions of an electric or hydraulic motor see the operating instructions of the electric or hydraulic motor.

### 9.1 General information on faults and malfunctions



Faults and malfunctions occurring during the guarantee period and requiring repair work on the gear unit must be carried out only by Siemens customer service.

In the case of faults and malfunctions occurring after the guarantee period and whose cause cannot be precisely identified, we advise our customers to contact our customer service.



**Siemens will not be bound by the terms of the guarantee or otherwise be responsible in cases of improper use of the gear unit, modifications carried out without Siemens' agreement or use of spare parts not supplied by Siemens.**



**To remedy faults and malfunctions, the gear unit must always be taken out of service. Secure the drive unit to prevent it from being started up unintentionally. Attach a warning notice to the start switch.**

### 9.2 Possible faults

**Table 10:** Faults, causes and remedy

Faults	Possible causes	Remedy
Changes in gear noise.	Damage to gear teeth.	Contact Customer Service. Check all toothed components and replace any damaged parts.
	Excessive bearing play.	Contact Customer Service. Adjust bearing backlash.
	Bearing defective.	Contact Customer Service. Replace defective bearings.
Loud noises in the area of the gear-unit fastening.	Gear-unit fastening has worked loose.	Tighten bolts / nuts to specified torque. Replace damaged bolts / nuts.
Increased temperature at the bearing points.	Oil level in housing too low.	Check oil level at room temperature and, if necessary, top up oil.
	Oil too old.	Check date of last oil change and, if necessary, change oil. See section 10.
	Bearing defective.	Contact Customer Service. Check and, if necessary, replace bearings.
Exterior of gear unit is oiled up.	Inadequate sealing of housing covers and/or joints.	Seal joints.

Faults	Possible causes	Remedy
Oil leakage from gear unit.	<p>Inadequate sealing of housing covers and/or joints.</p> <p>Radial shaft-sealing rings defective.</p>	<p>Check and, if necessary, replace sealings. Seal joints.</p> <p>Check radial shaft-sealing rings and, if necessary, replace.</p>
Oil foaming in the gear unit.	<p>Water in oil.</p> <p>Oil too old. (defoaming agent used up)</p> <p>Unsuitable oils mixed up.</p>	<p>Test the oil, change oil if necessary.</p> <p>Test the oil, change oil if necessary.</p> <p>Test the oil, change oil if necessary.</p>
Water in oil.	<p>Oil foams in sump.</p> <p>Defective oil cooler.</p> <p>Gear unit exposed to cold air from machine-room ventilator: water condensing.</p>	<p>Check state of oil by the test-tube method for water contamination. Have oil analysed by laboratory.</p> <p>Repair or, if necessary, replace oil cooler. Fill with oil, look for and repair any leaks.</p> <p>Protect gear unit with suitable heat insulation. Close air outlet or alter its direction by structural measures.</p>
Increased operating temperature.	<p>Oil level in housing too high.</p> <p>Oil too old.</p> <p>Oil badly contaminated.</p> <p>On gear units with oil-cooling system: Coolant flow too low.</p> <p>Coolant temperature too high.</p> <p>Oil flow through water oil-cooler too low due to: Badly clogged oil filter.</p>	<p>Check oil level and, if necessary, adjust.</p> <p>Check date of last oil change and, if necessary, change oil. See section 10.</p> <p>Change oil. See section 10.</p> <p>Fully open valves in in- and outflow pipes. Check for free flow through water oil-cooler.</p> <p>Check temperature and, if necessary, adjust.</p> <p>Clean the oil filter. See section 10.</p>
Fault in the geared motor		Consult the operating instructions for the geared motor.

## 10. Maintenance and repair

Observe the instructions in section 3, "Safety instructions", and in section 9, "Faults, causes and remedy"!



For information on maintenance of an electric or hydraulic motor, refer to the operating instructions for the electric or hydraulic motor.

### 10.1 General notes on maintenance

All maintenance and repair work must be done with care and by duly trained and qualified personnel only.

The following applies to all work in item 10.2:



**Switch the gear unit and add-on components off.**

**Secure the drive unit to prevent it from being started up unintentionally.  
Attach a warning notice to the start switch!**



**The periods indicated in table 11 depend on the conditions under which the gear unit is operated. Only average periods can therefore be stated here. These refer to:**

a daily operating time of            24 h  
a duty factor "ED" of                100 %  
max. operating temperature of    90 °C (applies to mineral oil)  
    100 °C (applies to synthetic oil)

**The operator must ensure that the intervals stated in table 11 are adhered to.  
This also applies if the maintenance work is included in the operator's internal maintenance schedules.**

**Table 11:** Maintenance and repair work

Measures	Periods	Remarks
Check the oil temperature	Daily	
Check the for unusual gear-unit noise	Daily	
Check the oil level	Monthly	- Lower edge of oil-level screw - Middle of the oil-sight glass
Check the gear unit for leaks	Monthly	
Test the water content of the oil.	Approx. 400 operating hours after start-up, at least once per year	see item 10.1.1
Perform the first oil change	Approx. 400 operating hours after start-up	see item 10.2.2
Perform subsequent oil changes	Every 18 months or 5000 operating hours <sup>1)</sup>	see item 10.2.2
Clean the air filter	Every 3 months	see item 10.2.3
Refill Taconite seals with grease	Every 3000 operating hours or at least every 6 months	see item 10.2.5
Clean the gear unit	Depending on requirements, at least every 2 years	See item 10.2.4

Measures	Periods	Remarks
Check tightness of fastening bolts.	After first oil change, then every 2 years	see item 10.2.7
Check the preservation of the free shaft ends	Every 3 years	see item 7.4.2
Inspection of the gear unit	Every 2 years	see item 10.3.1

1) When using synthetic oils and depending on the individual application, the periods can be extended.

#### 10.1.1 General oil-service lives

According to the manufacturers, the following are the minimum periods during which the oils can be used without undergoing any significant change in quality. They are calculated on the basis of an average oil temperature of 80 °C:

- for mineral oils, biologically degradable oils and physiologically safe (synthetic esters) oils 2 years or 10 000 operating hours (**does not apply to natural esters such as rape seed oils**).
- for poly- $\alpha$ -olefins and polyglycols, 4 years or 20 000 operating hours.



The actual service lives may differ. The general rule is that an increase in temperature of 10 K will halve the service life and a temperature decrease of 10 K will approximately double the service life.

### 10.2 Description of maintenance and repair works

#### 10.2.1 Examine water content of oil / conducting oil analyses

More information about examining the oil for water content or conducting oil analyses is obtainable from your lubricant manufacturer or our customer service.

- For reference purposes, a fresh sample of the operating lubricating oil used must be sent with the used oil sample to the analysing institute for analysis.
- The oil sample must be taken downstream of the filter of the oil-supply system while the gear unit is running. A suitable connection point is normally located upstream of the gear unit input (e.g. oil-drain cock in the pressure line).
- A special sample container should be filled with the specified quantity of oil. If there is no such sample container available, at least one litre of oil must be put in a **clean**, transportworthy, sealable vessel.

#### 10.2.2 Change oil

As an alternative to the oil-change intervals indicated in table 11 (see item 10.1) it is possible to have the oil sample tested at regular intervals by the Technical Service of the relevant oil company and to have it released for further use.

If re-usability has been confirmed, no oil change will be necessary.



Please observe the separately attached operating instructions BA 7300 EN.

- The instructions in item 7.1 must be observed!
- Close the stop valves in the coolant in- and outflow pipes (for gear units with water oil-cooling system).
- Drain the oil while the gear unit is still warm, i.e. immediately after shutting down the machinery.



**When changing the oil, always re-fill the gear unit with the same type of oil. Never mix different types of oil and/or oils made by different manufacturers. Polyglycol-based synthetic oils in particular must not be mixed with PAO-based synthetic oils or mineral oils. If changing to a different grade or make of oil, the gear unit must, if necessary, be flushed out with the new oil grade. Flushing is not necessary, if the new service oil is fully compatible with the old service oil in all respects. Compatibility must be confirmed by the oil supplier. If there is a change to another oil grade or make, Siemens recommends flushing out the gear unit with the new grade of service oil.**



When changing the oil, the housing and the oil-supply system, if available, must be flushed with oil to remove sludge, metal particles and oil residue. Use the same type of oil as is used for normal operation. High-viscosity oils must be heated beforehand using suitable means. Ensure that all residues have been removed before filling with fresh oil.

- Place a suitable container under the oil-drain plug of the gear-unit housing.
- Unscrew the air filter on the top of the housing.
- Unscrew the oil-drain plug and allow the oil to drain into the container.



**There is a danger of scalding from the hot oil emerging from the housing.  
Wear protective gloves!  
Remove any oil spillage immediately with an oil-binding agent.**

- Clean the permanent magnet of the oil-drain plug thoroughly.
- Screw in the oil-drain plug.
- Unscrew the oil-filling screw or air filter.
- Fill with lubricant according to item 7.2.
- Screw in the oil-filling screw or air filter again.

### 10.2.3 Clean the air filter



If a layer of dust has built up, the air filter must be cleaned, whether or not the minimum period of 3 months has expired.

- Unscrew the air filter including the reducing screw.
- Clean the air filter using benzine or a similar cleanser.
- Dry the air filter and/or blow with compressed air.



**Be especially careful when blowing with compressed air.  
Wear protective glasses!**



**Foreign bodies must be prevented from entering the gear unit.**

#### 10.2.4 Clean the gear unit



**To prevent the build-up of dust on the gear unit, cleaning must be done in accordance with operating conditions.**

- Remove any dirt adhering to the housing with a hard brush.
- Remove any corrosion.



**The outside of the gear unit must not be cleaned with high-pressure cleaning equipment.**

#### 10.2.5 Refill Taconite seals with grease

- Inject approx. 30 g lithium-based rolling-bearing grease into each of the lubrication points of the Taconite seal. The lubrication points are fitted with flat grease nipples type AM10x1 to DIN 3404.



**Remove and dispose of any old grease escaping.**

#### 10.2.6 Top up oil

- The instructions in item 7.2 must be observed!
- Always top up with the same type of oil as already used in the unit (see also item 10.2.2).

#### 10.2.7 Check tightness of fastening bolts

- The instructions in item 10.1 must be observed!
- Check tightness of all fastening bolts.



Damaged bolts must be replaced with new bolts of the same type and strength class.

#### 10.3 Final work



For operating and servicing the components, the pertinent instruction manuals and the specifications in sections 5 and 7 must be observed.  
For technical data, refer to the data sheet and/or the list of equipment.



Observe also item 6.9.



Damaged bolts must be replaced with new bolts of the same type and strength class.

#### 10.3.1 General inspection of the gear unit

The general inspection of the gear unit should be carried out by the Siemens Customer Service, as our engineers have the experience and training necessary to identify any components requiring replacement.



## 10.4 Lubricants

The quality of the oil used must meet the requirements of the separately supplied BA 7300 EN operating instructions, otherwise the guarantee given by Siemens will lapse. We urgently recommend using one of the oils listed in BA 7300 EN, because they have been tested and meet the requirements.



To avoid misunderstandings, we should like to point out that this recommendation is in no way intended as a guarantee of the quality of the lubricant supplied. Each lubricant manufacturer is responsible for the quality of his own product.

Information on the type, quantity and viscosity of the oil is given on the rating plate on the gear unit and/or in the supplied documentation.

The quantity of oil indicated on the rating plate is an approximation only. The marks on the oil dipstick or oil-sight glass are decisive for the amount of oil to be filled in.

The manual containing the current lubricants recommended by Siemens can also be consulted on the Internet (see back cover).

The oils listed there are subjected to continuous tests. Under certain circumstances the oils recommended there may therefore later be removed from the range or replaced with further developed oils.

We recommend regularly checking whether the selected lubricating oil is still recommended by Siemens. If it is not, the brand of oil should be changed.

## 11. Spare parts, customer-service

### 11.1 Stocking spare parts

By stocking the most important spare and wearing parts on site you can ensure that the gear unit is ready for use at any time.

To order spare parts, refer to the spare-parts list.

For further information refer to the spare-parts drawing stated in the spare parts list.



**We guarantee only the original spare parts supplied by us. Non-original spare parts have not been tested or approved by us. They may alter technical characteristics of the gear unit, thereby posing an active or passive risk to safety. Siemens will assume no liability or guarantee for damage caused by spare parts not supplied by Siemens. The same applies to any accessories not supplied by Siemens.**

Please note that certain components often have special production and supply specifications and that we supply you with spare parts which comply fully with the current state of technical development as well as current legislation.

When ordering spare parts, always state the following:

Order number, item	Type, size	Part number	Quantity
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### 11.2 Spare parts and customer-service addresses

When ordering spare parts or requesting a service specialist, please contact Siemens first (see section 2).

## 12. Declarations

### 12.1 Declaration of incorporation

#### Declaration of incorporation

in accordance with Directive 2006/42/EC, Annex II 1 B

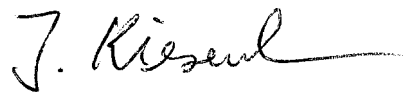
The manufacturer, Siemens Industriegetriebe GmbH, D-09322 Penig, declares with regard to the partly completed machinery

#### **Planetary gear unit FLENDER SIP Types RC, RP, RR Sizes 30 to 60**

developed for driving machines in most various industry areas:

- The special technical documents described in Annex VII B have been prepared.
- The following basic health and safety requirements set out in Directive 2006/42/EC, Annex I, are applied and are satisfied:  
  
1.1, 1.1.2, 1.1.3, 1.1.5; 1.2.4.4, 1.2.6; 1.3.1 - 1.3.4, 1.3.6 - 1.3.8.1; 1.4.1, 1.4.2.1;  
1.5.1 - 1.5.11, 1.5.13, 1.5.15, 1.5.16; 1.6.1 - 1.6.3; 1.7.1, 1.7.1.1, 1.7.2, 1.7.3 - 1.7.4.3
- The partly completed machinery must not be put into service until it has been established that the machinery into which the partly completed machinery is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC, as appropriate.
- The manufacturer undertakes, in response to a reasoned request by the national authorities, to transmit in electronic form relevant information about the partly completed machinery.
- The person authorised to compile the relevant technical documentation is:  
Jens Kiesenbauer (Head of Product Engineering SGU)

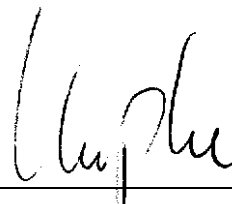
Penig, 2011-07-11



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Jens Kiesenbauer  
(Head of Product Engineering SGU)

Penig, 2011-07-11



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Michael Kupke  
(Director Business Subsegment SGU)

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Subject to modifications

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