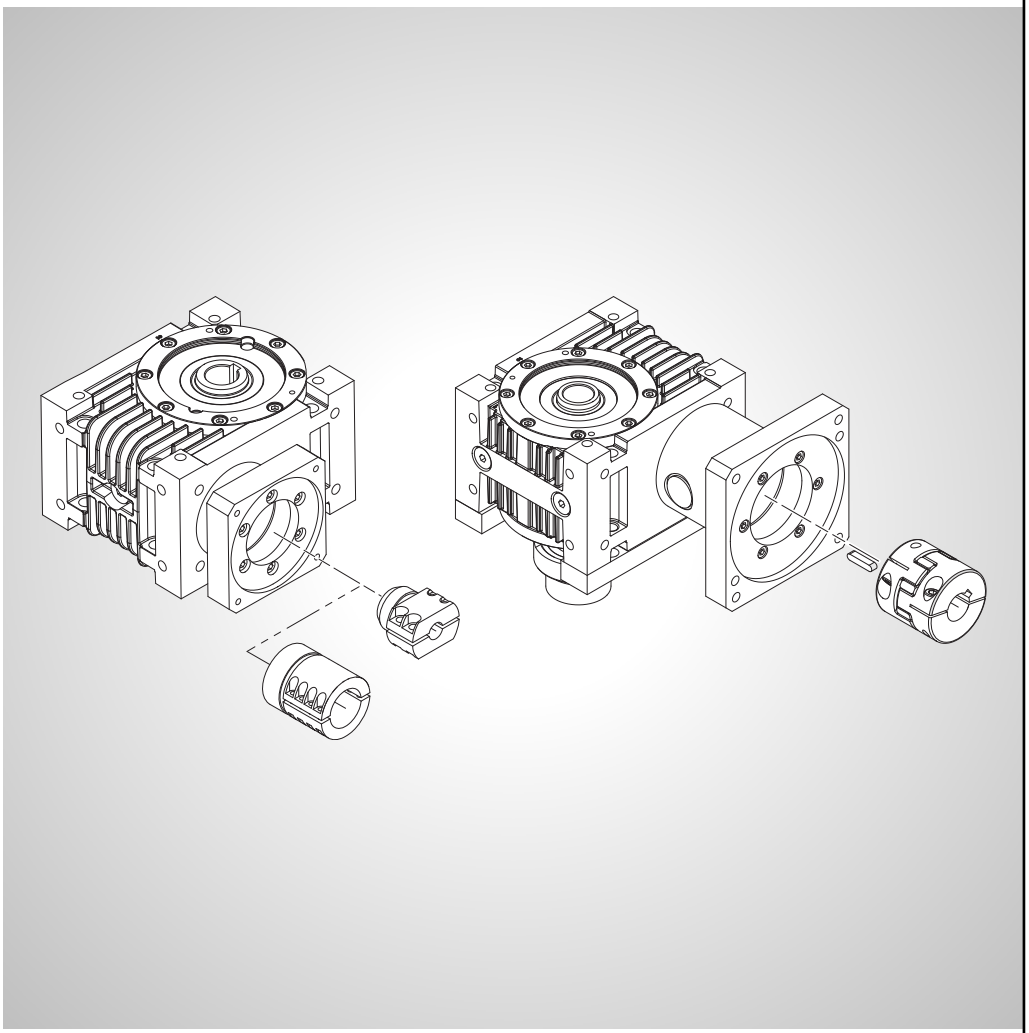
GÜDEL

SERVICE MANUAL

Gearbox Unit HPG



Project / Order:	B1M.10xxxxxx-xxxx
Bill of materials:	10xxxxxxx
Serial number:	
Year of manufacture:	2018

GÜDEL

Translation of the original instructions

This manual contains standard illustrations that may deviate from the original. In the case of special models, options, or technical changes, the scope of delivery may differ from the descriptions here. Reprinting the instructions, in whole or in part, requires our permission. Subject to change due to technical improvements.

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Revision history

Version	Date	Description
4.0	03.05.2018	New: • Elastomer coupling: Information on initial assembly ➲ 🗎 44 • General inpection ➲ 🗎 64 Modified: • Elastomer coupling: Tolerances ➲ 🗎 49
3.0	15.01.2018	New: • Feedback on the instructions ➲ Chapter 5.2.5, 🗎 117 Updated: • Greasing the gear teeth of the coupling and the worm shaft ➲ 🗎 37 • Maintenance schedule: Güdel gearbox unit with multi-tooth coupling ➲ 🗎 89 • Setting the gear backlash ➲ 🗎 124 Modified: • Terminology: Elastomer coupling instead of claw coupling • Tightening torque TA and type of coupling now also engraved on the motor ➲ 🗎 49 • Applying corrosion protection agent to motor shaft and input shaft ➲ 🗎 49 ➲ 🗎 53 ➲ 🗎 152
2.0	22.09.2017	Added: • Claw coupling: Assembly • Claw coupling: Maintenance tasks • Claw coupling: Repairs
1.0	10.10.2016	Basic version

Table -1 Revision history

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1 General

Read the entire manual before working with the product. The manual contains important information for your personal safety. The manual must be read and understood by all persons who work on the product in any of the product life phases.

1.1 Further applicable documentation

All documents delivered with this manual are further applicable documentation. They must be observed in addition to this operating manual for the safe handling of the product.

1.2 Purpose of the document

This manual describes the following product life phases of the product:

- Maintenance
- Service
- Disposal

The manual contains the information required for using the product as intended. It is an essential component of the product.

The manual must be available at the product site throughout the entire service life of the product. If the product is sold, the manual must be transferred to the new owner.

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1.3 Explanation of symbols/abbreviations

The following symbols and abbreviations are used in this manual:

Symbol/Abbreviation	Use	Explanation
➲	For cross-reference	See
🗎	Possibly for cross-reference	Page
Fig.	Designation of graphics	Figure
Table	Designation of tables	Table
	In the tip	Information or tip

Table 1-1 Explanation of symbols/abbreviations

2 Safety

2.1 General

Read the entire manual before working with the product. The manual contains important information for your personal safety. The manual must be read and understood by all persons who work on the product in any of the product life phases.

2.1.1 Product safety

Residual danger

The product is built using state-of-the-art technology. It was designed and constructed in accordance with the accepted safety regulations. However, some residual danger remains during its operation.

There is danger to the personal safety of the operator as well as for the product and other property.

Operation

When operating the product, always observe this manual and ensure that the system is always in perfect working order.

2.1.2 Personnel qualifications

⚠ WARNING

Lack of safety training

Incorrect behavior of untrained or insufficiently trained technicians can result in severe or fatal injuries!

Before technicians work on safety-related aspects of the product:

- Ensure that the technicians are trained with regard to safety
- Train and instruct the technicians specifically for their area of responsibility

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Only appropriately trained and authorized technicians are allowed to work on the product.

Persons are authorized if:

- they are familiar with the relevant safety regulations for their area of responsibility
- they have read and understood this manual
- they meet the requirements for an area of responsibility
- they were assigned an area of responsibility by the operator

The technician is responsible to third parties in his area of responsibility.

During a training session or instruction, the technician may only work on the product under the supervision of an experienced manufacturer's technician.

2.1.2.1 Operating companies

The operating company is responsible for ensuring that:

- the product is used as intended
- the product is sufficiently lubricated at all times
- all safety aspects are complied with
- the product is put out of operation if the functioning of the safety equipment is not fully guaranteed
- the technician working on the product is appropriately trained
- the technician is provided with personal protective equipment
- the operating manual is available to the technician at the operation site of the product at all times
- the technicians are kept up-to-date regarding best practice
- the technicians are informed about technical progress, modifications, and the like.
- the contracted cleaning staff only work under the supervision of a maintenance technician

2.1.2.2 Fitters

The fitter:

- has very good mechanical and/or electrical knowledge
- is flexible
- has assembly experience

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2.1.2.3 Commissioning technicians

The commissioning technician:

- has good programming knowledge
- has mechanical and/or electrical knowledge
- is flexible

The commissioning technician is responsible for the following tasks:

- commissioning the product
- testing the functions of the product

2.1.2.4 Manufacturer's technicians

The manufacturer's technician:

- is employed on site at the premises of the manufacturer or representative
- has very good mechanical and/or electrical knowledge
- has good software knowledge
- has maintenance, service and repair experience
- has experience with Güdel products

The manufacturer's technician is responsible for the following tasks:

- performing mechanical and electrical maintenance work in accordance with the manual
- performing mechanical and electrical service work in accordance with the manual
- cleaning the product
- replacing spare parts
- localizing and fixing malfunctions

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2.1.2.5 Maintenance technicians

The maintenance technician:

- was trained by the operating company or the manufacturer
- has very good mechanical and/or electrical knowledge
- has software knowledge
- has maintenance experience
- bears responsibility for the safety of the cleaning staff

The maintenance technician is responsible for the following tasks:

- performing mechanical and electrical maintenance work in accordance with the manual
- cleaning the product
- replacing spare parts
- monitoring and instructing the cleaning staff in the safety zone during the cleaning process

2.1.2.6 Service technicians

The service technician:

- was trained by the operating company or the manufacturer
- has very good mechanical and/or electrical knowledge
- has software knowledge
- has service and repair experience
- is flexible

The service technician is responsible for the following tasks:

- performing mechanical and electrical service work in accordance with the manual
- replacing spare parts

2.1.2.7 Disposal specialists

The disposal specialist:

- is able to separate waste
- is familiar with the country-specific disposal regulations
- has experience in environmentally-friendly disposal
- works carefully and safely

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2.1.3 Disregarding safety regulations

⚠ DANGER

Disregarding safety regulations

Disregarding safety regulations can result in damage to property, severe or fatal injuries.

- Always comply with the safety regulations

Liability

Güdel shall not be held liable under any of the following circumstances:

- The installation regulations were disregarded
- Included protective equipment was not installed
- Included protective equipment was modified
- Included monitoring equipment was not installed
- Included monitoring equipment was modified
- The product was not used as intended
- The maintenance work was not performed in the specified intervals, or was carried out incorrectly.

2.1.4 Installation instructions

Protective measures

The operating company is responsible for ensuring safe conditions in the vicinity of the product. In particular, he must ensure compliance with the general safety regulations, guidelines and standards. Before commissioning the system the operating company must check whether all the protective measures have been implemented. These must cover all hazards. This is the only way to ensure that application of the product conforms to CE regulations.

As stipulated by the Machinery Directive, the protective measures must:

- Correspond to best practices
- Comply with the required safety category

Modifications

The product must never be modified or used in a manner contrary to its intended use. ➲ 🗎 25

General rules for occupational safety

The generally accepted occupational safety rules must be observed and implemented.

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2.2 Hazard symbols in the manual

2.2.1 Hazard warnings

The hazard warnings are defined for the following four types of danger levels:

⚠ DANGER

DANGER

DANGER refers to hazards with a high risk of severe physical injury or immediate fatality.

⚠ WARNING

WARNING

WARNING refers to hazards with a moderate risk of severe physical injury or potential fatality.

⚠ CAUTION

CAUTION

CAUTION refers to hazards with a slight risk of moderate physical injury.

NOTE

NOTE

NOTE refers to hazards that can lead to property damage.

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2.2.2 Explanation of warning symbol

Hazard warnings for personal injuries contain the symbol of the corresponding hazard.

Symbol	Explanation of symbols
	Hazards due to general causes
	Hazards due to loose connecting elements
	Hazards due to overpressure
	Hazards due to toothed wheels
	Hazards resulting from automatic startup
	Hazards due to falling axles
	Hazards due to heat
	Hazards due to heavy components
	Hazards due to environmental pollution
	Hazards due to suspended loads

2.3 Hazard symbols on the product

The following warning labels are attached to the product:

2.3.1 Danger label "Hot surfaces"

Fig. 2-1 *Danger label "Hot surfaces"*

The danger label "Hot surfaces" warns against touching hot components.

2.3.2 Danger label "Heavy Components"

Fig. 2-2 *Danger label "Heavy Components"*

The danger label "Heavy Components" warns against lifting heavy components.

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2.4 Fundamentals of safety

2.4.1 Separating protective equipment, monitoring equipment

⚠ WARNING

Missing separating protective equipment and monitoring equipment

Missing or modified separating protective equipment and monitoring equipment may result in damage to property or serious injuries!

- Do not remove or modify separating protective equipment and monitoring equipment
- After commissioning the system, correctly attach all the separating protective equipment and monitoring equipment

For more information on separating safety and monitoring equipment, refer to the documentation on the complete system.

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2.4.2 Product-specific hazards

⚠ WARNING

Loose components

Vibrations can loosen connecting elements. Persons are surprised by unexpected situations and seriously injured as a result.

Observe the following points:

- Secure the connection elements by appropriate means
- Check the tightening torques regularly

⚠ WARNING

Risk of injury

Contact with rotating parts causes severe injuries!

Observe the following points:

- Attach separating protective equipment
- Keep extremities away from the danger area
- Wear appropriate protective clothing

⚠ WARNING

Hot oil squirting out

Overpressure in the gearbox is created by overload or incorrect performance parameters. Hot oil can squirt out. This can lead to severe burns or eye injuries!

- Operate the gearbox within the performance parameters as defined in the catalog
- Do not overload the gearbox
- Wear appropriate protective clothing

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2.4.3 Material safety data sheets (MSDS)

Safety data sheets contain safety information about the materials. They are country-specific. Safety data sheets are issued, for example, for materials such as oils, greases, cleaning agents, etc. The operating company is responsible for obtaining safety data sheets for all materials used.

Safety data sheets can be obtained as follows:

- Suppliers of chemicals usually supply their substances together with safety data sheets
- Safety data sheets are available on the Internet.
  (Enter "msds" and the name of the material in a search engine. Safety information about the material will be displayed.)

Read the safety data sheets carefully. Follow all the instructions. We recommend that you store the safety data sheets for future reference.

The safety data sheet for Güdel H1 can be found in the download area of our company Web site http://www.gudel.com

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3 Product description

3.1 Use

3.1.1 Intended use

The product is used to transfer torques and speeds. It is intended exclusively for installation in a machine or an incomplete machine.

Any other or additional use is not considered to be intended use. The manufacturer assumes no liability for any resulting damage. All risks are carried solely by the user!

3.1.2 Non-intended use

The product is not intended:

- for the movement of toxic goods
- for the movement of explosive goods
- for operation in potentially explosive areas
- for operation outside of the performance data specified by Güdel

Any use other than the specified intended use will be considered improper use and is prohibited!

The permitted input speed, output torque and the permitted additional forces must not be exceeded. Güdel's design guidelines must be observed. For detailed information, refer to Güdel's cataloghttp://www.gudel.com/products/gearboxes

Do not make any modifications to the product.

3.1.3 Definition

Flange gearboxes are assemblies in accordance with Machinery Directive 2006/42/EC. They are defined as machine components according to paragraph 35 of the guide for the application of the Machinery Directive. For this reason, Güdel will not issue a declaration of incorporation for the product.

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3.2 Product designation

3.2.1 Type plate

Each product has a type plate. It contains the following information:

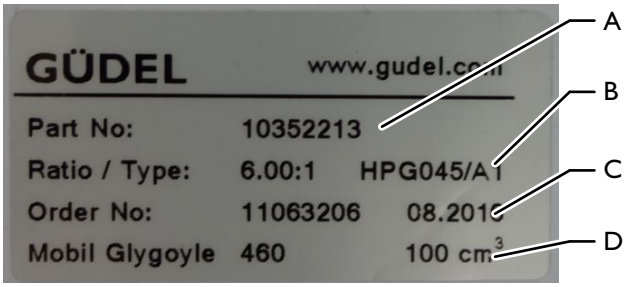

Fig. 3-1 *Type plate*

A	*Material number*	*C*	*Project number / order number*
B	*Size / type*	*D*	*Lubricant / lubrication quantity*

3.2.2 Position of the type plate

The type plate is attached according to the following illustration:

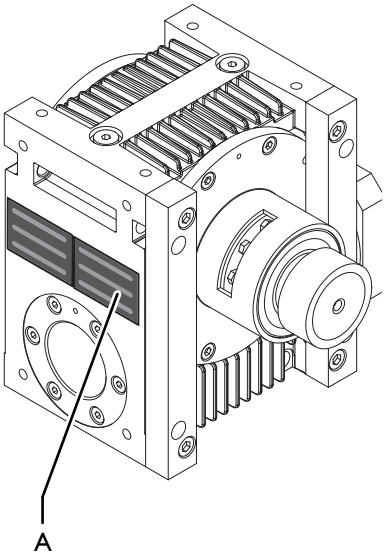

Fig. 3-2 *Position of the type plate*

A *Type plate*

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3.3 Technical data

Refer to the catalog for the defined performance data.

Temperature ranges

The following ambient temperatures and air humidities apply:

Product life phase	Temperature range	Air humidity
Transport	-10 to +60 °C	
Operation	+5 to +40 °C	Up to and at 85%, condensation formation is not permissible
Storage	-10 to +40 °C	Up to 75%

Table 3-1 *Temperature ranges*

Güdel gearbox unit operating temperature

The maximum operating temperature of the Güdel gearbox unit must not exceed 90°C.

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4 Commissioning

4.1 Introduction

4.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➲ 13
It concerns your personal safety!

⚠ WARNING

Ripping of lifting belts

The sharp edges cut the lifting belts. This can lead to severe or fatal injuries!

- Always protect the lifting belts with an edge guard

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

4.1.2 Personnel qualifications

Only appropriately trained and authorized technicians are allowed to commission the product.

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4.2 Installing

4.2.1 Applying danger labels

Attach the following labels to the product in a clearly visible position.

Symbol	Explanation of symbols	Item number
	Hazards due to heat	0215643
	Hazards due to heavy components (sizes 090 - 180)	0215645

Table 4-1 Applying danger labels

Store the supplied type plate at a useful location. It will help you whenever service is required.

4.2.2 Attaching the slings: Güdel gearbox unit

Use lifting units to transport gearbox units from size 090 upwards.

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

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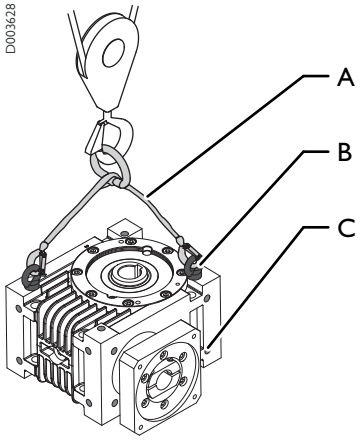

Fig. 4-1 *Attaching the slings: Güdel gearbox unit*

A *Belt harness*

B *Lifting screw*

C *Thread hole*

Size	Size of lifting screw
090	M10
120	M12
180	M16

Table 4-2 *Size of lifting screw*

Attach the slings as follows:

1 Insert lifting screws into threaded holes on desired side (Diagonal arrangement according to illustration)

2 Attach the slings as shown in the illustration

The slings are in place.

4.2.3 Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

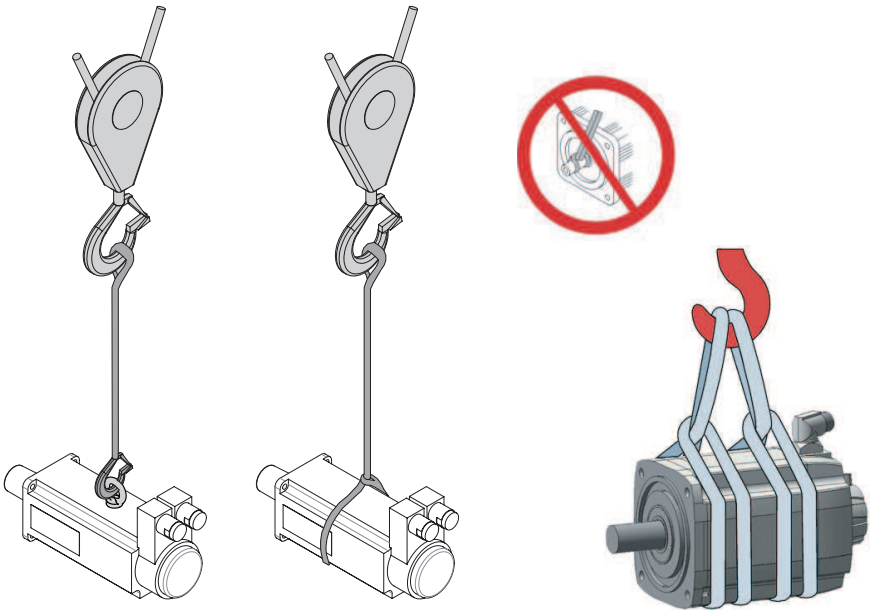

Fig. 4-2 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1. Remove fan from motor if necessary
2. Mount lifting screw if necessary
3. Attach the slings as shown in the illustration
4. Carefully lift the load
5. Check horizontal alignment of the load
6. If the load tilts: Repeat process from step 3

The slings are in place.

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4.2.4 Multi-tooth coupling

4.2.4.1 Positioning the coupling on the motor shaft

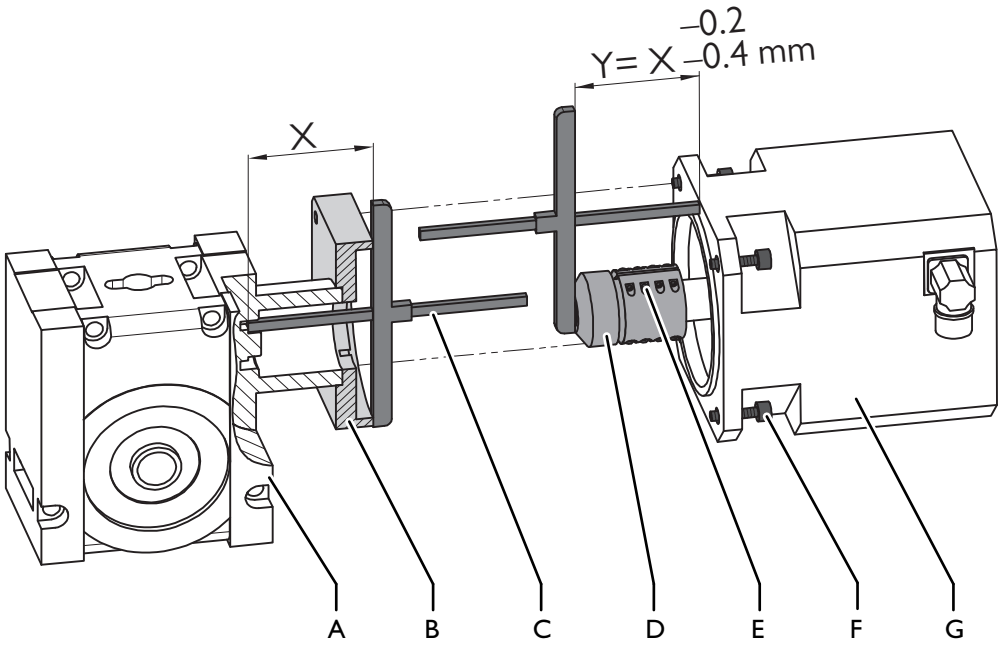

Fig. 4-3 *Positioning the coupling on the motor shaft*

A	*Gearbox unit*	*E*	*Coupling screw*
B	*Motor flange*	*F*	*Motor screw*
C	*Measuring instrument*	*G*	*Motor*
D	*Coupling*		

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 4-3 *Cleaning agents: Gearbox unit Güdel: Coupling and motor shaft*

Position the coupling on the motor shaft as follows:

Prerequisite: The transport securing device in effect at the gearbox is disassembled

1. Clean the coupling and motor shaft to ensure that they are free of grease
2. Measure distance X
3. Push the coupling onto the motor shaft
   (Set dimension Y as shown in the illustration)

The coupling is positioned.

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4.2.4.2 Tightening the screws on the motor shaft

⚠ WARNING

Falling axes, workpieces

Incorrect tightening torques can lead to axes or workpieces falling. This can lead to physical damage or severe or fatal injuries!

- Calibrate and check the torque wrench periodically
- Tighten all screws with a torque wrench to the specified tightening torques

NOTE

Ruined gear teeth

The gear teeth of the connection element are ruined if the connection element is not correctly mounted on the motor shaft.

- Tighten the screws according to the instructions
- Maintain the circular run-out tolerance of 0.04

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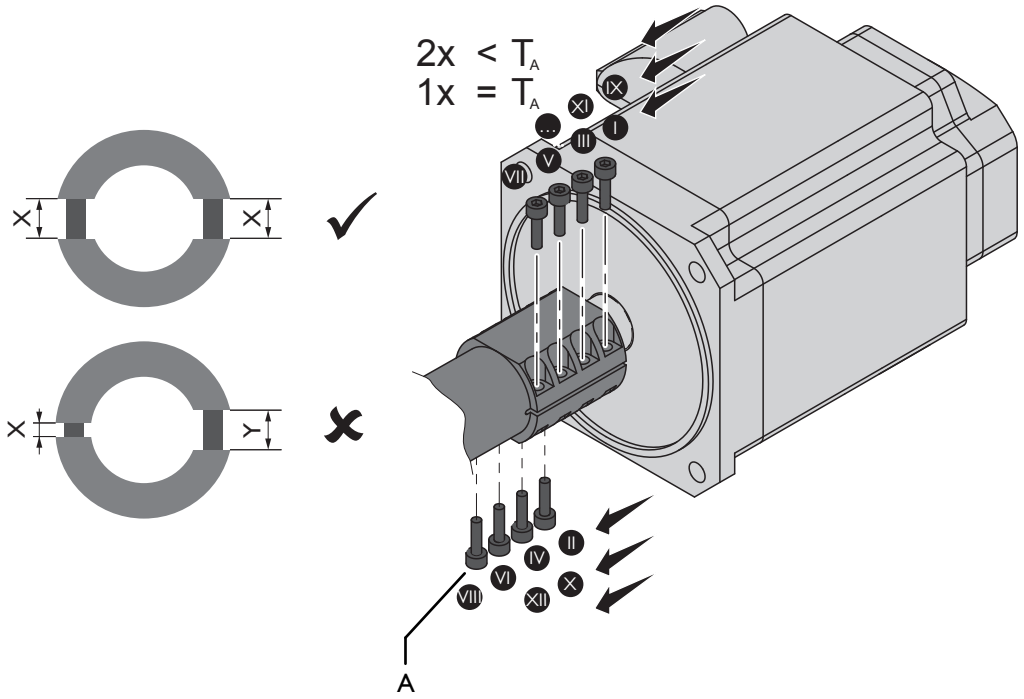

Fig. 4-4 *Motor shaft: Tighten the screws*

A *Screw*

Tighten the screws as follows:

1 Tighten the screws:
Tightening torques (T_A) ➲ 🗎 182

1.1 Tighten the upper screw with ⅓ of the tightening torque

1.2 Tighten the lower screw with ⅓ of the tightening torque

1.3 Repeat process from step 1.1 for the rest of the screws

1.4 Tighten the upper screw with ⅔ of the tightening torque

1.5 Tighten the lower screw with ⅔ of the tightening torque

1.6 Repeat process from step 1.4 for the remaining screws

1.7 Tighten the upper screw with the tightening torque

1.8 Tighten the lower screw with the tightening torque

1.9 Repeat process from step 1.7 for the remaining screws

2 Check for uniform play

3 If there are deviations: Loosen the screws and repeat the procedure starting from step 1

The screws are tightened.

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4.2.4.3 Checking the circular run-out of the motor shaft

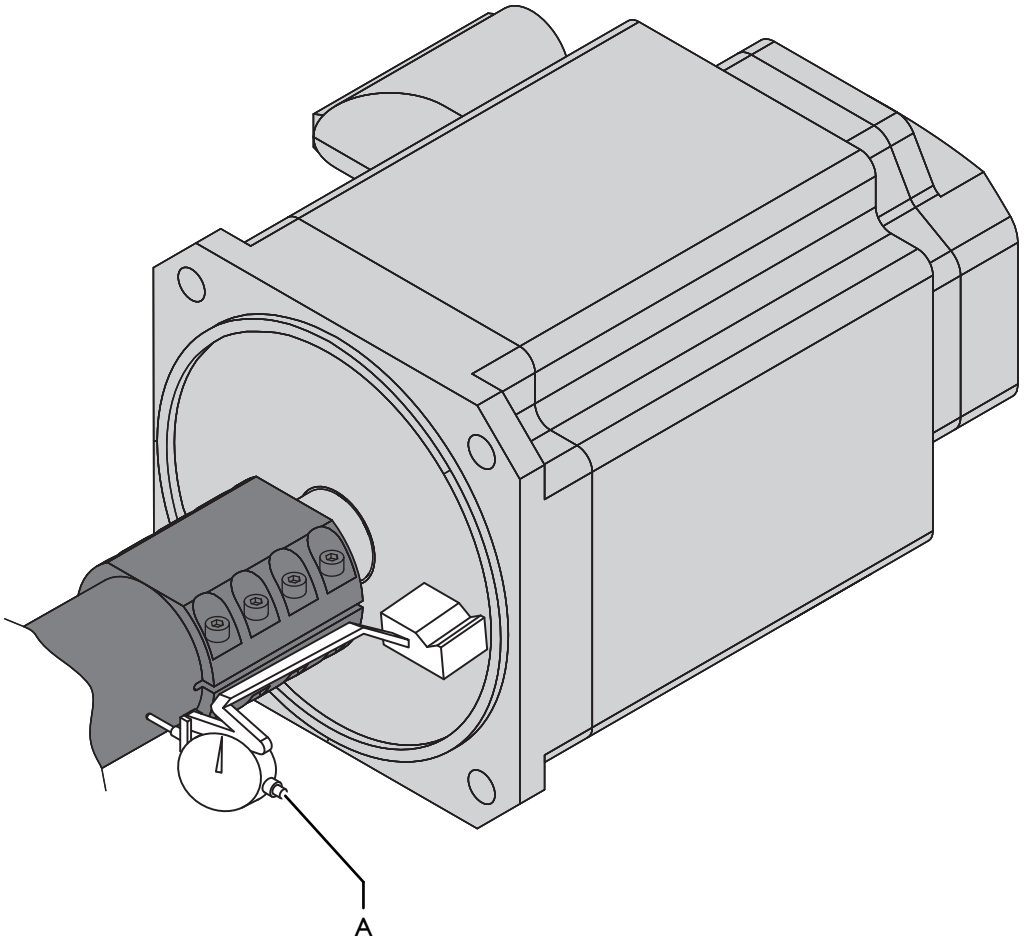

Fig. 4-5 *Motor shaft: Checking circular run-out*

A *Dial gauge*

Run-out tolerance
0.04 mm

Table 4-4 *Motor shaft: Run-out tolerance*

Check the circular run-out of the motor shaft as follows:

1. Attach the dial gauge as shown in the illustration
2. Ventilate the motor brake if necessary
3. Turn the motor shaft one rotation and read the measurement result from the dial gauge

The circular run-out has been checked.

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4.2.4.4 Greasing the gear teeth of the coupling and the worm shaft

⚠ WARNING

Falling axes / workpieces

If the contact surfaces between the coupling and the motor shaft are lubricated, the coupling slips. Axes or workpieces fall down. This can lead to severe or fatal injuries!

- Only grease the gear teeth of the coupling and the worm shaft

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

NOTE

Insufficient lubrication

Insufficient lubrication of the gear rim results in damage to the work shaft of the gearbox unit. This results in operational failure.

- Perform the described tasks at the specified times.

Checking gear teeth

Distinguishing characteristics of wear
• Defective teeth • Process inaccuracies • Discoloration due to heat • Presence of a wear edge • Heavy tribocorrosion present

Table 4-5 *Distinguishing characteristics of wear: Gear teeth of the coupling and the worm shaft*

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NOTE

Follow-on damage

Wear on the gear teeth of the coupling and worm shaft leads to process inaccuracies and other follow-on damage.

- If in doubt, replace the gearbox, the coupling or the entire gearbox unit

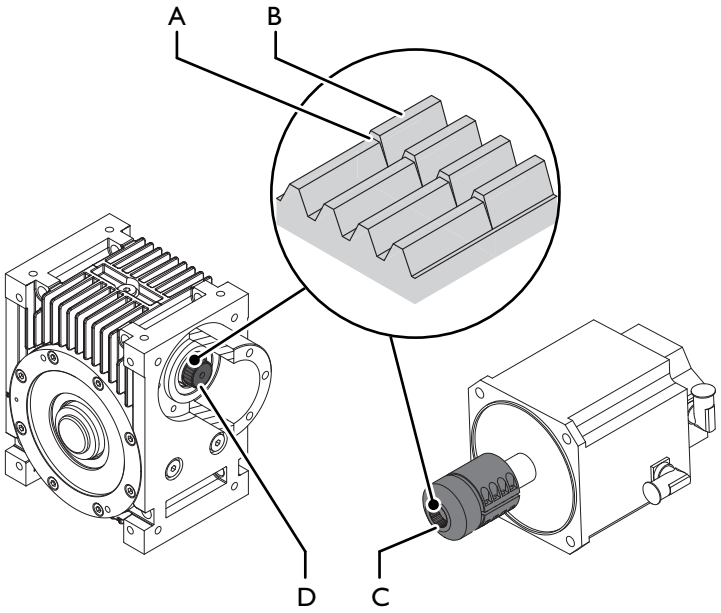

Fig. 4-6 *Checking gear teeth of the coupling and the worm shaft*

A	*Wear edge*	*C*	*Coupling*
B	*Gear teeth*	*D*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 4-5 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

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Check the gear teeth of the coupling and the worm shaft as follows:

Prerequisite:You are carrying out maintenance work or recommissioning. During the initial commissioning, there is no need for the gear teeth of the coupling and the worm shaft to be tested

1 Cleaning gear teeth

2 Checking gear teeth:

2.1 Presence of a wear edge on the worm shaft: Replace the gearbox

2.2 Presence of a wear edge on the coupling: Replace the coupling

2.3 Teeth defective: Replace gearbox unit

2.4 Heavy tribocorrosion present: Replace gearbox unit

2.5 First signs of tribocorrosion present (red discoloration of the track): Make a note in the intervention report and lubricate the gear teeth

2.6 Discoloration present: Make a note in the intervention report and lubricate the gear teeth

The gear teeth of the coupling and the worm shaft have been checked.

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Lubricating gearing of the coupling and the worm shaft

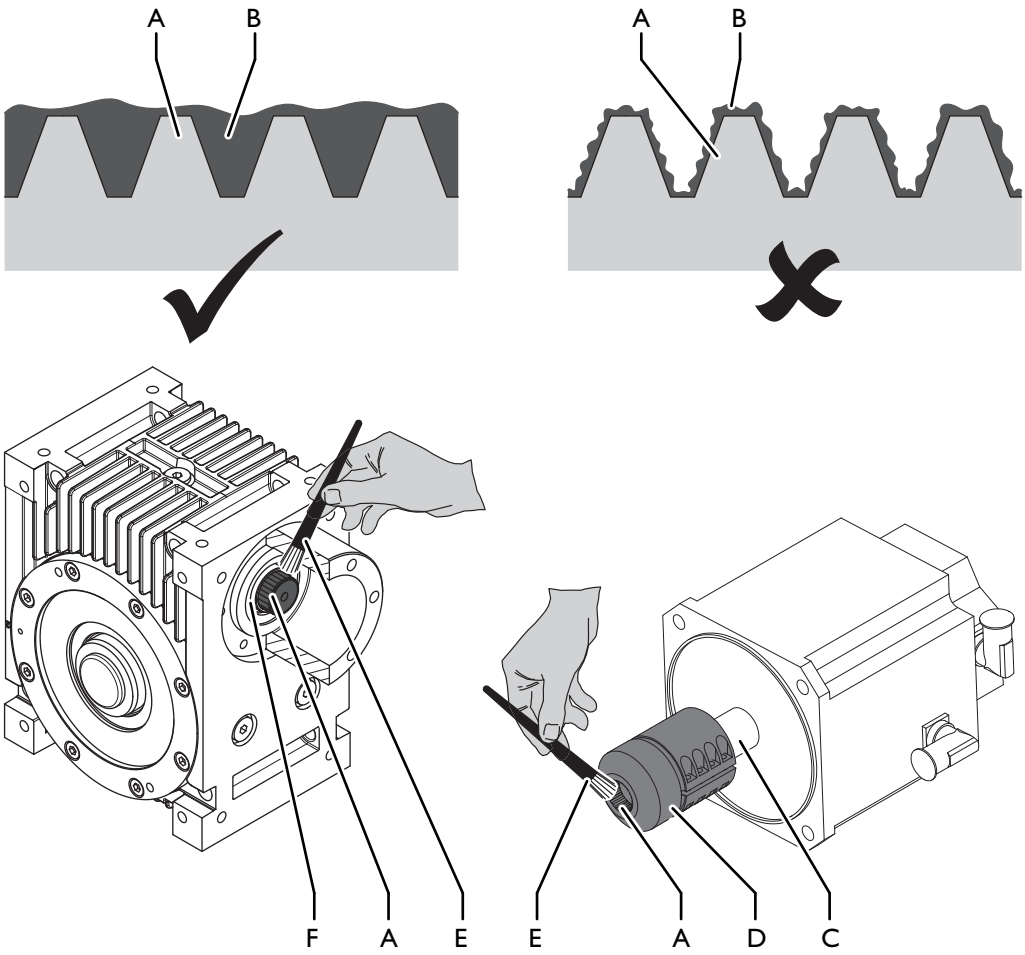

Fig. 4-7 *Greasing the gear teeth of the coupling and the worm shaft*

A	*Gear teeth*	*D*	*Coupling*
B	*Lubricant*	*E*	*Brush*
C	*Motor shaft*	*F*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

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Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 4-5 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

Grease the gear teeth of the coupling and the worm shaft as follows:

1 Coat the gear teeth of the coupling and the worm shaft with lubricant (The lubricant fills the recesses of the gear teeth completely)

The gear teeth of the coupling and the worm shaft are greased.

4.2.4.5 Installing the drive

NOTE

Failure of gearbox unit

If gearbox units are installed in a deviating manner, the worm gear does not run in the oil. The gearbox fails.

- Observe, without exception, the agreed installation position for size 180

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

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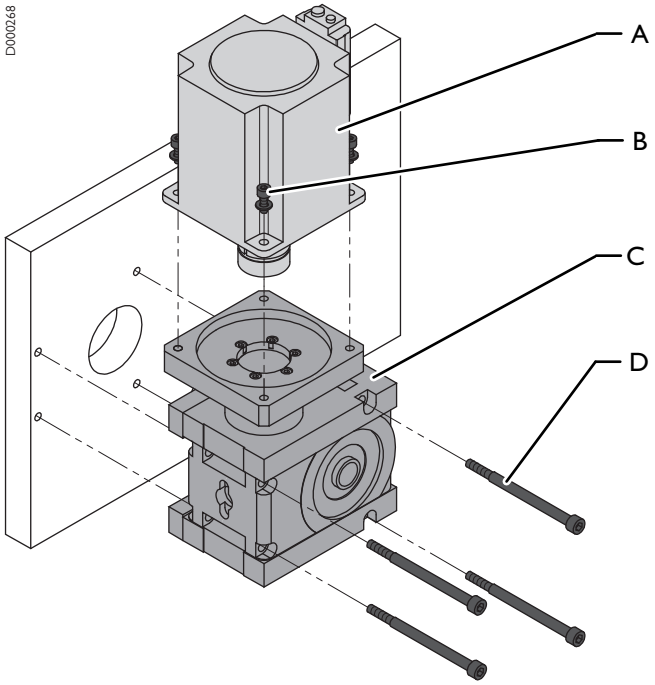

Fig. 4-8 *Installing the drive: Güdel gearbox unit*

A	*Motor*	*C*	*Gearbox unit*
B	*Motor screw*	*D*	*Gearbox screw*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 4-6 *Tightening torques for gearbox screws: Güdel gearbox unit*

Install the drive as follows:

1. Attach slings to gearbox unit ➲ 30
2. Install the gearbox unit
3. Install and tighten gearbox screws
4. Attach slings to the motor ➲ 32
5. Install the motor along with the coupling on the gearbox unit
6. Install and tighten motor screws
7. Remove the transport securing device or slings

The drive has been installed.

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4.2.5 Elastomer coupling

4.2.5.1 Installing the gearbox unit

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

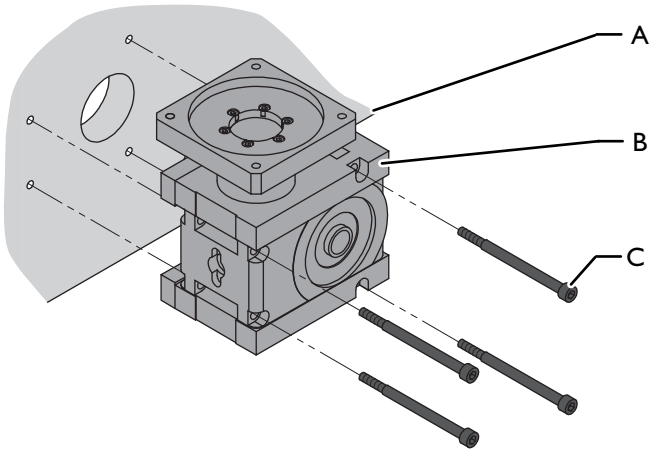

Fig. 4-9 *Installing the gearbox unit*

A *Adjacent construction*

B *Gearbox unit*

C *Gearbox screws*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 4-7 *Tightening torques for gearbox screws: Güdel gearbox unit*

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Install the gearbox unit as follows:

1 Attach slings to the gearbox unit ➲ 30
2 Install the gearbox unit
3 Install and tighten the gearbox screws
4 Remove the transport securing device or slings

The gearbox unit has now been installed.

4.2.5.2 Installing the motor

Information on initial assembly

The range of motors for the gearbox unit is very broad. The same applies to the dimensions of the motor shafts. A design solution was selected that allowed for the greatest variety of motor to be mounted on the gearbox unit. The increased expense for the initial assembly was consciously taken into account. It normally occurs only once during the entire service life of the gearbox unit. For maintenance tasks and repair, the motor is simply disassembled and remounted with one half of the elastomer coupling.

Prerequisites

Three conditions must be fulfilled simultaneously to allow you to install the motor on the gearbox unit:

- The gearbox flange is aligned to allow the coupling screws to be tightened through the drill holes of the gearbox flange with a torque wrench
- The input shaft with installed wedge must be positioned with the coupling attached to allow the coupling screws to be tightened through the drill holes of the gearbox flange
- In the event of angled motor flanges, the motor must be aligned to the motor flange to allow the motor screws to be fitted and tightened

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Aligning the gearbox flange

You can align the gearbox flange. When correctly aligned, the motor and coupling can be installed.

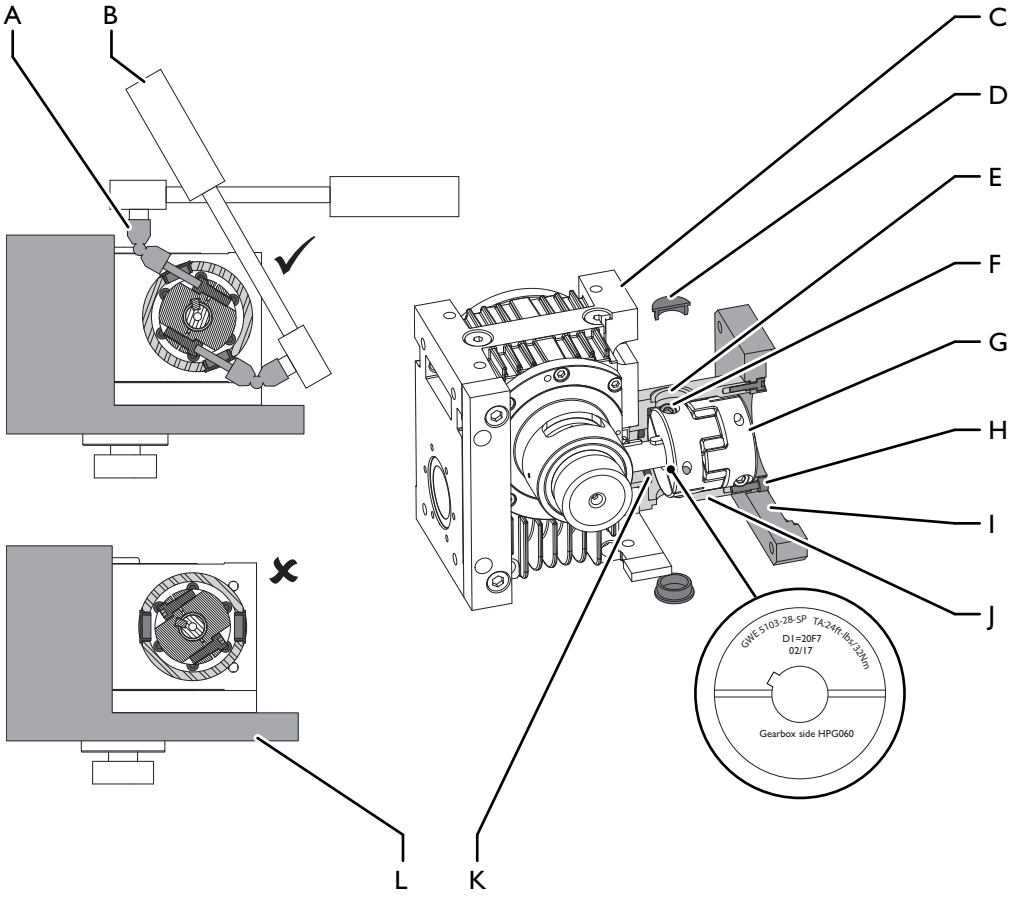

Fig. 4-10 *Aligning the gearbox flange*

A	*Articulated socket*	*G*	*Coupling*
B	*Torque wrench*	*H*	*Screw*
C	*Gearbox*	*I*	*Motor flange*
D	*Plug*	*J*	*Gearbox flange*
E	*Drill hole*	*K*	*Fastening screw*
F	*Coupling screw*	*L*	*Adjacent construction*

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Align the gearbox flange as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction
➲ 43

1 Switch off the system and secure it with a padlock against being switched on again

2 Remove the plug

3 Check whether the coupling screws can be reached through the drill hole and tightened with a torque wrench

4 If there are deviations:

- **4.1** Remove the coupling
- **4.2** Remove the fastening screws, screws and motor flange
- **4.3** Align the gearbox flange
- **4.4** Install and tighten the fastening screws
- **4.5** Install the motor flange
- **4.6** Install and tighten the screws
- **4.7** Place the coupling on the input shaft

5 Install the plug

The gearbox flange has now been aligned.

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Aligning the input shaft to the gearbox flange

⚠ WARNING

Moving the axis

The work requires moving the axis. This can lead to severe or fatal injuries!

- Ensure that no persons are in the danger area while the axis is moving

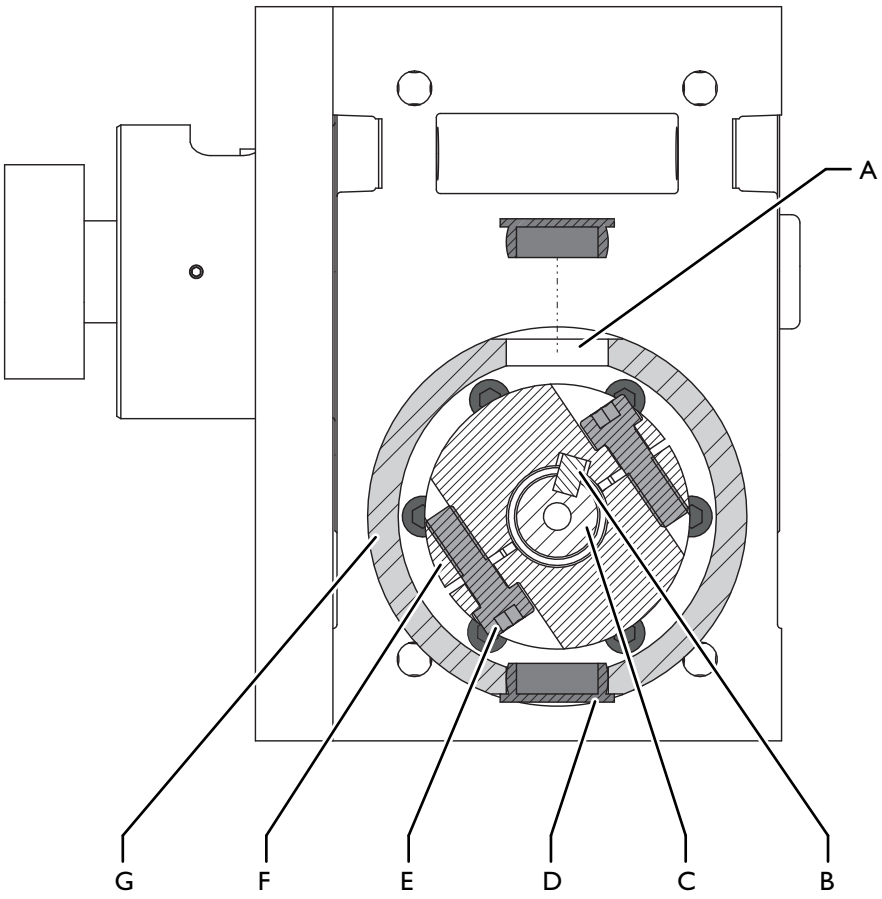

Fig. 4-11 *Aligning the input shaft to the gearbox flange*

A	*Drill hole*	*E*	*Coupling screw*
B	*Wedge*	*F*	*Coupling*
C	*Input shaft*	*G*	*Gearbox flange*
D	*Plug*		

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Align the input shaft to the gearbox flange as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction ➲ 43

Prerequisite: The gearbox flange has been aligned correctly ➲ 45

Prerequisite: The wedge has been installed on the gearbox side

Prerequisite: The coupling has been placed correctly on the input shaft

1. Check whether the coupling screws can be reached through the drill holes
2. If there are deviations: Adjust the axis until the coupling screws can be reached through the drill holes
3. Switch off the system and secure it with a padlock against being switched on again

The input shaft has been aligned to the gearbox flange.

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Positioning the coupling on the motor shaft

NOTE

Defective coupling

The coupling is destroyed if the coupling screws are tightened and the coupling is not installed on the shaft.

- Tighten the coupling screws only when the coupling is installed on the shaft.

The tightening torque TA and the type of couping are engraved on the motor and gearbox sides in the couping.

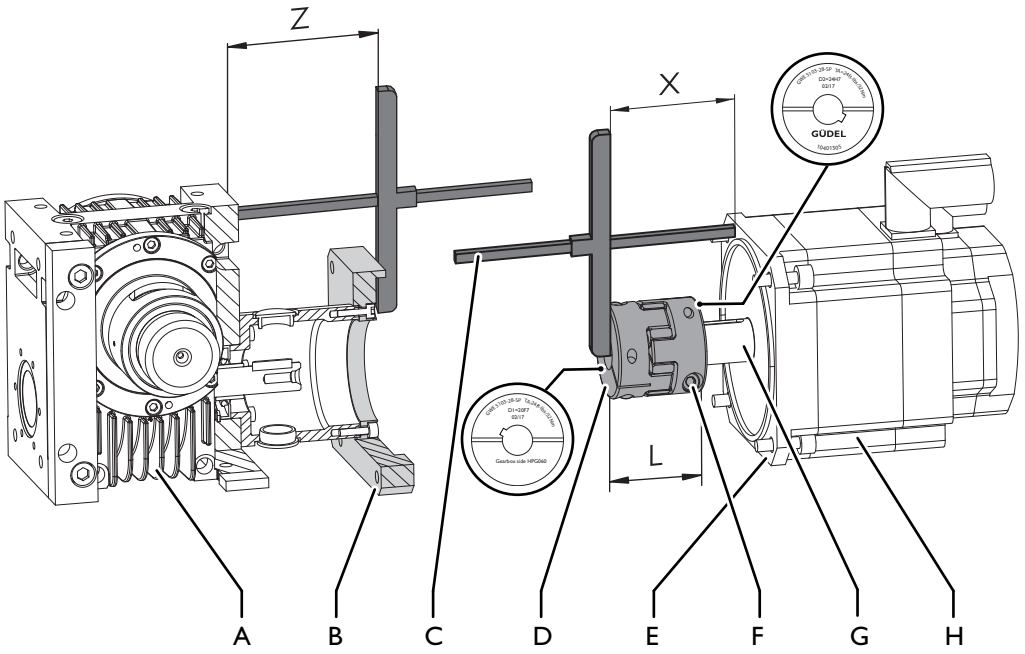

Fig. 4-12 *Positioning the coupling on the motor shaft: Elastomer coupling*

A	*Gearbox*	*E*	*Installation surface*
B	*Motor flange*	*F*	*Coupling screw*
C	*Measuring instrument*	*G*	*Motor shaft*
D	*Coupling*	*H*	*Motor*

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$$X = Z - Y$$

Fig. 4-13 *X dimension calculation formula*

Güdel HPG gearbox unit size	Coupling type	L dimension [mm]	L dimension tolerance [mm]	Y dimension [mm]	X dimension tolerance [mm]
030	GWE 5103-19-SP	50	+1	8.5	+0.5
			+0.5		-1
	GWE 5103-14-SP	32	+1	15.5	+0.5
			+0.5		0
045	GWE 5103-24-SP	54	+1	11	+0.5
			+0.5		0
	GWE 5103-19-SP	50	+1	10	+0.5
			+0.5		0
060	GWE 5103-28-SP	62	+1	16.5	+1
			+0.5		-3
	GWE 5103-24-SP	54	+1	18.5	+1
			+0.5		-2
090	GWE 5103-38-SP	76	+1.2	25	+1
			+0.5		-2
	GWE 5103-28-SP	62	+1	29	+1
			+0.5		-2

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Güdel HPG gearbox unit size	Coupling type	L dimension [mm]	L dimension tolerance [mm]	Y dimension [mm]	X dimension tolerance [mm]
120	GWE 5103-42-SP	102	+1.2	24	+1
			+0.5		-3
	GWE 5103-38-SP	76	+1.2	36	+1
			+0.5		-1

Table 4-9 *Weight and tolerances for the elastomer coupling*

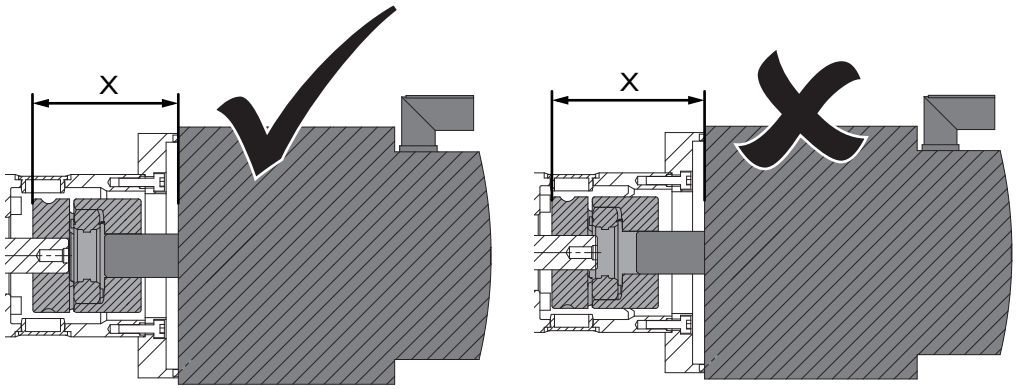

Fig. 4-14 *Position the coupling on the motor shaft: Make use of X dimension tolerance*

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 4-9 *Cleaning agents: Gearbox unit Güdel: Coupling and motor shaft*

Tool	Use	Item number
Corrosion protection agent MOTOREX Intact XD 20	Installing the coupling Applying corrosion protection to the product	0502037

Table 4-10 *Special tools, testing and measuring instruments*

Position the coupling on the motor shaft as follows:

Prerequisite: The transport securing device in effect at the gearbox is disassembled

1 Clean the coupling and motor shaft to ensure that they are free of grease

2 If desired by the customer, mount the wedge on the motor shaft (wedge on motor shaft not essentially necessary)

3 Apply corrosion protection agent to the motor shaft with a brush

4 Measure the distance Z

5 Push the coupling onto the motor shaft
(set L dimension according to table)

6 Position the coupling on the motor shaft:

6.1 Calculate dimension X and position coupling according to the calculated dimension

6.2 Coupling rest a little on the motor shaft: Make use of X dimension tolerance

7 Tighten the coupling screws:

7.1 Tighten alternately to 50% of the tightening torque TA

7.2 Tighten alternately with 100% of the tightening torque TA

The coupling is positioned.

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Installing the motor and coupling

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

Vent the motor brake according to the specifications of the motor manufacturer

The tightening torque TA and the type of couping are engraved on the motor and gearbox sides in the couping.

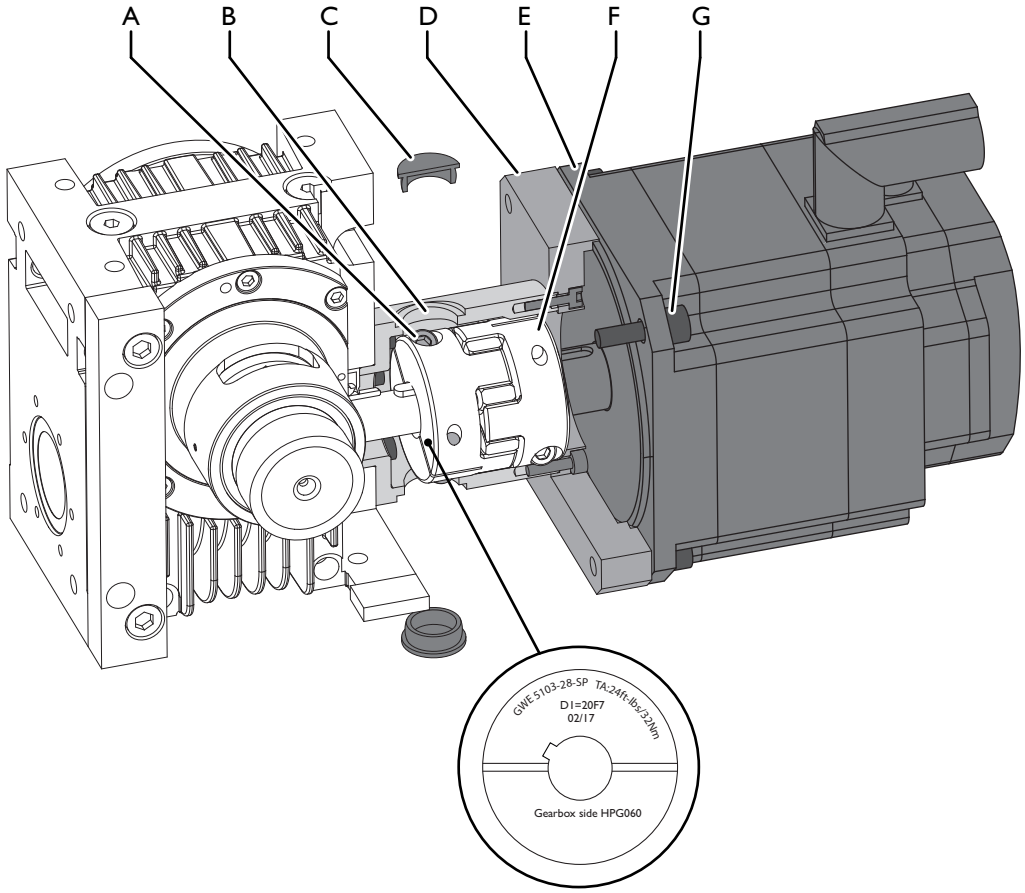

Fig. 4-15 *Installing the motor and coupling*

A	*Coupling screw*	*E*	*Motor*
B	*Drill hole*	*F*	*Coupling*
C	*Plug*	*G*	*Motor screw*
D	*Motor flange*		

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 4-11 *Cleaning agents: Güdel gearbox unit: coupling, input shaft and wedge*

Tool	Use	Item number
Corrosion protection agent MOTOREX Intact XD 20	Installing the coupling Applying corrosion protection to the product	0502037

Table 4-12 *Special tools, testing and measuring instruments*

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Install the motor and coupling as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction ➲ 43

Prerequisite: The gearbox flange has been aligned correctly ➲ 45

Prerequisite: The input shaft has been aligned correctly to the gearbox flange ➲ 47

Prerequisite: The couping has been positioned correctly on the motor shaft ➲ 49

1 Switch off the plant and padlock it to prevent it from being switched on again
2 Attach slings to the motor if necessary ➲ 32
3 Clean the coupling, input shaft and wedge to remove any grease
4 Installing the wedge on the input shaft
5 Apply corrosion protection agent to the wedge and input shaft with a brush
6 Push the motor, with the mounted coupling, onto the gearbox unit
7 Install and tighten motor screws
8 If the motor screws cannot be fitted:
   - **8.1** Ventilate the motor brake if necessary
   - **8.2** Turning the motor into correct installation position
   - **8.3** Repeat process from step 7
9 Tighten the coupling screws:
   - **9.1** Tighten alternately to 50% of the tightening torque TA
   - **9.2** Tighten alternately with 100% of the tightening torque TA
10 Mount plug

The motor and the coupling have been installed.

4.2.6 Final tasks

Perform the following final tasks:

1 Remove slings if necessary
2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

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5 Maintenance

5.1 Introduction

Work sequences

Perform the work sequences in the order described. Perform the described tasks at the specified times. This ensures a long service life for your product.

Original spare parts

Only use original spare parts. ➲ 173

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel.
➲ Chapter 9, 182

5.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➲ 13
It concerns your personal safety!

⚠ WARNING

Automatic startup

During work on the product, there is danger of the machine starting up automatically. This can lead to severe or fatal injuries!

Before working in the danger area:

- Secure vertical axes (if equipped) against falling.
- Switch off the superordinate main power supply. Secure it against being switched on again (main switch for the complete system)
- Before switching on the system again, make sure that no one is in the danger area

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⚠ WARNING

Slipping hazard

Liquids run out if there is a leak. Persons may slip and injure themselves seriously!

- Take application-specific protective measures
- Repair any leaks promptly
- Prevent any new leaks. Replace or modify the leaking component or assembly
- Check the fill level and refill if necessary

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

5.1.2 Personnel qualifications

Only appropriately trained and authorized technicians are allowed to work on the product.

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5.1.3 Consumables and auxiliary agents

5.1.3.1 Cleaning agents

Use a soft rag or cloth for cleaning tasks. Only use permissible cleaning agents.

Table of cleaning agents

Cleaning agents	Location of application
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)	Gear teeth of the coupling and the worm shaft
	Gearbox unit Güdel: Coupling and motor shaft
	Güdel gearbox unit: coupling, input shaft and wedge

This table does not purport to be exhaustive.

Table 5-1 Table of cleaning agents

5.1.3.2 Lubricants

NOTE

Unsuitable lubricants

Using unsuitable lubricants can cause damage to the machine!

- Only use the lubricants listed
- If uncertain, please contact our service departments

For more information on the lubricants, refer to the tables below. For further information, refer to the chapter "Maintenance tasks" and the respective third party documentation.

Special Güdel lubricants

If special lubricants have been delivered ex-works at the request of the customer, you can find the relevant specifications in the spare parts list.

Alternative manufacturers

The following tables show the specifications of the lubricants. Please inform your manufacturer accordingly. They will then suggest an alternative from their product range.

Low temperatures / food grade

Observe the application range limits of lubricants according to the safety data sheet.

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Lubricant table

Lubrication ex works	Specification	Lubrication quantity	Location of application	Category
Mobil Glygoyle 460 NSF no.136467	CLP PG 460 in accordance with DIN 51502	AE/HPG030: 40cm3 AE/HPG045: 100cm3 AE/HPG060: 250cm3 AE/HPG090: 700cm3 AE/HPG120: 1400cm3 AE/HPG180: as per type plate	Gearbox unit Güdel	oil
	CLP PG 460 in accordance with DIN 51502		Güdel gearbox unit	oil
	CLP PG 460 in accordance with DIN 51502		Pinion	oil
Mobil Mobilux EP 2	KP2K-30 in accordance with DIN 51502		Pinion	grease
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%		Gear teeth of the coupling and the worm shaft	grease
Vaseline	Cannot be determined		Güdel gearbox unit: elastomer gear rim of the coupling	Grease

This table does not purport to be exhaustive.

Table 5-2 Lubricant table

5.2 Maintenance tasks

5.2.1 General prerequisites

Prior to performing repair and maintenance tasks, do the following:

- If vertical axes are present, secure them against falling
- Switch off the system and padlock it to secure it against being switched on again
- Make sure that all necessary spare parts and wearing parts are at hand
  ➲ 🗎 173

5.2.2 Maintenance intervals

The product is subject to natural wear and tear. When it wears out, unplanned downtimes of your plant can result. Güdel specifies the service life and maintenance intervals of the product so as to ensure safe and continuous operation. The maintenance intervals relate to the effective operating hours of the product at a power-on time (POT) of 40%. Normal operating conditions are assumed. These correspond with the parameters used by Güdel when designing the product. If the conditions are rougher than assumed, products may fail earlier. Adjust the maintenance intervals to your operating conditions if necessary.

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The definition is based on 5/7 working days per week.

Operating hours	1-shift operation	2-shift operation	3-shift operation
150	every 4 weeks	every 2 weeks	Weekly
2'250	yearly	every 6 months	every 4 months
6'750	every 3 years	every 1.5 years	yearly
11'250	every 5 years	every 2.5 years	every 20 months
13'500	every 6 years	every 3 years	every 2 years
22'500	every 10 years	every 5 years	every 3.3 years
31'500	every 14 years	every 7 years	every 4.5 years
54'000	every 24 years	every 12 years	every 8 years

Table 5-3 *Maintenance intervals in shift operation (5 days a week)*

Operating hours	1-shift operation	2-shift operation	3-shift operation
150	every 18 days	every 9 days	every 6 days
2'250	every 9 months	every 4.5 months	every 3 months
6'750	every 2.5 years	every 15 months	every 10 months
11'250	every 4 years	every 2 years	every 16 months
13'500	every 4.5 years	every 3 years	every 1.5 years
22'500	every 7.75 years	every 3.8 years	every 2.5 years
31'500	every 11 years	every 5.5 years	every 3.5 years
54'000	every 18.5 years	every 9.25 years	every 6.25 years

Table 5-4 *Maintenance intervals in shift operation (7 days a week)*

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5.2.3 Multi-tooth coupling

5.2.3.1 Maintenance tasks after 150 hours

Lubricating the pinion

If available, lubricate the pinion after 150 operating hours or 100 km. Lubricate several times if tribocorrosion (reddish discoloration) occurs.

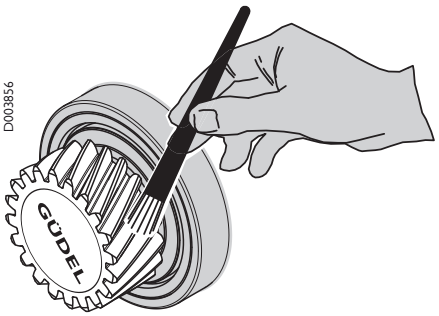
⚠ CAUTION

Danger of being crushed

When performing work on the product, there is a risk of being crushed in the area around the exposed pinions.

Observe the following points:

- Never reach into the area around the pinions
- Use a brush to apply the lubrication to the pinions



Lubrication ex works	Specification	Lubrication quantity
Mobil Mobilux EP 2	KP2K-30 in accordance with DIN 51502	

Table 5-5 Lubricants: Pinion

5.2.3.2 Maintenance tasks after 2,250 hours

General inspection

Performing a general inspection

For the general inspection, perform a rough check of the entire product.

Perform the general inspection as follows:

1 Switch off the system and padlock it to secure it against being switched on again

2 Check the inspection points as described in the inspection table

3 Take measures as described in the inspection table

The general inspection is complete.

NOTE

Leaks due to worn gaskets

Gaskets become brittle due to natural ageing, high temperatures or UV radiation. This can lead to leaks in the gearbox. The lubricant leaks out. The bearings heat up and fail. The gear teeth in the gear unit wear out and fail. The gearbox fails.

- Regularly check visible gaskets. Replace defective gaskets immediately
- In the event of leaks, check the gaskets. Replace defective gaskets immediately. Modify or replace the gearbox
- Repair any leaks promptly

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Inspection point	Description	Measures
Contamination	Check all the components for contamination: • Gearbox • Output flange	Immediately clean away any contamination
Damage	Check the product for damage: • Paint damage • Bent components • General damage • Cracks in the cast components	Immediately remedy all discovered damage
Loose components	Check the fit of the components: • Screws • Clamping sets	• Immediately tighten loose screws to the required torque • Immediately tighten loose clamping sets to the required torque
Loss of oil	Check product and its surroundings for traces: • Puddles of oil and oil spills on the floor • Leakages	• Repair or replace the gearbox • Clear up puddles of oil and oil spills on the floor
Components	Check the condition of the components: • Gasket • Clamping set • Pinion • Coupling • Gearbox	• Replace worn and defective components • Repair or replace the gearbox

Table 5-6 Inspection table

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Greasing the gear teeth of the coupling and the worm shaft

⚠ WARNING

Falling axes / workpieces

If the contact surfaces between the coupling and the motor shaft are lubricated, the coupling slips. Axes or workpieces fall down. This can lead to severe or fatal injuries!

- Only grease the gear teeth of the coupling and the worm shaft

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

NOTE

Insufficient lubrication

Insufficient lubrication of the gear rim results in damage to the work shaft of the gearbox unit. This results in operational failure.

- Perform the described tasks at the specified times.

Checking gear teeth

Distinguishing characteristics of wear
• Defective teeth • Process inaccuracies • Discoloration due to heat • Presence of a wear edge • Heavy tribocorrosion present

Table 5-7 *Distinguishing characteristics of wear: Gear teeth of the coupling and the worm shaft*

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NOTE

Follow-on damage

Wear on the gear teeth of the coupling and worm shaft leads to process inaccuracies and other follow-on damage.

- If in doubt, replace the gearbox, the coupling or the entire gearbox unit

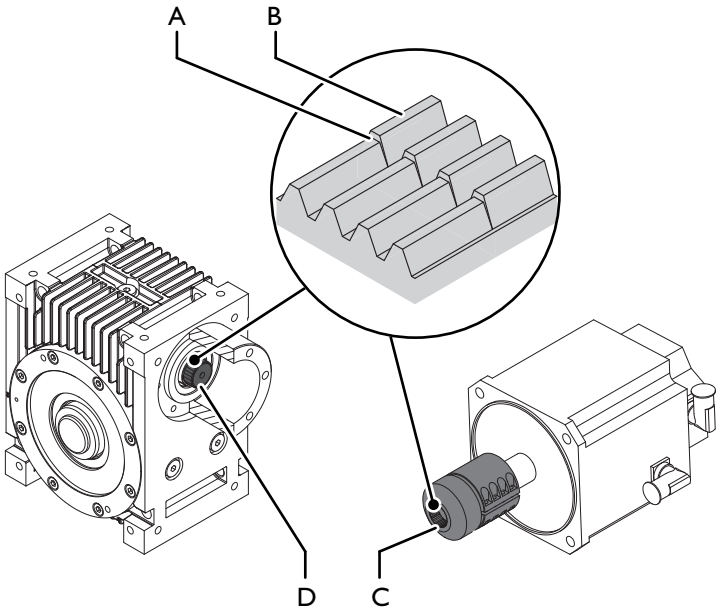

Fig. 5-1 *Checking gear teeth of the coupling and the worm shaft*

A	*Wear edge*	*C*	*Coupling*
B	*Gear teeth*	*D*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-7 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

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Check the gear teeth of the coupling and the worm shaft as follows:

Prerequisite:You are carrying out maintenance work or recommissioning. During the initial commissioning, there is no need for the gear teeth of the coupling and the worm shaft to be tested

1 Cleaning gear teeth

2 Checking gear teeth:

2.1 Presence of a wear edge on the worm shaft: Replace the gearbox

2.2 Presence of a wear edge on the coupling: Replace the coupling

2.3 Teeth defective: Replace gearbox unit

2.4 Heavy tribocorrosion present: Replace gearbox unit

2.5 First signs of tribocorrosion present (red discoloration of the track): Make a note in the intervention report and lubricate the gear teeth

2.6 Discoloration present: Make a note in the intervention report and lubricate the gear teeth

The gear teeth of the coupling and the worm shaft have been checked.

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Lubricating gearing of the coupling and the worm shaft

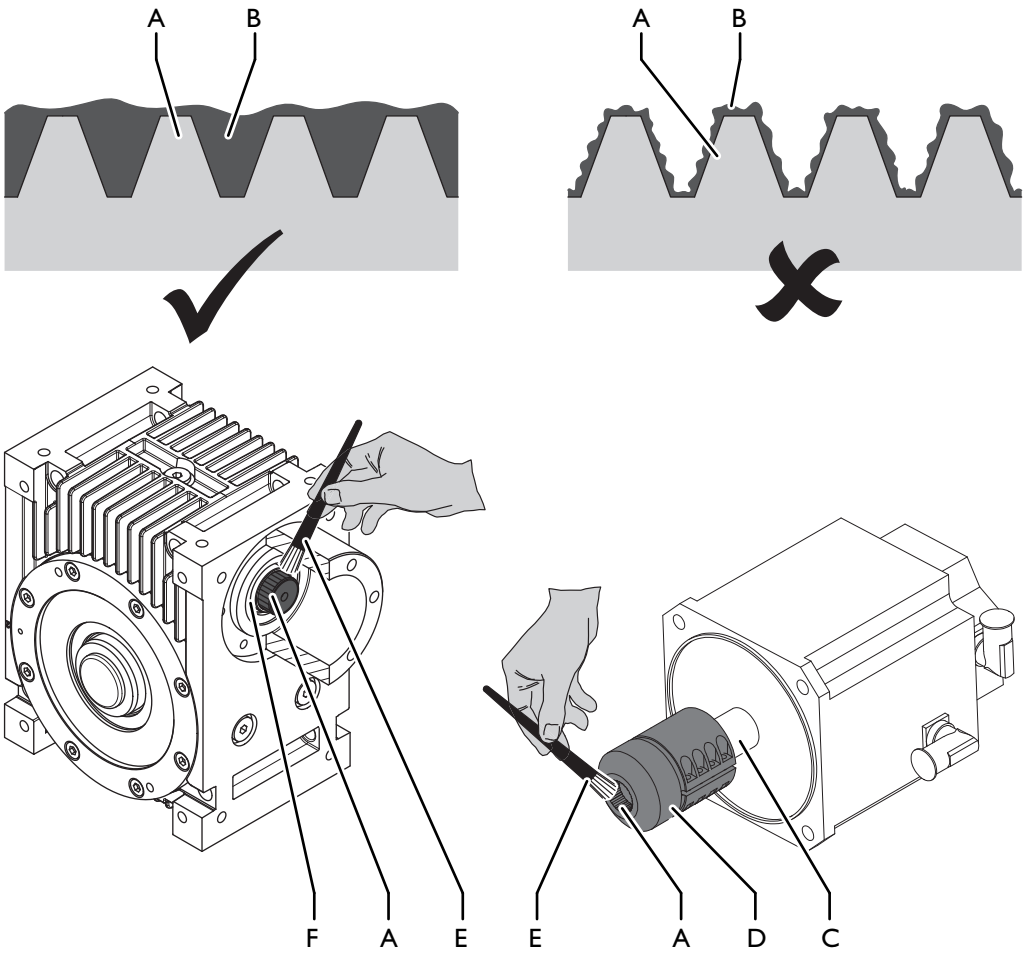

Fig. 5-2 *Greasing the gear teeth of the coupling and the worm shaft*

A	*Gear teeth*	*D*	*Coupling*
B	*Lubricant*	*E*	*Brush*
C	*Motor shaft*	*F*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

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Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-7 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

Grease the gear teeth of the coupling and the worm shaft as follows:

1 Coat the gear teeth of the coupling and the worm shaft with lubricant (The lubricant fills the recesses of the gear teeth completely)

The gear teeth of the coupling and the worm shaft are greased.

5.2.3.3 Maintenance tasks after 22,500 hours

Replacing the gearbox unit

This chapter describes the steps for replacing the Güdel gearbox unit. Replace the gearbox as follows:

Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

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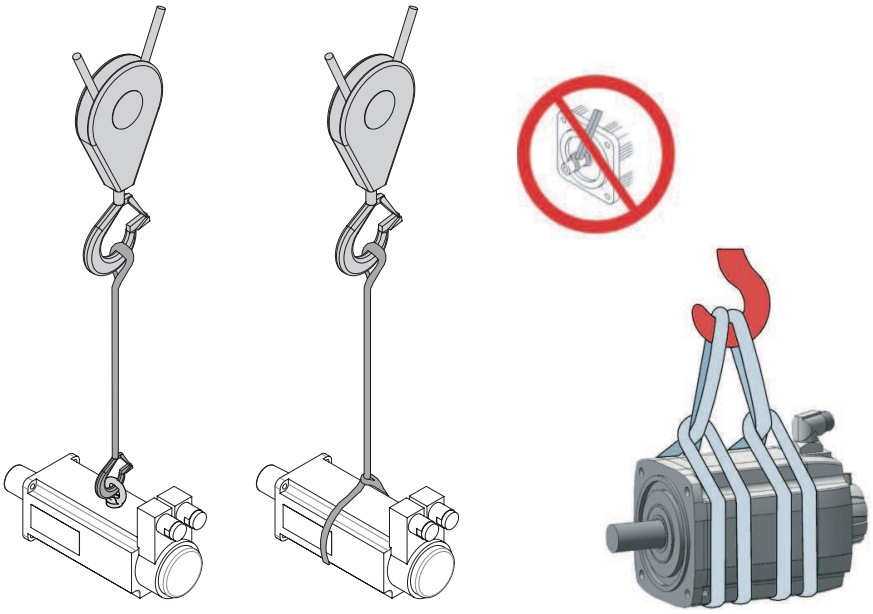

Fig. 5-3 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1. Remove fan from motor if necessary
2. Mount lifting screw if necessary
3. Attach the slings as shown in the illustration
4. Carefully lift the load
5. Check horizontal alignment of the load
6. If the load tilts: Repeat process from step 3

The slings are in place.

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Attaching the slings: Güdel gearbox unit

Use lifting units to transport gearbox units from size 090 upwards.

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

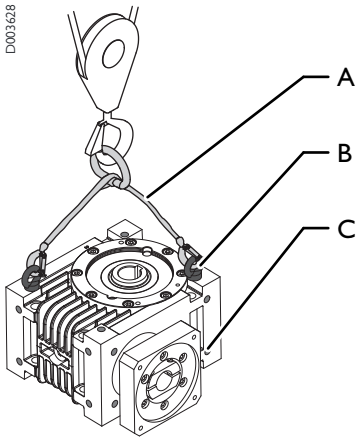

Fig. 5-4 *Attaching the slings: Güdel gearbox unit*

A *Belt harness*
B *Lifting screw*
C *Thread hole*

Size	Size of lifting screw
090	M10
120	M12
180	M16

Table 5-8 *Size of lifting screw*

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Attach the slings as follows:

1 Insert lifting screws into threaded holes on desired side (Diagonal arrangement according to illustration)

2 Attach the slings as shown in the illustration

The slings are in place.

Disassembling the drive

⚠ WARNING

Falling axes

After removing the transport securing device, brakes or motors, the vertical axes fall downwards. Carriages may run off to the side. This can lead to severe or fatal injuries!

- If necessary, secure the vertical axes and the carriages before removing transport securing devices, brakes or motors

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

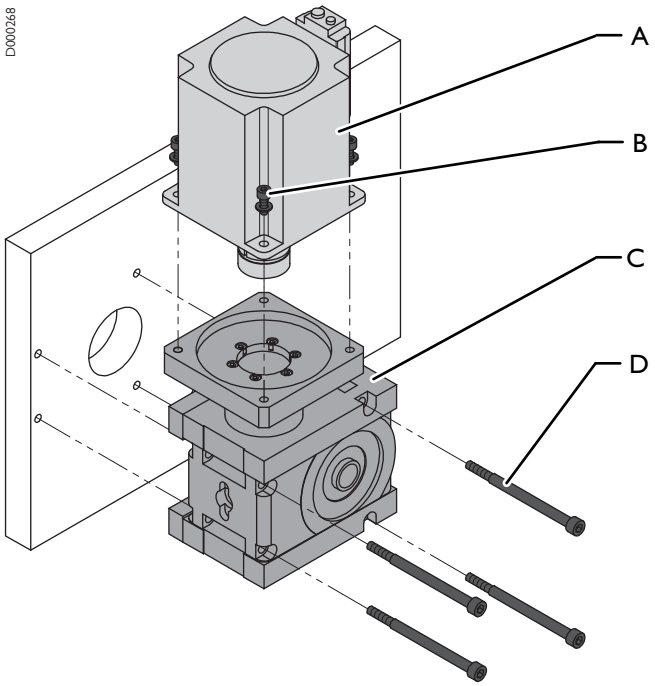

Fig. 5-5 *Disassembling the drive: Güdel gearbox unit*

A	*Motor*	*C*	*Gearbox unit*
B	*Motor screw*	*D*	*Gearbox screw*

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Disassemble the drive as follows:

1 Switch off the plant and secure it with a padlock against being switched on again
2 Secure carriage or axis with transport securing device or lifting equipment
3 Attach slings to the motor ➲ 🗎 70
4 Remove the motor screws
5 Remove the motor, together with the coupling, from the gearbox unit
6 Attach slings to gearbox unit ➲ 🗎 72
7 Remove the gearbox screws
8 Remove the gearbox unit

The drive has been disassembled.

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Removing the coupling

Mark the position of the coupling on the motor shaft. The marking makes it easier for you to re-install the coupling.

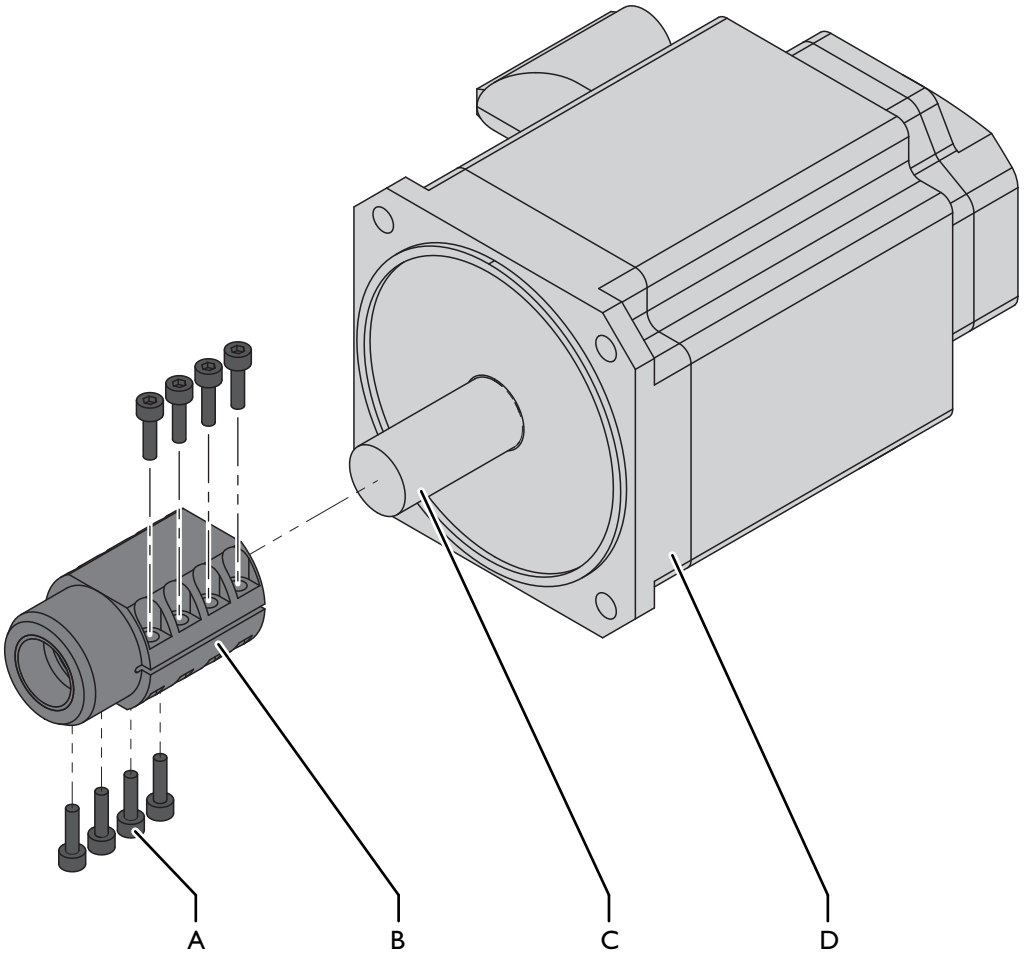

Fig. 5-6 *Removing the coupling*

A	*Coupling screw*	*C*	*Motor shaft*
B	*Coupling*	*D*	*Motor*

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Remove the coupling as follows:

1 Loosen the coupling screws

2 Remove the coupling from the motor shaft

The coupling is removed.

Replacing the gearbox unit

Replace the gearbox unit as follows:

1 Replace the complete gearbox unit and coupling

The gearbox unit has been replaced.

Positioning the coupling on the motor shaft

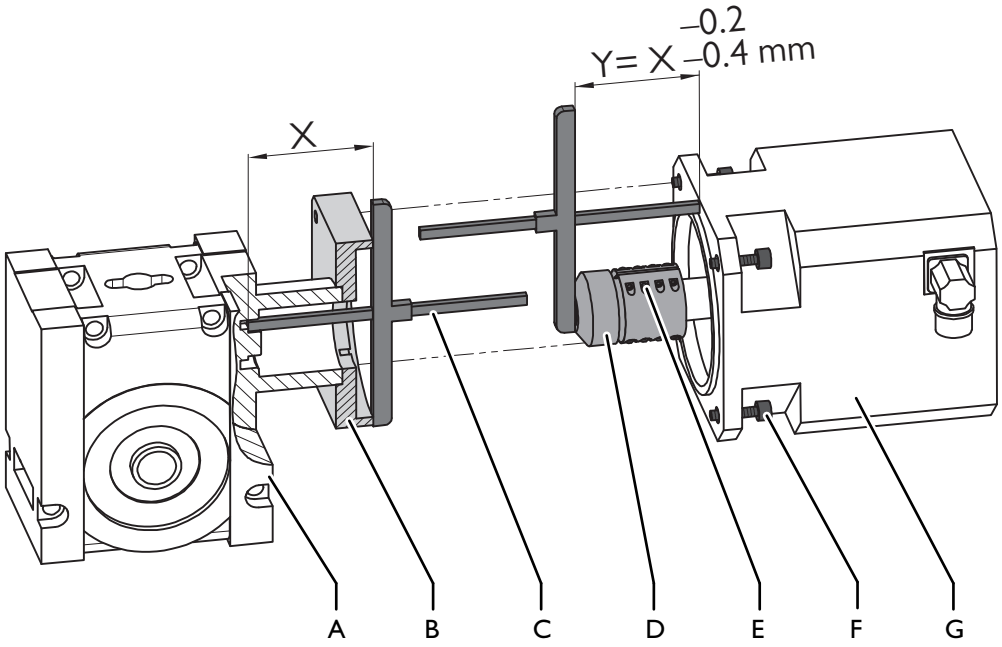

Fig. 5-7 *Positioning the coupling on the motor shaft*

A	*Gearbox unit*	*E*	*Coupling screw*
B	*Motor flange*	*F*	*Motor screw*
C	*Measuring instrument*	*G*	*Motor*
D	*Coupling*		

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-9 *Cleaning agents: Gearbox unit Güdel: Coupling and motor shaft*

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Position the coupling on the motor shaft as follows:

Prerequisite: The transport securing device in effect at the gearbox is disassembled

1 Clean the coupling and motor shaft to ensure that they are free of grease

2 Measure distance X

3 Push the coupling onto the motor shaft
(Set dimension Y as shown in the illustration)

The coupling is positioned.

Tightening the screws on the motor shaft

⚠ WARNING

Falling axes, workpieces

Incorrect tightening torques can lead to axes or workpieces falling. This can lead to physical damage or severe or fatal injuries!

- Calibrate and check the torque wrench periodically
- Tighten all screws with a torque wrench to the specified tightening torques

NOTE

Ruined gear teeth

The gear teeth of the connection element are ruined if the connection element is not correctly mounted on the motor shaft.

- Tighten the screws according to the instructions
- Maintain the circular run-out tolerance of 0.04

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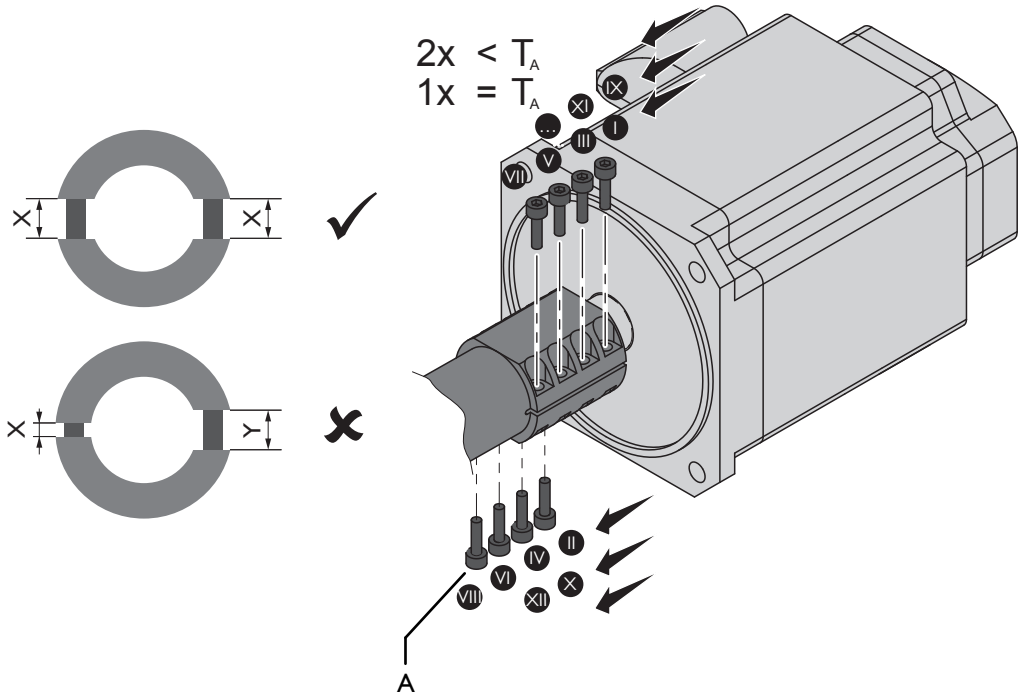

Fig. 5-8 *Motor shaft: Tighten the screws*

A *Screw*

Tighten the screws as follows:

1 Tighten the screws:
Tightening torques (T_A) ➲ 🗎 182

1.1 Tighten the upper screw with ⅓ of the tightening torque

1.2 Tighten the lower screw with ⅓ of the tightening torque

1.3 Repeat process from step 1.1 for the rest of the screws

1.4 Tighten the upper screw with ⅔ of the tightening torque

1.5 Tighten the lower screw with ⅔ of the tightening torque

1.6 Repeat process from step 1.4 for the remaining screws

1.7 Tighten the upper screw with the tightening torque

1.8 Tighten the lower screw with the tightening torque

1.9 Repeat process from step 1.7 for the remaining screws

2 Check for uniform play

3 If there are deviations: Loosen the screws and repeat the procedure starting from step 1

The screws are tightened.

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Checking the circular run-out of the motor shaft

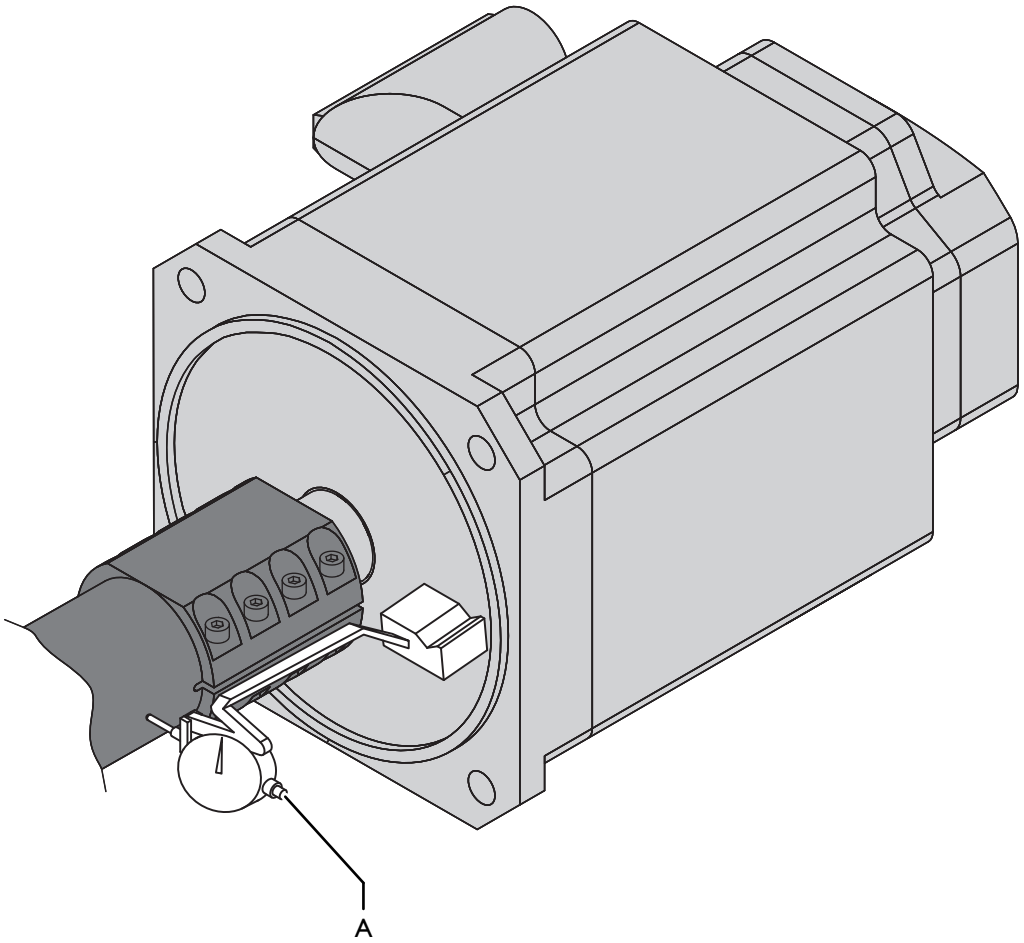

Fig. 5-9 *Motor shaft: Checking circular run-out*

A *Dial gauge*

Run-out tolerance
0.04 mm

Table 5-10 *Motor shaft: Run-out tolerance*

Check the circular run-out of the motor shaft as follows:

1. Attach the dial gauge as shown in the illustration
2. Ventilate the motor brake if necessary
3. Turn the motor shaft one rotation and read the measurement result from the dial gauge

The circular run-out has been checked.

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Greasing the gear teeth of the coupling and the worm shaft

⚠ WARNING

Falling axes / workpieces

If the contact surfaces between the coupling and the motor shaft are lubricated, the coupling slips. Axes or workpieces fall down. This can lead to severe or fatal injuries!

- Only grease the gear teeth of the coupling and the worm shaft

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

NOTE

Insufficient lubrication

Insufficient lubrication of the gear rim results in damage to the work shaft of the gearbox unit. This results in operational failure.

- Perform the described tasks at the specified times.

Checking gear teeth

Distinguishing characteristics of wear
• Defective teeth • Process inaccuracies • Discoloration due to heat • Presence of a wear edge • Heavy tribocorrosion present

Table 5-11 Distinguishing characteristics of wear: Gear teeth of the coupling and the worm shaft

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NOTE

Follow-on damage

Wear on the gear teeth of the coupling and worm shaft leads to process inaccuracies and other follow-on damage.

- If in doubt, replace the gearbox, the coupling or the entire gearbox unit

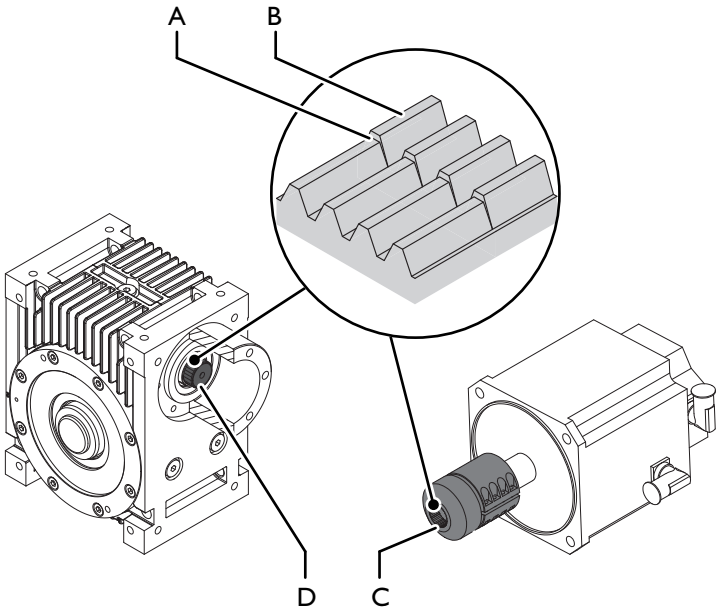

Fig. 5-10 *Checking gear teeth of the coupling and the worm shaft*

A	*Wear edge*	*C*	*Coupling*
B	*Gear teeth*	*D*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-11 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

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Check the gear teeth of the coupling and the worm shaft as follows:

Prerequisite:You are carrying out maintenance work or recommissioning. During the initial commissioning, there is no need for the gear teeth of the coupling and the worm shaft to be tested

1 Cleaning gear teeth

2 Checking gear teeth:

2.1 Presence of a wear edge on the worm shaft: Replace the gearbox

2.2 Presence of a wear edge on the coupling: Replace the coupling

2.3 Teeth defective: Replace gearbox unit

2.4 Heavy tribocorrosion present: Replace gearbox unit

2.5 First signs of tribocorrosion present (red discoloration of the track): Make a note in the intervention report and lubricate the gear teeth

2.6 Discoloration present: Make a note in the intervention report and lubricate the gear teeth

The gear teeth of the coupling and the worm shaft have been checked.

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Lubricating gearing of the coupling and the worm shaft

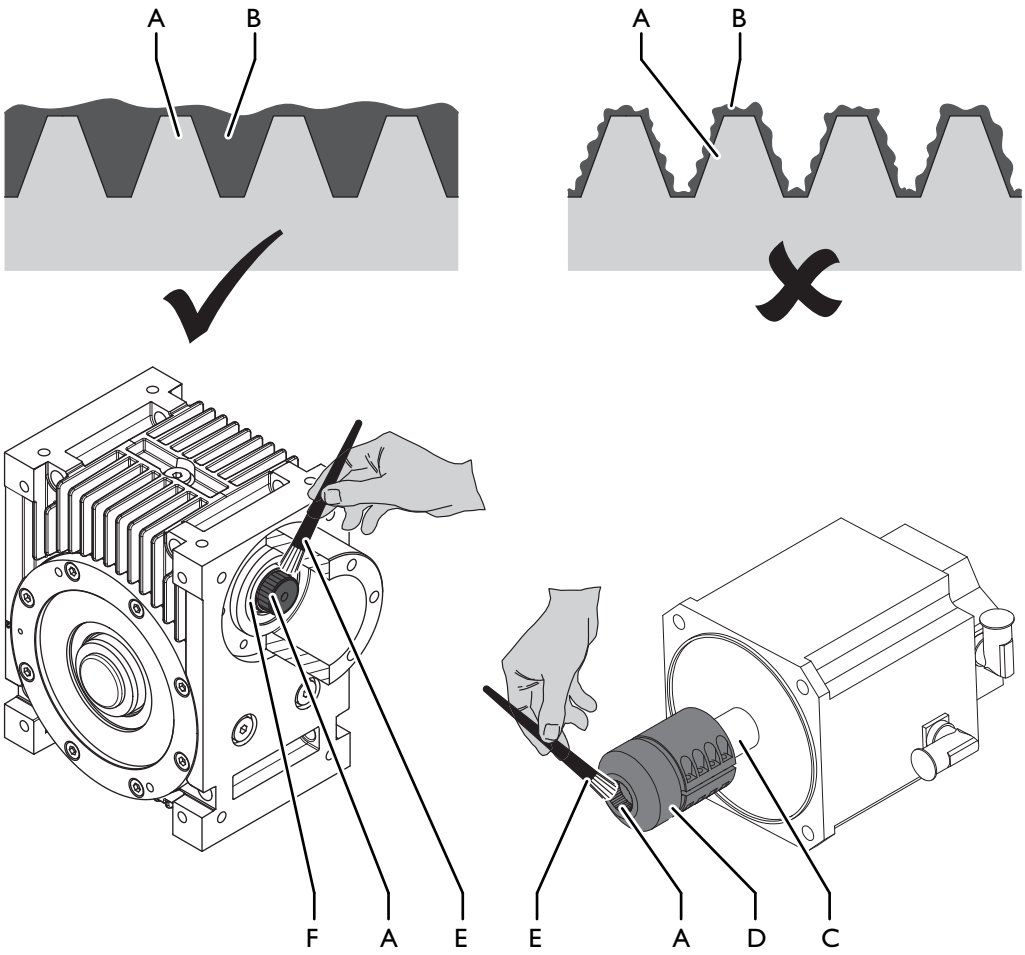

Fig. 5-11 *Greasing the gear teeth of the coupling and the worm shaft*

A	*Gear teeth*	*D*	*Coupling*
B	*Lubricant*	*E*	*Brush*
C	*Motor shaft*	*F*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

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Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-11 Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft

Grease the gear teeth of the coupling and the worm shaft as follows:

1 Coat the gear teeth of the coupling and the worm shaft with lubricant (The lubricant fills the recesses of the gear teeth completely)

The gear teeth of the coupling and the worm shaft are greased.

Installing the drive

NOTE

Failure of gearbox unit

If gearbox units are installed in a deviating manner, the worm gear does not run in the oil. The gearbox fails.

- Observe, without exception, the agreed installation position for size 180

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

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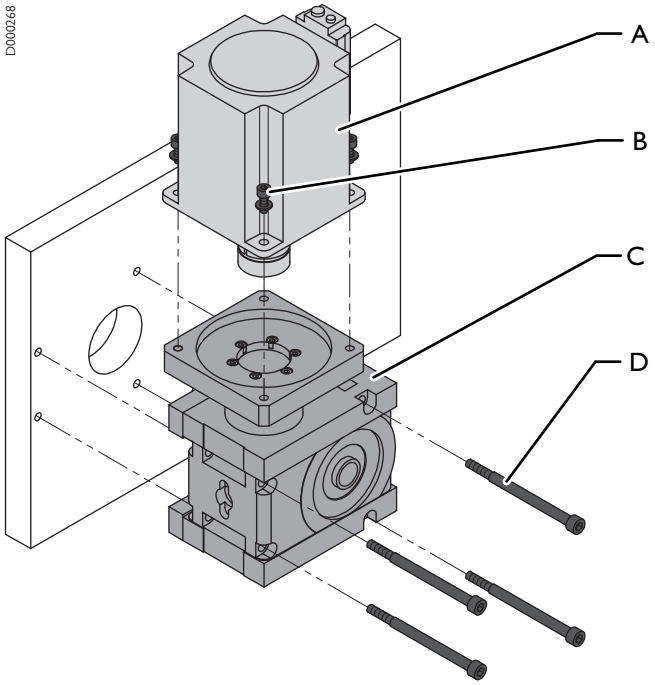

Fig. 5-12 *Installing the drive: Güdel gearbox unit*

A	*Motor*	*C*	*Gearbox unit*
B	*Motor screw*	*D*	*Gearbox screw*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 5-12 *Tightening torques for gearbox screws: Güdel gearbox unit*

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Install the drive as follows:

1 Attach slings to gearbox unit ➲ 72
2 Install the gearbox unit
3 Install and tighten gearbox screws
4 Attach slings to the motor ➲ 70
5 Install the motor along with the coupling on the gearbox unit
6 Install and tighten motor screws
7 Remove the transport securing device or slings

The drive has been installed.

Final tasks

Perform the following final tasks:

1 Remove slings if necessary
2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

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5.2.3.4 Maintenance schedule: Güdel gearbox unit with multi-tooth coupling

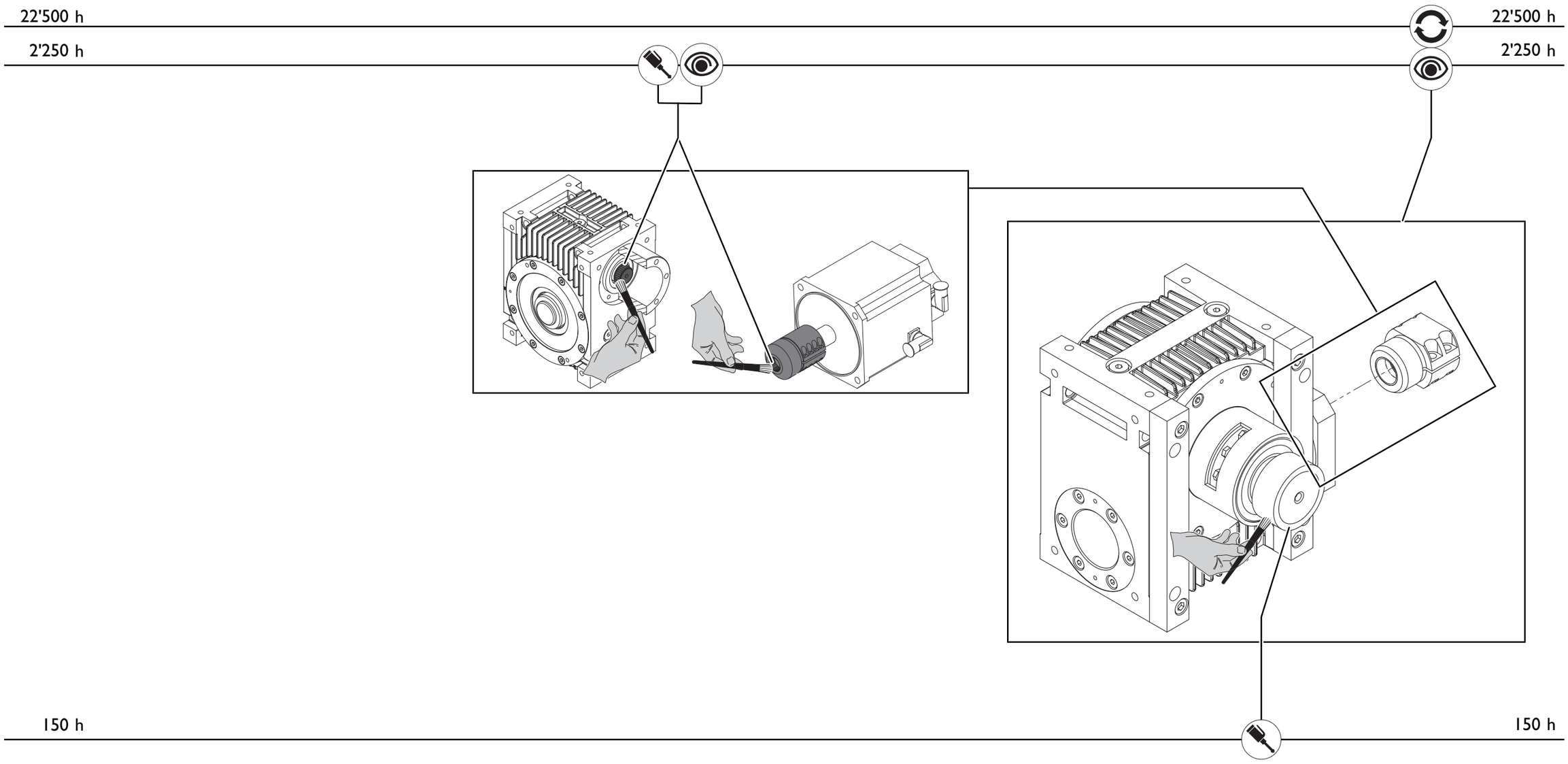

Fig. 5-13 Maintenance schedule: Güdel gearbox unit with multi-tooth coupling

Grease
Oil
Replacing
Clean
Replacing lubricant
Visual inspection

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5.2.3.5 Maintenance table: Güdel gearbox unit with multi-tooth coupling

Maintenance work	Maintenance cycle [h]	Duration [min]	Target readership	Lubricants Cleaning agents	Further information
Lubricating the pinion	150		Maintenance technicians The manufacturer's technicians	Mobil Mobilux EP 2	➲ 63
General inspection	2,250		Maintenance technicians The manufacturer's technicians		➲ 64
Greasing the gear teeth of the coupling and the worm shaft			Maintenance technicians The manufacturer's technicians	Motorex Grease 218 M; mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)	➲ 66
Replacing the gearbox unit	22,500	60	Service technicians The manufacturer's technicians Maintenance technicians		➲ 70

This table does not purport to be exhaustive.

Table 5-13 Maintenance table: Güdel gearbox unit with multi-tooth coupling

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5.2.4 Elastomer coupling

5.2.4.1 Maintenance tasks after 150 hours

Lubricating the pinion

If available, lubricate the pinion after 150 operating hours or 100 km. Lubricate several times if tribocorrosion (reddish discoloration) occurs.

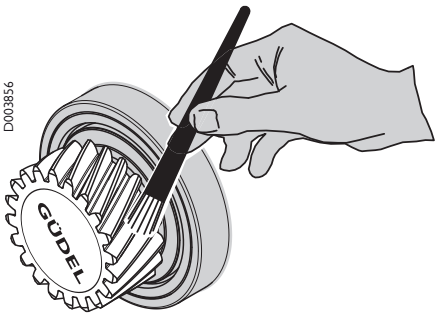
⚠ CAUTION

Danger of being crushed

When performing work on the product, there is a risk of being crushed in the area around the exposed pinions.

Observe the following points:

- Never reach into the area around the pinions
- Use a brush to apply the lubrication to the pinions



Lubrication ex works	Specification	Lubrication quantity
Mobil Mobilux EP 2	KP2K-30 in accordance with DIN 51502	

Table 5-14 Lubricants: Pinion

5.2.4.2 Maintenance tasks after 2,250 hours

General inspection

Performing a general inspection

For the general inspection, perform a rough check of the entire product.

Perform the general inspection as follows:

1 Switch off the system and padlock it to secure it against being switched on again

2 Check the inspection points as described in the inspection table

3 Take measures as described in the inspection table

The general inspection is complete.

NOTE

Leaks due to worn gaskets

Gaskets become brittle due to natural ageing, high temperatures or UV radiation. This can lead to leaks in the gearbox. The lubricant leaks out. The bearings heat up and fail. The gear teeth in the gear unit wear out and fail. The gearbox fails.

- Regularly check visible gaskets. Replace defective gaskets immediately
- In the event of leaks, check the gaskets. Replace defective gaskets immediately. Modify or replace the gearbox
- Repair any leaks promptly

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Inspection point	Description	Measures
Contamination	Check all the components for contamination: • Gearbox • Output flange	Immediately clean away any contamination
Damage	Check the product for damage: • Paint damage • Bent components • General damage • Cracks in the cast components	Immediately remedy all discovered damage
Loose components	Check the fit of the components: • Screws • Clamping sets	• Immediately tighten loose screws to the required torque • Immediately tighten loose clamping sets to the required torque
Loss of oil	Check product and its surroundings for traces: • Puddles of oil and oil spills on the floor • Leakages	• Repair or replace the gearbox • Clear up puddles of oil and oil spills on the floor
Components	Check the condition of the components: • Gasket • Clamping set • Pinion • Coupling • Gearbox	• Replace worn and defective components • Repair or replace the gearbox

Table 5-15 Inspection table

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5.2.4.3 Maintenance tasks after 22,500 hours

Replacing the gearbox unit

This chapter describes the steps for replacing the Güdel gearbox unit. Replace the gearbox as follows:

Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

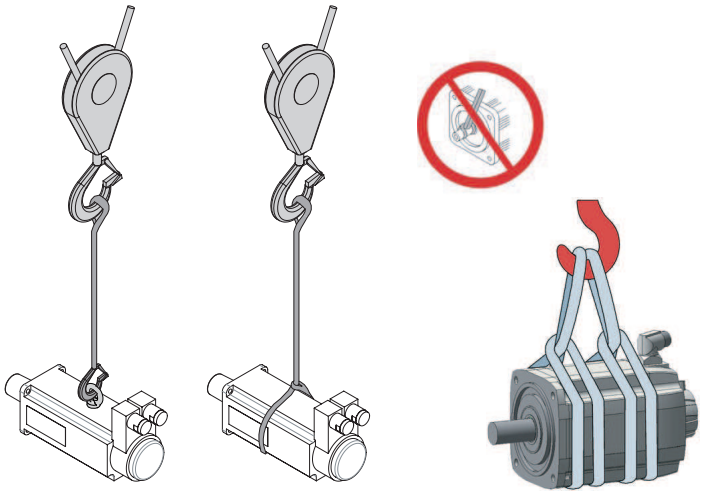

Fig. 5-14 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1 Remove fan from motor if necessary
2 Mount lifting screw if necessary
3 Attach the slings as shown in the illustration
4 Carefully lift the load
5 Check horizontal alignment of the load
6 If the load tilts: Repeat process from step 3

The slings are in place.

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Attaching the slings: Güdel gearbox unit

Use lifting units to transport gearbox units from size 090 upwards.

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

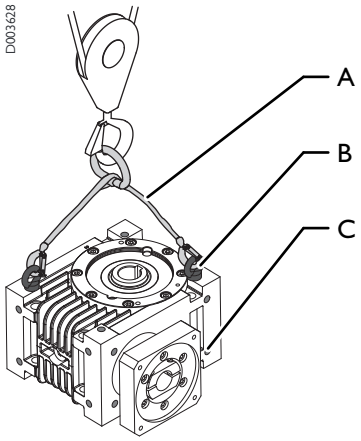

Fig. 5-15 *Attaching the slings: Güdel gearbox unit*

A *Belt harness*
B *Lifting screw*
C *Thread hole*

Size	Size of lifting screw
090	M10
120	M12
180	M16

Table 5-16 *Size of lifting screw*

Attach the slings as follows:

1 Insert lifting screws into threaded holes on desired side (Diagonal arrangement according to illustration)

2 Attach the slings as shown in the illustration

The slings are in place.

Removing the motor and coupling

⚠ WARNING

Moving the axis

The work requires moving the axis. This can lead to severe or fatal injuries!

- Ensure that no persons are in the danger area while the axis is moving

⚠ WARNING

Falling axes

After removing the transport securing device, brakes or motors, the vertical axes fall downwards. Carriages may run off to the side. This can lead to severe or fatal injuries!

- If necessary, secure the vertical axes and the carriages before removing transport securing devices, brakes or motors

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

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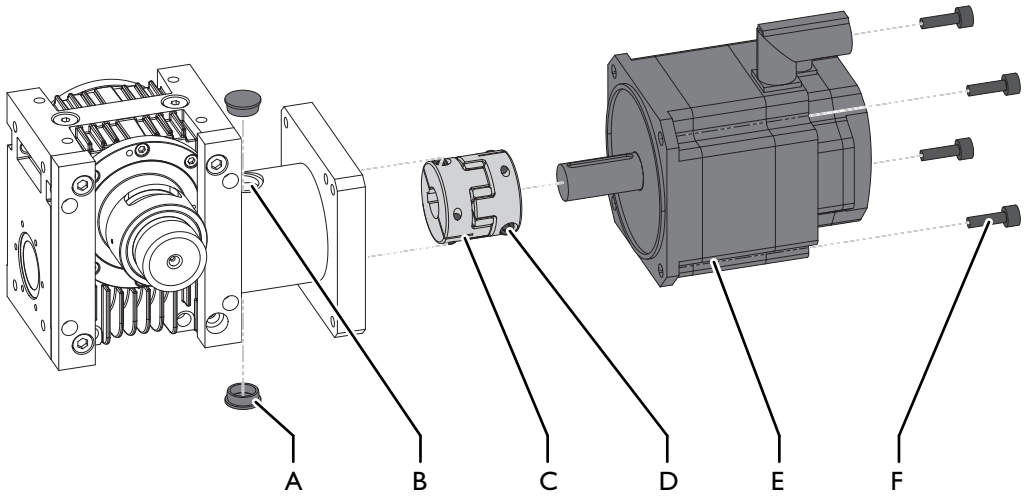

Fig. 5-16 *Remove motor and coupling*

A	*Plug*	*D*	*Coupling screw*
B	*Drill hole*	*E*	*Motor*
C	*Coupling*	*F*	*Motor screw*

Remove the motor and coupling as follows:

1 Switch off the plant and secure it with a padlock against being switched on again

2 Remove the plug

3 Check whether the coupling screws can be reached through the drill holes

4 If there are deviations: Adjust axis until the coupling screws can be reached through the drill hole

5 Switch off the plant and secure it with a padlock against being switched on again

6 Attach slings to the motor ➲ 🗎 96

7 Undoing the coupling screws on the gearbox unit side

8 Remove the motor screws

9 Remove motor and coupling

10 Undoing the coupling screws on the motor side

11 Remove the coupling from the motor shaft

12 Remove the slings

The motor and coupling have now been removed.

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Removing the gearbox unit

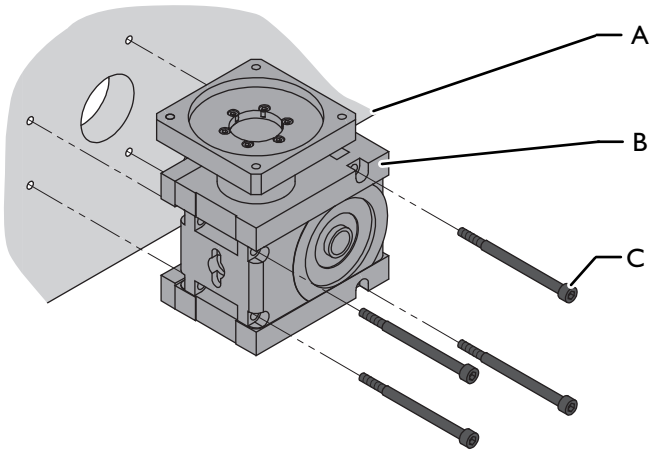

Fig. 5-17 *Removing the gearbox unit*

A *Adjacent construction*
B *Gearbox unit*
C *Gearbox screws*

Remove the gearbox unit as follows:

1 Attach slings to the gearbox unit ➲ 97
2 Remove the gearbox screws
3 Remove the gearbox unit
4 Remove the transport securing device or slings

The gearbox unit has now been removed.

Replacing the gearbox unit

Replace the gearbox unit as follows:

1 Replace the complete gearbox unit and coupling

The gearbox unit has been replaced.

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Installing the gearbox unit

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

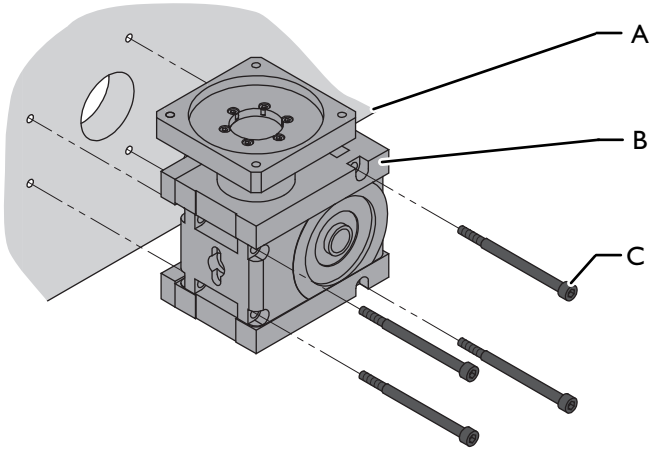

Fig. 5-18 *Installing the gearbox unit*

A *Adjacent construction*

B *Gearbox unit*

C *Gearbox screws*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 5-17 *Tightening torques for gearbox screws: Güdel gearbox unit*

Install the gearbox unit as follows:

1. Attach slings to the gearbox unit ➲ 97
2. Install the gearbox unit
3. Install and tighten the gearbox screws
4. Remove the transport securing device or slings

The gearbox unit has now been installed.

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Installing the motor

Information on initial assembly

The range of motors for the gearbox unit is very broad. The same applies to the dimensions of the motor shafts. A design solution was selected that allowed for the greatest variety of motor to be mounted on the gearbox unit. The increased expense for the initial assembly was consciously taken into account. It normally occurs only once during the entire service life of the gearbox unit. For maintenance tasks and repair, the motor is simply disassembled and remounted with one half of the elastomer coupling.

Prerequisites

Three conditions must be fulfilled simultaneously to allow you to install the motor on the gearbox unit:

- The gearbox flange is aligned to allow the coupling screws to be tightened through the drill holes of the gearbox flange with a torque wrench
- The input shaft with installed wedge must be positioned with the coupling attached to allow the coupling screws to be tightened through the drill holes of the gearbox flange
- In the event of angled motor flanges, the motor must be aligned to the motor flange to allow the motor screws to be fitted and tightened

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Aligning the gearbox flange

You can align the gearbox flange. When correctly aligned, the motor and coupling can be installed.

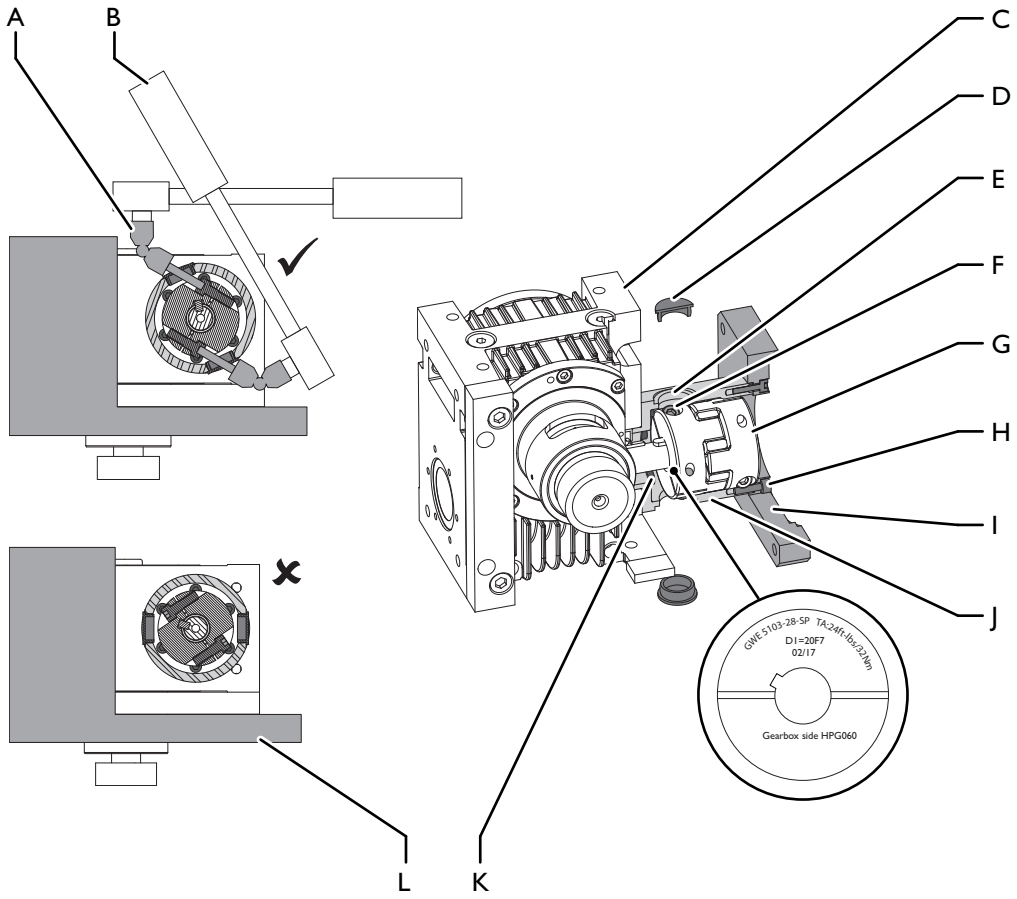

Fig. 5-19 *Aligning the gearbox flange*

A	*Articulated socket*	*G*	*Coupling*
B	*Torque wrench*	*H*	*Screw*
C	*Gearbox*	*I*	*Motor flange*
D	*Plug*	*J*	*Gearbox flange*
E	*Drill hole*	*K*	*Fastening screw*
F	*Coupling screw*	*L*	*Adjacent construction*

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Align the gearbox flange as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction
➲ 101

1 Switch off the system and secure it with a padlock against being switched on again

2 Remove the plug

3 Check whether the coupling screws can be reached through the drill hole and tightened with a torque wrench

4 If there are deviations:

- **4.1** Remove the coupling
- **4.2** Remove the fastening screws, screws and motor flange
- **4.3** Align the gearbox flange
- **4.4** Install and tighten the fastening screws
- **4.5** Install the motor flange
- **4.6** Install and tighten the screws
- **4.7** Place the coupling on the input shaft

5 Install the plug

The gearbox flange has now been aligned.

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Aligning the input shaft to the gearbox flange

⚠ WARNING

Moving the axis

The work requires moving the axis. This can lead to severe or fatal injuries!

- Ensure that no persons are in the danger area while the axis is moving

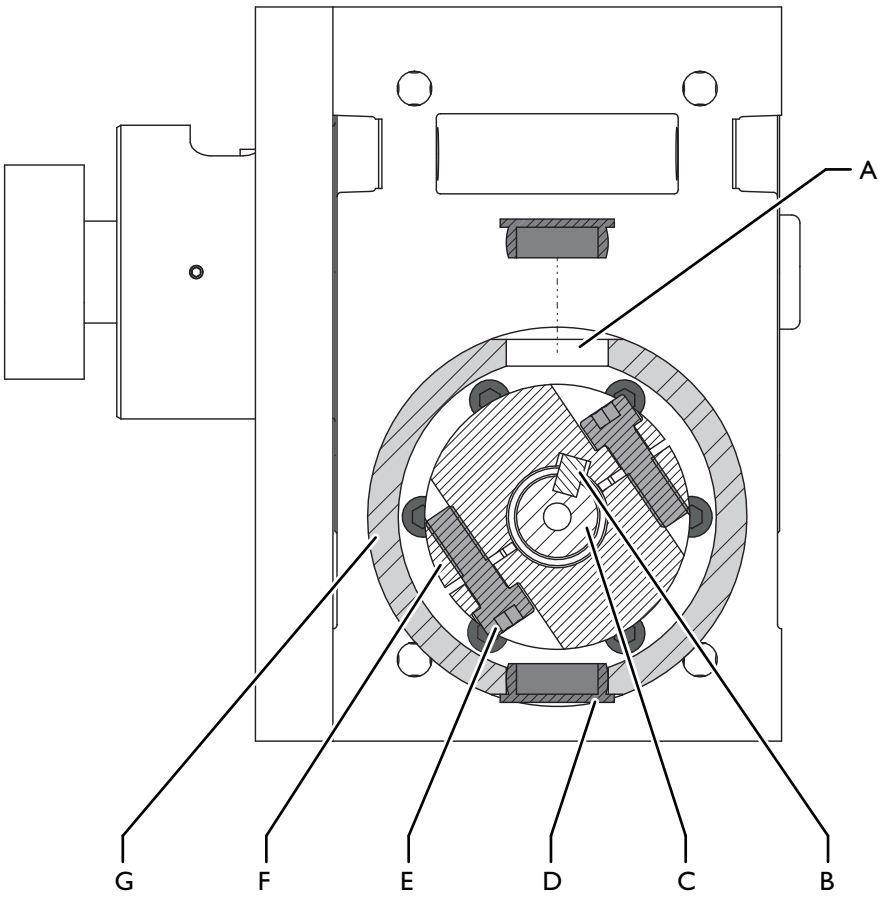

Fig. 5-20 *Aligning the input shaft to the gearbox flange*

A	*Drill hole*	*E*	*Coupling screw*
B	*Wedge*	*F*	*Coupling*
C	*Input shaft*	*G*	*Gearbox flange*
D	*Plug*		

Align the input shaft to the gearbox flange as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction ➲ 101

Prerequisite: The gearbox flange has been aligned correctly ➲ 102

Prerequisite: The wedge has been installed on the gearbox side

Prerequisite: The coupling has been placed correctly on the input shaft

1 Check whether the coupling screws can be reached through the drill holes

2 If there are deviations: Adjust the axis until the coupling screws can be reached through the drill holes

3 Switch off the system and secure it with a padlock against being switched on again

The input shaft has been aligned to the gearbox flange.

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Positioning the coupling on the motor shaft

NOTE

Defective coupling

The coupling is destroyed if the coupling screws are tightened and the coupling is not installed on the shaft.

- Tighten the coupling screws only when the coupling is installed on the shaft.

The tightening torque TA and the type of couping are engraved on the motor and gearbox sides in the couping.

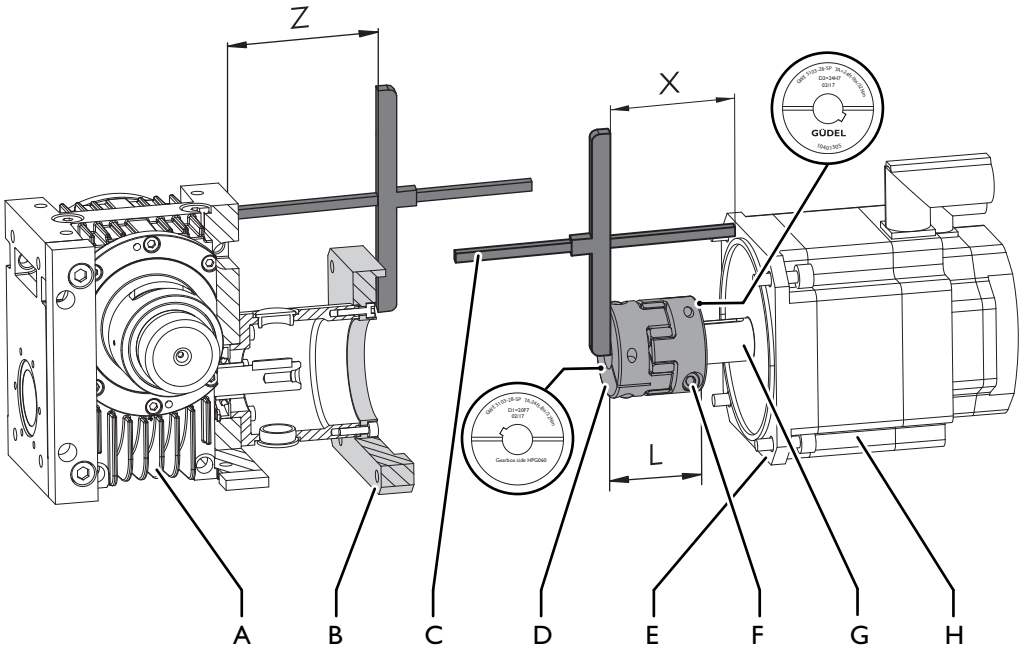

Fig. 5-21 *Positioning the coupling on the motor shaft: Elastomer coupling*

A	*Gearbox*	*E*	*Installation surface*
B	*Motor flange*	*F*	*Coupling screw*
C	*Measuring instrument*	*G*	*Motor shaft*
D	*Coupling*	*H*	*Motor*

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$$X = Z - Y$$

Fig. 5-22 *X dimension calculation formula*

Güdel HPG gearbox unit size	Coupling type	L dimension [mm]	L dimension tolerance [mm]	Y dimension [mm]	X dimension tolerance [mm]
030	GWE 5103-19-SP	50	+1	8.5	+0.5
			+0.5		-1
	GWE 5103-14-SP	32	+1	15.5	+0.5
			+0.5		0
045	GWE 5103-24-SP	54	+1	11	+0.5
			+0.5		0
	GWE 5103-19-SP	50	+1	10	+0.5
			+0.5		0
060	GWE 5103-28-SP	62	+1	16.5	+1
			+0.5		-3
	GWE 5103-24-SP	54	+1	18.5	+1
			+0.5		-2
090	GWE 5103-38-SP	76	+1.2	25	+1
			+0.5		-2
	GWE 5103-28-SP	62	+1	29	+1
			+0.5		-2

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Güdel HPG gearbox unit size	Coupling type	L dimension [mm]	L dimension tolerance [mm]	Y dimension [mm]	X dimension tolerance [mm]
120	GWE 5103-42-SP	102	+1.2	24	+1
			+0.5		-3
	GWE 5103-38-SP	76	+1.2	36	+1
			+0.5		-1

Table 5-19 Weight and tolerances for the elastomer coupling

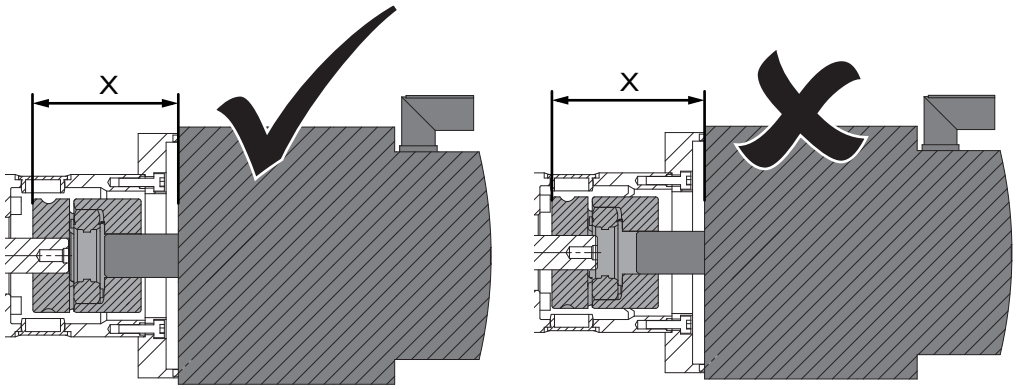

Fig. 5-23 Position the coupling on the motor shaft: Make use of X dimension tolerance

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-19 Cleaning agents: Gearbox unit Güdel: Coupling and motor shaft

Tool	Use	Item number
Corrosion protection agent MOTOREX Intact XD 20	Installing the coupling Applying corrosion protection to the product	0502037

Table 5-20 Special tools, testing and measuring instruments

Position the coupling on the motor shaft as follows:

Prerequisite: The transport securing device in effect at the gearbox is disassembled

1 Clean the coupling and motor shaft to ensure that they are free of grease

2 If desired by the customer, mount the wedge on the motor shaft (wedge on motor shaft not essentially necessary)

3 Apply corrosion protection agent to the motor shaft with a brush

4 Measure the distance Z

5 Push the coupling onto the motor shaft
(set L dimension according to table)

6 Position the coupling on the motor shaft:

6.1 Calculate dimension X and position coupling according to the calculated dimension

6.2 Coupling rest a little on the motor shaft: Make use of X dimension tolerance

7 Tighten the coupling screws:

7.1 Tighten alternately to 50% of the tightening torque TA

7.2 Tighten alternately with 100% of the tightening torque TA

The coupling is positioned.

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Installing the motor and coupling

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

Vent the motor brake according to the specifications of the motor manufacturer

The tightening torque TA and the type of couping are engraved on the motor and gearbox sides in the couping.

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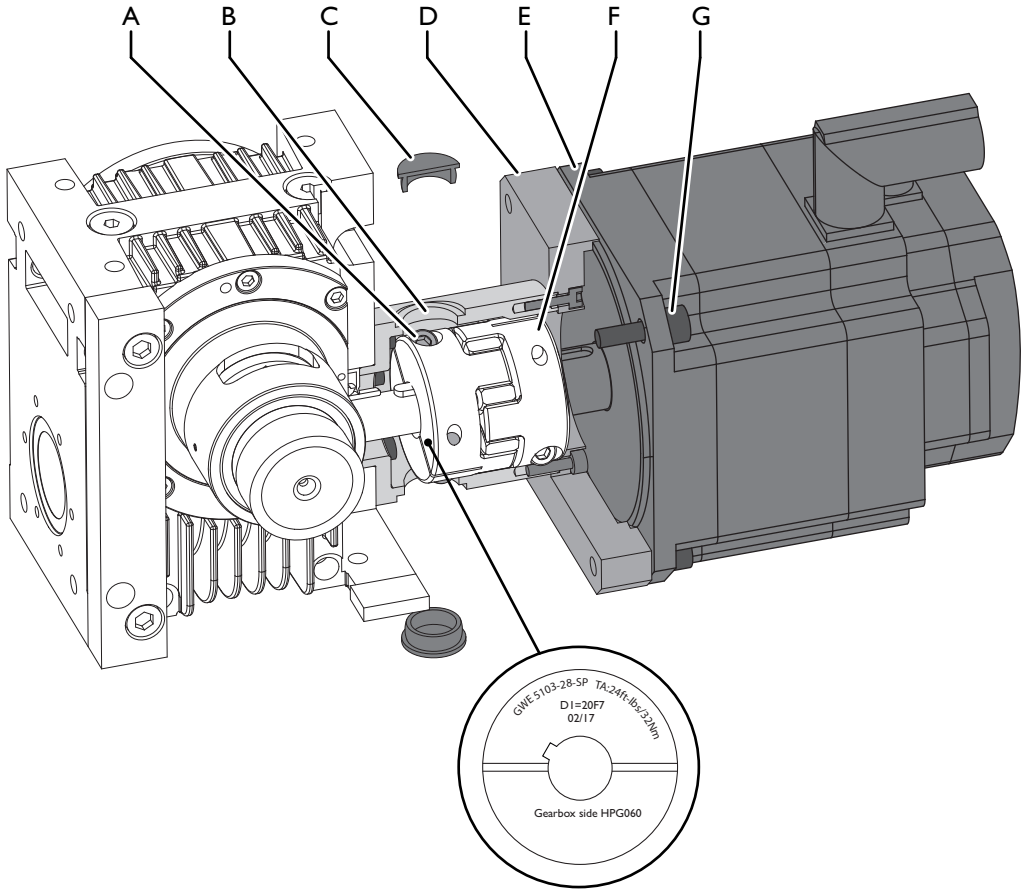

Fig. 5-24 *Installing the motor and coupling*

A	*Coupling screw*	*E*	*Motor*
B	*Drill hole*	*F*	*Coupling*
C	*Plug*	*G*	*Motor screw*
D	*Motor flange*		

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 5-21 *Cleaning agents: Güdel gearbox unit: coupling, input shaft and wedge*

Tool	Use	Item number
Corrosion protection agent MOTOREX Intact XD 20	Installing the coupling Applying corrosion protection to the product	0502037

Table 5-22 *Special tools, testing and measuring instruments*

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Install the motor and coupling as follows:

Prerequisite: The gearbox unit is installed on the adjacent construction ➲ 101

Prerequisite: The gearbox flange has been aligned correctly ➲ 102

Prerequisite: The input shaft has been aligned correctly to the gearbox flange ➲ 105

Prerequisite: The couping has been positioned correctly on the motor shaft ➲ 106

1 Switch off the plant and padlock it to prevent it from being switched on again

2 Attach slings to the motor if necessary ➲ 96

3 Clean the coupling, input shaft and wedge to remove any grease

4 Installing the wedge on the input shaft

5 Apply corrosion protection agent to the wedge and input shaft with a brush

6 Push the motor, with the mounted coupling, onto the gearbox unit

7 Install and tighten motor screws

8 If the motor screws cannot be fitted:

8.1 Ventilate the motor brake if necessary

8.2 Turning the motor into correct installation position

8.3 Repeat process from step 7

9 Tighten the coupling screws:

9.1 Tighten alternately to 50% of the tightening torque TA

9.2 Tighten alternately with 100% of the tightening torque TA

10 Mount plug

The motor and the coupling have been installed.

Final tasks

Perform the following final tasks:

1 Remove slings if necessary

2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

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5.2.4.4 Maintenance schedule: Güdel gearbox unit with elastomer coupling

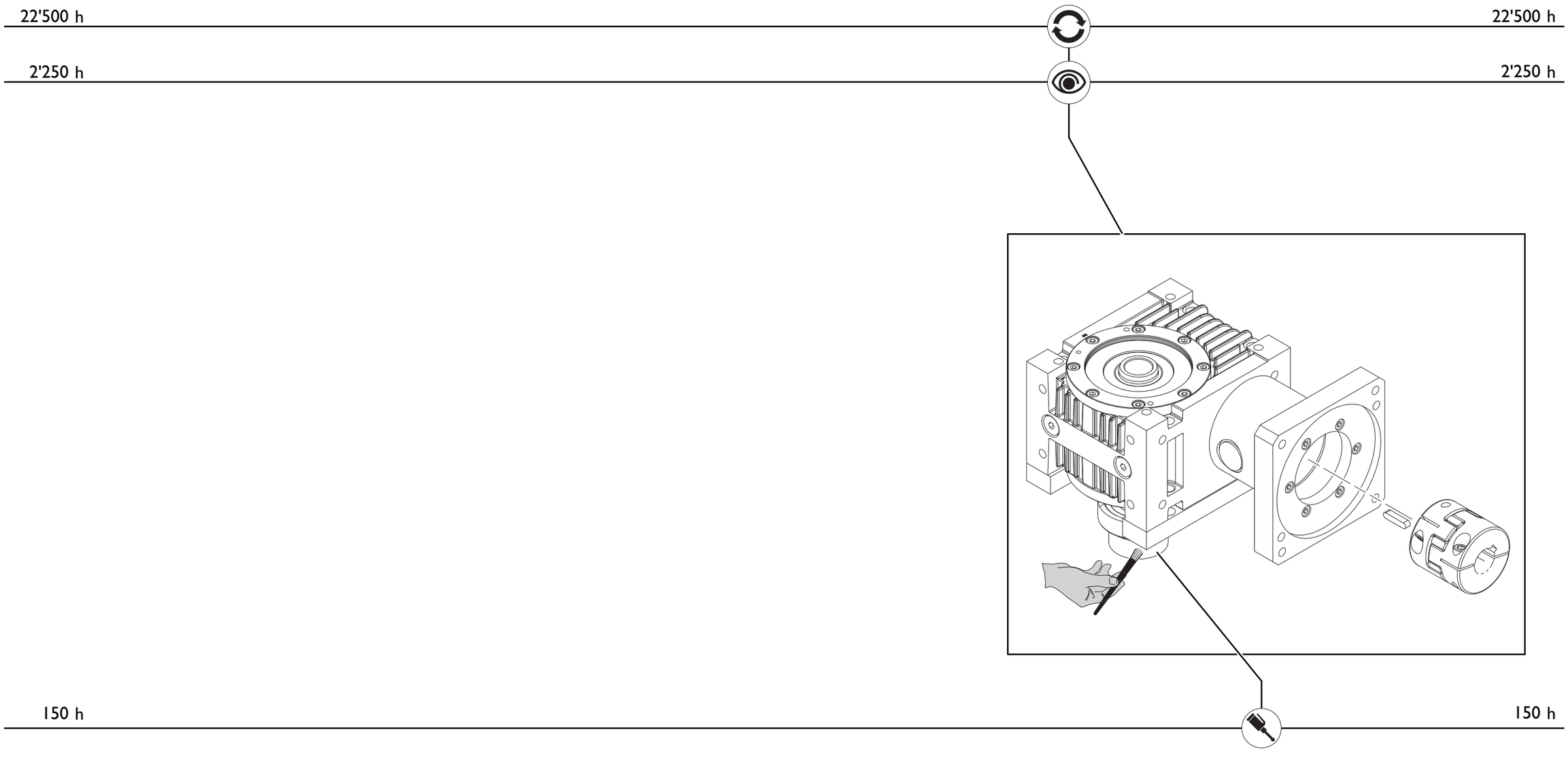

Fig. 5-25 Maintenance schedule: Güdel gearbox unit with elastomer coupling

Grease
Oil
Replacing
Clean
Replacing lubricant
Visual inspection

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5.2.4.5 Maintenance table: Güdel gearbox unit with elastomer coupling

Maintenance work	Maintenance cycle [h]	Duration [min]	Target readership	Lubricants Cleaning agents	Further information
Lubricating the pinion	150		Maintenance technicians The manufacturer's technicians	Mobil Mobilux EP 2	➲ 93
General inspection	2,250		Maintenance technicians The manufacturer's technicians		➲ 94
Replacing the gearbox unit	22,500	60	Service technicians The manufacturer's technicians Maintenance technicians		➲ 96

This table does not purport to be exhaustive.

Table 5-23 Maintenance table: Güdel gearbox unit with elastomer coupling

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5.2.5 Feedback on the instructions

Your feedback helps us to keep improving these instructions. Thank you!

mailto: docufeedback@ch.gudel.com

Please provide the following information with your feedback:

- Identification number of the instructions
- Product, type
- Project number, order number
- Material number / serial number
- Year of manufacture
- Location of the product (country, ambient conditions, etc.)
- Photos, comments, feedback with clear reference to the section in the instructions
- Your contact data for clarifications if necessary

You can find most of the information on the type plate or the title page of the instructions. The identification number of the instructions is given on each page, as shown here:

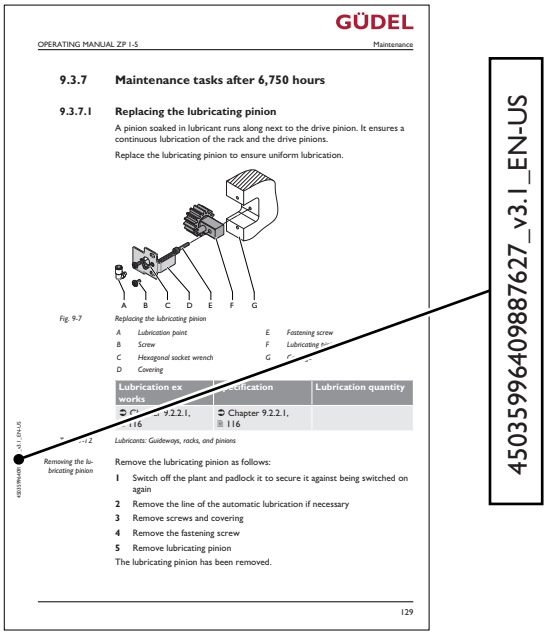

Fig. 5-26 *Identification number of the instructions*

6 Repairs

6.1 Introduction

Work sequences

Perform the work sequences in the order described. Perform the described tasks at the specified times. This ensures a long service life for your product.

Original spare parts

Only use original spare parts. ➲ 173

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel.
➲ Chapter 9, 182

6.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➲ 13
It concerns your personal safety!

⚠ WARNING

Automatic startup

During work on the product, there is danger of the machine starting up automatically. This can lead to severe or fatal injuries!

Before working in the danger area:

- Secure vertical axes (if equipped) against falling.
- Switch off the superordinate main power supply. Secure it against being switched on again (main switch for the complete system)
- Before switching on the system again, make sure that no one is in the danger area

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⚠ WARNING

Slipping hazard

Liquids run out if there is a leak. Persons may slip and injure themselves seriously!

- Take application-specific protective measures
- Repair any leaks promptly
- Prevent any new leaks. Replace or modify the leaking component or assembly
- Check the fill level and refill if necessary

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

6.1.2 Personnel qualifications

Only appropriately trained and authorized technicians are allowed to work on the product.

6.2 Repairs

6.2.1 General prerequisites

Prior to performing repair and maintenance tasks, do the following:

- If vertical axes are present, secure them against falling
- Switch off the system and padlock it to secure it against being switched on again
- Make sure that all necessary spare parts and wearing parts are at hand
  ➲ 🗎 173

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6.2.2 Replacing pinion, bearing, and clamping set

The components are designed for continuous use. Their wear depends on the duration of operation of the product and the ambient conditions. Güdel recommends preventatively replacing components as soon as their service life has been reached. Components may fail before expiry of the service life however. Replace worn components immediately.

Distinguishing characteristics of pinion wear
• Defective teeth • Process inaccuracies • Discoloration due to heat present

Table 6-1 Distinguishing characteristics of wear: Pinion

Distinguishing characteristics of bearing wear
• Excessive noise audible • Discoloration due to heat • Uneven running due to vibrations perceptible

Table 6-2 Distinguishing characteristics of wear: Bearing

Distinguishing characteristics of clamping set wear
• Defective screws • Process inaccuracies • Slippage

Table 6-3 Distinguishing characteristics of wear: Clamping set

⚠ WARNING

Loose components

Vibrations can loosen connecting elements. Persons are surprised by unexpected situations and seriously injured as a result.

Observe the following points:

- Secure the connection elements by appropriate means
- Check the tightening torques regularly

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The O-ring will be destroyed if you remove the centering flange. Always replace the O-ring when you have removed the centering flange.

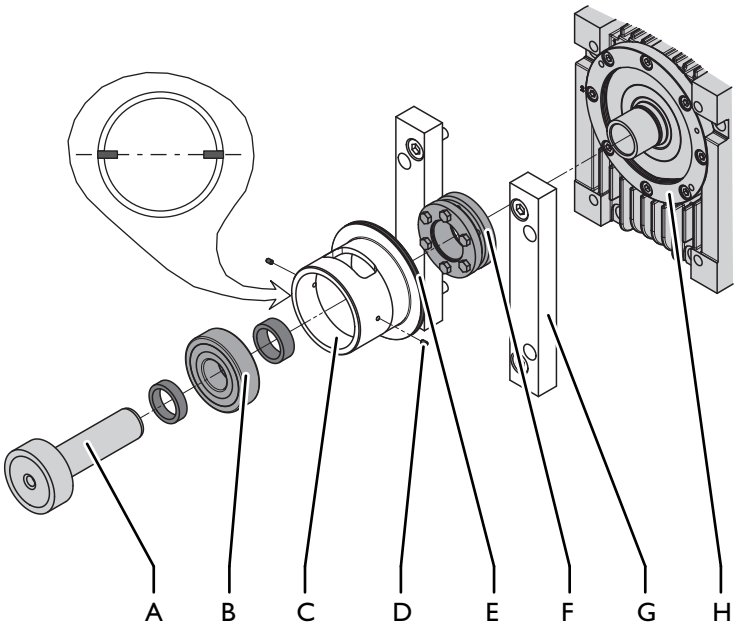

Fig. 6-1 *Replacing pinion, bearing, and clamping set: Güdel gearbox unit*

A	*Pinion*	*E*	*O-ring*
B	*Bearing*	*F*	*Clamping set*
C	*Centering flange*	*G*	*Spacing strip*
D	*Headless set screw*		

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Replace the pinion, bearing, and clamping set as follows:

1 Switch off the system and padlock it to secure it against being switched on again
2 Remove the drive if necessary
3 Remove the spacing strips
4 Remove the headless set screws
5 Remove the centering flange in axis direction
6 Loosen the clamping set screws
7 Replace pinion, bearing, O-ring and clamping set
8 Install the pinion, bearing, O-ring and clamping set in reverse order
   - **8.1** Tightening torque of clamping set ➲ Chapter 9.2, 186
   - **8.2** Install headless set screws according to the illustration (secure with Loctite)
   - **8.3** Check the tooth flank backlash

Pinion, bearing, and clamping set have been replaced.

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6.2.3 Setting the gear backlash

The gear backlash is set ex works. Reset the gear backlash to ensure reliable function.

NOTE

Incorrect assembly of the casing cover

The gearbox oil runs out. The worm shaft engages incorrectly with the worm gear.

- Do not remove the casing cover
- Align both casing covers in the identical position

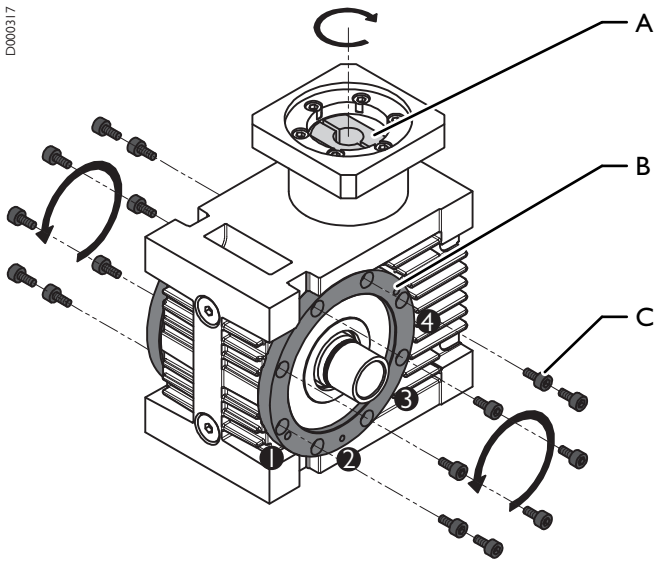

Fig. 6-2 *Setting the gear backlash: Güdel gearbox unit*

A *Worm shaft*
B *Casing cover*
C *Screw*

Size	030	045	060	090	120	180
Tightening torque [Nm]	6	7	8	19	36	36

Table 6-4 *Tightening torques of screws of casing cover*

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Set the gear backlash as follows:

1 Switch off the system and padlock it to secure it against being switched on again

2 Disassemble the drive

3 Remove all screws on both sides

4 Rotate both covers toward the next higher, cast-in number

5 Tighten four screws on each of the two sides

6 Checking the gear backlash: Rotate the worm shaft 360° by hand

- **6.1** The shaft does not resist rotation: Repeat from step 3
- **6.2** The shaft resists rotation: Remove the screws, set both gearbox covers one level lower
- **6.3** The shaft always resists rotation: Replace gearbox unit immediately

7 Insert all screws on both sides and tighten crosswise

8 Checking the gear backlash: Rotate the worm shaft 360° by hand
The shaft resists rotation: Repeat from step 3

The gear backlash has been set.

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6.2.4 Multi-tooth coupling

6.2.4.1 Replacing the motor and coupling

Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

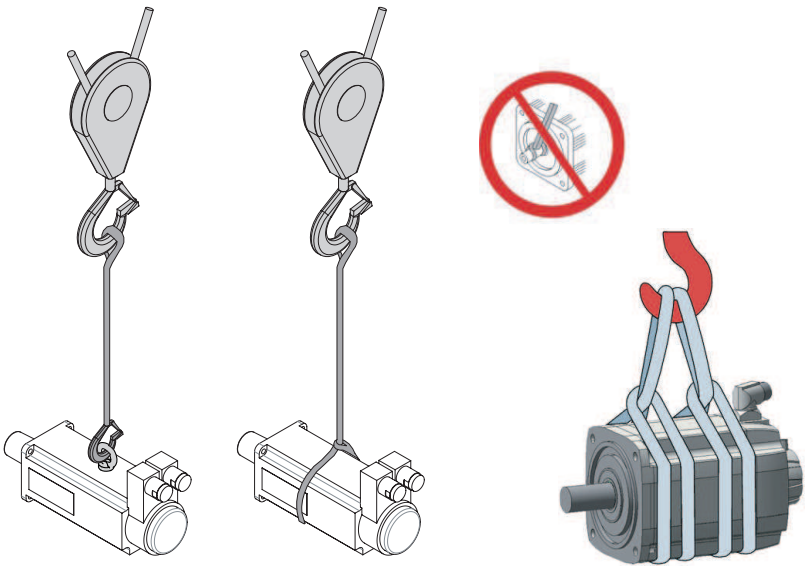

Fig. 6-3 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1. Remove fan from motor if necessary
2. Mount lifting screw if necessary
3. Attach the slings as shown in the illustration
4. Carefully lift the load
5. Check horizontal alignment of the load
6. If the load tilts: Repeat process from step 3

The slings are in place.

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Disassembling the motor and coupling

⚠ WARNING

Falling axes

After removing the transport securing device, brakes or motors, the vertical axes fall downwards. Carriages may run off to the side. This can lead to severe or fatal injuries!

- If necessary, secure the vertical axes and the carriages before removing transport securing devices, brakes or motors

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

Disassemble the motor and the coupling as follows:

1 Switch off the system and padlock it to secure it against being switched on again

2 Loosen the motor screws

3 Remove the motor, together with the coupling, from the gearbox

4 Release the coupling screws

5 Remove the coupling from the motor shaft

The motor and the coupling have been disassembled.

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Positioning the coupling on the motor shaft

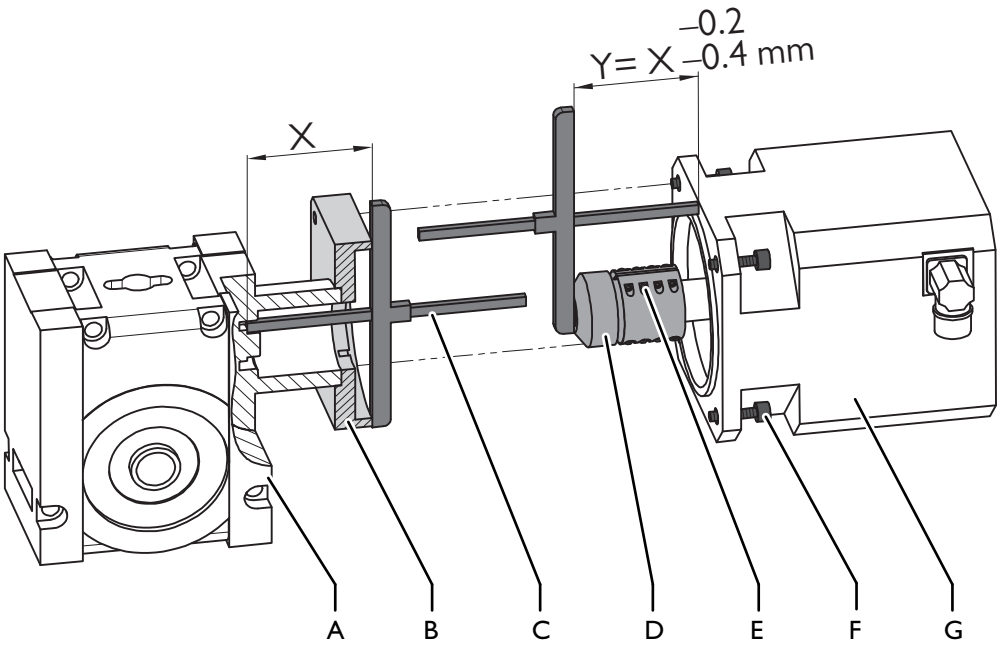

Fig. 6-4 *Positioning the coupling on the motor shaft*

A	*Gearbox unit*	*E*	*Coupling screw*
B	*Motor flange*	*F*	*Motor screw*
C	*Measuring instrument*	*G*	*Motor*
D	*Coupling*		

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 6-5 *Cleaning agents: Gearbox unit Güdel: Coupling and motor shaft*

Position the coupling on the motor shaft as follows:

Prerequisite: The transport securing device in effect at the gearbox is disassembled

1. Clean the coupling and motor shaft to ensure that they are free of grease
2. Measure distance X
3. Push the coupling onto the motor shaft
   (Set dimension Y as shown in the illustration)

The coupling is positioned.

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Tightening the screws on the motor shaft

⚠ WARNING

Falling axes, workpieces

Incorrect tightening torques can lead to axes or workpieces falling. This can lead to physical damage or severe or fatal injuries!

- Calibrate and check the torque wrench periodically
- Tighten all screws with a torque wrench to the specified tightening torques

NOTE

Ruined gear teeth

The gear teeth of the connection element are ruined if the connection element is not correctly mounted on the motor shaft.

- Tighten the screws according to the instructions
- Maintain the circular run-out tolerance of 0.04

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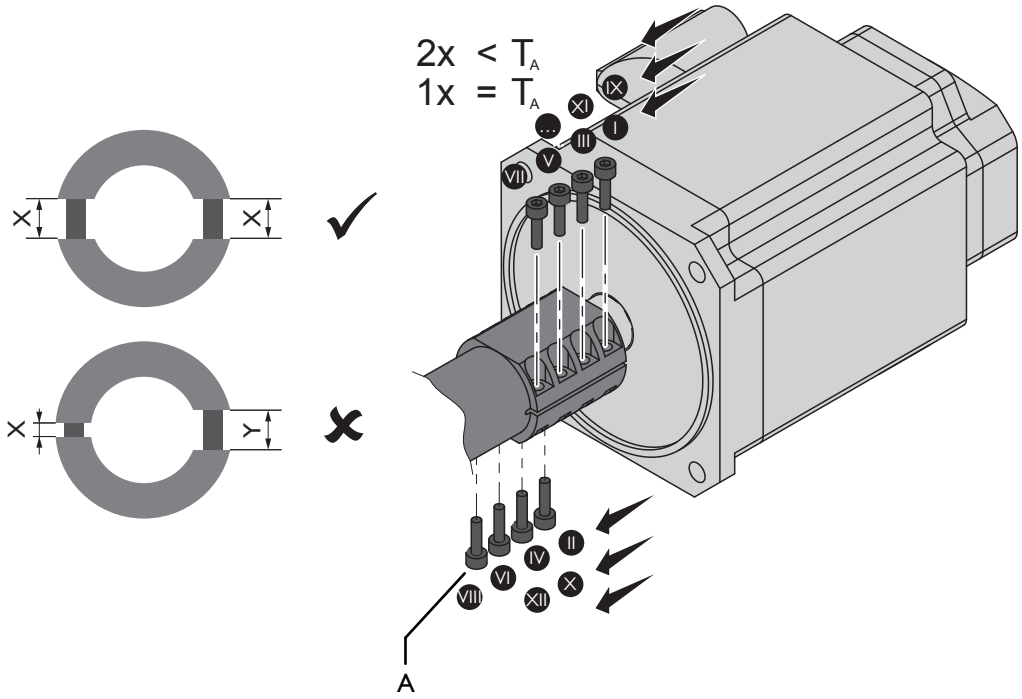

Fig. 6-5 *Motor shaft: Tighten the screws*

A *Screw*

Tighten the screws as follows:

1 Tighten the screws:
Tightening torques (T_A) ➲ 182

1.1 Tighten the upper screw with ⅓ of the tightening torque

1.2 Tighten the lower screw with ⅓ of the tightening torque

1.3 Repeat process from step 1.1 for the rest of the screws

1.4 Tighten the upper screw with ⅔ of the tightening torque

1.5 Tighten the lower screw with ⅔ of the tightening torque

1.6 Repeat process from step 1.4 for the remaining screws

1.7 Tighten the upper screw with the tightening torque

1.8 Tighten the lower screw with the tightening torque

1.9 Repeat process from step 1.7 for the remaining screws

2 Check for uniform play

3 If there are deviations: Loosen the screws and repeat the procedure starting from step 1

The screws are tightened.

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Checking the circular run-out of the motor shaft

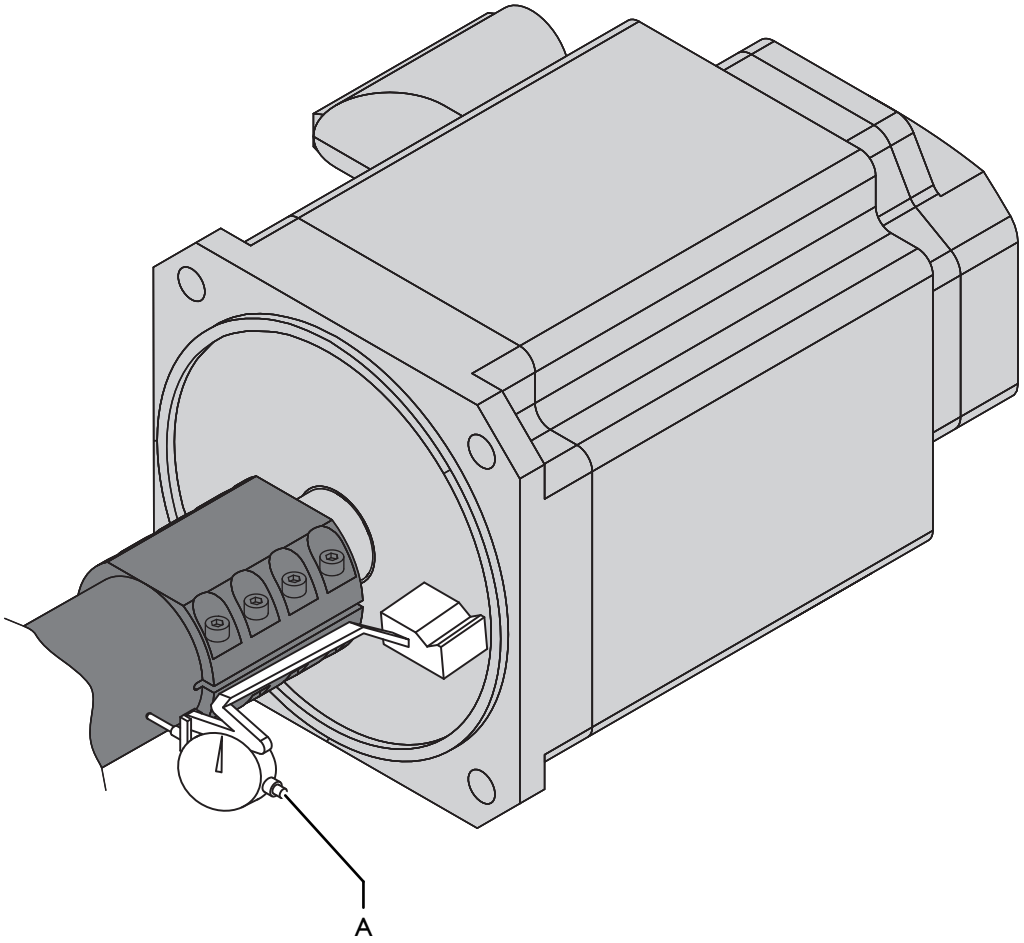

Fig. 6-6 *Motor shaft: Checking circular run-out*

A *Dial gauge*

Run-out tolerance
0.04 mm

Table 6-6 *Motor shaft: Run-out tolerance*

Check the circular run-out of the motor shaft as follows:

1. Attach the dial gauge as shown in the illustration
2. Ventilate the motor brake if necessary
3. Turn the motor shaft one rotation and read the measurement result from the dial gauge

The circular run-out has been checked.

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Greasing the gear teeth of the coupling and the worm shaft

⚠ WARNING

Falling axes / workpieces

If the contact surfaces between the coupling and the motor shaft are lubricated, the coupling slips. Axes or workpieces fall down. This can lead to severe or fatal injuries!

- Only grease the gear teeth of the coupling and the worm shaft

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

NOTE

Insufficient lubrication

Insufficient lubrication of the gear rim results in damage to the work shaft of the gearbox unit. This results in operational failure.

- Perform the described tasks at the specified times.

Checking gear teeth

Distinguishing characteristics of wear
• Defective teeth • Process inaccuracies • Discoloration due to heat • Presence of a wear edge • Heavy tribocorrosion present

Table 6-7 *Distinguishing characteristics of wear: Gear teeth of the coupling and the worm shaft*

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NOTE

Follow-on damage

Wear on the gear teeth of the coupling and worm shaft leads to process inaccuracies and other follow-on damage.

- If in doubt, replace the gearbox, the coupling or the entire gearbox unit

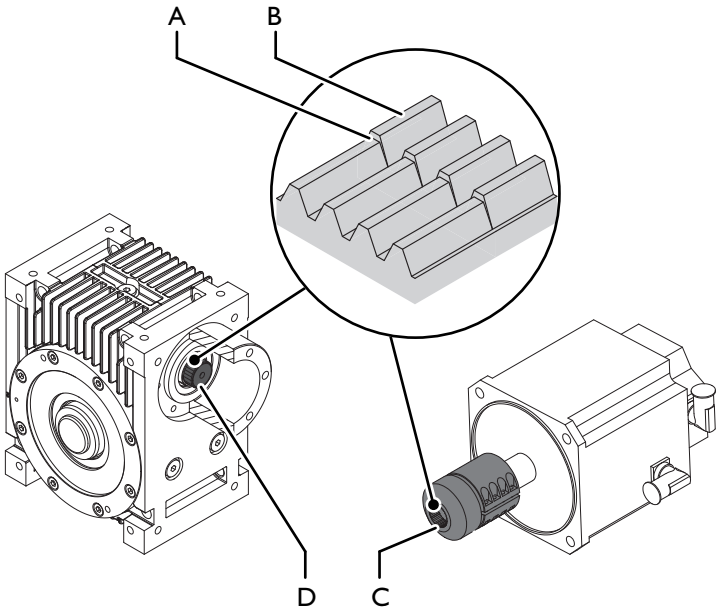

Fig. 6-7 *Checking gear teeth of the coupling and the worm shaft*

A	*Wear edge*	*C*	*Coupling*
B	*Gear teeth*	*D*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 6-7 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

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Check the gear teeth of the coupling and the worm shaft as follows:

Prerequisite:You are carrying out maintenance work or recommissioning. During the initial commissioning, there is no need for the gear teeth of the coupling and the worm shaft to be tested

1 Cleaning gear teeth

2 Checking gear teeth:

2.1 Presence of a wear edge on the worm shaft: Replace the gearbox

2.2 Presence of a wear edge on the coupling: Replace the coupling

2.3 Teeth defective: Replace gearbox unit

2.4 Heavy tribocorrosion present: Replace gearbox unit

2.5 First signs of tribocorrosion present (red discoloration of the track): Make a note in the intervention report and lubricate the gear teeth

2.6 Discoloration present: Make a note in the intervention report and lubricate the gear teeth

The gear teeth of the coupling and the worm shaft have been checked.

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Lubricating gearing of the coupling and the worm shaft

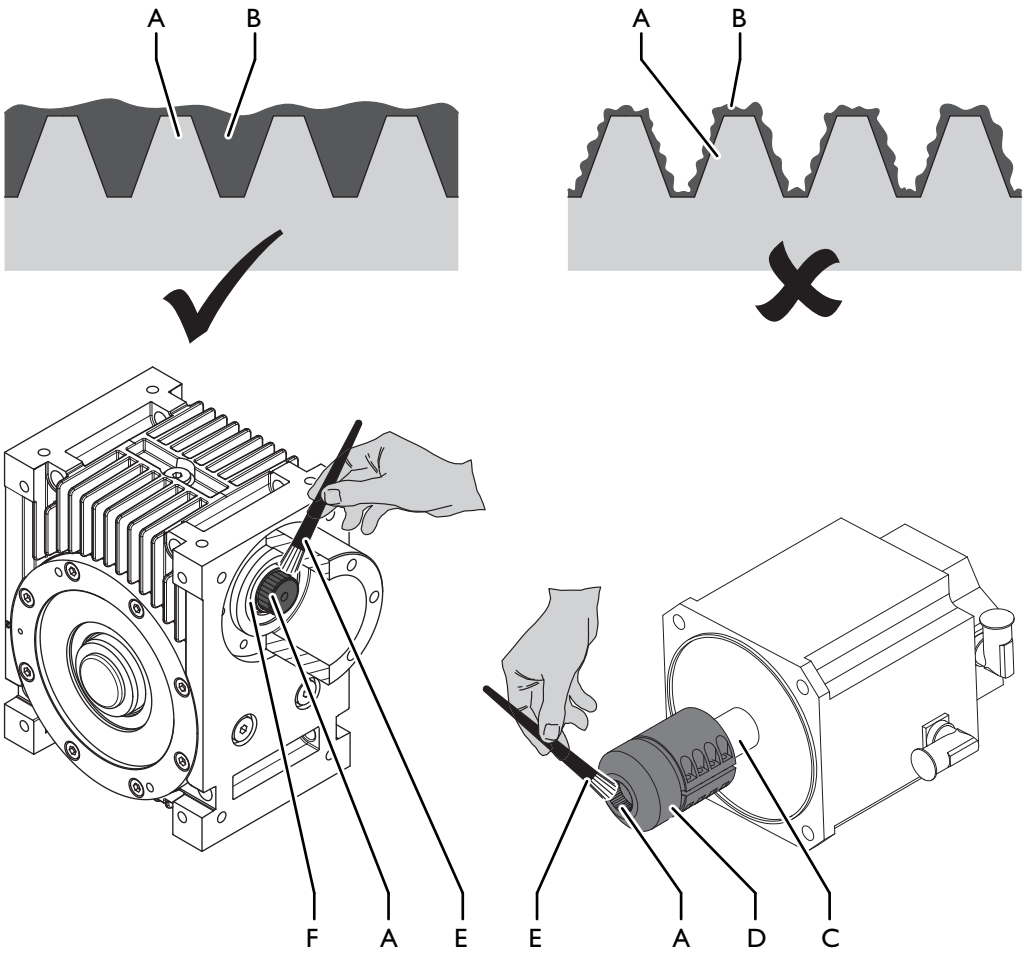

Fig. 6-8 *Greasing the gear teeth of the coupling and the worm shaft*

A	*Gear teeth*	*D*	*Coupling*
B	*Lubricant*	*E*	*Brush*
C	*Motor shaft*	*F*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

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Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 6-7 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

Grease the gear teeth of the coupling and the worm shaft as follows:

1 Coat the gear teeth of the coupling and the worm shaft with lubricant (The lubricant fills the recesses of the gear teeth completely)

The gear teeth of the coupling and the worm shaft are greased.

Installing the motor and coupling

Install the motor and coupling as follows:

1 Push the motor, with the mounted coupling, onto the gearbox unit

2 Install and tighten motor screws

The motor and the coupling have been installed.

Final tasks

Perform the following final tasks:

1 Remove slings if necessary

2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

6.2.4.2 Replacing motor flange, intermediate flange, and coupling

⚠ CAUTION

Leaking oil

If you remove the motor flange screws, the oil leaks out of some gearbox units. Oil is hazardous to the environment.

- Only replace the motor flange and intermediate flange for gearbox units that are HPG sizes 030 to 120.

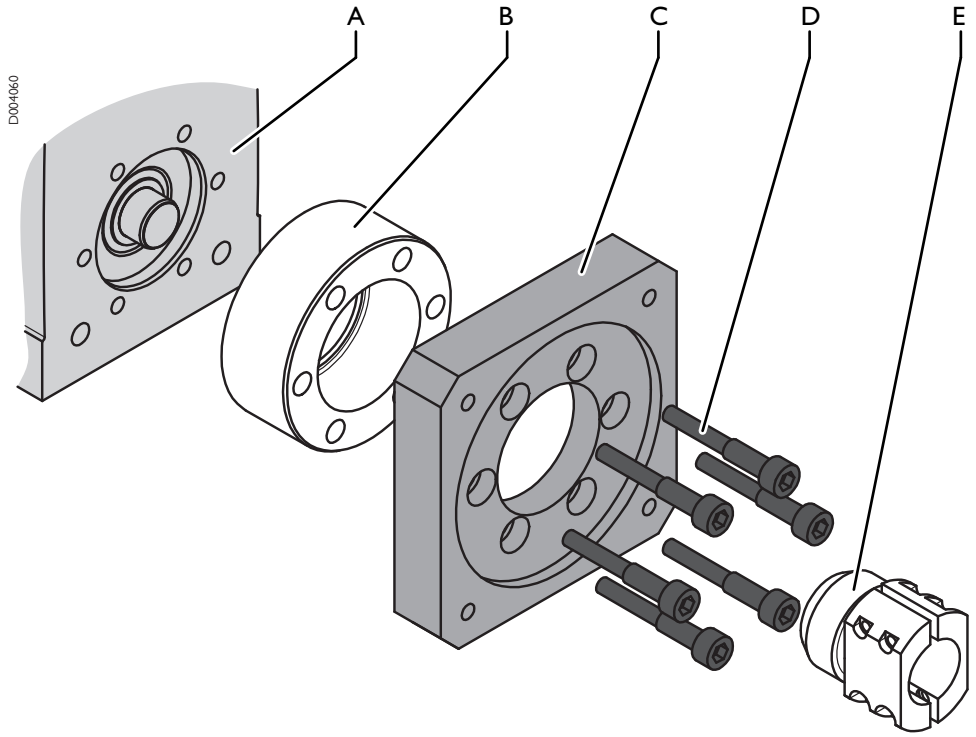

Fig. 6-9 *Replacing the motor flange, intermediate flange and coupling*

A	*Gearbox*	*D*	*Screw*
B	*Gearbox flange*	*E*	*Coupling*
C	*Motor flange*		

Replace the motor flange, intermediate flange, and coupling as follows:

1. Remove motor and coupling
2. Remove the coupling carefully from the motor ➲ 🗎 76
3. Remove motor flange
4. Remove the gearbox flange
5. Replace motor flange, intermediate flange, and coupling
6. Mount intermediate flange and motor flange
7. Install the motor and coupling ➲ 🗎 128

The motor flange, intermediate flange, and coupling have now been replaced.

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6.2.4.3 Replacing lubricant

Attaching the slings: Güdel gearbox unit

Use lifting units to transport gearbox units from size 090 upwards.

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

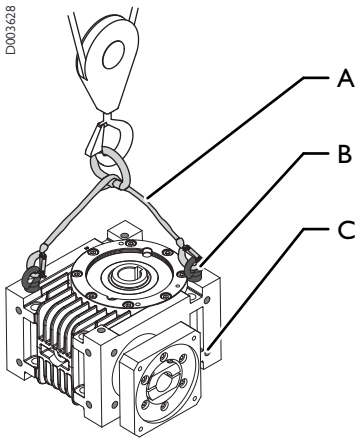

Fig. 6-10 *Attaching the slings: Güdel gearbox unit*

A *Belt harness*
B *Lifting screw*
C *Thread hole*

Size	Size of lifting screw
090	M10
120	M12
180	M16

Table 6-8 *Size of lifting screw*

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Attach the slings as follows:

1 Insert lifting screws into threaded holes on desired side (Diagonal arrangement according to illustration)

2 Attach the slings as shown in the illustration

The slings are in place.

Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

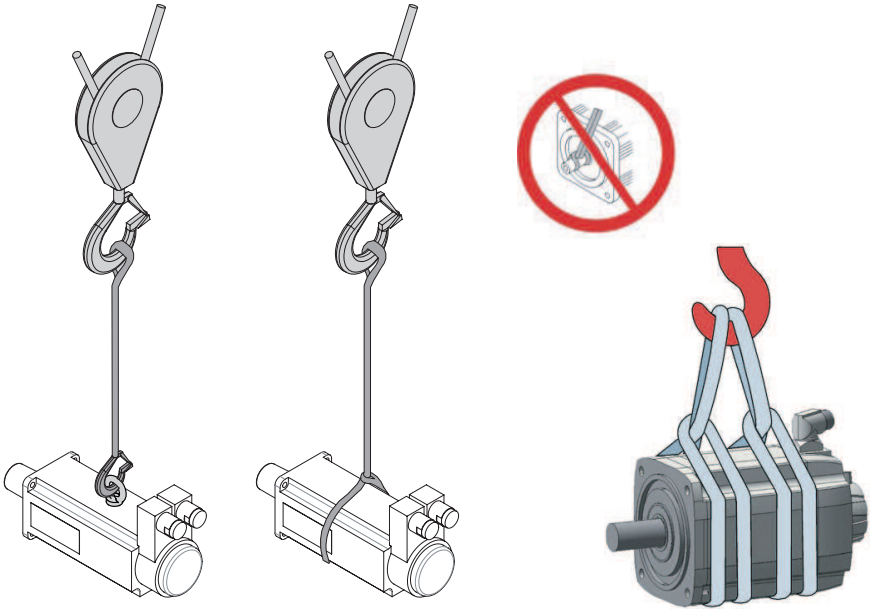

Fig. 6-11 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1 Remove fan from motor if necessary
2 Mount lifting screw if necessary
3 Attach the slings as shown in the illustration
4 Carefully lift the load
5 Check horizontal alignment of the load
6 If the load tilts: Repeat process from step 3

The slings are in place.

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Disassembling the drive

⚠ WARNING

Falling axes

After removing the transport securing device, brakes or motors, the vertical axes fall downwards. Carriages may run off to the side. This can lead to severe or fatal injuries!

- If necessary, secure the vertical axes and the carriages before removing transport securing devices, brakes or motors

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

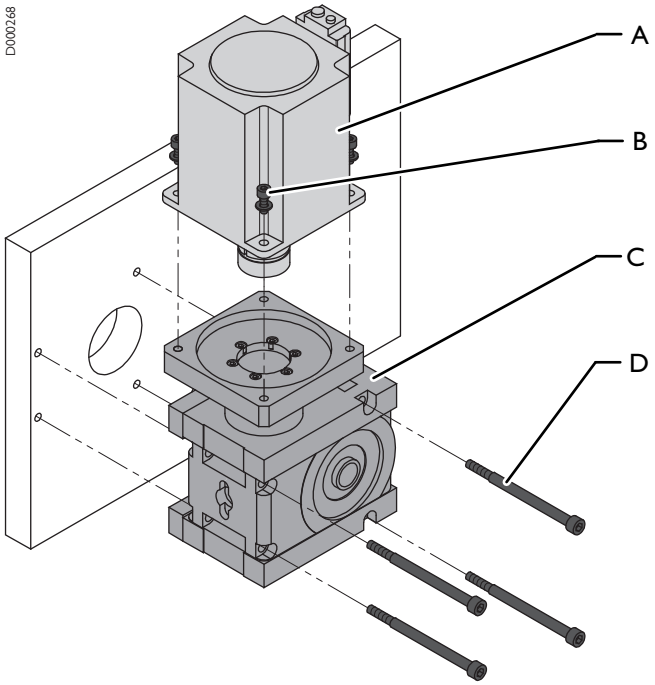

Fig. 6-12 *Disassembling the drive: Güdel gearbox unit*

A	*Motor*	*C*	*Gearbox unit*
B	*Motor screw*	*D*	*Gearbox screw*

Disassemble the drive as follows:

1 Switch off the plant and secure it with a padlock against being switched on again
2 Secure carriage or axis with transport securing device or lifting equipment
3 Attach slings to the motor ➲ 140
4 Remove the motor screws
5 Remove the motor, together with the coupling, from the gearbox unit
6 Attach slings to gearbox unit ➲ 138
7 Remove the gearbox screws
8 Remove the gearbox unit

The drive has been disassembled.

Replacing lubricant

⚠ WARNING

Hot gearbox oil

Working on the gearbox carries the risk of severe injury due to burns!

- Let the gearbox cool before commencing any work

⚠ CAUTION

Oil, greases

Oils and greases are harmful to the environment!

- The oils and greases must not get into the drinking water supply. Take appropriate measures
- Observe the country-specific safety data sheets
- Oils and greases must be disposed of as hazardous waste, even if the total quantity is small

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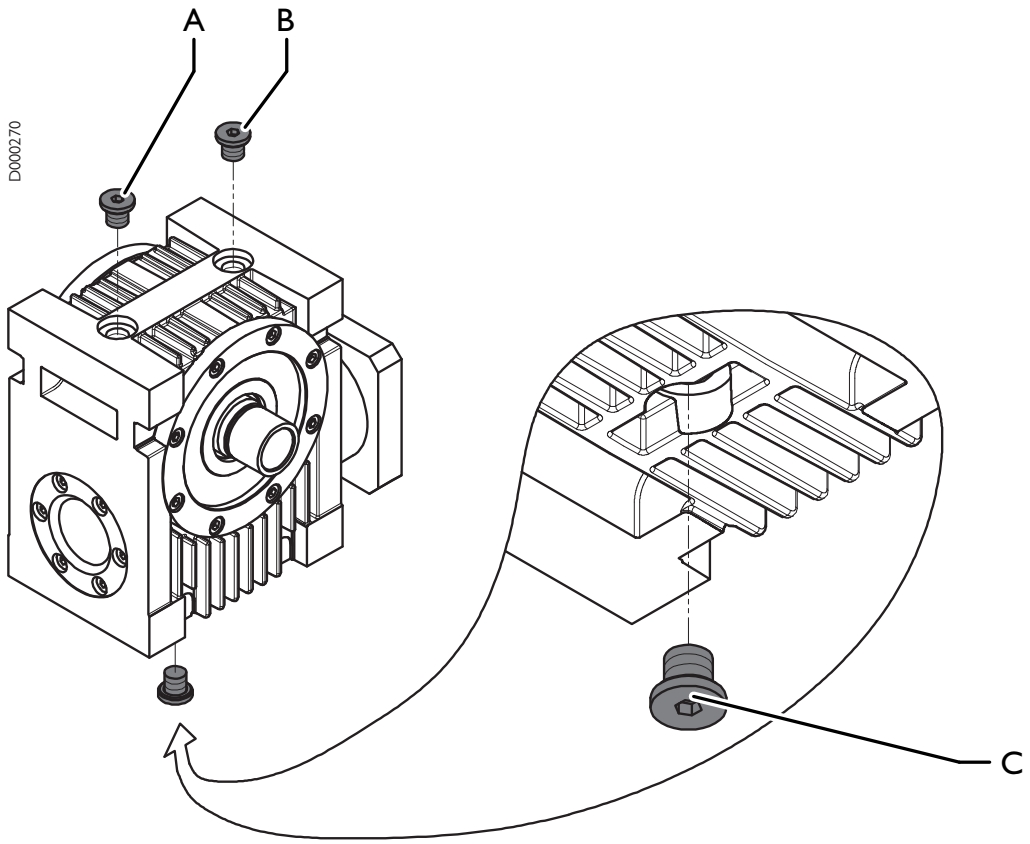

Fig. 6-13 *Replacing lubricant: Güdel gearbox unit*

A *Bleed screw*

B *Filler screw*

C *Drain screw*

Lubrication ex works	Specification	Lubrication quantity
Mobil Glygoyle 460 NSF no.136467	CLP PG 460 in accordance with DIN 51502	AE/HPG030: 40cm3 AE/HPG045: 100cm3 AE/HPG060: 250cm3 AE/HPG090: 700cm3 AE/HPG120: 1400cm3 AE/HPG180: as per type plate

Table 6-9 *Lubricants: Gearbox unit Güdel*

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Replace the lubricant as follows:

1 Position the gearbox:
Drain screw at the bottom
Filler and bleed screw at the top
2 Position a suitable container below the drain screw
3 Remove the bleed, filler, and drain screws
4 Drain the lubricant
5 Rinse the gearbox with fresh lubricant
6 Allow the gearbox to drain
7 Screw in the drain screw
8 Fill up the gearbox through the filler screw
9 Screw in the bleed and filler screws

The lubricant is replaced.

Greasing the gear teeth of the coupling and the worm shaft

⚠ WARNING

Falling axes / workpieces

If the contact surfaces between the coupling and the motor shaft are lubricated, the coupling slips. Axes or workpieces fall down. This can lead to severe or fatal injuries!

- Only grease the gear teeth of the coupling and the worm shaft

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

NOTE

Insufficient lubrication

Insufficient lubrication of the gear rim results in damage to the work shaft of the gearbox unit. This results in operational failure.

- Perform the described tasks at the specified times.

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Checking gear teeth

Distinguishing characteristics of wear
• Defective teeth • Process inaccuracies • Discoloration due to heat • Presence of a wear edge • Heavy tribocorrosion present

Table 6-10 *Distinguishing characteristics of wear: Gear teeth of the coupling and the worm shaft*

NOTE

Follow-on damage

Wear on the gear teeth of the coupling and worm shaft leads to process inaccuracies and other follow-on damage.

- If in doubt, replace the gearbox, the coupling or the entire gearbox unit

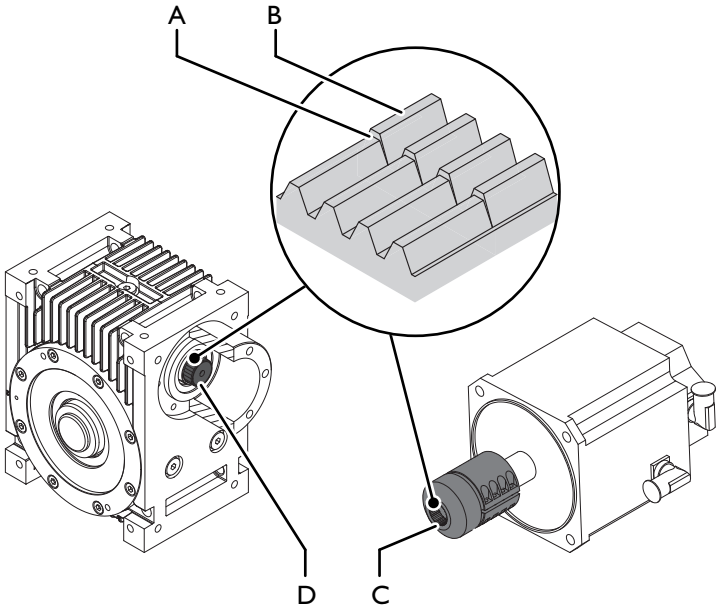

Fig. 6-14 *Checking gear teeth of the coupling and the worm shaft*

A	*Wear edge*	*C*	*Coupling*
B	*Gear teeth*	*D*	*Worm shaft*

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Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 6-10 *Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft*

Check the gear teeth of the coupling and the worm shaft as follows:

Prerequisite:You are carrying out maintenance work or recommissioning. During the initial commissioning, there is no need for the gear teeth of the coupling and the worm shaft to be tested

1 Cleaning gear teeth

2 Checking gear teeth:

2.1 Presence of a wear edge on the worm shaft: Replace the gearbox

2.2 Presence of a wear edge on the coupling: Replace the coupling

2.3 Teeth defective: Replace gearbox unit

2.4 Heavy tribocorrosion present: Replace gearbox unit

2.5 First signs of tribocorrosion present (red discoloration of the track): Make a note in the intervention report and lubricate the gear teeth

2.6 Discoloration present: Make a note in the intervention report and lubricate the gear teeth

The gear teeth of the coupling and the worm shaft have been checked.

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Lubricating gearing of the coupling and the worm shaft

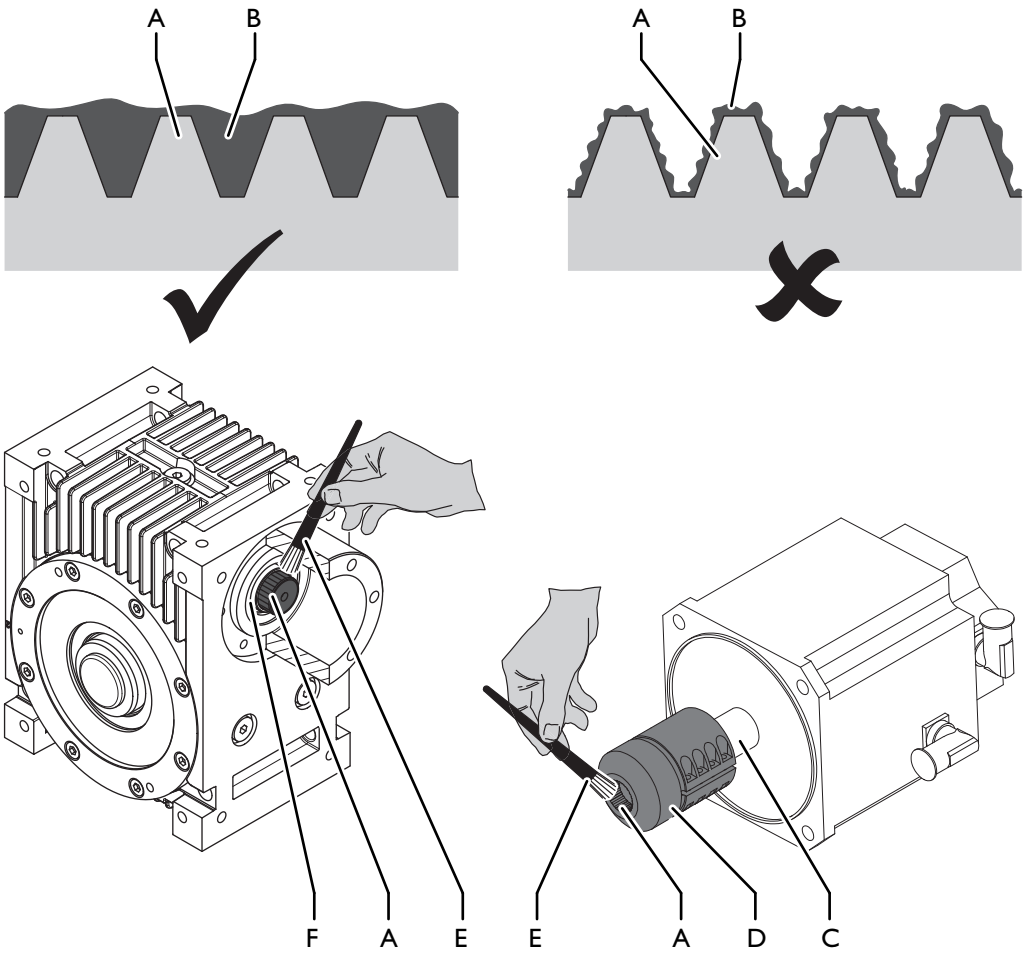

Fig. 6-15 *Greasing the gear teeth of the coupling and the worm shaft*

A	*Gear teeth*	*D*	*Coupling*
B	*Lubricant*	*E*	*Brush*
C	*Motor shaft*	*F*	*Worm shaft*

Lubrication ex works	Specification	Lubrication quantity
Motorex Grease 218 M	KPF2K-20 in accordance with DIN 51502, MoS2 content minimum 3%	

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Cleaning agents
mild universal cleaner free from aromatic compounds (e.g. Motorex OPAL 5000)

Table 6-10 Lubricants, Cleaning agents: Gear teeth of the coupling and the worm shaft

Grease the gear teeth of the coupling and the worm shaft as follows:

1 Coat the gear teeth of the coupling and the worm shaft with lubricant (The lubricant fills the recesses of the gear teeth completely)

The gear teeth of the coupling and the worm shaft are greased.

Installing the drive

NOTE

Failure of gearbox unit

If gearbox units are installed in a deviating manner, the worm gear does not run in the oil. The gearbox fails.

- Observe, without exception, the agreed installation position for size 180

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

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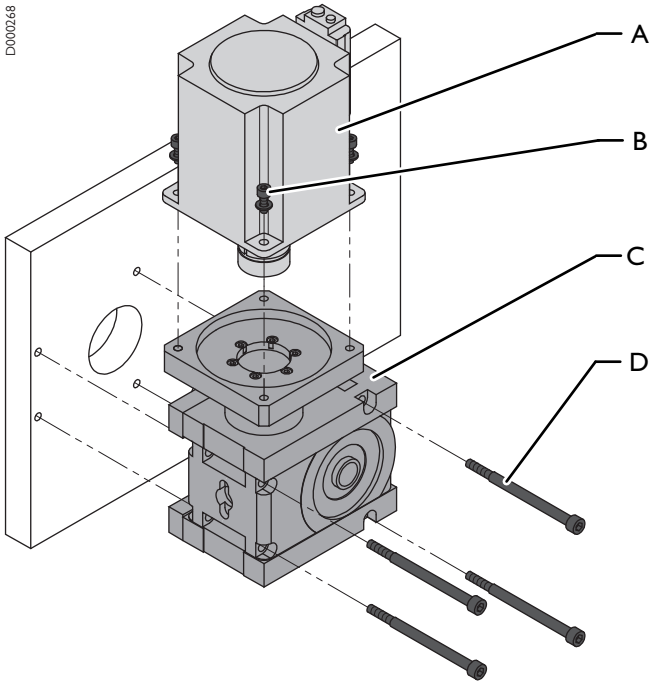

Fig. 6-16 *Installing the drive: Güdel gearbox unit*

A	*Motor*	*C*	*Gearbox unit*
B	*Motor screw*	*D*	*Gearbox screw*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 6-11 *Tightening torques for gearbox screws: Güdel gearbox unit*

Install the drive as follows:

1. Attach slings to gearbox unit ➲ 138
2. Install the gearbox unit
3. Install and tighten gearbox screws
4. Attach slings to the motor ➲ 140
5. Install the motor along with the coupling on the gearbox unit
6. Install and tighten motor screws
7. Remove the transport securing device or slings

The drive has been installed.

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Final tasks

Perform the following final tasks:

1 Remove slings if necessary

2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

6.2.5 Elastomer coupling

6.2.5.1 Replacing the motor flange and gearbox flange

Mark the position of the drill holes of the gearbox flange. Install the new gearbox flange identically

Do not change the position of the input shaft

Do not change the position of the coupling on the motor shaft!

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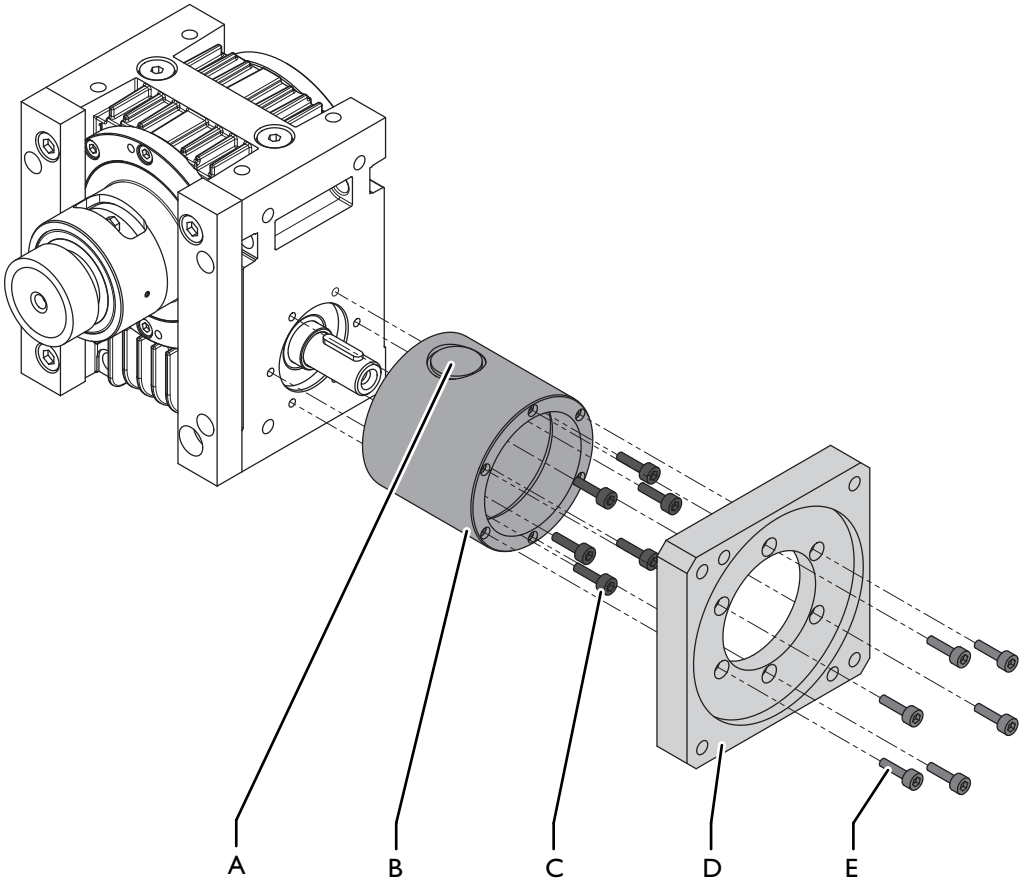

Fig. 6-17 *Replacing the motor flange and gearbox flange*

A	*Drill hole*	*D*	*Motor flange*
B	*Gearbox flange*	*E*	*Screw*
C	*Fastening screw*		

Replace the motor flange and gearbox flange as follows:

1. Switch off the system and secure it with a padlock against being switched on again
2. Remove the motor and coupling ➲ 98
3. Remove the fastening screws, screws and motor flange
4. Remove the gearbox flange
5. Replacing the motor flange and gearbox flange
6. Install the components in the reverse order
7. Install the motor ➲ 102

The motor flange and gearbox flange have now been replaced.

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6.2.5.2 Replacing the motor

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

Mark the position of the coupling on the motor shaft. The marking makes it easier for you to re-install the coupling.

The tightening torque TA and the type of couping are engraved on the motor and gearbox sides in the couping.

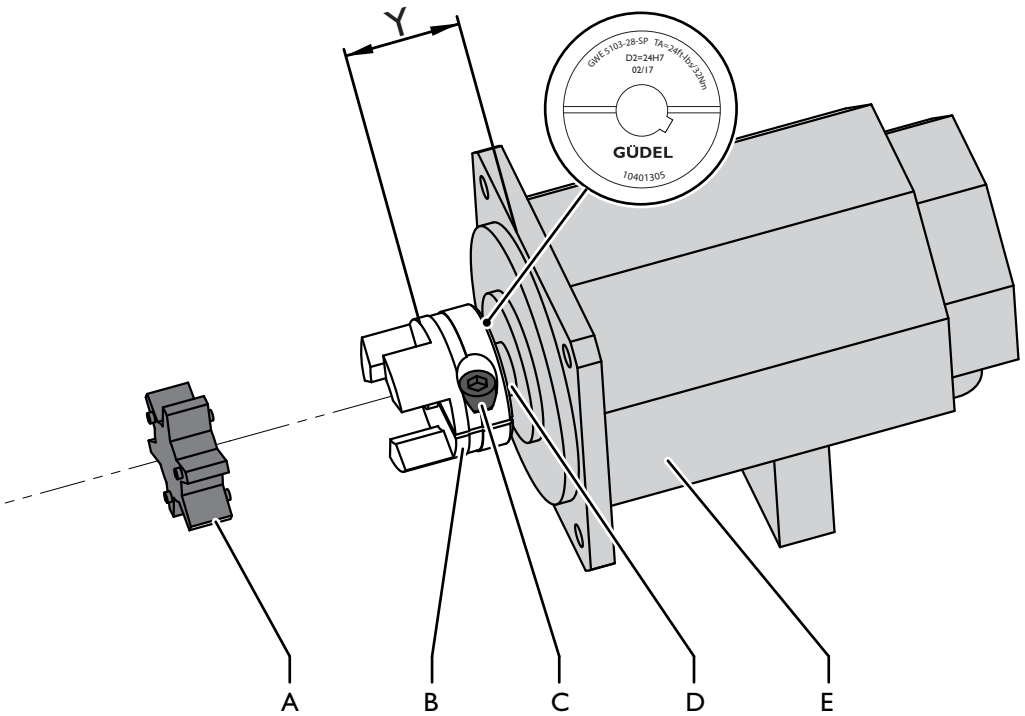

Fig. 6-18 *Replacing the motor: Positioning the coupling half on the motor shaft*

A	*Elastomer gear rim*	*D*	*Motor shaft*
B	*Coupling half*	*E*	*Motor*
C	*Coupling screw*		

Tool	Use	Item number
Corrosion protection agent MOTOREX Intact XD 20	Installing the coupling Applying corrosion protection to the product	0502037

Table 6-12 Special tools, testing and measuring instruments

Replace the motor as follows:

1 Switch off the plant and padlock it to prevent it from being switched on again
2 Remove the cables and lines
3 Remove motor ➲ 156
4 Remove the elastomer gear rim if necessary
5 Measuring the Y distance
6 Release the coupling screws
7 Remove the coupling half
8 Replacing the motor
9 Apply corrosion protection agent to the motor shaft with a brush
10 Push the coupling half onto the motor shaft
11 Set the Y distance
12 Tighten the coupling screws:
  12.1 Tighten alternately to 50% of the tightening torque TA
  12.2 Tighten alternately with 100% of the tightening torque TA
13 Installing the motor and coupling ➲ 163
14 Connect the cables and lines in accordance with the electrical diagram
15 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The motor has been replaced.

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6.2.5.3 Replacing lubricant

Attaching the slings: Motor

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

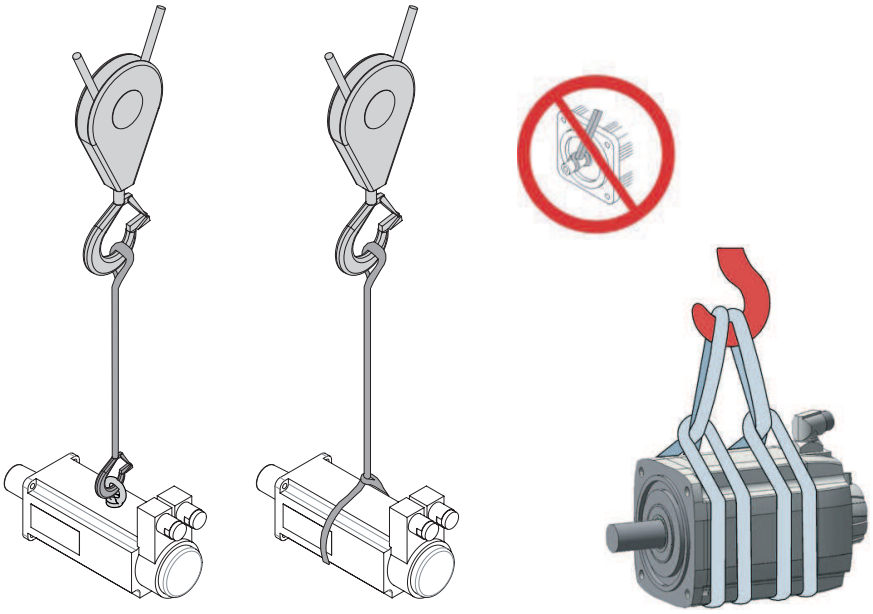

Fig. 6-19 *Attaching the slings: Motor (image source: Bosch Rexroth)*

Attach the slings as follows:

1 Remove fan from motor if necessary
2 Mount lifting screw if necessary
3 Attach the slings as shown in the illustration
4 Carefully lift the load
5 Check horizontal alignment of the load
6 If the load tilts: Repeat process from step 3

The slings are in place.

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Attaching the slings: Güdel gearbox unit

Use lifting units to transport gearbox units from size 090 upwards.

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

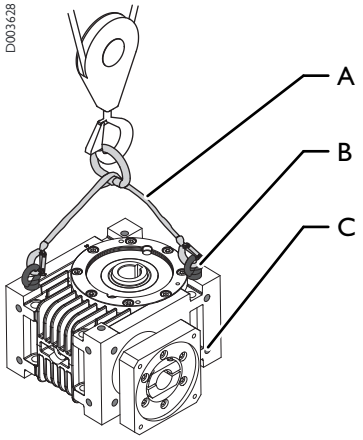

Fig. 6-20 *Attaching the slings: Güdel gearbox unit*

A *Belt harness*
B *Lifting screw*
C *Thread hole*

Size	Size of lifting screw
090	M10
120	M12
180	M16

Table 6-13 *Size of lifting screw*

Attach the slings as follows:

1 Insert lifting screws into threaded holes on desired side (Diagonal arrangement according to illustration)

2 Attach the slings as shown in the illustration

The slings are in place.

Remove the motor

⚠ WARNING

Falling axes

After removing the transport securing device, brakes or motors, the vertical axes fall downwards. Carriages may run off to the side. This can lead to severe or fatal injuries!

- If necessary, secure the vertical axes and the carriages before removing transport securing devices, brakes or motors

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

If the elastomer gear rim remains stuck on the gearbox side, remove it manually. This is necessary only if you wish to replace the elastomer gear rim.

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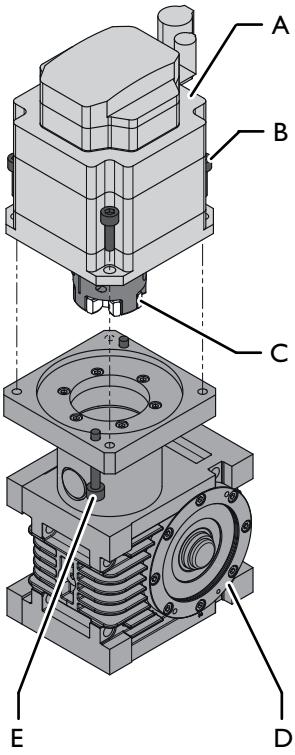

Fig. 6-21 *Removing the motor: Güdel gearbox unit*

A	*Motor*	*D*	*Gearbox unit*
B	*Motor screw*	*E*	*Forcing screw*
C	*Elastomer gear rim*		

Remove the motor as follows:

1. Switch off the system and secure it with a padlock against being switched on again
2. Secure the carriage or axis with the transport securing device or lifting equipment
3. Attach slings to the motor ➲ 154
4. Remove the motor screws
5. Force the motor off the gearbox unit with the forcing screws
6. Remove the motor, together with the elastomer gear rim, from the gearbox unit

The motor has now been removed.

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Removing the gearbox unit

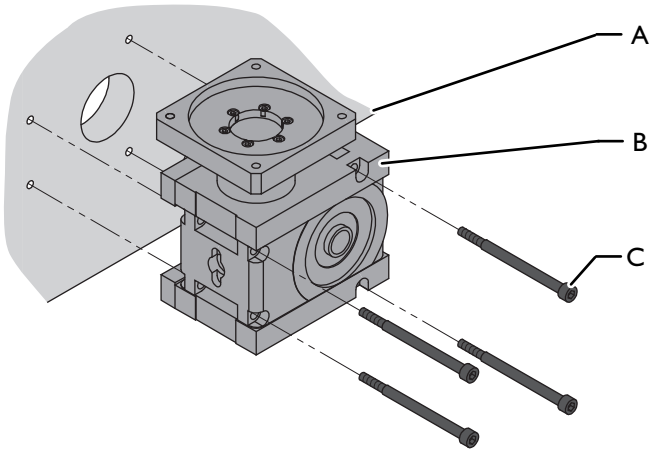

Fig. 6-22 *Removing the gearbox unit*

A *Adjacent construction*
B *Gearbox unit*
C *Gearbox screws*

Remove the gearbox unit as follows:

1 Attach slings to the gearbox unit ➲ 155
2 Remove the gearbox screws
3 Remove the gearbox unit
4 Remove the transport securing device or slings

The gearbox unit has now been removed.

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Replacing lubricant

⚠ WARNING

Hot gearbox oil

Working on the gearbox carries the risk of severe injury due to burns!

- Let the gearbox cool before commencing any work

⚠ CAUTION

Oil, greases

Oils and greases are harmful to the environment!

- The oils and greases must not get into the drinking water supply. Take appropriate measures
- Observe the country-specific safety data sheets
- Oils and greases must be disposed of as hazardous waste, even if the total quantity is small

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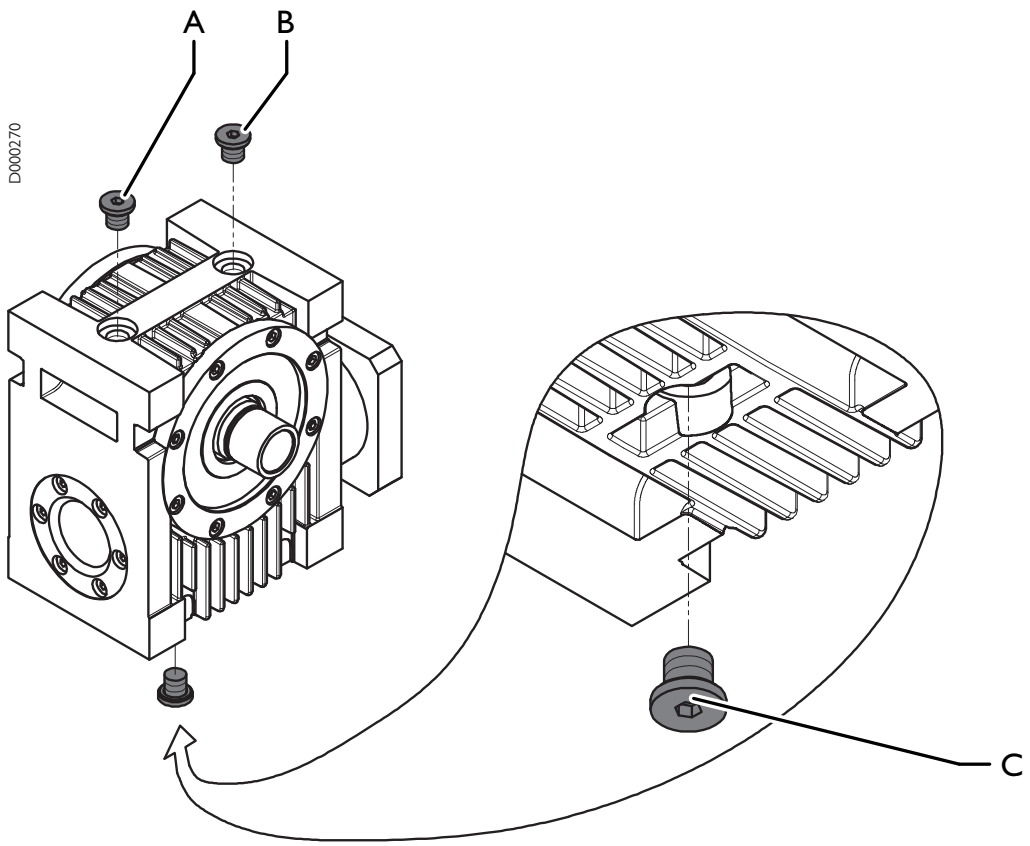

Fig. 6-23 *Replacing lubricant: Güdel gearbox unit*

A *Bleed screw*

B *Filler screw*

C *Drain screw*

Lubrication ex works	Specification	Lubrication quantity
Mobil Glygoyle 460 NSF no.136467	CLP PG 460 in accordance with DIN 51502	AE/HPG030: 40cm3 AE/HPG045: 100cm3 AE/HPG060: 250cm3 AE/HPG090: 700cm3 AE/HPG120: 1400cm3 AE/HPG180: as per type plate

Table 6-14 *Lubricants: Gearbox unit Güdel*

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Replace the lubricant as follows:

1 Position the gearbox:
Drain screw at the bottom
Filler and bleed screw at the top

2 Position a suitable container below the drain screw

3 Remove the bleed, filler, and drain screws

4 Drain the lubricant

5 Rinse the gearbox with fresh lubricant

6 Allow the gearbox to drain

7 Screw in the drain screw

8 Fill up the gearbox through the filler screw

9 Screw in the bleed and filler screws

The lubricant is replaced.

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Installing the gearbox unit

NOTE

Breakage of cast casing

Excessively high tightening torques destroy the cast casing!

- Observe the tightening torques

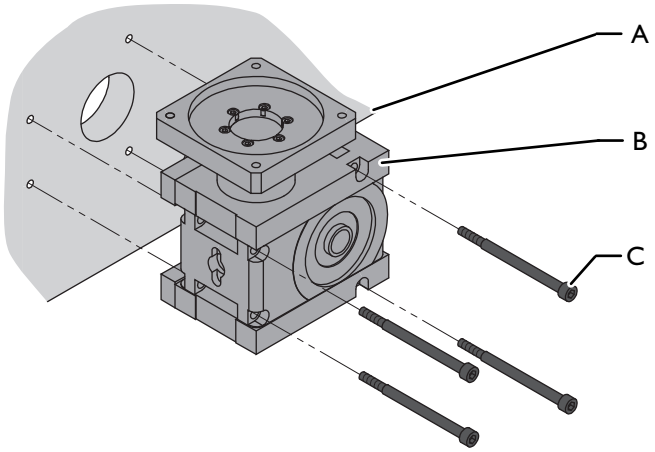

Fig. 6-24 *Installing the gearbox unit*

A *Adjacent construction*
B *Gearbox unit*
C *Gearbox screws*

Size	030	045	060	090	120	180
Thread size	M6	M8	M10	M12	M16	M20
Tightening torque [Nm]	9	22	42	50	120	240

Table 6-15 *Tightening torques for gearbox screws: Güdel gearbox unit*

Install the gearbox unit as follows:

1 Attach slings to the gearbox unit ➲ 155
2 Install the gearbox unit
3 Install and tighten the gearbox screws
4 Remove the transport securing device or slings

The gearbox unit has now been installed.

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Installing the motor

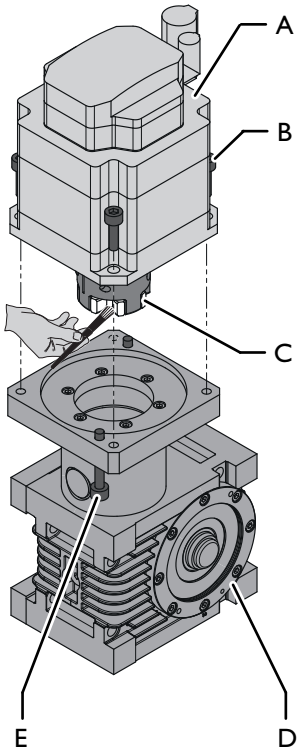

Fig. 6-25 *Installing the motor: Güdel gearbox unit*

A	*Motor*	*D*	*Gearbox unit*
B	*Motor screw*	*E*	*Forcing screw*
C	*Elastomer gear rim*		

Lubrication ex works	Specification	Lubrication quantity
Vaseline	Cannot be determined	

Table 6-16 *Lubricants: Güdel gearbox unit: elastomer gear rim of the coupling*

Install the motor as follows:

1 Switch off the system and secure it with a padlock against being switched on again
2 Remove the forcing screws if necessary
3 Lubricate the elastomer gear rim
4 Attach slings to the motor ➲ 154
5 Install the motor, together with the elastomer gear rim, on the gearbox unit
6 Install and tighten the motor screws

The motor has now been installed.

Final tasks

Perform the following final tasks:

1 Remove slings if necessary
2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the complete system or the motor)

The final tasks have been performed.

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6.2.5.4 Replacing the elastomer gear rim

The elastomer gear rim is designed for a service life of 3 years or 22,500 operating hours. The wear depends on the duration of operation of the product and the ambient conditions. However, components may fail before expiry of the service life. Replace worn components immediately.

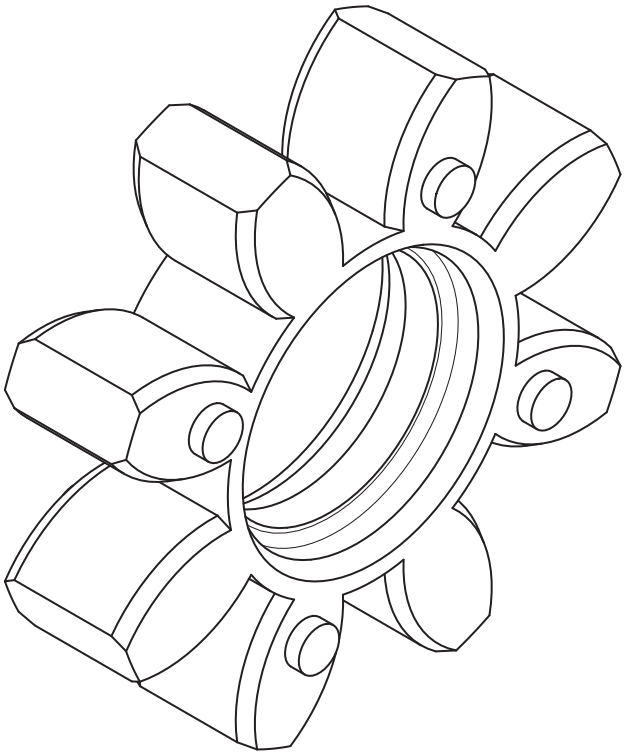

Fig. 6-26 *Elastomer gear rim*

Distinguishing characteristics of wear
• Teeth broken out • Teeth frayed • Material brittle

Table 6-17 *Distinguishing characteristics of wear: Elastomer gear rim*

6.3 Service departments

If you have questions, please contact the service departments. ➲ 175

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7 Disposal

7.1 Introduction

Observe the following during disposal:

- Adhere to the country-specific regulations
- Separate the material groups
- Dispose of the materials in an environmentally friendly way
- Recycle waste if possible

7.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➲ 🗎 13
It concerns your personal safety!

⚠ WARNING

Automatic startup

During work on the product, there is danger of the machine starting up automatically. This can lead to severe or fatal injuries!

Before working in the danger area:

- Secure vertical axes (if equipped) against falling.
- Switch off the superordinate main power supply. Secure it against being switched on again (main switch for the complete system)
- Before switching on the system again, make sure that no one is in the danger area

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⚠ WARNING

Slipping hazard

Liquids run out if there is a leak. Persons may slip and injure themselves seriously!

- Take application-specific protective measures
- Repair any leaks promptly
- Prevent any new leaks. Replace or modify the leaking component or assembly
- Check the fill level and refill if necessary

⚠ WARNING

Heavy components

Components can be very heavy. Improper handling can cause severe or fatal injuries!

- Use appropriate lifting units
- Use suitable means to secure the components against tipping over
- Only remove the safety devices after the product has been completely assembled

⚠ CAUTION

Hot parts/surfaces

Hot surfaces present a burn hazard during work on this product!

- Protect yourself by wearing heat-resistant gloves
- Allow the parts to cool down first

7.1.2 Personnel qualifications

Only appropriately trained and authorized technicians are allowed to work on the product.

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7.2 Disposal

Your product consists of the following units:

- Packaging
  - Contaminated materials / auxiliary agents (oil paper)
  - Wood
  - Plastic (film)
- Consumables
  - Lubricants (oils/greases)
  - Batteries
- Base unit
  - Metals (steel/aluminum)
  - Plastics (thermoplasts/duroplasts)
  - Contaminated materials / auxiliary agents (felt / cleaning cloths)
  - Electrical material (cables)

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7.3 Waste management compliant assemblies

7.3.1 Disassembly

⚠ WARNING

Suspended loads

Improper handling of suspended loads can lead to severe injuries or death!

- Use appropriate lifting units
- Wear appropriate protective clothing
- Always keep sufficient distance from suspended loads
- Never enter the area below a suspended load

⚠ WARNING

Ripping of lifting belts

The sharp edges cut the lifting belts. This can lead to severe or fatal injuries!

- Always protect the lifting belts with an edge guard

⚠ CAUTION

Oil, greases

Oils and greases are harmful to the environment!

- The oils and greases must not get into the drinking water supply. Take appropriate measures
- Observe the country-specific safety data sheets
- Oils and greases must be disposed of as hazardous waste, even if the total quantity is small

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Disassemble the product as follows:

Prerequisite:Prior to disassembly, shut down the product

1 Remove the connecting elements (cables / energy chains)

2 Disassemble the gearbox and drain the oil

3 Disassembly the assemblies and separate the different materials

The product has now been disassembled.

7.3.2 Material groups

Dispose of the material groups in accordance with the following table:

Material	Disposal method
Contaminated materials / auxiliary agents	Hazardous waste
Wood	Municipal waste
Plastic	Collecting point or municipal waste
Lubricants	Collecting point disposal in accordance with the safety data sheets ➲ 23
Batteries	Battery collection
Metals	Scrap metal collection
Electrical material	Electrical waste

Table 7-1 Disposal: material groups

7.4 Disposal facilities, authorities

The disposal facilities and authorities differ from country to country. Observe the local laws and regulations concerning disposal.

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8 Spare parts supply

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8.1 Service departments

Have the following information available for service inquiries:

- Product, type (as per type plate)
- Project number, order number (as per type plate)
- Serial number (as per type plate)
- Material number (as per type plate)
- Location of the system
- Contact person at the operating company
- Description of the issue
- Drawing number (if applicable)

Regular inquiries

If you have questions relating to service, please use the service form at www.gudel.com or contact the responsible service department:

For all other countries not included in the following list, please contact the service department in Switzerland.

Customer with special agreements should contact the service department specified in the contract.

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Americas

Country	Relevant service department	Phone	E-mail
Brazil	Güdel Lineartec Comércio de Automção Ltda. Rua Américo Brasiliense n° 2170, cj. 506 Chácara Santo Antonio CEP 04715-005 São Paulo Brazil	+55 11 99590 8223	info@br.gudel.com
Argentina Mexico	Güdel TSC S.A. de C.V. Gustavo M. Garcia 308 Col. Buenos Aires N.L. 64800 Monterrey Mexico	+52 81 8374 2500 107	service@mx.gudel.com
Canada United States	Güdel Inc. 4881 Runway Blvd. Ann Arbor, Michigan 48108 United States	+1 734 214 0000	service@us.gudel.com

Table 8-1 *Service departments Americas*

Asia

Country	Relevant service department	Phone	E-mail
China	Güdel International Trading Co. Ltd. Block A, 8 Floor, C2 BLDG, No. 1599 New Jin Qiao Road Pudong 201206 Shanghai China	+86 21 5055 0012	info@cn.gudel.com
China press automation	Güdel Jier Automation Ltd. A Zone 16th Floor JIER Building 21th Xinxi Road 250022 Jinan China	+86 531 81 61 6465	service@gudeljier.com
India	Güdel India Pvt. Ltd. Gat No. 458/459 Mauje Kasar Amboli Pirangut, Tal. Mulshi 412 111 Pune India	+91 20 679 10200	service@in.gudel.com
Korea	Güdel Lineartec Inc. 11-22 Songdo-dong Yeonsu-Ku Post no. 406-840 Incheon City South Korea	+82 32 858 05 41	gkr.service@gudel.co.kr
Taiwan	Güdel Lineartec Co. Ltd. No. 99, An-Chai 8th St. Hsin-Chu Industrial Park TW-Hu-Ko 30373 Hsin-Chu Taiwan	+88 635 97 8808	info@tw.gudel.com
Thailand	Güdel Lineartec Co. Ltd. 19/28 Private Ville Hua Mak Road Hua Mak Bang Kapi 10240 Bangkok Thailand	+66 2 374 0709	service@th.gudel.com

Table 8-2 *Service departments in Asia*

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Europe

Country	Relevant service department	Phone	E-mail
Denmark	Güdel AG Gaswerkstrasse 26 Industrie Nord 4900 Langenthal Switzerland	+41 62 916 91 70	service@ch.gudel.com
Finland			
Greece			
Norway			
Sweden			
Switzerland			
Turkey			
Bosnia and Herzegovina	Güdel GmbH Schöneringer Strasse 48 4073 Wilhering Austria	+43 7226 20690 0	service@at.gudel.com
Croatia			
Austria			
Romania			
Serbia			
Slovenia			
Hungary			
Slovakia	Güdel a.s. Holandská 4 63900 Brno Czech Republic	+420 602 309 593	info@cz.gudel.com
Czech Republic			
Portugal	Güdel Spain C/Industria 60 Local 7 08025 Barcelona Spain	+34 93 476 03 80	info@es.gudel.com
Spain			
France	Güdel SAS Tour de l'Europe 213 3 Bd de l'Europe 68100 Mulhouse France	+33 1 6989 80 16	info@fr.gudel.com

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Country	Relevant service department	Phone	E-mail
Germany	Güdel Germany GmbH Industriepark 107 74706 Osterburken Germany	+49 6291 6446 792	service@de.gudel.com
Germany intralogistics	Güdel Intralogistics GmbH Gewerbegebiet Salzhub 11 83737 Irschenberg Germany	+49 8062 7075 0	service-intralogistics@de.gudel.com
Italy	Güdel S.r.l. Via per Cernusco, 7 20060 Bussero (Mi) Italy	+39 02 92 17 021	info@it.gudel.com
Belgium Luxembourg The Netherlands	Güdel Benelux Eertmansweg 30 7595 PA Weerselo The Netherlands	+31 541 66 22 50	info@nl.gudel.com
Estonia Latvia Lithuania Poland Ukraine	Gudel Sp. z o.o. ul. Legionów 26/28 43-300 Bielsko-Biała Poland	+48 33 819 01 25	serwis@pl.gudel.com
Russia Belarus	Gudel Russia Yubileynaya 40 Office 1902 445057 Togliatti Russia	+7 848 273 5544	info@ru.gudel.com
Ireland United Kingdom	Güdel Lineartec (U.K.) Ltd. Unit 5 Wickmans Drive, Banner Lane Coventry CV4 9XA West Midlands United Kingdom	+44 24 7669 5444	service@uk.gudel.com

Table 8-3 *Service departments in Europe*

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All other countries

Country	Relevant service department	Phone	E-mail
All other countries	Güdel AG Gaswerkstrasse 26 Industrie Nord 4900 Langenthal Switzerland	+41 62 916 91 70	service@ch.gudel.com

Table 8-4 *Service departments for all other countries*

Inquiries outside of business hours

If you have service inquiries outside of business hours, please contact the following service departments:

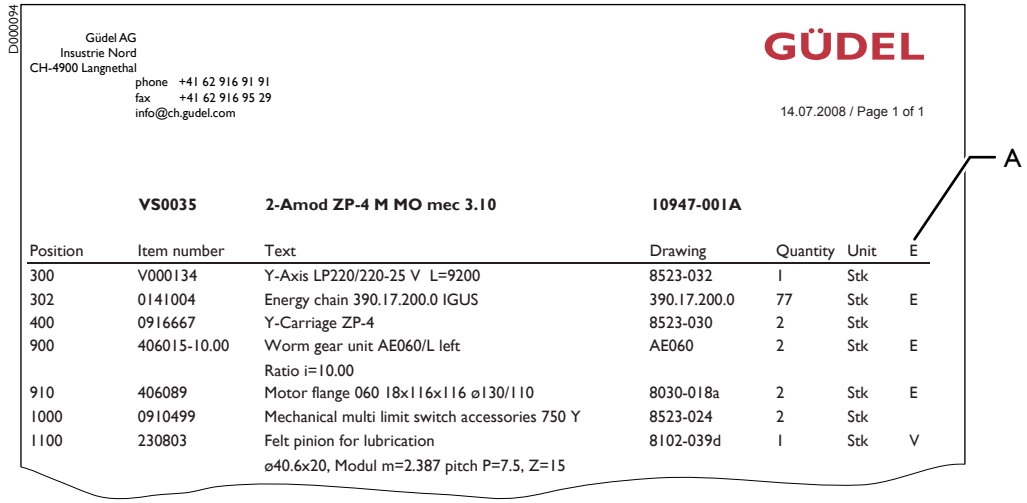
Europe	Güdel AG Gaswerkstrasse 26 Industrie Nord 4900 Langenthal Switzerland	+41 62 916 91 70	service@ch.gudel.com
Americas	Güdel Inc. 4881 Runway Blvd. Ann Arbor, Michigan 48108 United States	+1 734 214 0000	service@us.gudel.com

Table 8-5 *Service departments outside of business hours*

8.2 Explanations regarding the spare parts list

8.2.1 Parts list

The parts list contains all parts of your product. The spare parts and wear items are indicated as described in the explanation of symbols.



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A

VS0035 **2-Amod ZP-4 M MO mec 3.10** **10947-001A**

Position	Item number	Text	Drawing	Quantity	Unit	E
300	V000134	Y-Axis LP220/220-25 V L=9200	8523-032	1	Stk	
302	0141004	Energy chain 390.17.200.0 IGUS	390.17.200.0	77	Stk	E
400	0916667	Y-Carriage ZP-4	8523-030	2	Stk	
900	406015-10.00	Worm gear unit AE060/L left Ratio i=10.00	AE060	2	Stk	E
910	406089	Motor flange 060 18x116x116 ø130/110	8030-018a	2	Stk	E
1000	0910499	Mechanical multi limit switch accessories 750 Y	8523-024	2	Stk	
1100	230803	Felt pinion for lubrication ø40.6x20, Modul m=2.387 pitch P=7.5, Z=15	8102-039d	1	Stk	V

Fig. 8-1 *Explanation of symbols*

A *Spare part status*

Spare part status (column E): E = Spare part
V = Wear item

8.2.2 Position drawings

The positions of the spare parts can be seen on the drawings. These are standard drawings. Individual positions or images might differ from your product.

9 Torque tables

9.1 Tightening torques for screws

NOTE

Vibrations

Screws without screw lock become loose.

- Secure screw connections on moving parts Loctite medium strength 242.
- Apply the adhesive on the nut thread, not on the screw!

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9.1.1 Zinc plated screws

Unless otherwise specified, the following tightening torques apply for zinc-plated screws lubricated with Molykote (MoS2) grease or secured with Loctite 242:

Thread size	Tightening torque [Nm]		
	8.8	10.9	12.9
M3	1.1	1.58	1.9
M4	2.6	3.9	4.5
M5	5.2	7.6	8.9
M6	9	13.2	15.4
M8	21.6	31.8	37.2
M10	43	63	73
M12	73	108	126
M14	117	172	201
M16	180	264	309
M20	363	517	605
M22	495	704	824
M24	625	890	1041
M27	915	1304	1526
M30	1246	1775	2077
M36	2164	3082	3607

Table 9-1 *Torque table for zinc-plated screws lubricated with Molykote (MoS2) grease*

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9.1.2 Black screws

Unless otherwise specified, the following tightening torques apply for black oiled and non-lubricated screws, or screws secured with Loctite 242:

Thread size	Tightening torque [Nm]		
	8.8	10.9	12.9
M4	3	4.6	5.1
M5	5.9	8.6	10
M6	10.1	14.9	17.4
M8	24.6	36.1	42.2
M10	48	71	83
M12	84	123	144
M14	133	195	229
M16	206	302	354
M20	415	592	692
M22	567	804	945
M24	714	1017	1190
M27	1050	1496	1750
M30	1420	2033	2380
M36	2482	3535	4136

Table 9-2 *Torque table for black oiled and non-lubricated screws*

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9.1.3 Stainless steel screws

Unless otherwise specified, the following tightening torques apply for stainless steel screws lubricated with Molykote (MoS2) grease or secured with Loctite 242:

Thread size	Tightening torque [Nm]		
	50	70	80
M3	0.37	0.8	1.1
M4	0.86	1.85	2.4
M5	1.6	3.6	4.8
M6	2.9	6.3	8.4
M8	7.1	15.2	20.3
M10	14	30	39
M12	24	51	68
M14	38	82	109
M16	58	126	168
M20	115	247	330
M22	157	337	450
M24	198	426	568
M27	292	—	—
M30	397	—	—
M36	690	—	—

Table 9-3 *Torque table for stainless steel screws lubricated with Molykote (MoS2) grease*

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9.2 Tightening torques for clamping sets

Normally, the tightening torque will be stamped onto the clamping set by the manufacturer. If you have conflicting values, always use the manufacturer's information.
The following tightening torques are applicable for clamping sets on Güdel gearbox units:

Gearbox unit size	Tightening torque T_A [Nm]
030	5
045 / 060	6.5
090 / 120	12
180	59

Table 9-4 *Torque table for clamping sets*

Properly tighten and loosen clamping sets

Properly tighten clamping sets. Do not remove any screws!

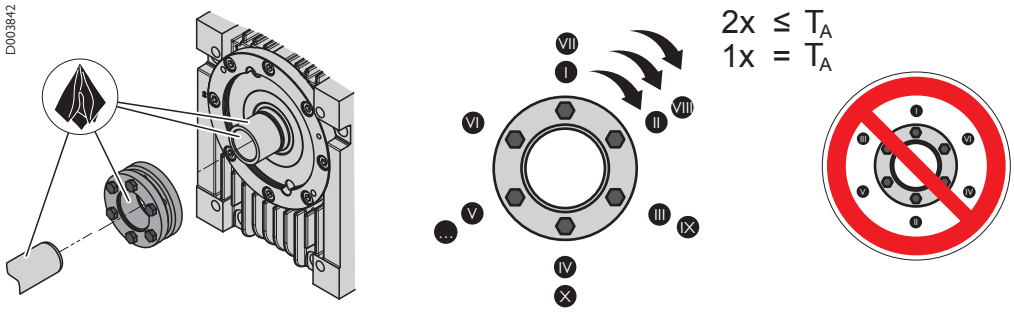

Fig. 9-1 *Tightening the clamping set*

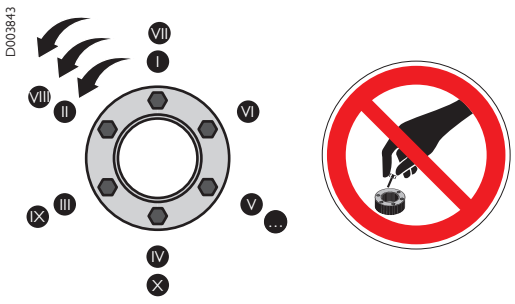

Fig. 9-2 *Releasing the clamping set*

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