



# PARAMAX<sup>®</sup>

9000 Series

Installation manual

## Copyright and contact data

### Copyright Sumitomo Drive Technologies

This document or parts thereof may not be reproduced, stored in a retrieval system, nor transmitted, in any form nor by any means, electronic, mechanical, photocopying, recording, nor otherwise, without the prior written permission of Sumitomo Drive Technologies.

This document could contain technical inaccuracies or typographical errors. Sumitomo Drive Technologies reserves the right to revise the content of this document from time to time without the obligation of Sumitomo Drive Technologies to notify any person of such revision or change.

Details and values given in this document are average values and have been compiled with care. They are not binding, however, and Sumitomo Drive Technologies disclaims any liability for damage or detriments suffered as a result of reliance on the information given herein or the use of products, processes or equipment to which this document refers. No warranty is made that the use of the information or of the products, processes or equipment to which this document refers will not infringe any third party's patents or rights. The information given does not release the user from making their own experiments and tests.

### Contact data

[www.sumitomodrive.com](http://www.sumitomodrive.com)



Sociedad Industrial de Transmisiones S.A.

Paseo de Ubarburu 67

San Sebastián, Guipúzcoa

Spain

E-mail: [smib.customerservice@shi-g.com](mailto:smib.customerservice@shi-g.com)



**24/7 SERVICE HOTLINE**

Tel.: +32 3 450 12 34

# Contents

<b>1</b>	<b>Manual Disclaimer.....</b>	<b>7</b>
<b>2</b>	<b>About this document.....</b>	<b>8</b>
2.1	Function of the document.....	8
2.2	Language.....	8
2.3	Illustrations.....	8
2.4	Use of steps, lists and titles in this document.....	8
2.5	How to use this document.....	8
2.6	Warnings, cautions and notes used in the document.....	8
2.7	Related documents.....	9
2.8	Storage of this document and the related documents.....	9
2.9	Abbreviations.....	10
2.10	Customer support.....	10
<b>3</b>	<b>Description.....</b>	<b>11</b>
3.1	Intended use.....	11
3.2	Type plate.....	11
3.2.1	Type plate.....	11
3.3	Gear unit configurations.....	12
3.4	Signs in the documentation and on the gear unit.....	13
3.5	Description of the lubrication of the gear unit.....	16
3.5.1	Function of lubrication.....	16
3.5.2	Oil bath lubrication.....	16
3.5.3	Splash lubrication.....	16
3.5.4	Force-feed lubrication.....	17
3.6	Breather plug.....	17
3.7	Cooling system.....	17
3.8	Direction of rotation of the shafts.....	17
<b>4</b>	<b>Safety.....</b>	<b>18</b>
4.1	Restrictions.....	18
4.2	Approved installation engineer.....	18
4.3	General safety instructions.....	18
4.4	Safety instructions for installation.....	19
4.5	Special safety instructions (backstop).....	19
4.6	Noise and vibrations.....	19
4.7	Partly completed machine.....	19
4.8	Instructions in case of a fire.....	19
4.9	Disposal of the gear unit or parts of the gear unit.....	20
4.10	Warranty.....	20
<b>5</b>	<b>Transport.....</b>	<b>21</b>
5.1	Off-site transport.....	21
5.2	On-site transport.....	21
5.2.1	Lift the gear unit.....	21

<b>6</b>	<b>Storage.....</b>	<b>24</b>
6.1	General storage instructions.....	24
6.2	Indoor storage for maximum 1 year.....	24
6.3	Extended storage outdoors for maximum 2 years (extended outdoor storage).....	24
6.4	Extended storage indoors for maximum 5 years (extended indoor storage).....	25
<b>7</b>	<b>Installation.....</b>	<b>26</b>
7.1	Maximum time between installation and commissioning.....	26
7.2	Remove the packaging material.....	26
7.3	Installation instructions for parts that are not part of the gear unit.....	26
7.4	Do a check for corrosion of internal parts of the gear unit.....	26
7.5	Install the couplings.....	26
	Prepare.....	27
	Apply the sealing paste.....	27
	Install the coupling hubs.....	27
	Remove unwanted sealing paste and apply paint.....	28
7.6	Install the chain, sprocket and gear.....	28
7.7	Install the V-belt.....	28
7.8	Install parts that give external loads to the gear unit.....	28
7.9	Install gear units with a backstop.....	29
7.10	Align the gear unit.....	29
	7.10.1 Align the gear unit in the horizontal plane.....	29
	7.10.2 Align the LSS (multi-stage).....	30
	7.10.3 Align the LSS (single stage).....	30
	7.10.4 Align the HSS.....	30
7.11	Attach the gear unit with the bolts (solid shafts).....	30
	Attach the gear unit.....	31
	Install the safety cover.....	31
7.12	Attach the gear unit with the bolts (solid shafts, parallel shafts).....	31
7.13	Attach the gear unit (hollow shafts).....	31
	7.13.1 Install the shrink disk.....	31
	7.13.2 Install the shaft with keyway connection (size 9015 to 9055, with shoulder).....	33
	7.13.3 Install the shaft with keyway connection (size 9015 to 9055, no shoulder).....	35
	7.13.4 Install the shaft with keyway connection (size 9060 to 9085, with shoulder).....	37
	7.13.5 Install the shaft with keyway connection (size 9060 to 9085, no shoulder).....	39
	7.13.6 Install the torque arm.....	42
7.14	Install the breather lines.....	42
7.15	Install the drain lines.....	42
7.16	Install a ground connection.....	43
7.17	Install the lubrication system.....	43
	7.17.1 General instructions for the lubrication system.....	43
	7.17.2 Instructions for force-feed lubrication (integrated pump).....	43
	7.17.3 Instructions for force-feed lubrication (pump with a motor).....	43
	7.17.4 Instructions for force-feed lubrication (pressure lubrication).....	44
7.18	Fill the gear unit with gear oil.....	44
	7.18.1 Select the gear oil.....	44
	7.18.2 Measure the gear oil level.....	44
	7.18.3 Add gear oil (all gear units).....	45
	7.18.4 Drain gear oil.....	46
7.19	Add grease to the lubrication points for grease.....	46
	7.19.1 Select the grease type.....	46
	7.19.2 Add grease.....	46
7.20	Install the oil-to-air cooler.....	47
7.21	Install the water cooling.....	47

---

7.21.1	Install the water cooling.....	47
7.21.2	Install the oil-to-water cooler.....	47
7.21.3	Install the cooling coils.....	47
7.22	Installation instructions (heater).....	48
<b>8</b>	<b>Commissioning.....</b>	<b>49</b>
8.1	Maximum time between commissioning and operation.....	49
8.2	Do a check on the gear unit.....	49
8.3	Start instructions (backstop).....	49
8.4	Start instructions (heater).....	49
8.5	Start instructions (force-feed lubrication, pump with a motor).....	49
8.6	Start instructions (force-feed lubrication, integrated pump).....	50
8.7	Start instructions (drive group with a 2-speed motor).....	50
8.8	Instructions after commissioning.....	50
<b>9</b>	<b>Instructions for operation.....</b>	<b>51</b>
9.1	General instructions for operation.....	51
9.2	Instructions (force-feed lubrication, pump with a motor).....	51
9.3	Instructions (water cooling).....	51
9.4	Instructions (drive group with a 2-speed motor).....	51
9.5	Instructions to change the direction of rotation of the shafts.....	51
9.6	Instructions if the gear unit does not operate more than 2 weeks.....	52
	Operate the gear unit for 5 minutes each 2 weeks.....	52
	Protect the gear unit with a volatile corrosion inhibitor.....	52
<b>10</b>	<b>Removal of the gear unit.....</b>	<b>53</b>
10.1	General instructions for removal of the gear unit.....	53
10.2	Remove the gear unit (solid shafts, couplings).....	53
10.3	Remove the gear unit (hollow shafts).....	53
10.3.1	Disconnect the gear unit from the torque reaction point.....	53
10.3.2	Remove the shrink disk (2-part shrink disk).....	53
10.3.3	Remove the shrink disk (3-part shrink disk).....	54
10.3.4	Disconnect the keyway connection (size 9015 to 9055).....	55
10.3.5	Disconnect the keyway connection (size 9060 to 9085).....	56
<b>11</b>	<b>Technical data.....</b>	<b>58</b>
11.1	Dimensions and mass.....	58
11.2	Materials of the gear unit.....	58
11.3	Torque seal specification.....	58
11.4	Paint specification.....	58
11.5	Corrosion protection by SDT.....	58
11.6	Position of the gear unit.....	59
11.7	Ambient conditions for storage.....	59
11.8	Misalignment of the LSS.....	59
11.9	Misalignment of the HSS (couplings).....	59
11.10	Eccentricity of parallelism between the two pulleys (V-belt).....	60
11.11	Bolt specifications (solid shafts).....	60
11.12	Torque value for the bolts of the fan.....	61
11.13	Bolt specifications to remove the shaft with shrink disk.....	61
11.14	Bolt specifications to remove the shaft with keyway connection.....	62
11.15	Distance ring specifications (keyway connection, no shoulder).....	63
11.16	Lubrication for installation (hollow shaft).....	63

---

11.17	Torque values for oil drain screw.....	63
11.18	Shrink disk specifications.....	64
11.18.1	Shrink disk specifications (2-part shrink disk).....	64
11.18.2	Shrink disk specifications (3-part shrink disk).....	65
11.19	Specifications for the torque arm (hollow shaft).....	66
11.20	Lubricants.....	67
11.20.1	General specifications for lubricants.....	67
11.20.2	Additional gear oil specifications (heater).....	67
11.20.3	Mineral gear oil and related grease.....	68
11.21	Grease quantity at lubrication points for bearings.....	69
11.21.1	Grease quantity for locations A to E.....	69
11.21.2	Grease quantity for location A (multi-stage, right angle shafts).....	70
11.22	Cooling water specifications.....	70

# 1 Manual Disclaimer

This Manual and its instructions and information do not purport to cover all details or variations in the gear unit and do not claim to provide for every possible contingency met in connection with handling, installation, operation, or maintenance. Sumitomo Drive Technologies does not make any representations, warranties or guarantees, express or implied, as to the accuracy or completeness of the Manual. Users must be aware that updates and amendments will be made from time to time to the Manual. It is the user's responsibility to determine whether there have been any such updates or amendments. Neither Sumitomo Drive Technologies nor any of its directors, officers, employees or agents shall be liable in contract, tort or in any other manner whatsoever to any person for any loss, damage, injury, liability, cost or expense of any nature, including without limitation incidental, special, direct or consequential damages arising out of or in connection with the use of the Manual. The user and/or purchaser bears all risks. Should further information be desired or should particular problems arise which are not covered sufficiently for the users' and/or purchaser's purposes, the matter should be referred to in writing to Sumitomo Drive Technologies.



**Warning:** Read and understand all instructions and information prior to any handling including maintenance, installing or starting the gear unit. Failure to follow instructions could lead to damage, serious injury, or death.

- Only qualified and trained personnel should be involved with the storage (including transport), commissioning, operation, installation (including removal), inspection, maintenance and repairs of this gear unit.
- Make sure all your personnel, operators of this gear unit have been professionally and adequately trained for safe working practices.
- Operators must wear adequate personal protective equipment.
- Ensure all international, EU, national and local safety regulations and codes are followed when handling, maintaining, installing (including all related actions) the gear unit.
- Verify the compatibility of the gear unit with the installation it is meant for.

## 2 About this document

### 2.1 Function of the document

The document is only applicable for the "PARAMAX" gear unit, from here on in the document referred to as the gear unit.

The document is for approved installation engineers and gives the information that is necessary to install and remove the gear unit.

### 2.2 Language

The original instructions of this document are in English. All other language versions are translations of the original instructions.

If there is any doubt, the English version of the document is binding.

### 2.3 Illustrations

It is not always possible to show the configuration of your gear unit as in the certified drawing. The illustrations in this document show a typical setup. They are for instruction or description only.

### 2.4 Use of steps, lists and titles in this document



- The steps in procedures have numbers (123) if the sequence is important.
- The lists and steps with bullets (•) are used if the sequence is not important.
- The lists with letters (abc) are used if the sequence is important.
- In titles of sections, the part between brackets () shows to which type of gear unit or component of the gear unit the section applies.

### 2.5 How to use this document


#### Procedure

1. Make sure that you know the structure and the contents of the related documents.
2. Read the safety chapter and make sure that you know all the instructions.
3. Do the steps in the procedures fully and in the correct sequence.

### 2.6 Warnings, cautions and notes used in the document

Type	Description	Icon
Warning	If you do not obey the instruction, this can cause injury.	
Caution	If you do not obey the instruction, this can cause damage to the gear unit, to equipment or to property.	



Type	Description	Icon
Note	A note gives more data.	

## 2.7

### Related documents

Document name	Document code	Target audience
General conditions of sale	-	<ul style="list-style-type: none"> <li>All personnel</li> </ul>
Order acknowledgment	OA_XXXX	<ul style="list-style-type: none"> <li>Approved installation engineers</li> </ul>
Certified drawing	Refer to the order acknowledgment.	<ul style="list-style-type: none"> <li>Approved installation engineers</li> </ul>
Installation manual	IM_PARAMAX	<ul style="list-style-type: none"> <li>Approved installation engineers</li> </ul>
Maintenance manual	MM_PARAMAX	<ul style="list-style-type: none"> <li>Approved maintenance engineers</li> </ul>
Logbook, if applicable	LOG_PARAMAX	<ul style="list-style-type: none"> <li>Approved installation engineers</li> <li>Approved maintenance engineers</li> </ul>
Spare parts drawing, if applicable	SD_XXXX	<ul style="list-style-type: none"> <li>Approved maintenance engineers</li> </ul>
Service manual of the lubrication and cooling system, if applicable	LC_XXXX	<ul style="list-style-type: none"> <li>Approved installation engineers</li> <li>Approved maintenance engineers</li> </ul>
Drive package documentation, if applicable	DP_XXXX	<ul style="list-style-type: none"> <li>Approved installation engineers</li> <li>Approved maintenance engineers</li> </ul>

Explanation of codes:

- XXXX: the manufacturing number of the gear unit. Refer to the type plate.

## 2.8

### Storage of this document and the related documents

This document and the related documents are a part of the gear unit.

- Make sure that you keep the document and the related documents in a dry and clean location.
- Make sure that the document and the related documents are available to all personnel.

## 2.9 Abbreviations

Abbreviation	Description
SDT	Sumitomo Drive Technologies
LSS	Low-Speed Shaft
HSS	High-Speed Shaft

## 2.10 Customer support

### Procedure

1. If more information is necessary, speak to SDT.
2. Give the serial number and gear unit type to SDT. Refer to the type plate.

## 3 Description

### 3.1 Intended use

The gear unit is a part of a machine.

Only use the gear unit for the application, ambient conditions, operation conditions and other conditions of use shown in the order acknowledgement.

Resonant vibrations may cause severe overloads on components which may be several times higher than the nominal load. The responsibility for the vibration analysis which includes the total system of driver, gearbox, driven equipment, couplings, mounting conditions and sources of excitation rests with the owner of the installation. SDT is not responsible for system dynamics and related damage.

### 3.2 Type plate

#### 3.2.1 Type plate

The type plate gives information about the gear unit.

Sumitomo Drive Technologies		MEMBER OF	
TYPE	A	B	
N°	C		
P <sub>NOM</sub> / T <sub>NOM</sub>	D / E	SF	F
Ratio	G	m	H
min <sup>-1</sup>	I		
	Z		
Oil	J		
ISO VG	K	K	
MIN startup T	L	L	
MAX ambient T	M	M	
OIL VOLUME	N		
Grease	O	Nipples	P
	Q		

- A Manufacturing number
- B Gear unit type
- C Production number
- D Nominal power rating at the HSS
- E Nominal torque rating at the LSS
- F Service factor
- G Exact ratio (R: reduction, M: multiplication)
- H Mass of the gear unit, without gear oil
- I Input speed n<sub>1</sub> (output speed n<sub>2</sub>)  
Input speeds n<sub>1</sub>/n<sub>1</sub>' (output speeds n<sub>2</sub>/n<sub>2</sub>')  
Variable input speed n<sub>1</sub>-n<sub>1</sub>' (variable output speed n<sub>2</sub>-n<sub>2</sub>')

- J Type of gear oil
- K Viscosity of the gear oil
- L Minimum temperature for the oil bath for startup
- M Maximum ambient temperature for which the viscosity of the gear oil is applicable
- N Quantity of gear oil
- O Grease quantity type
- P Number of lubrication points
- Q Grease type
- Z Remarks

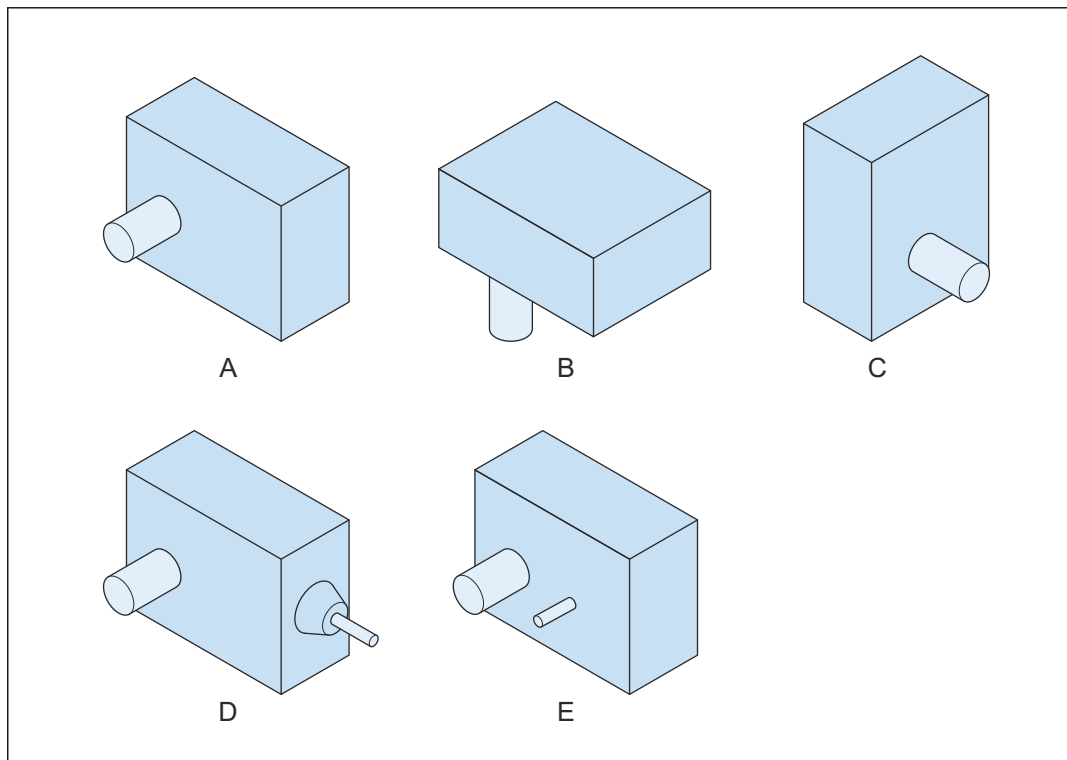


**Note:** The certified drawing shows more data:

- illustration of the gear unit type
- connection diagrams
- dimensions







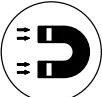




### 3.3


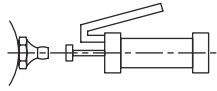
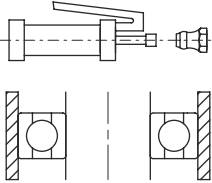
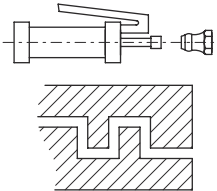






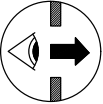
#### Gear unit configurations

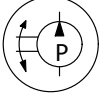
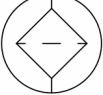
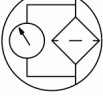
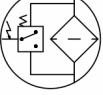
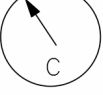
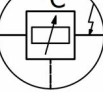
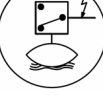
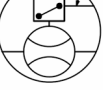
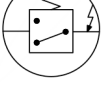
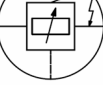

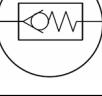








- A "Horizontal" installation
- B "Vertical" installation
- C "Upright" installation
- D "Right angle" shafts
- E "Parallel" shafts

### 3.4 Signs in the documentation and on the gear unit

Sign	Description
	Risk of hot surface
	Protective clothing is mandatory.
	Hearing protection is mandatory.
	Read and understand the installation and maintenance manual before any handling.
	Dipstick
	Oil drain
	Magnetic
	Drain valve with hose coupling
	Oil fill plug
	Breather plug
	Anti-humidity

Sign	Description
	Condensation drain
	Lubrication point for grease
	Lubrication point for grease at bearing
	Lubrication point for grease at labyrinth seal
	Direction of rotation: clockwise
	Direction of rotation: counterclockwise
	Breather plug to prevent ingress of moisture
	Level indicator
	Gauge glass
	Overflow
	Inspection opening

Sign	Description
	Pump lubrication
	Filter
	Filter with mechanical contamination indicator
	Filter with electrical contamination indicator
	Temperature indicator
	Temperature transmitter
	Level switch
	Flow switch
	Pressure switch
	Pressure transmitter
	Pressure indicator
	Pressure relief valve

Sign	Description
	Built-in backstop
	Heater
	Protection cap for bolt or nut
	Hole for vibration sensor
	Ground connection
	ATEX

## 3.5 Description of the lubrication of the gear unit

### 3.5.1 Function of lubrication

Lubrication is necessary for these functions:

- To prevent metal-to-metal contact in gears and bearings
- To decrease friction losses
- To dissipate generated heat from the gears and the bearings
- To prevent corrosion

These parameters have an effect on the type of lubrication system for the gear unit:

- Gear speed
- Mounting position of the gear unit
- Operation conditions

The certified drawing shows the lubrication system that is used for your gear unit.

### 3.5.2 Oil bath lubrication

The parts of the gear unit that turn get the oil from the oil bath and supply the oil on all the necessary parts of the gear unit. After the lubrication, the oil flows back to the oil bath in the housing of the gear unit.

### 3.5.3 Splash lubrication

The movement of the gears splashes oil on all the parts where lubrication is necessary.



### 3.5.4 Force-feed lubrication

An oil pump lubricates all turning parts above the level of the oil bath. The oil pump pumps the oil through pressure lines.

There are different types of oil pumps:

- Integrated pump: one of the shafts of the gear unit operates the oil pump.
- Motor pump: a motor operates the oil pump.

The lubrication can be circulation lubrication or pressure lubrication.

#### Integrated pump

Refer to the certified drawing for the lubrication system for your gear unit. The lubrication system can have these parts:

- A pump
- A filter with bypass
- A flow switch

The pump can operate in two directions of rotation.

#### Motor pump

A sign on the pump shows the direction of rotation of the motor shaft of the motor pump.

### 3.6 Breather plug

A breather plug is installed to prevent a too high pressure in the gear unit.

### 3.7 Cooling system

A cooling system can be necessary to remove heat from the gear unit. Friction and churning of gears and bearings in the gear oil causes the heat.

The certified drawing shows the cooling system that is used for your gear unit, if any.

### 3.8 Direction of rotation of the shafts

As a standard, the shafts of the gear unit can turn in two directions. If the shafts of the gear unit can only turn in one direction, a sign on the gear unit and the certified drawing shows this.

## 4 Safety

### 4.1 Restrictions



**Warning:** Use of the gear unit in ways other than described in the related documents may result in injury, death, or property and equipment damage. Use the gear unit only as described in the related documents.

SDT cannot be held responsible for injuries or damages resulting from non-standard, unintended use of the gear unit. The gear unit is designed and intended only for the purpose described in the related documents.

Unintended use includes these actions:

- Making changes to the gear unit that have not been recommended in the related documents or using parts that are not replacement parts or accessories from SDT.
- Use of materials or equipment that are inappropriate or incompatible with the gear unit.
- Use of gear oils and grease that is not indicated on the type plate or the specifications in this document.
- Allowing unapproved personnel to perform any task on or with the gear unit.

### 4.2 Approved installation engineer

The term approved installation engineer is specified here as a person that fully knows the gear unit and its safe operation. Approved installation engineers obey all related safety regulations and are approved to safely install the gear unit.

It is the responsibility of the company that owns the system where the gear unit is part of to make sure that all installation engineers obey these requirements.

### 4.3 General safety instructions



**Warning:** Obey the specifications that the certified drawing shows. If specifications in this document and the certified drawing for the same item are different, only the specifications in the certified drawing are applicable.

- When you do work on or with the gear unit, obey all legislation and regulations that apply to safety and work requirements, that apply in the country and at the location where you do work on the gear unit.
- Obey the safety instructions of the manufacturer of all chemical materials, including gear oil and grease. Refer to the material data sheets of the chemical material. Make sure that all personnel that installs, does maintenance and servicing on the gear unit, receives these safety instructions.
- Do not open the gear unit near an open flame, spark or hot object. If not this can cause ignition of the fumes of the oil.
- If the gear unit is used as a part of a system that moves persons, obey all regulations and install all necessary safety devices.
- Do not use a gear unit that has damage.
- Do not use a gear unit that gives unexpected noise and vibrations.
- Do not cause a blockage of the air flow around the gear unit. For the dimensions, refer to the certified drawing.

## 4.4 Safety instructions for installation

- Make sure that the personnel that lift the gear unit are approved and obey state-of-the-art safety procedures and state-of-the-art lifting equipment.
- Obey the European Directives 2006/42/EG and the local safety regulations and install guards and other safety equipment.
- Make sure that the drive group the gear unit is a part of, cannot start when you install the gear unit.
- If safety devices are removed for installation, make sure they are correctly installed again before you start the gear unit.
- Make sure that the installation agrees with the EMC directive.

## 4.5 Special safety instructions (backstop)



### Warning:

- Do not loosen a part of the backstop when there is load on the gear unit. In this condition, the gear unit can turn in the incorrect direction.
- Make sure that a failure of a backstop cannot cause injury or damage to the system.

## 4.6 Noise and vibrations

The drive group, which the gear unit is a part of, and the attached parts cause vibrations and noise.

To agree with local legislation, it can be necessary to decrease the noise of the drive group and the attached parts. Speak to SDT.

If you cannot do such procedures, all personnel that does work with or adjacent to the drive group must wear correct personnel protection equipment, to decrease the noise to the ears.

Make sure that the vibration agrees with ISO standard 10816-3.

## 4.7 Partly completed machine

The gear unit is a part of a drive group. Refer to the documentation of the drive group and obey all instructions of the drive group.

## 4.8 Instructions in case of a fire



**Warning:** After a fire, protective clothing and respiratory equipment are mandatory to handle the gear unit. After a fire, the gear unit can contain dangerous substances that cause injury when you touch or breath them.

- Do not start a gear unit that has burn marks. Speak to SDT.
- Hazardous substances of combustion can be generated in a fire involving materials in section [Materials of the gear unit](#) on page 58.

## 4.9 Disposal of the gear unit or parts of the gear unit

- When you discard the gear unit or the components of the gear unit, obey the local environmental regulations.
- At the end of the service life of the gear unit or the components of the gear unit, try to recycle to prevent environmental pollution.



- Obey the local environmental regulations when you discard used oil. Do not put it on garden soil, wooded areas, in streams or in sewage drains.
- Remove spilled oil immediately.
- Sort metal and electrical components correctly. Make sure that these components are recycled.
- Obey the environmental regulations to discard materials that you cannot recycle.

## 4.10 Warranty

The warranty clause of the general conditions of sale applies to gear units installed and maintained as per instructions contained in this document, including the related documents, and in any additional instruction leaflets supplied with the gear unit insofar as the gear unit operates within the service and rating conditions put forward in the order acknowledgment and on the certified drawing.

Non compliance with these instructions, injudicious choice of lubricant or a lack of maintenance will render warranty agreement invalid.

This warranty clause applies to all parts of the gear unit with the exception of those parts which are subject to wear.

## 5 Transport

### 5.1 Off-site transport



**Caution:** Prevent vibration of the gear unit. Vibration can cause damage to the gears and the bearings.

#### Procedure

1. If you move the gear unit with a train, prevent damage to gears and bearings. Use an anti-brinelling device.

### 5.2 On-site transport

#### 5.2.1 Lift the gear unit

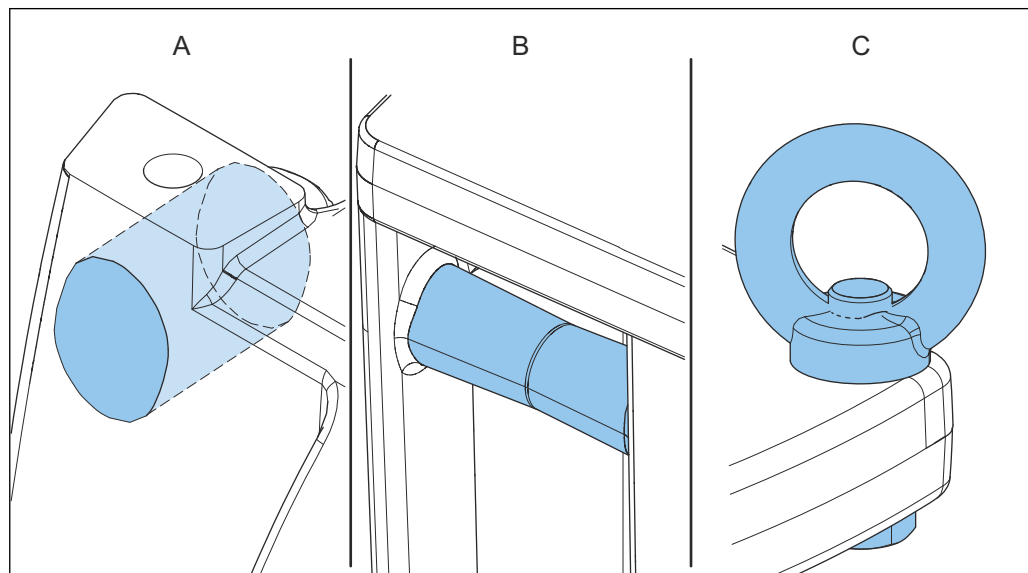


**Note:** The certified drawing shows more data:

- dimensions
- mass

SDT makes sure that all necessary lifting points are installed on the gear unit.

These are the possible lifting points:



- A Integrated lifting eye
- B Integrated bar
- C Lifting eye

### Prepare to lift the gear unit

**Warning:**

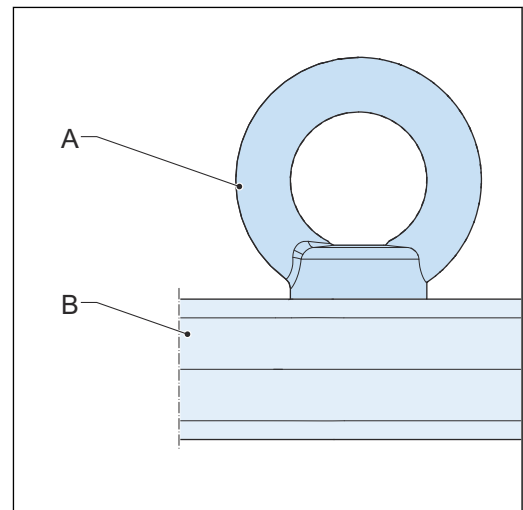
- Make sure that the personnel that lift the gear unit are approved and obey state-of-the-art safety procedures and use state-of-the-art lifting equipment.
- Do not connect the lifting equipment to other parts of the gear unit than the lifting points.
- If only the gear unit is supplied, use the lifting points to lift the gear unit.
- If the gear unit is supplied as a part of a drive group on a chassis, refer to the certified drawing for the correct lifting points.
- If the gear unit is supplied as a part of a drive group without chassis, only use the lifting points on the gear unit.



**Caution:** If parts of the gear unit are removed to move the gear unit, make sure that water or contamination cannot come into the lubrication system or the gear unit.

### Procedure

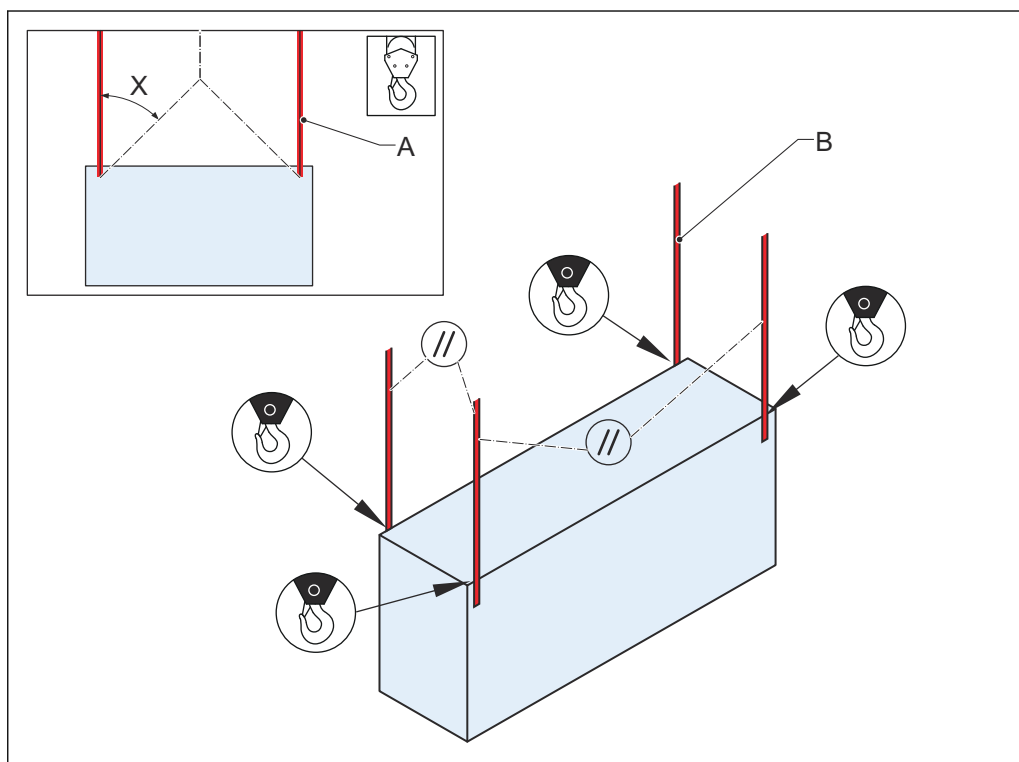
1. Do a check on the lifting points for these signs:
  - Fatigue
  - Cracks
  - Deformation
  - Rupture
  - Corrosion
2. If you see one of these signs, do not lift the gear unit.
3. For a gear unit with lifting eyes, make sure that the lifting eyes (A) are correctly installed on the housing of the gear unit (B).
4. Make sure that the lifting equipment agrees with all local regulations.



### Lift the gear unit



**Warning:** Make sure that the lifting cables do not cause damage to external components of the gear unit.



#### Procedure

1. For gear units with horizontal LSS with integrated lifting eyes: make sure that the maximum angle (X) of the lifting cables (A) is  $45^\circ$  in the plane of the long side of the gear unit.
2. For all other gear units, make sure that all lifting cables (B) are vertical and parallel to each other.
3. Connect the lifting equipment to the gear unit. Use all lifting points of the gear unit.
4. Lift the gear unit. Use the safe lifting equipment.

## 6 Storage

### 6.1 General storage instructions

The storage period starts when the gear unit leaves SDT.

Procedure

1. Prevent vibration of the gear unit.
2. Make sure that:
  - The ambient conditions for storage are correct. Refer to section *Ambient conditions for storage* on page 59.
  - The gear unit is installed, started and in operation before the end of the maximum storage time.
3. If it is necessary to put the gear unit in storage for more than 1 year, speak to SDT.
4. If a longer storage period, than shown in this chapter, is necessary, speak to SDT.

### 6.2 Indoor storage for maximum 1 year

Procedure

1. Obey also these instructions:
  - Keep the gear unit in a dry area with a good airflow.
  - Make sure that weather conditions have no effect on the gear unit.

### 6.3 Extended storage outdoors for maximum 2 years (extended outdoor storage)

The storage period starts when the gear unit leaves SDT. For this date, refer to the dispatch form.

Procedure

1. Make sure that the gear unit is installed, started and in operation before the end of the maximum storage time.
2. Obey also these instructions during the complete storage:
  - a) Prevent vibration of the gear unit.
  - b) Do not remove the gear unit from its seaworthy packing case.
  - c) Make sure that the seaworthy packing case is above water level (no submersion allowed).
  - d) Put the seaworthy packing case on a stable and level ground.
  - e) Put a plastic cover on the seaworthy packing case to prevent contamination with dust and water.
  - f) Make sure that there is no damage of the seaworthy packing case. If you see damage to the seaworthy packing case, tell SDT Services immediately.



## 6.4 Extended storage indoors for maximum 5 years (extended indoor storage)

The storage period starts when the gear unit leaves SDT. For this date, refer to the dispatch document.

### Procedure

1. Make sure that the gear unit is installed, started and in operation before the end of the maximum storage time.
2. Obey these instructions during the complete storage:
  - a) Prevent vibration of the gear unit.
  - b) The ambient conditions for storage are correct. Refer to section [Ambient conditions for storage](#) on page 59.
  - c) Keep the gear unit in a dry area with a good airflow.
  - d) Make sure that weather conditions have no effect on the gear unit.
  - e) Put the gear unit on a stable and level ground.
  - f) Put a plastic cover on the gear unit to prevent contamination with dust.
3. Each year, do these inspections on the gear unit:
  - a) Examine the paint on the gear unit for damage.
  - b) Examine all bare surfaces for damage.
  - c) Apply anti-oxidising waxy varnish on all bare machined surfaces. Refer to section [Corrosion protection by SDT](#) on page 58.
4. Each 2 years, fill the gear unit again with rust preventive mineral oil.
  - a) Drain the oil from the gear unit. Refer to section [Drain gear oil](#) on page 46.
  - b) Add a volatile corrosion inhibitor to the gear oil. Speak to the supplier of the gear oil for instructions. Do not add more volatile corrosion inhibitor than specified in section [General specifications for lubricants](#) on page 67.
  - c) Seal all openings of the gear unit.
  - d) With your hand, turn the HSS until the LSS made 2 complete turns.

## 7 Installation

### 7.1 Maximum time between installation and commissioning

#### Procedure

1. Make sure that the time between installation and commissioning is not more than 1 month. If this is not possible, speak to SDT.

### 7.2 Remove the packaging material

#### Procedure

1. Move the package to a dry area that has a good airflow.
2. Do a check for these items:
  - Damage to the package.
  - Damage to the protection of machined surfaces and shaft extensions. For the specification of the protection, refer to section [Corrosion protection by SDT](#) on page 58.
3. If you see damage, tell SDT immediately.
4. Remove the packaging material from the gear unit.
5. Do a check if the gear unit agrees with the shipping papers.
6. If the gear unit shows damage or does not agree with your order, tell SDT immediately.

### 7.3 Installation instructions for parts that are not part of the gear unit

#### Procedure

1. For installation instructions of parts that are not included in this document: refer to the drive package documentation.
2. For installation of electrical components: refer to section [Related documents](#) on page 9.

### 7.4 Do a check for corrosion of internal parts of the gear unit

#### Procedure

1. Open the inspection cover. For the location of the inspection cover, refer to the certified drawing.
2. Do a check for corrosion of internal parts of the gear unit.
3. If there is a sign of corrosion of internal parts of the gear unit, do these steps:
  - a) Make a report.
  - b) Give the report to SDT.

### 7.5 Install the couplings

## Prepare

### Procedure

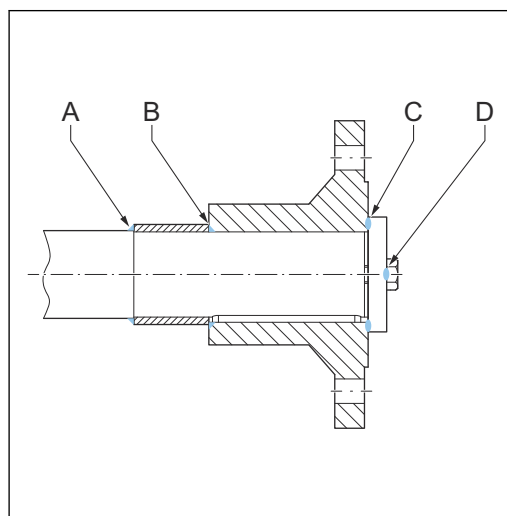
1. Remove the grease and contamination from the shaft extensions and from the coupling.
2. Make sure that the specifications of the coupling agree with the specifications on the certified drawing.

## Apply the sealing paste

### Procedure

1. Apply a sealing paste to the contact surfaces A, B, C and D. For the type of the sealing paste, refer to your supplier of the sealing paste.

The sealing paste prevents moisture, which can cause corrosion, to come between the parts.



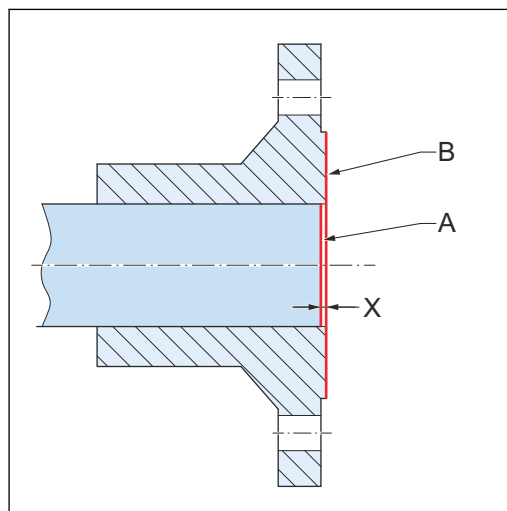
## Install the coupling hubs



**Caution:** Make sure that the temperature of the shafts, during the installation of the coupling hubs, is lower than 100 °C .

### Procedure

1. Install the spacer between the shaft shoulder and the coupling hub.
2. Install the coupling hubs on the shaft extensions. If necessary, apply heat on the couplings.
3. Make sure that the surface of the shaft extension (A) is flush with the surface (B) of the coupling or that the distance (X) is as low as possible (not negative). Obey the specifications of the supplier of the coupling.
4. If necessary, install more parts. Refer to the certified drawing:
  - Thrust washer
  - Bolt
5. Make sure that the assembly of the coupling hub, the spacer, the thrust washer and the bolt agree with these specifications. Speak to SDT to get specifications.



## Remove unwanted sealing paste and apply paint

### Procedure

1. Remove the sealing paste from all surfaces that are not contact surfaces.
2. Do a check for openings between the parts.
3. If you see openings, apply sealing paste and do steps 1 and 2 again.
4. Apply paint on all parts but not on the oil seals. Make sure that the paint agrees with the correct atmospheric corrosion class. Refer to the order acknowledgement.

**Caution:** Do not apply the paint on the oil seals.

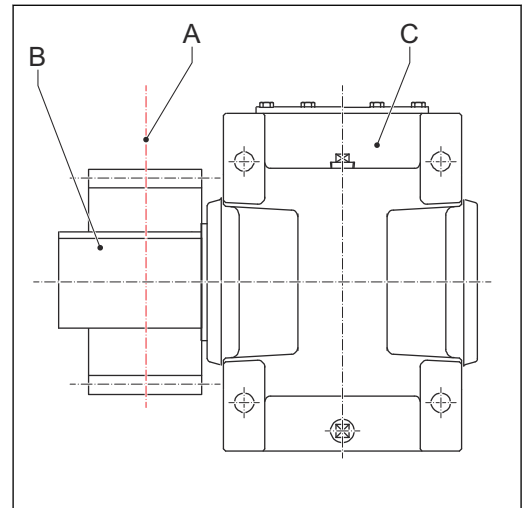


## 7.6 Install the chain, sprocket and gear

### Procedure

1. Make sure that the angle of the tension of the chain (A) is perpendicular to the shaft (B) of the gear unit (C).
2. Make sure that the pitch circle of the sprocket and gear is more than three times the diameter of the shaft.
3. Make sure that the distance between the sprocket and gear, and the gear unit is as small as possible.

Then, the point of application of the load is near to the vertical centerline of the gear unit.



## 7.7 Install the V-belt

### Procedure

1. Make sure that the tension of the V-belt agrees with the specifications of the manufacturer of the V-belt.
2. Make sure that the eccentricity of parallelism between the two pulleys is not more than specified. For the specification, refer to section [Eccentricity of parallelism between the two pulleys \(V-belt\)](#) on page 60.
3. If you use more than one V-belt, use the same circumferential length for all V-belts.

## 7.8 Install parts that give external loads to the gear unit



**Note:** Only do the steps if it is necessary to install parts that give external loads on the gear unit.

## Procedure

1. Make sure that the gear unit does not move during operation. Install thrust blocks.
2. Make sure that the distance between the external load and the housing of the gear unit is as small as possible.
3. Make sure that only the external loads that agree with the order acknowledgement or the certified drawing work on the gear unit. This includes the loads of the machine in operation.

## 7.9 Install gear units with a backstop

**Warning:**

- Do not loosen a part of the backstop when there is a load on the gear unit. In this condition, the gear unit can turn in the incorrect direction.
- Make sure that a failure of a backstop cannot cause injury or damage to the system.
- If the gear unit is used as a part of a system that moves persons, obey all regulations and install all necessary safety devices.



**Caution:** Do not turn the gear unit in the incorrect direction. This condition causes damage to the backstop.

## Procedure

1. Make sure that the direction of rotation of the backstop shaft agrees with the direction of rotation of the machine shaft.



**Note:** For drive groups, use a phase meter to do a check on the direction of rotation of the machine shaft.

2. If it is necessary to change the direction of the backstop shaft, speak to SDT.

## 7.10 Align the gear unit

### 7.10.1 Align the gear unit in the horizontal plane

## Procedure

1. Put the gear unit in the correct position, as shown in the certified drawing.  
For instructions on how to lift the gear unit, refer to section [Transport](#) on page 21.
2. If it is necessary to install the gear unit in a position that is different from the position in the certified drawing, speak to SDT.
3. Put the gear unit on a rigid and stable bedplate or foundation.
4. Use 3 bolt holes and align the gear unit. Only use the bolt holes that are shown in the certified drawing.
5. Make sure that the inclination is correct. Refer to section [Position of the gear unit](#) on page 59.
6. Adjust the vertical position at the other bolt holes. Use spacers.
7. Make sure that the vertical adjustment of the other bolt holes agrees with the specification. Refer to section [Position of the gear unit](#) on page 59.

### 7.10.2 Align the LSS (multi-stage)



**Caution:** Obey the specifications. If not, the lifetime of the bearings and the couplings will be decreased.

#### Procedure

1. Make sure that only the external loads that agree with the order acknowledgement or the certified drawing work on the gear unit. This includes the loads of the machine in operation.
2. Make sure that the combination of the angular and radial misalignment agrees with the specification in section *Misalignment of the LSS* on page 59.

### 7.10.3 Align the LSS (single stage)

#### Procedure

1. Make sure that the misalignment is not more than specified. Refer to section *Misalignment of the LSS* on page 59.
2. If you use a flexible gear coupling, speak to SDT and give all external causes that have an effect on the gear unit.
3. Wait until SDT gives specifications for the misalignment.
4. Make sure that the misalignment is not more than these specifications.

### 7.10.4 Align the HSS

#### Procedure

1. Make sure that the misalignment is not more than specified. Refer to section *Misalignment of the HSS (couplings)* on page 59.
2. If you use a flexible gear coupling, speak to SDT and give all external causes that have an effect on the gear unit.
3. Wait until SDT gives specifications for the misalignment.
4. Make sure that the misalignment is not more than these specifications.

### 7.11 Attach the gear unit with the bolts (solid shafts)



**Warning:** If safety devices are removed for installation, make sure that they are correctly installed again before you start the gear unit.

## Attach the gear unit

### Procedure

1. Install the applicable bolts at the bolt holes of the gear unit. For the dimension and quality of the bolts, refer to section *Bolt specifications (solid shafts)* on page 60.
2. Tighten the bolts. For the correct torque, refer to section *Bolt specifications (solid shafts)* on page 60.
3. Do a check on the position of the gear unit. Refer to section *Align the gear unit* on page 29.
4. If the position does not agree with the specifications:
  - a) Loosen the bolts.
  - b) Align the gear unit. Refer to section *Align the gear unit* on page 29. Start with step 2 until the position agrees with the specifications.

## Install the safety cover

### Procedure

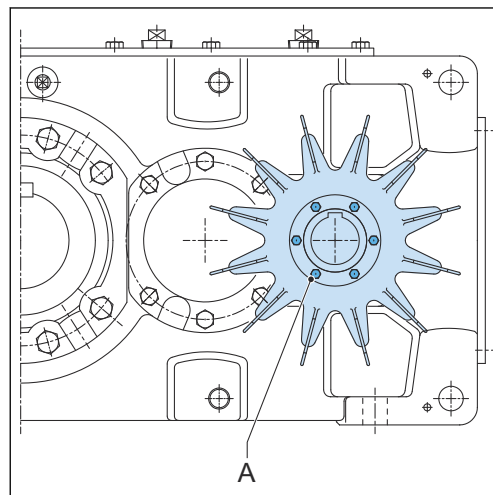
1. Install the safety cover.

## 7.12

## Attach the gear unit with the bolts (solid shafts, parallel shafts)

### Procedure

1. To get access to all the fixation bolts, remove the safety cover.
2. To remove the fan, remove the bolts (A).
3. Attach the gear unit with the bolts. Refer to section *Attach the gear unit with the bolts (solid shafts)* on page 30.
4. Install the fan. Tighten the bolts (A). For the correct torque, refer to section *Torque value for the bolts of the fan* on page 61.
5. Install the safety cover.



## 7.13

## Attach the gear unit (hollow shafts)

### 7.13.1

#### Install the shrink disk



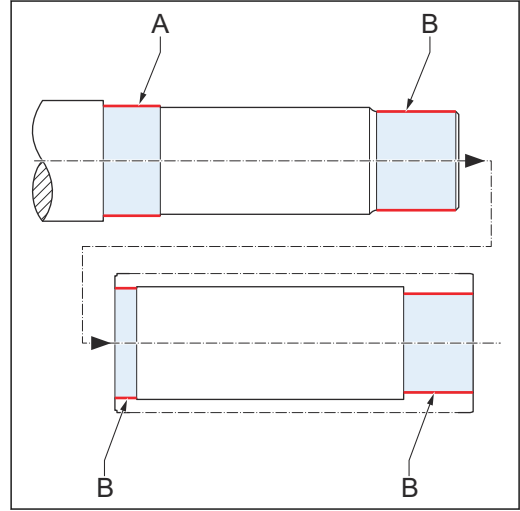
#### Warning:

- Do not disassemble the shrink disk. SDT prepared it for installation.
- Obey the specifications that the certified drawing shows. If specifications in this document and the certified drawing for the same item are different, the specifications in the certified drawing are applicable.

**Lubricate the contact surface**

Procedure

1. Clean and remove grease from the contact surfaces (A) and (B).
2. Apply lubricant, only to contact surface (A). For the lubricant specification, refer to section *Lubrication for installation (hollow shaft)* on page 63.
3. Do not apply lubricant to the surfaces (B). If there is lubricant on these surfaces, the friction between the machine shaft and the shaft of the gear unit will not be correct.
4. Wait until the lubricant is dry.



**Attach the gear unit to the machine shaft**



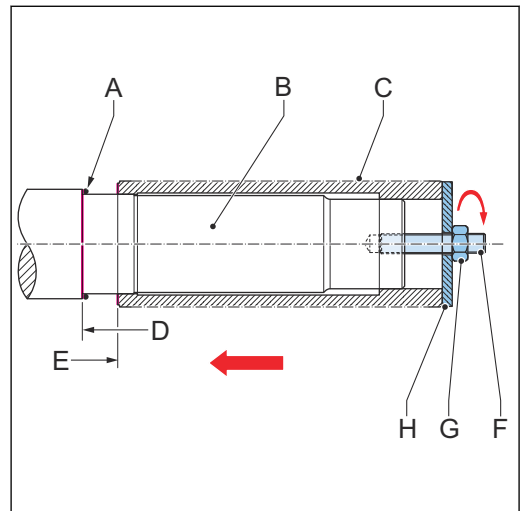
**Caution:** Make sure that there is no opening between the parts (A), (D) and (E). If there is an opening, water can come in and cause corrosion.



**Note:** The parts (F), (G) and (H) are not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies these parts.

Procedure

1. If necessary, install the O-ring (A) on the machine shaft (B). Refer to section *Shrink disk specifications* on page 64.
2. Move the gear unit (C) until the surfaces (D) and (E) tightly touch each other. Use the threaded rod (F), the nut (G) and the installation disk (H).



**Install the shrink disk**



**Caution:**

- Obey the instructions of the supplier of the shrink disk. Refer to the drive package documentation.
- Do not tighten the bolts crosswise.
- Do not tighten the bolts when the shrink disk is not at the correct location on the shaft.

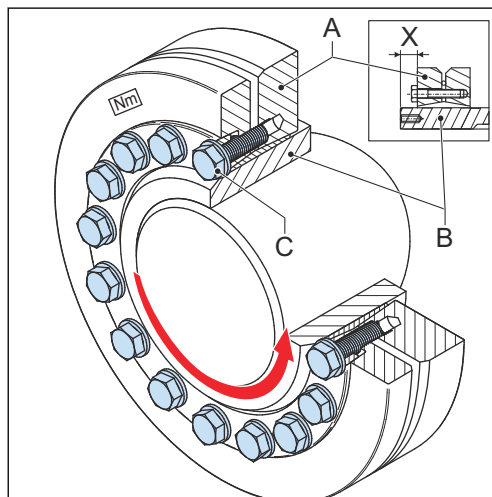


**Note:**

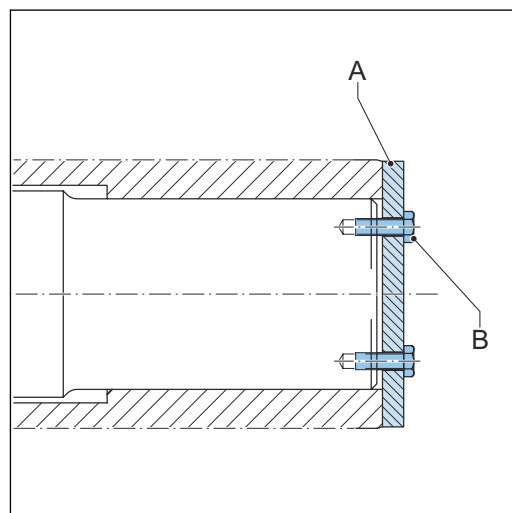
- The instructions from this point in the procedure only apply to the types of shrink disk that are specified in this manual. Refer to section *Shrink disk specifications* on page 64.
- The illustration below is a general illustration that applies to 2-part and 3-part shrink disks.

**Procedure**

1. Install the shrink disk (A) and make sure that the distance (X) between the shrink disk and the end of the hollow shaft (B) is correct. Refer to section *Shrink disk specifications* on page 64.
2. Tighten four bolts (C), at approximately equal distances on the shrink disk, 3/5 of the correct torque. Refer to section *Shrink disk specifications* on page 64.
3. Tighten all the bolts in some steps and increase the torque gradually, 30 degrees each time, to the correct torque. Start with one bolt and continue clockwise until the last bolt. Make sure that you keep the inner ring and outer ring parallel during the process.
4. Remove the threaded rod, the nut and the installation disk that are used for installation.

**Instructions if the shoulder of the machine shaft does not absorb the axial load****Procedure**

1. Install the locking disk (A) and the bolts (B).
2. Refer to the certified drawing for more instructions.

**Install the safety cover****Procedure**

1. Install the safety cover.

**7.13.2****Install the shaft with keyway connection (size 9015 to 9055, with shoulder)**

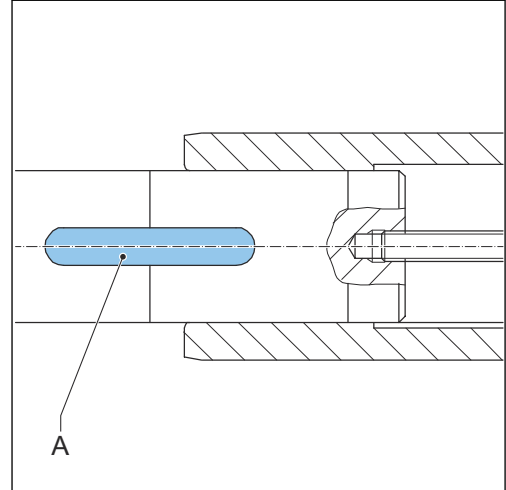
### Prepare



**Note:** The key is not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies this part.

#### Procedure

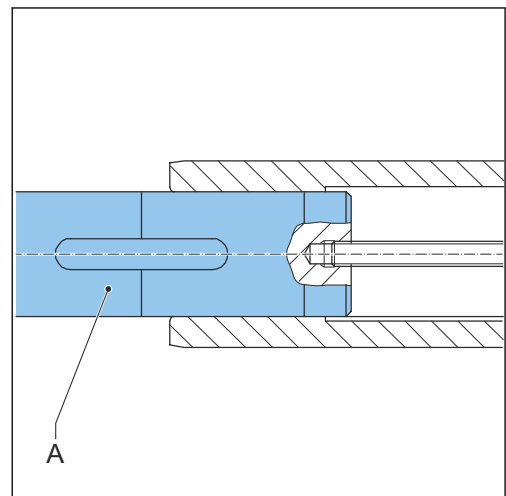
1. Make sure that the key (A) is installed.



### Lubricate the contact surface

#### Procedure

1. Clean and remove grease from the contact surface (A).
2. Apply lubricant, only to contact surface (A). For the lubricant specification, refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.
3. Wait until the lubricant is dry.



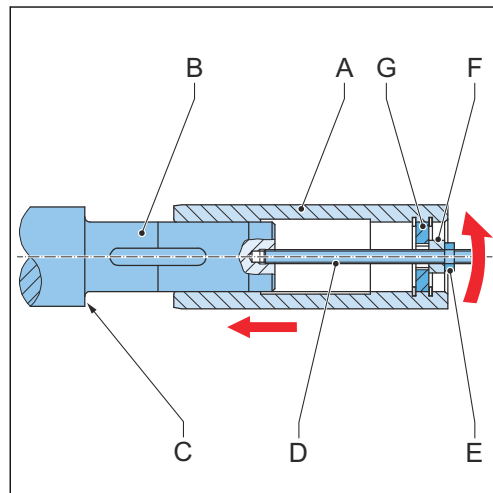
### Install the gear unit on the machine shaft



**Note:** The parts (D), (E) and (F) are not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies these parts.

## Procedure

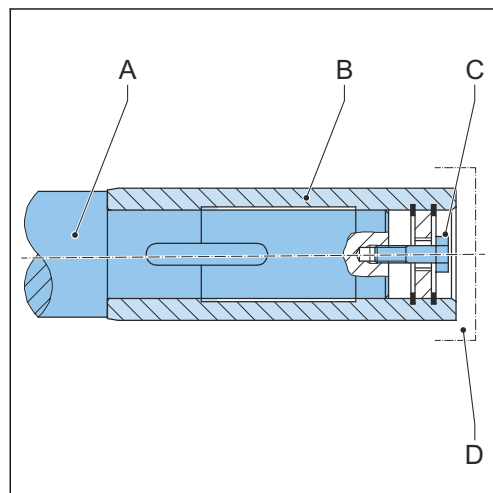
1. Align the gear unit (A) with the machine shaft (B). Make sure that the keyways of the machine shaft and the hollow shaft align.
2. Move the hollow shaft over the machine shaft until it touches the shoulder (C) of the machine shaft. Use the threaded rod (D) and the nut (E). If you cannot get access to the nut, install a washer (F) between the nut and the ring (G).
3. Remove these parts:
  - threaded rod
  - nut
  - washer



## Lock the shaft

## Procedure

1. Install the bolt (C). For the specifications of the bolt, refer to the certified drawing.
2. Install the safety cover (D). Refer to the certified drawing.
3. Make sure that there is no opening between the machine shaft (A) and the hollow shaft (B). Seal the machine shaft and the hollow shaft with a sealing paste. For the type of the sealing paste, refer to your supplier of the sealing paste.  
The sealing paste prevents moisture, which can cause corrosion, to come between the parts.



## 7.13.3

## Install the shaft with keyway connection (size 9015 to 9055, no shoulder)

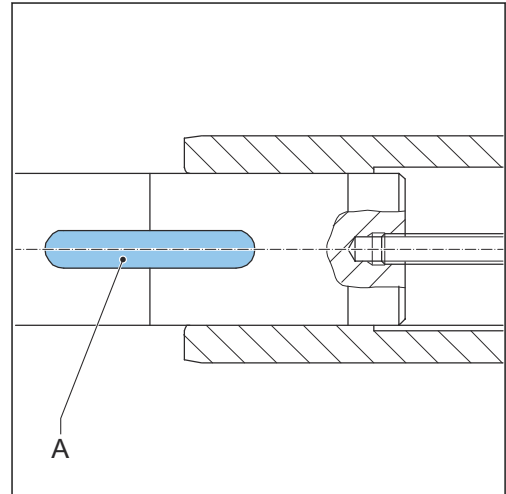
## Prepare



**Note:** The key is not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies this part.

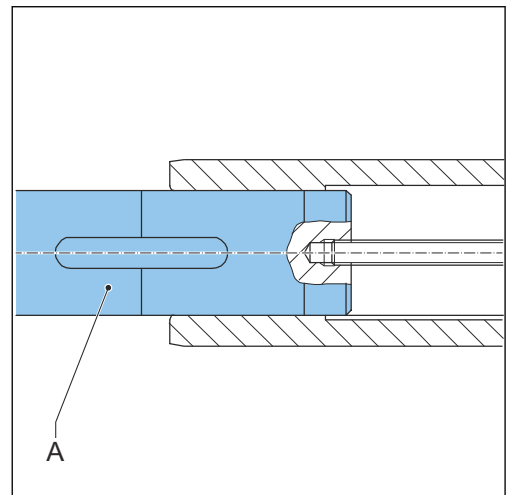
## Procedure

1. Make sure that the key (A) is installed.

**Lubricate the contact surface**

## Procedure

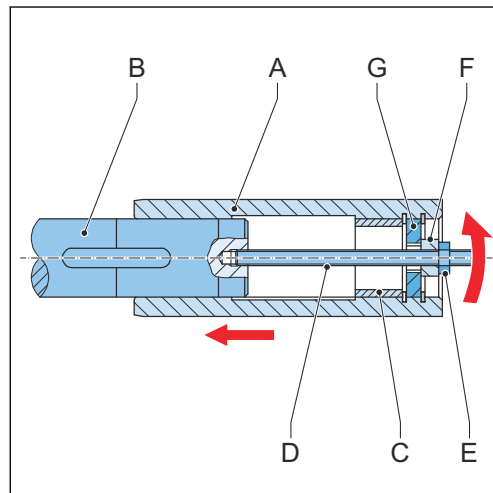
1. Clean and remove grease from the contact surface (A).
2. Apply lubricant, only to contact surface (A). For the lubricant specification, refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.
3. Wait until the lubricant is dry.

**Install the gear unit on the machine shaft**

**Note:** The parts (C), (D) and (E) are not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies these parts.

## Procedure

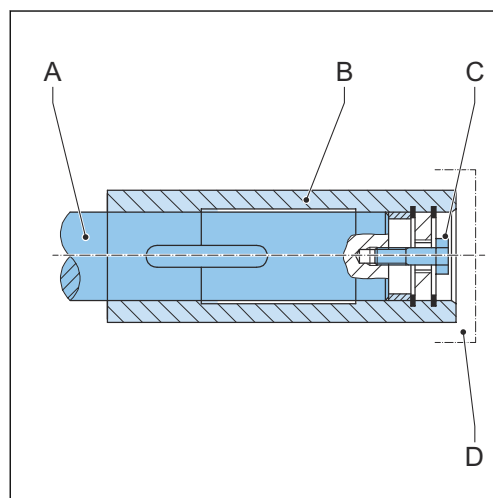
1. Align the gear unit (A) with the machine shaft (B). Make sure that the keyways of the machine shaft and the hollow shaft align.
2. Install a distance ring (C). For the specifications, refer to section [Distance ring specifications \(keyway connection, no shoulder\)](#) on page 63.
3. Move the hollow shaft over the machine shaft until the distance ring blocks the movement. Use the threaded rod (D) and the nut (E). If you cannot get access to the nut, install a washer (F) between the nut and the ring (G).
4. Remove these parts:
  - threaded rod
  - nut

**Lock the shaft**

## Procedure

1. Install the bolt (C). For the specifications of the bolt, refer to the certified drawing.
2. Install the safety cover (D). Refer to the certified drawing.
3. Make sure that there is no opening between the machine shaft (A) and the hollow shaft (B). Seal the machine shaft and the hollow shaft with a sealing paste. For the type of the sealing paste, refer to your supplier of the sealing paste.

The sealing paste prevents moisture, which can cause corrosion, to come between the parts.



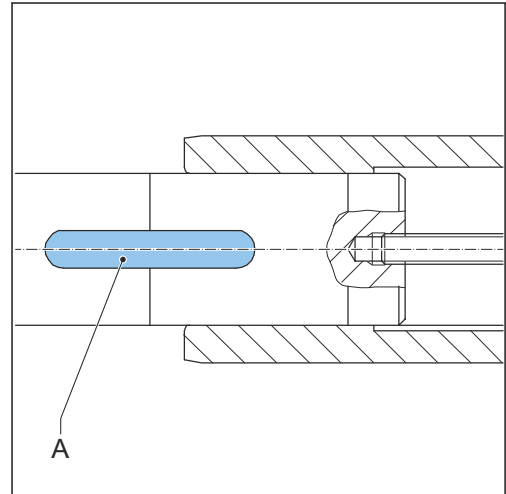
## 7.13.4

**Install the shaft with keyway connection (size 9060 to 9085, with shoulder)****Prepare**

**Note:** The key is not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies this part.

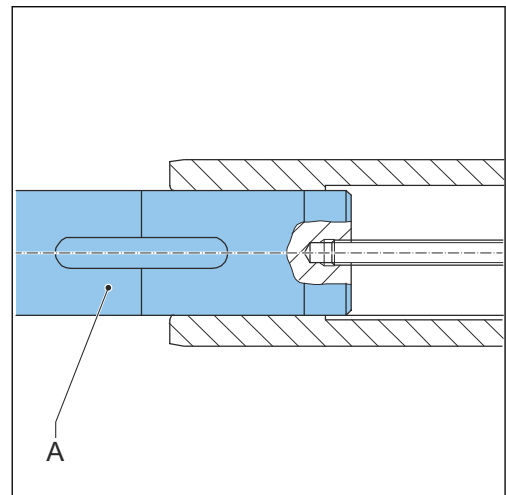
## Procedure

1. Make sure that the key (A) is installed.

**Lubricate the contact surface**

## Procedure

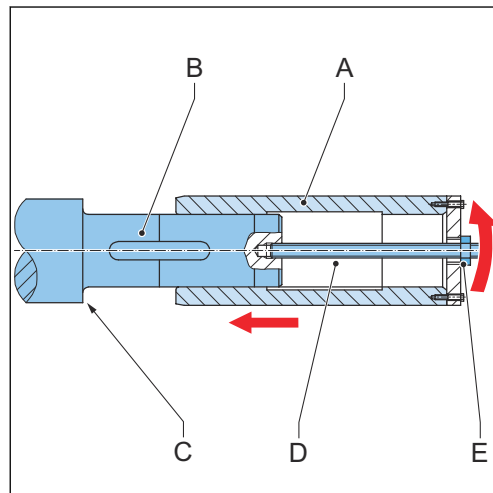
1. Clean and remove grease from the contact surface (A).
2. Apply lubricant, only to contact surface (A). For the lubricant specification, refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.
3. Wait until the lubricant is dry.

**Install the gear unit on the machine shaft**

**Note:** The parts (D) and (E) are not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies these parts.

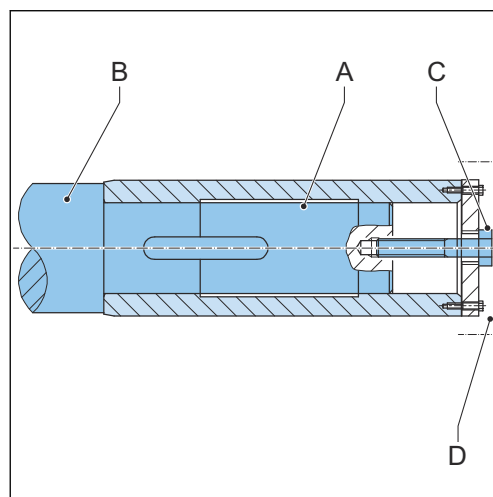
## Procedure

1. Align the gear unit (A) with the machine shaft (B). Make sure that the keyways of the machine shaft and the hollow shaft align.
2. Move the hollow shaft over the machine shaft until it touches the shoulder (C) of the machine shaft. Use the threaded rod (D) and the nut (E).
3. Remove these parts:
  - threaded rod
  - nut

**Lock the shaft**

## Procedure

1. Install the bolt (C). For the specifications of the bolt, refer to the certified drawing.
2. Install the safety cover (D). Refer to the certified drawing.
3. Make sure that there is no opening between the machine shaft (A) and the hollow shaft (B). Seal the machine shaft and the hollow shaft with a sealing paste. For the type of the sealing paste, refer to your supplier of the sealing paste.  
The sealing paste prevents moisture, which can cause corrosion, to come between the parts.



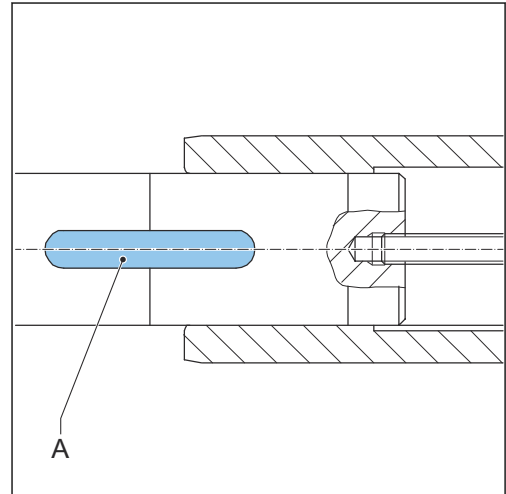
## 7.13.5

**Install the shaft with keyway connection (size 9060 to 9085, no shoulder)****Prepare**

**Note:** The key is not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies this part.

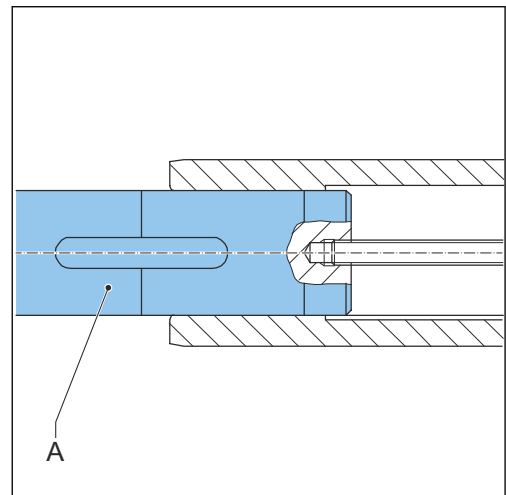
## Procedure

1. Make sure that the key (A) is installed.

**Lubricate the contact surface**

## Procedure

1. Clean and remove grease from the contact surface (A).
2. Apply lubricant, only to contact surface (A). For the lubricant specification, refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.
3. Wait until the lubricant is dry.

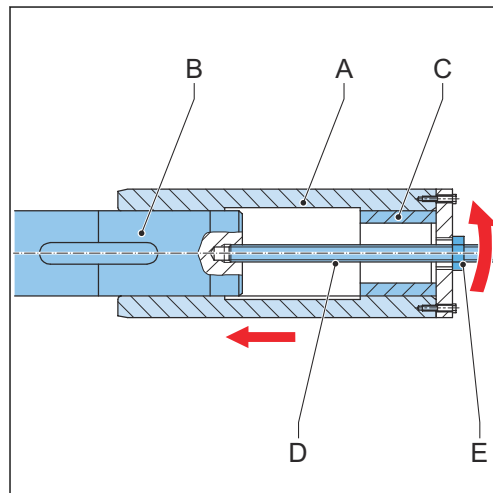
**Install the gear unit on the machine shaft**

**Note:** The parts (C), (D) and (E) are not a part of the gear unit. Speak to SDT if it is necessary that SDT supplies these parts.



## Procedure

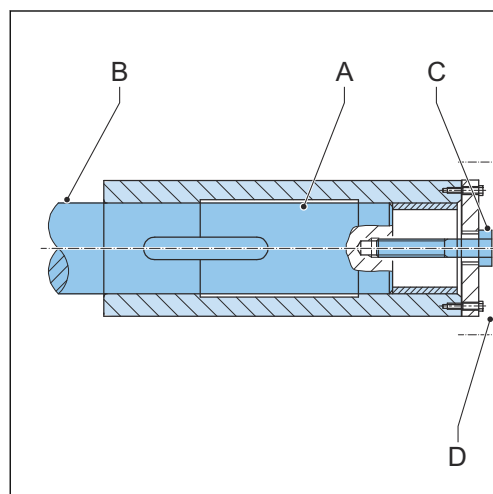
1. Align the gear unit (A) with the machine shaft (B). Make sure that the keyways of the machine shaft and the hollow shaft align.
2. Install a distance ring (C). For the specifications, refer to section [Distance ring specifications \(keyway connection, no shoulder\)](#) on page 63.
3. Move the hollow shaft over the machine shaft until the distance rings blocks the movement. Use the threaded rod (D) and the nut (E).
4. Remove these parts:
  - threaded rod
  - nut

**Lock the shaft**

## Procedure

1. Install the bolt (C). For the specifications of the bolt, refer to the certified drawing.
2. Install the safety cover (D). Refer to the certified drawing.
3. Make sure that there is no opening between the machine shaft (A) and the hollow shaft (B). Seal the machine shaft and the hollow shaft with a sealing paste. For the type of the sealing paste, refer to your supplier of the sealing paste.

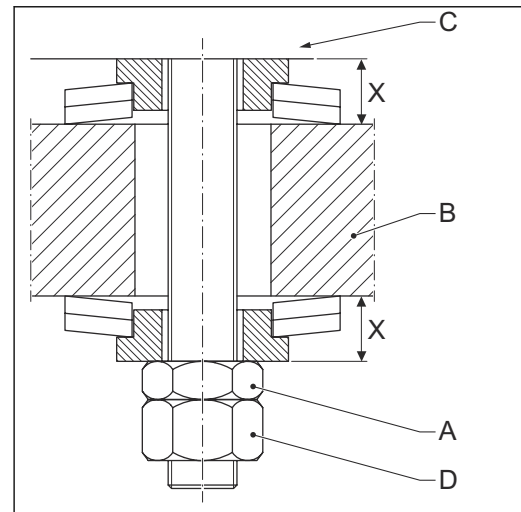
The sealing paste prevents moisture, which can cause corrosion, to come between the parts.



### 7.13.6 Install the torque arm

#### Procedure

1. Attach the gear unit to a torque reaction point. Use a torque arm. Refer to the certified drawing for the location of the torque arm on the gear unit.
2. Turn the nut (A) to the distance (X). (X) is the distance between the torque reaction point (B) and the gear unit (C). For the specification of (X), refer to section [Specifications for the torque arm \(hollow shaft\)](#) on page 66.
3. Turn the nut (D) tightly against the nut (A).
4. Apply torque seal to the nuts. Refer to section [Torque seal specification](#) on page 58.



### 7.14 Install the breather lines



**Note:** The certified drawing shows if the breather lines are necessary.



#### Caution:

- Make sure that the condensation water flows towards the condensation drain.
- Make sure that the breather operates outside the humid area to extend the lifetime of the breather.

#### Procedure

1. Remove the breather from the gear unit.
2. Install the breather lines.
3. Install the breather on the breather lines.

### 7.15 Install the drain lines



**Note:** The certified drawing shows if the drain lines are necessary.

#### Procedure

1. Make sure that the water in the drain lines cannot freeze.
2. Make sure that the drain valves are closed.

## 7.16 Install a ground connection



**Warning:** Do not use the gear unit as a part of a circuit to ground other machines.



**Caution:** Install a ground connection. If not, electric current can cause damage to the gears and the bearings.

### Procedure

1. Ground the gear unit.

## 7.17 Install the lubrication system

### 7.17.1 General instructions for the lubrication system



**Warning:** Obey the safety instructions of the manufacturer of all chemical materials, also of gear oil and grease. Refer to the material data sheets of the chemical material. Make sure that all personnel that installs, does maintenance and servicing on the gear unit, receives these safety instructions.



**Caution:** Make sure that during operation, the temperature of the gear oil is satisfactory. Refer to section [General specifications for lubricants](#) on page 67.



**Note:** For more information on and instructions for these parts of the gear unit, refer to the certified drawing and the service manual of the lubrication and cooling system:

- Lubrication system
- Instrumentation
- Settings

### 7.17.2 Instructions for force-feed lubrication (integrated pump)



**Note:** During startup, it is necessary to delay the alarm signal.

### Procedure

1. Wire the flow switch to make sure that the motor that operates the gear unit stops when the oil flow is less than the alarm level.

### 7.17.3 Instructions for force-feed lubrication (pump with a motor)



**Caution:** Make sure that the motor of the pump turns in the correct direction. If not, the gear unit is not lubricated correctly. This condition causes damage to the gear unit.

## Procedure

1. Refer to the service manual of the lubrication and cooling system.

## 7.17.4 Instructions for force-feed lubrication (pressure lubrication)

## Procedure

1. Refer to the service manual of the lubrication and cooling system.

## 7.18 Fill the gear unit with gear oil

### 7.18.1 Select the gear oil

**Caution:**

- Only use the gear oil that agrees with the type plate and with section [Lubricants](#) on page 67. Do not use another type of gear oil.
- Only use the markings on the dipstick to measure the gear oil level.
- Make sure that all items that can cause draining of the gear oil by accident are secured

**Note:**

- SDT is not responsible or liable if the supplier of oil changes the composition of the gear oil.
- It can be necessary to rinse the gear unit. Speak to the supplier of the gear oil.

## Procedure

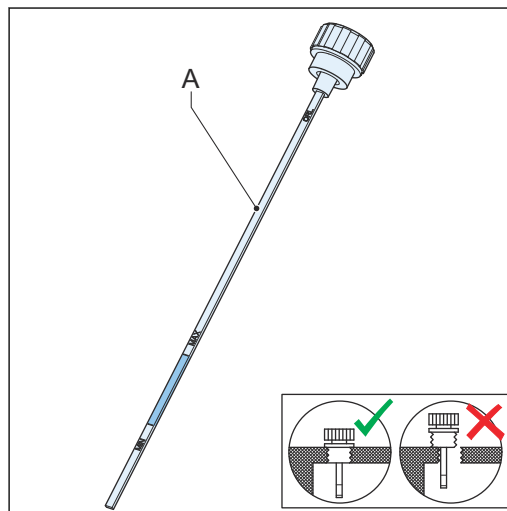
1. For the correct type and viscosity of gear oil, refer to the type plate.
2. With the type and viscosity, select the gear oil from the tables in section [Lubricants](#) on page 67.
3. If the gear unit contains gear oil for storage, drain it.

### 7.18.2 Measure the gear oil level

**Procedure if the gear unit has a dipstick**

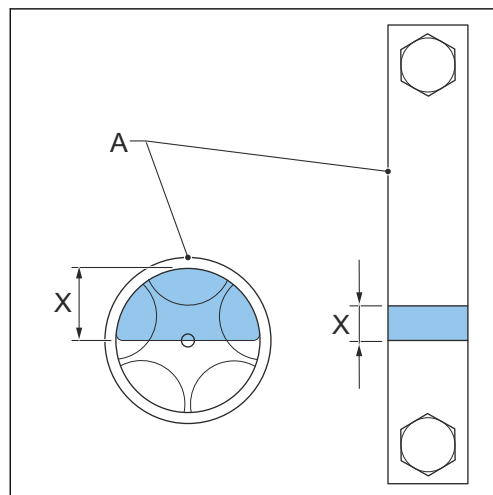
## Procedure

1. Remove the dipstick (A). Refer to the sign on the gear unit.
2. Clean the dipstick.
3. Lower the dipstick fully.
4. Remove the dipstick.
5. Read the gear oil level on the dipstick.
6. If the gear oil level is below the minimum level indicated on the dipstick, add gear oil.
7. If the gear oil level is above the maximum level indicated on the dipstick, drain gear oil.

**Procedure if the gear unit has a gauge glass**

## Procedure

1. Read the gear oil level on the gauge glass (A).  
The gear oil level must be in the range (X).
2. If the gear oil level is below the minimum level, add gear oil.
3. If the gear oil level is above the maximum level, drain gear oil.

**7.18.3****Add gear oil (all gear units)**

Only do the procedure if it is necessary to add gear oil.



**Caution:** Before you use a different type of gear oil that is in the gear unit, speak to the supplier of the gear oil. Not all gear oils are compatible with each other. The supplier of the gear oil gives instructions. Obey these instructions.

## Procedure

1. Open the gear unit at the oil fill plug. Refer to the sign on the gear unit.
2. Add gear oil.
3. If the gear unit has a motor pump, make sure that the pump goes on for minimum 3 minutes.
4. Measure the level of gear oil.

## 7.18.4 Drain gear oil

Only do the procedure if it is necessary to drain gear oil.

### Procedure

1. Put a container below the oil drain. Refer to the sign on the gear unit.
2. Open the gear unit at the oil drain. Gear oil comes out of the opening at the oil drain.
3. If the gear unit has a magnetic plug, clean it.
4. Close the oil drain. For the correct torque, refer to [Torque values for oil drain screw](#) on page 63.
5. Discard the gear oil in the container. Obey the local regulations to prevent environmental pollution.
6. Measure the gear oil level.

## 7.19 Add grease to the lubrication points for grease

### 7.19.1 Select the grease type



**Caution:** Only use the grease type that agrees with the type plate and with section [Lubricants](#) on page 67. Do not use another grease type.



**Note:** If the supplier of grease changes the composition of the grease, SDT is not responsible or liable.

### Procedure

1. For the correct grease type, refer to the type plate.
2. Use this data to select the grease from the tables in section [Lubricants](#) on page 67.

### 7.19.2 Add grease



**Caution:** Before you use a different type of grease that is in the gear unit, speak to the supplier of the grease. Not all greases are compatible with each other. The supplier of the grease gives instructions. Obey these instructions.



### Note:

- The grease nipples agree with the standard DIN 71412 or optional DIN 3404.
- For the grease quantity, refer to chapter [Grease quantity at lubrication points for bearings](#) on page 69.

### Procedure

1. Add grease to the grease nipples. Refer to the signs on the gear unit. Use a grease gun.

## 7.20 Install the oil-to-air cooler

### Procedure

1. Obey the instructions for the cooling system. Refer to the service manual of the lubrication and cooling system.

## 7.21 Install the water cooling

### 7.21.1 Install the water cooling



**Note:** If the certified drawing does not show the cooling water temperature, the water flow on the certified drawing is applicable to water at 20 °C (70 °F).

### Procedure

1. Obey the instructions for the water cooling system. Refer to the service manual of the lubrication and cooling system.

### 7.21.2 Install the oil-to-water cooler



**Caution:** Make sure that the quality of the cooling water agrees with the specification in the service manual of the lubrication and cooling system.

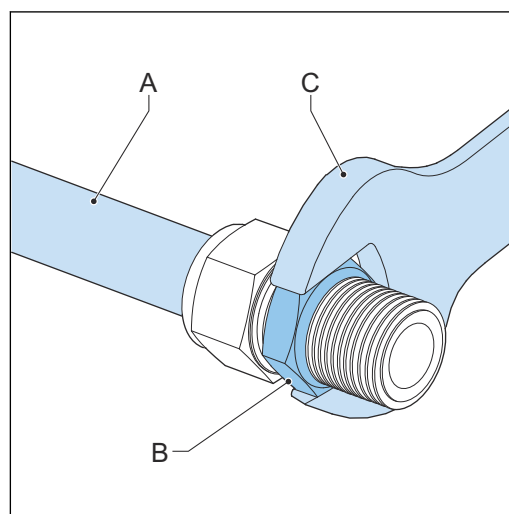
### Procedure

1. Connect the oil-to-water cooler to the cooling water supply.

### 7.21.3 Install the cooling coils

#### Procedure

1. Connect the cooling coil to the cooling water supply.
2. Make sure that the quality and water pressure of the cooling water agrees with the specifications. Refer to section [Cooling water specifications](#) on page 70.
3. While you connect the cooling coil (A), hold the connection (B) with an open spanner (C), to prevent torsion on the cooling coil.



## 7.22 Installation instructions (heater)

### Procedure

1. Make sure that the heater automatically goes off if the temperature of the gear oil has the correct temperature. For the specification, refer to [Additional gear oil specifications \(heater\)](#) on page 67.



## 8 Commissioning

### 8.1 Maximum time between commissioning and operation

#### Procedure

1. Make sure that the time between commissioning and operation is not more than 2 weeks. If this is not possible, speak to SDT.

### 8.2 Do a check on the gear unit

#### Procedure

1. Do a check on the gear oil level. Refer to [Measure the gear oil level](#) on page 44.
2. Make sure that all lubrication points for grease are filled.
3. Make sure that all safety covers are installed correctly.

### 8.3 Start instructions (backstop)



**Caution:** Do not turn the gear unit in the incorrect direction. This condition causes damage to the backstop.

#### Procedure

1. Make sure that the backstop operates correctly.

### 8.4 Start instructions (heater)

#### Procedure

1. Do not start the gear unit if the temperature of the gear oil is not correct. For the specification, refer to section [Additional gear oil specifications \(heater\)](#) on page 67.

### 8.5 Start instructions (force-feed lubrication, pump with a motor)

#### Procedure

1. Make sure that the pump goes on minimum 60 s before the gear unit starts.
2. For more instructions, refer to the service manual of the lubrication and cooling system.

## 8.6 Start instructions (force-feed lubrication, integrated pump)

### Procedure

1. Delay the alarm signal, to stop the motor that operates the gear unit when the oil flow is low, with 5 s. If not, unwanted alarms occur during startup.
2. For more instructions, refer to the service manual of the lubrication and cooling system.

## 8.7 Start instructions (drive group with a 2-speed motor)

### Procedure

1. Before you change from the higher to the lower speed, decrease the speed below the lower speed.  
Then, the motor must increase the speed to the lower speed. This condition prevents that the torque to the gear unit becomes too high.

## 8.8 Instructions after commissioning

### Procedure

1. Do a check on the gear oil level. Refer to section [Measure the gear oil level](#) on page 44.
2. While the gear unit operates, listen for unexpected noise and vibrations.
3. If you hear unexpected noise and vibrations, remove the source of the unexpected noise and vibrations.

#### Warning:



- Do not remove the safety covers.
- Do not use the gear unit before the source of the unexpected noise and vibrations is removed.

4. Examine the surface of the gear unit and the adjacent parts.
5. If you see leakage: find and remove the cause of the leakage.
6. Clean all parts that have gear oil or grease on the surface.
7. Make sure that the gear unit operates until the temperature is constant ( $\Delta T < 1 \text{ }^\circ\text{C} / 1 \text{ h}$ )
8. Make sure that the gear unit is aligned correctly. Refer to section [Align the gear unit](#) on page 29.

**Warning:** Do not touch the gear unit. It is hot. Use protective clothing



## 9 Instructions for operation

### 9.1 General instructions for operation



**Caution:** If the instructions are not obeyed during operation, this causes damage to the gear unit.

#### Procedure

1. Give all the instructions in this chapter to the owner of the gear unit.  
These instructions are a part of the instructions of a larger system in which the gear unit is one part.

### 9.2 Instructions (force-feed lubrication, pump with a motor)

#### Procedure

1. Make sure that a pump goes on minimum 60 s before the gear unit starts.

### 9.3 Instructions (water cooling)

#### Procedure

1. Drain the cooling water if the gear unit does not operate and the ambient temperature is below the freezing point.

### 9.4 Instructions (drive group with a 2-speed motor)

#### Procedure

1. Before you change from the higher to the lower speed, decrease the speed below the lower speed.  
Then, the motor must increase the speed to the lower speed. This condition prevents that the torque to the gear unit becomes too high.

### 9.5 Instructions to change the direction of rotation of the shafts

#### Procedure

1. Stop the gear unit fully before you change the direction of rotation of the shafts.



**Caution:** If you change the direction when the shafts move, you cause damage to the gear unit.

## 9.6 Instructions if the gear unit does not operate more than 2 weeks

### Procedure

1. Obey the general storage instructions. Refer to section [General storage instructions](#) on page 24.
2. Do one of these procedures:
  - Operate the gear unit for minimum 5 minutes each 2 weeks.
  - Protect the gear unit with a volatile corrosion inhibitor.
3. Before you start again, do all instructions in chapter [Commissioning](#) on page 49.

### Operate the gear unit for 5 minutes each 2 weeks

#### Procedure

1. Operate the gear unit for minimum 5 minutes each 2 weeks. In this condition, the gear oil prevents corrosion of the internal parts of the gear unit.

### Protect the gear unit with a volatile corrosion inhibitor

#### Procedure

1. Add a volatile corrosion inhibitor. Speak to the supplier of the gear oil for instructions. Do not add more volatile corrosion inhibitor than specified in section [General specifications for lubricants](#) on page 67.
2. Measure the gear oil level. Refer to section [Measure the gear oil level](#) on page 44.
3. Seal all openings of the gear unit.

## 10 Removal of the gear unit

### 10.1 General instructions for removal of the gear unit



**Warning:**

- Obey the instructions on how to move the gear unit when it is on-site. Refer to section *On-site transport* on page 21.
- Make sure that the gear unit cannot fall. Make sure that safe lifting equipment holds the gear unit.

Procedure

1. For removal instructions of parts that are not included in this document: refer to the drive package documentation.
2. Make sure that there is no load or torque on the gear unit.

### 10.2 Remove the gear unit (solid shafts, couplings)

Procedure

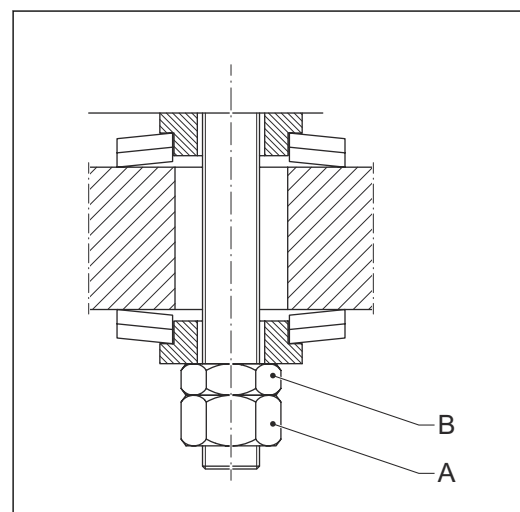
1. Disconnect the coupling. If SDT supplied the coupling, refer to the certified drawing. If SDT did not supply the coupling, refer to the instructions of the coupling.
2. Remove the bolts that connect the gear unit to the bedplate or foundation. Refer to the certified drawing.
3. To move the gear unit, refer to section *On-site transport* on page 21.

### 10.3 Remove the gear unit (hollow shafts)

#### 10.3.1 Disconnect the gear unit from the torque reaction point

Procedure

1. Remove the nuts (A) and (B).



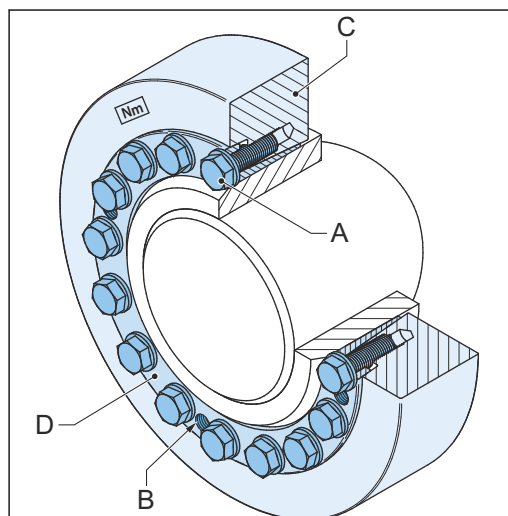
#### 10.3.2 Remove the shrink disk (2-part shrink disk)

**Remove the shrink disk**

## Procedure

1. Remove the safety cover.
2. Loosen the bolts (A) 1/4 of a turn. Start with one bolt and continue counterclockwise until the last bolt.
3. Do the step 2 again until all bolts are loose. Do not remove the bolts.
4. If the shrink disk does not become loose, do these steps:
  - a) Remove four bolts (A), adjacent to each of the four holes (B).
  - b) Install the bolts in the holes (B) and tighten them.

This way, the inner ring (D) and the outer ring (C) are pushed away from each other.

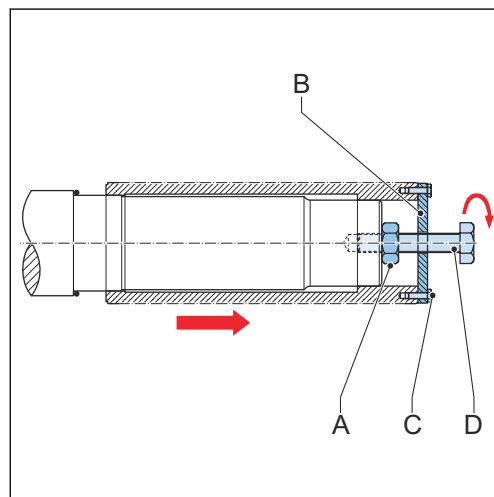


5. Remove the shrink disk.
6. Install the four bolts (A) in the holes where you removed them from.
7. If the shrink disk is dirty:
  - Clean the shrink disk.
  - Apply a solid lubricant to the machined surfaces. Refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.

**Remove the gear unit**

## Procedure

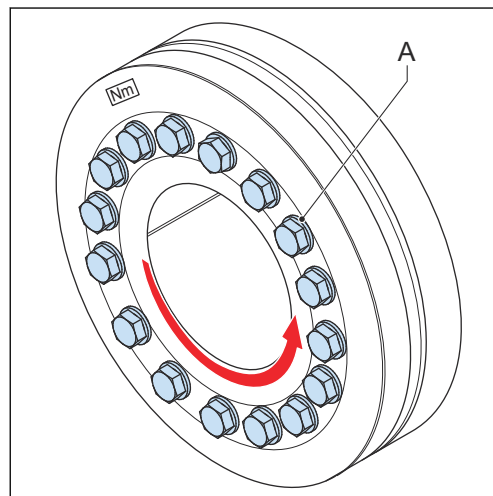
1. Install these parts:
  - Bolt (A). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with shrink disk](#) on page 61.
  - Installation disk (B)
  - Bolts (C) (for the type of bolts, refer to the certified drawing)
  - Bolt to remove the gear unit (D)
2. To remove the gear unit from the machine shaft, tighten the bolt (D).
3. To move the gear unit, refer to section [On-site transport](#) on page 21.

**10.3.3****Remove the shrink disk (3-part shrink disk)**

**Remove the shrink disk**

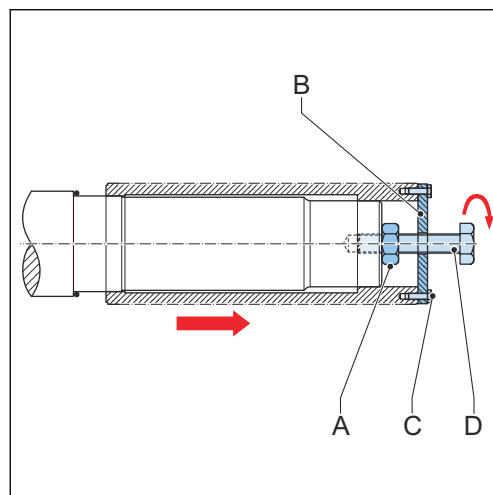
## Procedure

1. Remove the safety cover.
2. Loosen the bolts (A) 1/4 of a turn. Start with one bolt and continue counterclockwise until the last bolt.
3. Do the step 2 again until all bolts are loose. Do not remove the bolts.
4. Remove the shrink disk.
5. If the shrink disk is dirty:
  - Clean the shrink disk.
  - Apply a solid lubricant to the machined surfaces. Refer to section [Lubrication for installation \(hollow shaft\)](#) on page 63.

**Remove the gear unit**

## Procedure

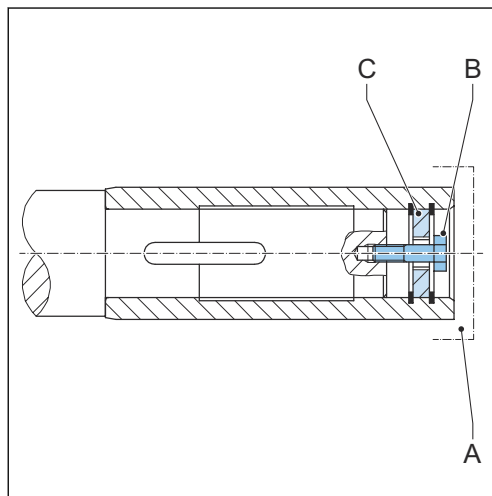
1. Install these parts:
  - Bolt (A). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with shrink disk](#) on page 61.
  - Installation disk (B)
  - Bolts (C) (for the type of bolts, refer to the certified drawing)
  - Bolt to remove the gear unit (D)
2. To remove the gear unit from the machine shaft, tighten the bolt (D).
3. To move the gear unit, refer to section [On-site transport](#) on page 21.

**10.3.4****Disconnect the keyway connection (size 9015 to 9055)**

**Prepare**

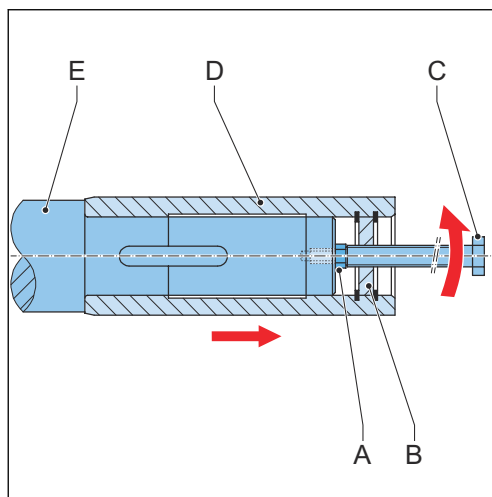
## Procedure

1. Remove these parts:
  - Safety cover (A)
  - Bolt (B)
  - Ring (C)

**Remove the gear unit**

## Procedure

1. Install these parts:
  - Bolt (A). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with keyway connection](#) on page 62.
  - Ring (B)
  - Bolt (C). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with keyway connection](#) on page 62.
2. To remove the gear unit (D) from the machine shaft (E), tighten the bolt (C).
3. To move the gear unit, refer to section [On-site transport](#) on page 21.

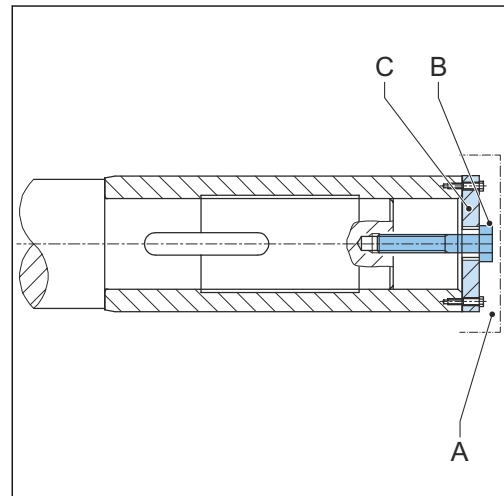
**10.3.5****Disconnect the keyway connection (size 9060 to 9085)**



**Prepare**

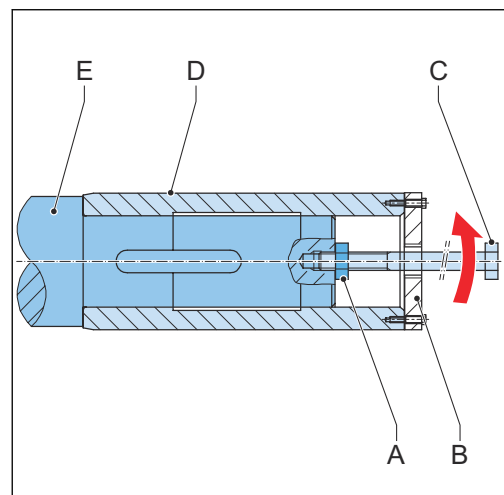
## Procedure

1. Remove these parts:
  - Safety cover (A)
  - Bolt (B)
  - Locking disk (C)

**Remove the gear unit**

## Procedure

1. Install these parts:
  - Bolt (A). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with keyway connection](#) on page 62.
  - Locking disk (B)
  - Bolt (B). For the size of the bolt, refer to section [Bolt specifications to remove the shaft with keyway connection](#) on page 62.
2. To remove the gear unit (D) from the machine shaft (E), tighten the bolt (C).
3. To move the gear unit, refer to section [On-site transport](#) on page 21.



## 11 Technical data

### 11.1 Dimensions and mass

Refer to the certified drawing.

### 11.2 Materials of the gear unit

- Gear oil
- Grease
- FKM (a type of fluoroelastomer)
- Copper
- Aluminium
- Polycarbonate (solid)
- Polypropylene (with embedded glass fibre or with carbon)
- Polyamide (solid)
- Polyphenol sulfide (solid)
- NBR (nitrile rubber)
- For information on the paint and other materials, refer to the drive package documentation.

### 11.3 Torque seal specification

Parameter	Specification
Torque seal	Loctite 7417 torque Marque or similar

### 11.4 Paint specification



**Note:** The order acknowledgment shows the paint specifications for your gear unit. The table below gives general paint specifications.

Parameter	Specification
Primer	Two-component, polyamide-cured epoxy pre-fabrication primer (20µm)
Finish	Two-component, high build, polyamine adduct-cured epoxy coating (200µm)
Total average minimum dry film thickness	220µm

### 11.5 Corrosion protection by SDT

Parameter	Specification
Inner parts	Rust preventive mineral oil
Breather plug	Present but not sealed
Shaft extensions	Rust preventive grease
Hollow shafts	Anti-oxidising waxy varnish

Parameter	Specification
Unpainted machined surfaces	Anti-oxidising waxy varnish

## 11.6 Position of the gear unit

Parameter	Specification
Inclination	Maximum 5 mm per 1 m (5/32 inch per 3 feet or 5 mrad or 17 arc minutes)
Accuracy of the vertical position from the fourth connection point [mm] ([inch])	0.1 (0.004)

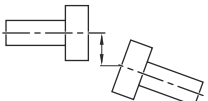
## 11.7 Ambient conditions for storage

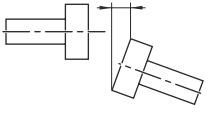
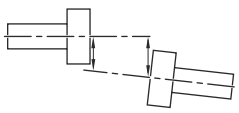
Parameter	Specification
Temperature [°C]	Above dew point temperature
Relative humidity, non-condensing [%]	Maximum 60
General protection	Against corrosion and contamination
Vibration	Not allowed

## 11.8 Misalignment of the LSS

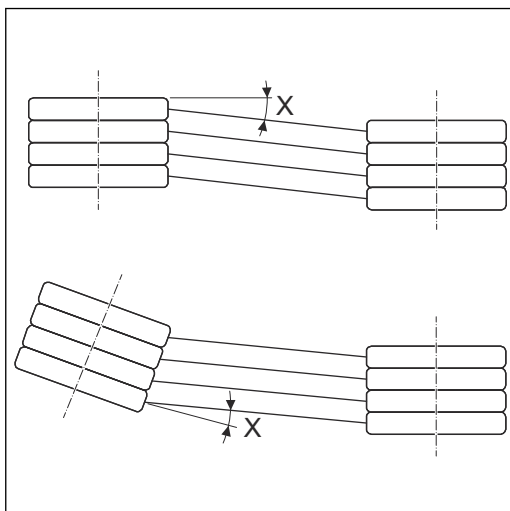
Parameter	Specification
$\frac{dr}{\Delta r} + \frac{d\alpha}{\Delta\alpha}$ <p>Misalignment equation, where</p> <ul style="list-style-type: none"> <li>• <math>dr</math> = measured radial misalignment [mm]</li> <li>• <math>\Delta r</math> = maximum permitted radial misalignment [mm]</li> <li>• <math>d\alpha</math> = measured angular misalignment [mm]</li> <li>• <math>\Delta\alpha</math> = maximum permitted angular misalignment [mm]</li> </ul>	Smaller than or equal to 1

## 11.9 Misalignment of the HSS (couplings)

Type of coupling	Speed of the HSS [1/min ]	Maximum permitted misalignment [mm] ([mils])
Short flexible coupling, radial misalignment 	750	0.19 (7.5)
	900	0.15 (6.0)
	1000	0.12 (4.8)
	1200	0.10 (4.0)
	1500	0.09 (3.5)
	1800	0.08 (3.0)

Type of coupling	Speed of the HSS [1/min ]	Maximum permitted misalignment [mm] ([mils])
Angular misalignment for coupling diameter 100 mm (10 inch) 	750	0.13 (13.0)
	900	0.10 (10.0)
	1000	0.096 (9.6)
	1200	0.08 (8.0)
	1500	0.07 (7.0)
	1800	0.05 (5.0)
Radial misalignment for the spacer shaft and membrane (disk) coupling, spacer length 100 mm (1 inch) 	750	0.25 (2.5)
	900	0.20 (2.0)
	1000	0.18 (1.8)
	1200	0.15 (1.5)
	1500	0.12 (1.2)
	1800	0.10 (1.0)

### 11.10 Eccentricity of parallelism between the two pulleys (V-belt)



Parameter	Value
Angle (X)	Maximum 20'

### 11.11 Bolt specifications (solid shafts)

Bolts according to DIN 267 bolt quality grade 8.8

Gear unit size	Bolt dimension [ISO]	Torque [Nm]
9015	M12	79
9025	M16	180
9030	M20	335
9035	M20	335
9040	M24	675

Gear unit size	Bolt dimension [ISO]	Torque [Nm]
9045	M24	675
9050	M24	675
9055	M24	675
9060	M30	1350
9065	M30	1350
9070	M36	2350
9075	M36	2350
9080	M36	2350
9085	M36	2350
9090	M36	2350
9095	M36	2350
9100	M42	3800
9105	M42 M36 <sup>1</sup>	3800 2350 <sup>1</sup>
9110	M48 M42 <sup>1</sup>	5700 3800 <sup>1</sup>
9115	M48	5700
9118	M48	5700
9121	M48	5700
9126	M48	5700
9128	M56	9150
9131	M56	9150
9136	M56	9150

## 11.12 Torque value for the bolts of the fan

Bolt dimension	Torque
M6	10.8 Nm

## 11.13 Bolt specifications to remove the shaft with shrink disk

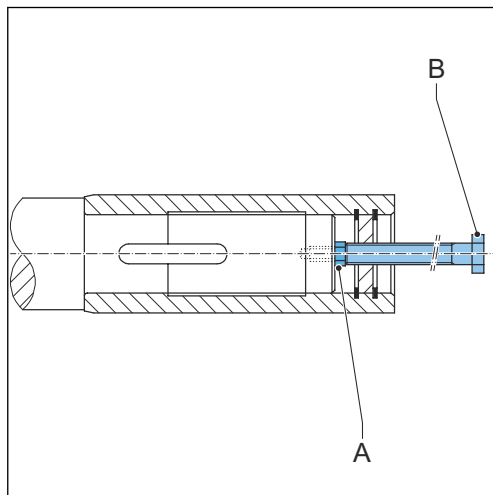
Gear unit size	Bolt size	Bolt length [mm]
9015	M20	20
9025	M20	20
9030	M20	20
9035	M24	25
9040	M24	25

<sup>1</sup> For "right angle" shafts, double reduction, "horizontal" installation

Gear unit size	Bolt size	Bolt length [mm]
9045	M24	25
9050	M24	25
9055	M24	25
9060	M24	25
9065	M30	30
9070	M30	30
9075	M30	30
9080	M30	30
9085	M30	30
9090	M36	35
9095	M36	35
9100	M36	35
9105	M36	35
9110	M36	35
9115	M36	35

## 11.14

### Bolt specifications to remove the shaft with keyway connection



Gear unit size	Bolt (A) size	Bolt (A) length [mm]	Bolt (B) size	Bolt (B) length [mm]
9015	M20	20	M24	350
9025	M20	20	M24	350
9030	M20	20	M24	350
9035	M20	20	M24	350
9040	M24	25	M30	450
9045	M24	25	M30	450
9050	M24	25	M30	450
9055	M24	25	M30	450

Gear unit size	Bolt (A) size	Bolt (A) length [mm]	Bolt (B) size	Bolt (B) length [mm]
9060	M24	30	M30	160
9065	M30	45	M36	220
9070	M30	45	M36	220
9075	M30	45	M36	220
9080	M30	30	M36	220
9085	M30	30	M36	220

### 11.15 Distance ring specifications (keyway connection, no shoulder)

Gear unit size	Diameter [mm] -0.3 / -0.1	Length [mm]
9015	55	5
9025	65	5
9030	75	5
9035	85	5
9040	90	4
9045	105	6
9050	105	6
9055	115	6
9060	125	25
9065	145	30
9070	145	30
9075	150	30
9080	165	30
9085	175	30

### 11.16 Lubrication for installation (hollow shaft)

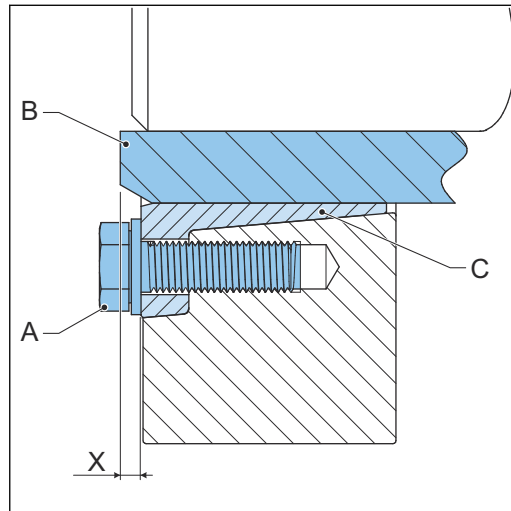
Parameter	Specification
Lubricant	Molykote D321R or similar (friction coefficient: 0.04)

### 11.17 Torque values for oil drain screw

Dimension of the drain screw	Torque
G ½ "	56,5 Nm
G ¾ "	73,4 Nm
≥ G 1 "	79 Nm

11.18 Shrink disk specifications

11.18.1 Shrink disk specifications (2-part shrink disk)

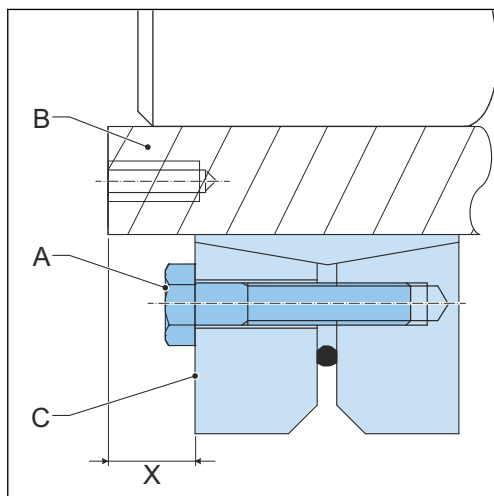


Gear unit size	SDT part number of the shrink disk	O-ring necessary	Torque of the bolts (A) [Nm] <sup>2</sup>	Distance X between the hollow shaft (B) and the shrink disk (C) [mm]
9070	901-SDA2D185001	No	290	26
9075	901-SDA2D200001	No	290	24
9080	901-SDA2D220001	No	570	22
9085	901-SDA2D240001	No	570	25
9090	901-SDA2D240001	Yes	570	25
9095	901-SDA2D260001	Yes	570	21
9100	901-SDA2D260001	Yes	570	21
9105	901-SDA2D280001	Yes	570	21
9110	901-SDA2D300001	Yes	990	32
9115	901-SDA2D320001	Yes	990	32

<sup>2</sup> Torque values only valid for 'Sumitomo Drive Technologies' branded shrink disc. For other brands, obey the installation instructions and torque values of the manufacturer.



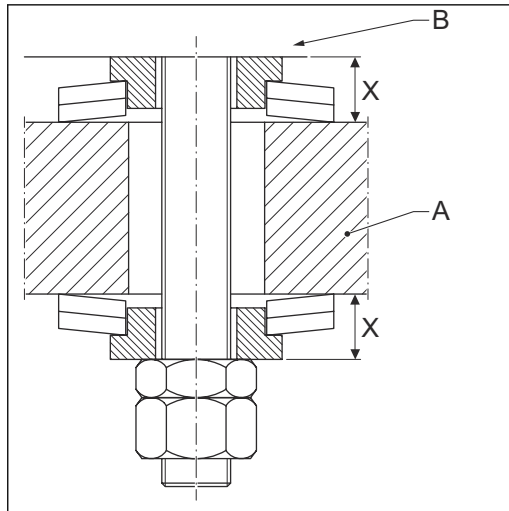
## 11.18.2 Shrink disk specifications (3-part shrink disk)



Gear unit size	SDT part number of the shrink disk	O-ring necessary	Torque of the bolts (A) [Nm] <sup>3</sup>	Distance X between the hollow shaft (B) and the shrink disk (C) [mm]
9015	TAS3091.4-080	No	35	14
9025	TAS3081.-090	No	35	14
9030	TAS3091.1-100	No	59	14
9035	TAS3093.-110	No	70	14
9040	TAS3081.-125	No	70	20
9045	TAS3093.-140	No	120	20
9050	TAS3093.-140	No	120	22
9055	TAS3091.-165	No	250	27
9060	TAS3091.-165	No	250	27
9065	TAS3091.-175	No	250	26
9070	TAS3081.-185	No	290	26
9075	TAS3081.-200	No	290	26
9080	TAS3081.-220	No	290	26
9085	TAS3081.-240	No	570	27
9090	TAS3081.-240	Yes	570	27
9095	TAS3081.1-260	Yes	535	27
9100	TAS3081.1-260	Yes	535	27
9105	TAS3081.1-280	Yes	535	27
9110	TAS3081.1-300	Yes	535	32
9115	TAS3091.-320	Yes	490	32

<sup>3</sup> Torque values only valid for 'TAS Schäfer' branded shrink discs. For other brands, obey the installation instructions and torque values of the manufacturer.

11.19 Specifications for the torque arm (hollow shaft)



**Note:** (X) Is the distance between the torque reaction point (A) and the gear unit (B).

Gear unit size	X	
	[mm]	[inch]
9015	13.1	0.516
9025	16.1	0.634
9030	18.9	0.744
9035	18.9	0.744
9040	21.7	0.854
9045	21.7	0.854
9050	21.7	0.854
9055	21.7	0.854
9060	32.2	1.28
9065	32.2	1.28
9070	38.2	1.50
9075	38.2	1.50
9080	38.2	1.50
9085	38.2	1.50
9090	38.6	1.51

Gear unit size	X	
	[mm]	[inch]
9095	38.6	1.51
9100	47.6	1.87
9105	47.6	1.87
9110	48.5	1.91
9115	48.5	1.91

## 11.20 Lubricants

### 11.20.1 General specifications for lubricants

Parameter	Specification
Initial gear oil cleanliness	-/15/12 (or better) according to ISO 4406
Gear oil: maximum allowable water content (Karl Fischer) [%]	0,05
NLGI-Grade of grease	3
	2 or 3, for labyrinth seals and lower bearing of the LSS
Nominal temperature of the gear oil in the oil bath, during operation [°C] ([°F])	60 - 80 (140 - 180)
Maximum volume concentration of corrosion inhibitor in the gear oil [%]	2
Working temperature range for corrosion inhibitor [°C] ([°F]) <sup>4</sup>	15 - 70 (60 - 158)

### General specifications for gear oil per viscosity grade

Viscosity grade	AGMA
ISO VG68	2EP
ISO VG100	3EP
ISO VG150	4EP
ISO VG220	5EP
ISO VG320	6EP
ISO VG460	7EP

### 11.20.2 Additional gear oil specifications (heater)

Parameter	Specification
Minimum gear oil temperature for startup	Refer to the type plate

<sup>4</sup> Make sure to store the gearbox in this temperature range for at least 5 days after each fill of corrosion inhibitor. Afterwards the conditions for storage apply. Refer to [Ambient conditions for storage](#) on page 59

Parameter	Specification
Gear oil temperature at which the heater must stop [°C] ([°F])	15 (60), unless the certified drawing shows another specification. Then, refer to the certified drawing.

### 11.20.3 Mineral gear oil and related grease

Table 1: Mineral gear oil, ISO VG68 and 100

Supplier	ISO VG68	ISO VG100
BP	Energol GR-XP-68	Energol GR-XP-100
CASTROL	Alpha SP68	Alpha SP100
	Optigear BM68	Optigear BM100
	Tribol 1100/68	Tribol 1100/100
CHEVRON TEXACO	Gear Compounds EP68	Gear Compounds EP100
	Meropa WM68	Meropa WM100
EXXON MOBIL	-	-
	Mobilgear 600XP 68	Mobilgear 600XP 100
SHELL	Shell Omala S2 G 68	Shell Omala S2 G 100
TOTAL	Carter EP68	Carter EP100

Table 2: Mineral gear oil, ISO VG150, 220 and 320

Supplier	ISO VG150	ISO VG220	ISO VG320
BP	Energol GR-XP-150	Energol GR-XP-220	Energol GR-XP-320
CASTROL	Alpa SP150	Alpha SP220	Alpha SP320
	Optigear BM150	Optigear BM220	Optigear BM320
	Tribol 1100/150	Tribol 1100/220	Tribol 1100/320
CHEVRON TEXACO	Gear Compounds EP150	Gear Compounds EP220	Gear Compounds EP320
	Meropa WM150	Meropa WM220	Meropa WM320
EXXON MOBIL	Spartan EP150	Spartan EP220	Spartan EP320
	Mobilgear 600XP 150	Mobilgear 600XP 220	Mobilgear 600XP 320
SHELL	Shell Omala S2 G 150	Shell Omala S2 G 220	Shell Omala S2 G 320
TOTAL	Carter EP150	Carter EP220	Carter EP320

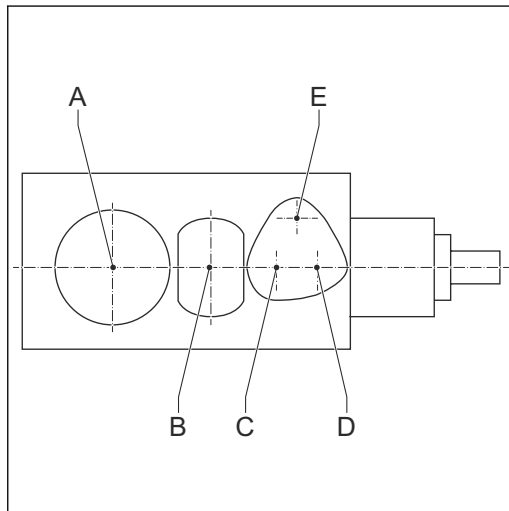
Table 3: Related grease

Supplier	Related grease
BP	Energrease LS EP2
CASTROL	For Alpha mineral oil: Spheerol AP3
	For Optigear mineral oil: Olista Longtime 3EP
	For Tribol mineral oil: Tribol 3020/1000-2
CHEVRON TEXACO	For Gear Compounds mineral oil: Duralith grease 68
	For Meropa mineral oil: Multifak EP2
EXXON MOBIL	For Spartan mineral oil: Beacon EP2
	For Mobilgear mineral oil: Mobilplex 48

Supplier	Related grease
SHELL	Shell Gadus S2 V 220 2
TOTAL	Multis EP2

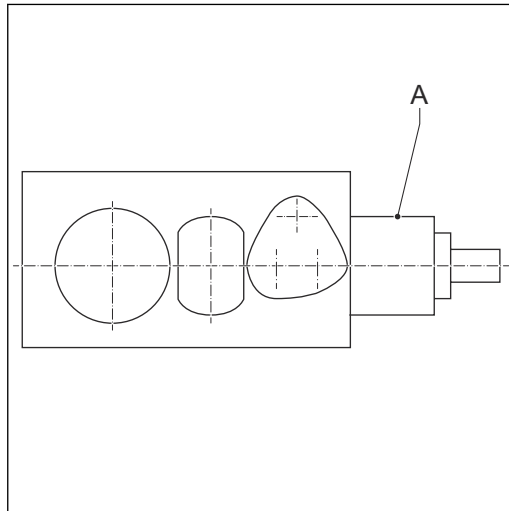
## 11.21 Grease quantity at lubrication points for bearings

### 11.21.1 Grease quantity for locations A to E



Gear unit size	Grease quantity per location [g]				
	Location A	Location B	Location C	Location D	Location E
9015	30	10	10	10	-
9025	30	10	10	10	-
9030	30	30	20	20	10
9035	40	30	20	20	10
9040	40	30	20	20	10
9045	50	30	20	20	10
9050	70	50	20	20	10
9055	100	50	20	20	10
9060	100	50	30	30	10
9065	150	50	30	30	10
9070	150	50	40	40	20
9075	150	70	40	40	20
9080	150	70	50	40	20
9085	200	70	50	40	20
9090	200	100	70	50	30
9059	200	100	70	50	30
9100	200	150	70	50	30
9105	200	150	70	50	30
9110	200	200	100	50	30
9115	200	200	100	50	30

11.21.2 Grease quantity for location A (multi-stage, right angle shafts)



Gear unit size	Grease quantity [g]		
	2-stage	3-stage	4-stage
9015	20	-	-
9025	20	-	-
9030	20	20	-
9035	20	20	-
9040	40	20	20
9045	40	20	20
9050	40	30	20
9055	40	30	20
9060	60	40	20
9065	60	40	20
9070	100	40	30
9075	100	40	30
9080	100	60	40
9085	100	60	40
9090	-	100	60
9059	150	100	60
9100	-	100	60
9105	150	100	60
9110	-	100	60
9115	200	100	60

11.22 Cooling water specifications

Parameter	Specification		
	[MPa]	[bar]	[psi]
Maximum water pressure on the cooling coils	0.8	8	116

Parameter	Specification		
	[MPa]	[bar]	[psi]
Quality	Fresh water or salt water		

Headquarters Manufacturing  
EMEIA

---

Hansen Industrial Transmissions NV  
Leonardo Da Vincilaan 1 B-2650 Edegem | Antwerp | Belgium  
Phone: +32 3 4501211 | Fax: +32 3 4501220  
[hit.info@shi-g.com](mailto:hit.info@shi-g.com)

Sumitomo (SHI) Cyclo Drive Germany GmbH  
Cyclostraße 92 | 85229 Markt Indersdorf | Germany  
Phone: +49 8136 66-0 | Fax: +49 8136 5771  
[scg.info@shi-g.com](mailto:scg.info@shi-g.com)

See our worldwide sales service network at

[emeia.sumitomodrive.com](http://emeia.sumitomodrive.com)

