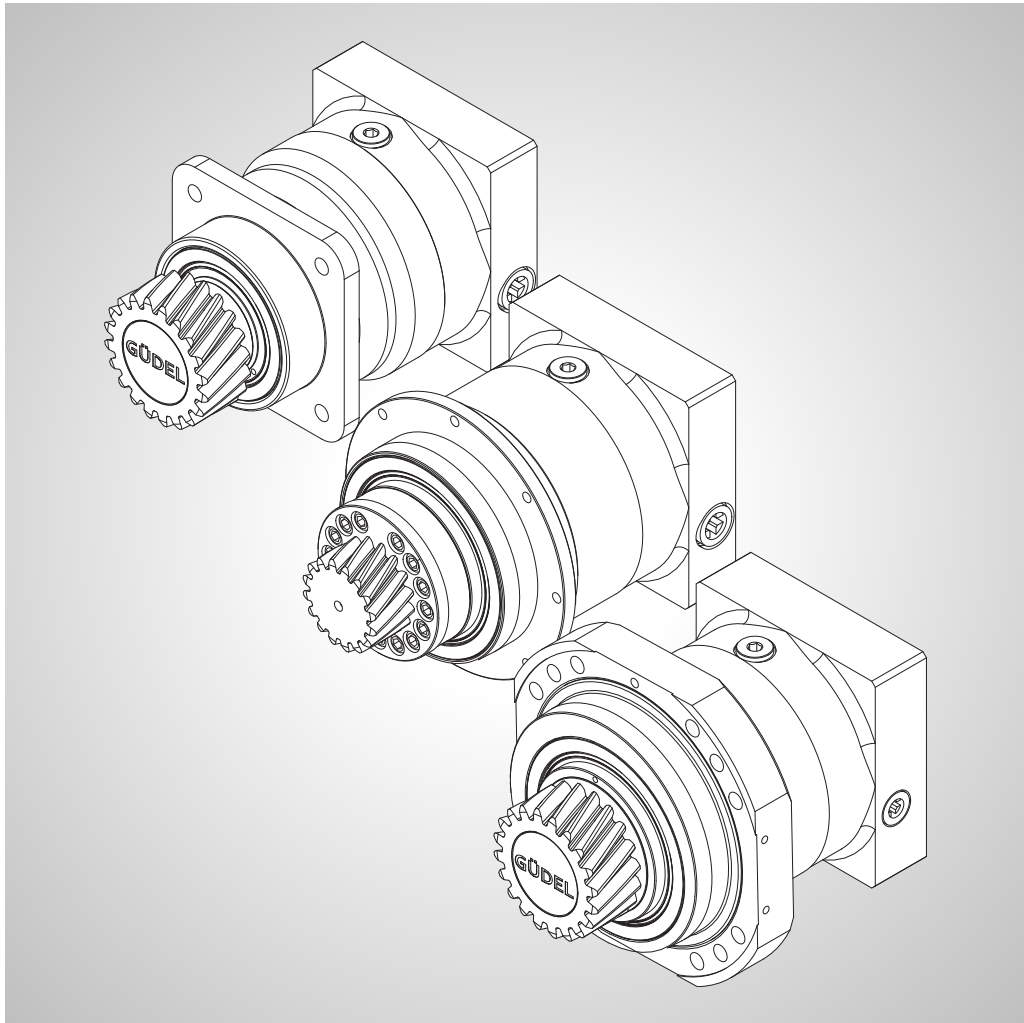


SERVICE MANUAL

Planetary gear **Güdel NRH, NRHP, NGHP**



Project / Order:

Bill of materials:

Serial number:

Year of manufacture:

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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.

Revision history

Version	Date	Description
2.0	01.05.2019	New: • Special pinion formulas ↻ 📄 65 Modified: • Installing the NGHP ↻ 📄 47 • Setting the NGHP ↻ 📄 49
1.0	09.07.2018	Basic version

Table -I Revision history

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I 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.

I.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.

I.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.

I.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 I-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

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

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 Operators

The operator:

- was trained and instructed by the operating company or the manufacturer
- has very good knowledge of the user interface and the operating elements
- has process knowledge which is specifically geared to the product

The operator is responsible for the following tasks:

- switching the control system of the product on and off
- creating production readiness
- monitoring the production process
- localizing minor malfunctions

2.1.2.5 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

2.1.2.6 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

2.1.2.7 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

2.1.2.8 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

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.

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.

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

Symbol	Explanation of symbols
	Danger of slipping

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.

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.

2.4.2 Product-specific hazards



⚠ 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



⚠ 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



⚠ 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

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 HI can be found in the download area of our company Web site <http://www.gudel.com>

3 Product description

3.1 Use

3.1.1 Intended use



Operate the product exclusively with motors acc. to DIN 42955 R.

The product is used to transfer torques and for reduction of 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 borne 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 catalog <http://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.

3.2 Product designation

3.2.1 Identifying lubricant amount

The lubricant amount can be found on the type plate or the type key of the spare parts list. If you have any questions, please contact our service departments.

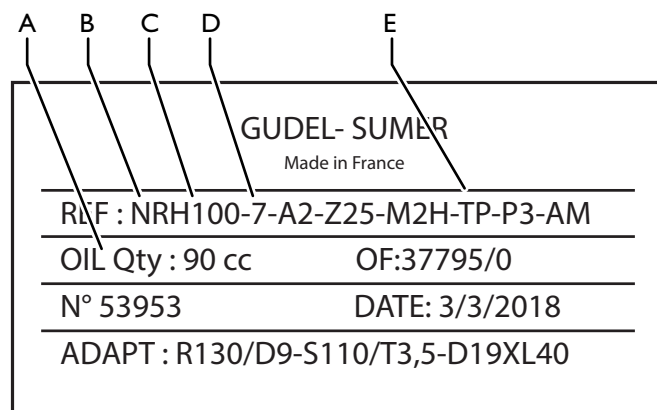


Fig. 3-1

Güdel planetary gearbox: Identifying lubricant quantity

A	Lubricant quantity [cm ³]	D	Ratio
B	Type	E	Installation position
C	Size		

Number of stages	Ratios
1	3, 4, 5, 7, 10
2	12, 16, 20, 25, 30, 35, 40, 50, 70, 100

Table 3-1

Güdel planetary gearbox: Ratio

Stage	Installation position	Type / Size		
		80	100	140
1	TP	30	90	130
2		50	130	190

Table 3-2 Güdel planetary gearbox: Lubricant quantity [cm³]

3.3 Technical data

Refer to the catalog for the 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	-15 to +40 °C	Up to and at 85%, condensation formation is not permissible
Bearing	-10 to +40 °C	Up to 75 %

Table 3-3 Temperature ranges

4 Design, function

4.1 Structure



The designs of output and planetary gear differ according to customer requirements and gearbox ratio.

4.1.1 NRH

The product consists of the following components:

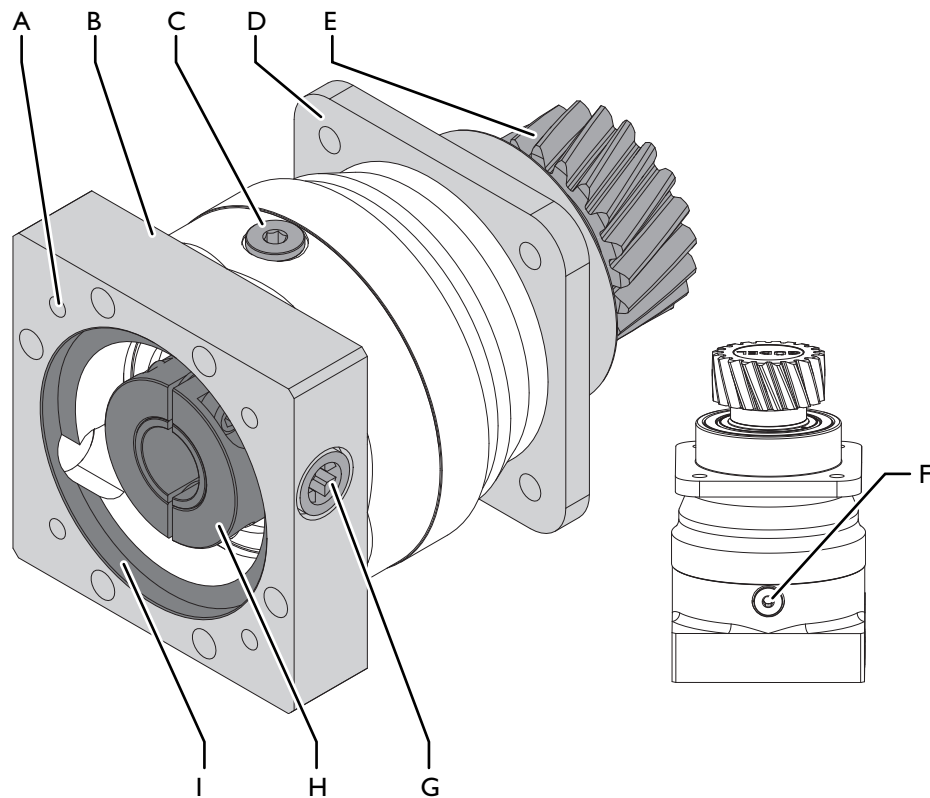


Fig. 4-1

Design NRH

- A Bore / Thread for motor
- B Motor flange
- C Bleed screw and filler screw
- D Flange
- E Pinion

- F Drain screw
- G Plug
- H Coupling
- I Centering diameter, motor

4.1.2 NRHP

The product consists of the following components:

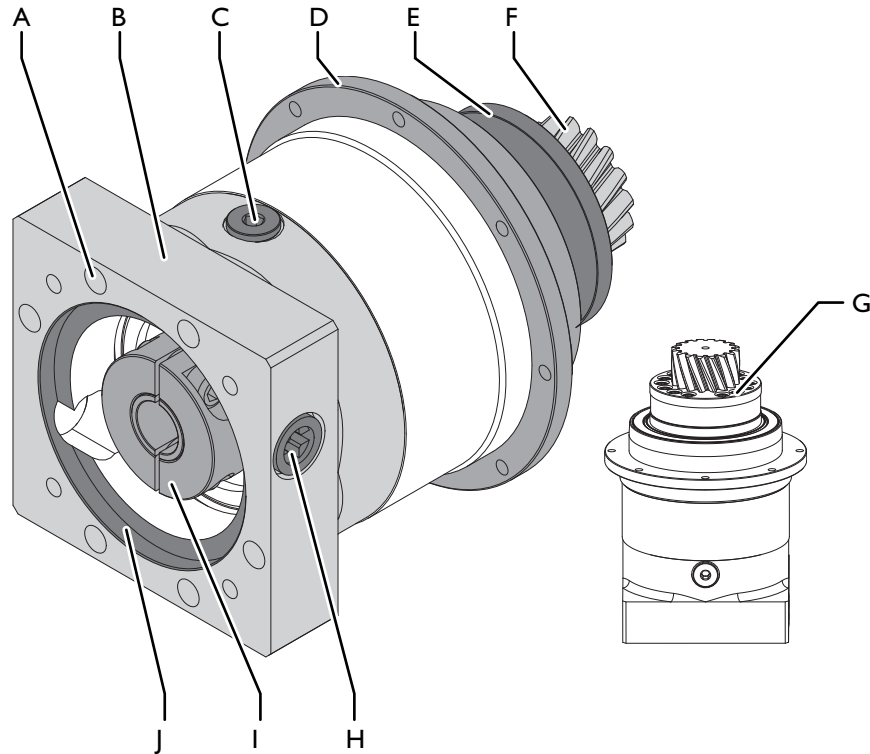


Fig. 4-2

Design NRHP

A	Bore / Thread for motor	F	Pinion
B	Motor flange	G	Screw
C	Bleed screw and filler screw	H	Plug
D	Flange	I	Coupling
E	Plate	J	Centering diameter, motor

4.1.3 NGHP

The product consists of the following components:

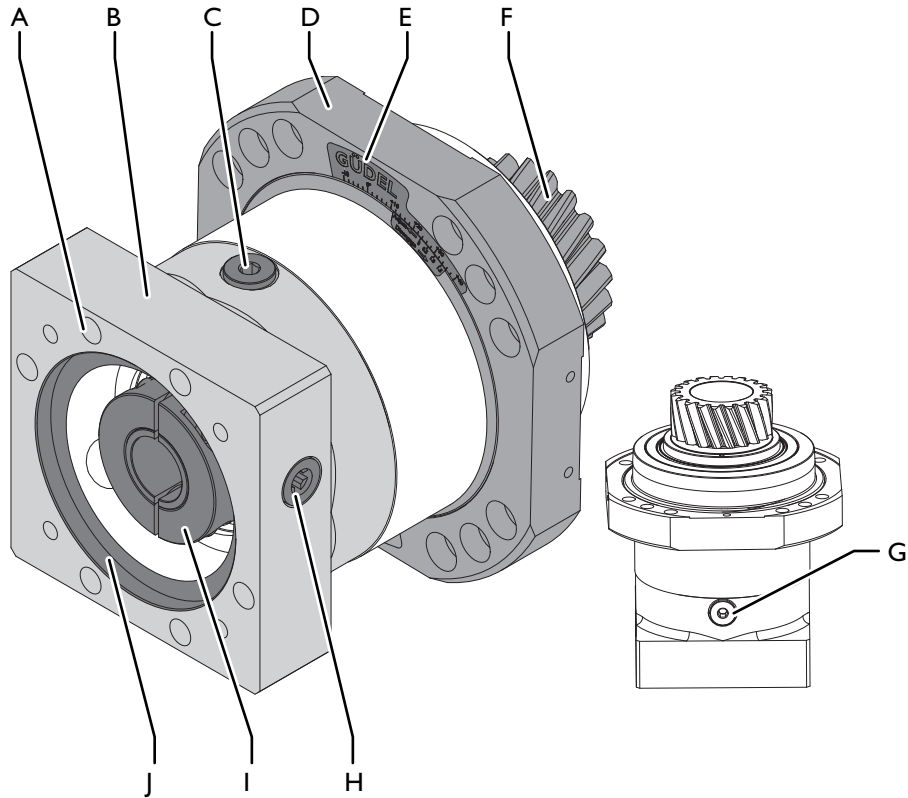


Fig. 4-3

Design NGHP

A	Bore / Thread for motor	F	Pinion
B	Motor flange	G	Drain screw
C	Bleed screw and filler screw	H	Plug
D	Gearbox flange	I	Coupling
E	Eccentric marking	J	Centering diameter, motor

4.2 Function

The planetary gear is used to transfer torques and for the reduction of speeds.

On the planetary gear NGHP, the tooth engagement between rack and pinion is adjusted by eccentric and eccentric marking.

5 Transport

The product is transported by air, land, or water. The packaging depends on the mode of transport.

Truck	=	Shipped on a transport pallet
Aircraft	=	Shipped in a crate
Ship	=	Shipped in a case or container

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

NOTE

Improper transport

Improper handling of the crates can lead to transport damage!

- Do not tip over the crates
- Avoid heavy vibrations and shocks
- Observe the symbols on the packaging

5.1 Packaging symbols

When moving the transport pallets / crates / cases, observe the following symbols:

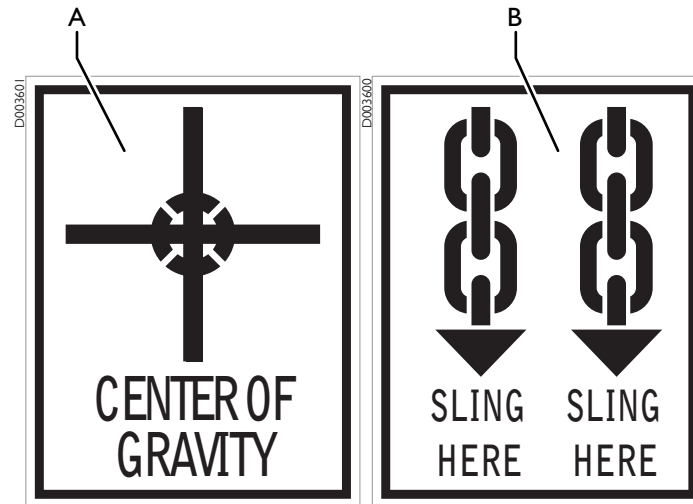


Fig. 5-1

Attaching slings

- A Center of gravity
- B Fastening point

Depending on the contents, the packaging units are marked with the symbols shown below. Observe these at all times.

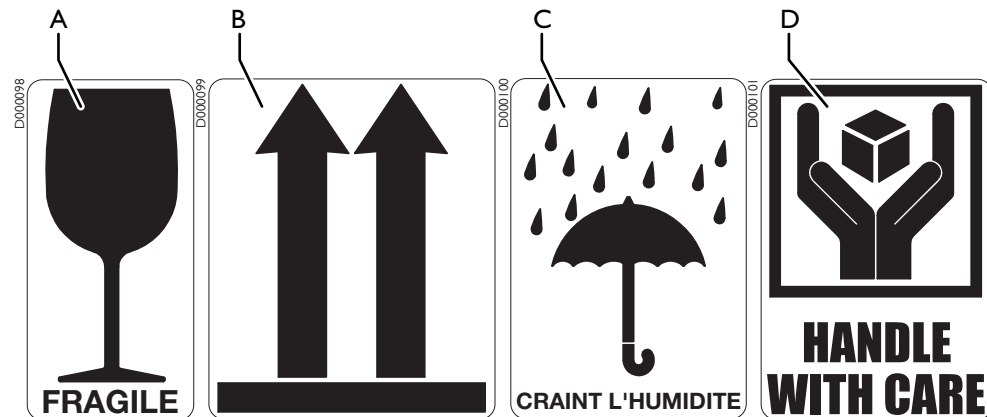


Fig. 5-2

Packaging symbols

- A Fragile
- B This side up
- C Keep dry
- D Handle with care

Remove the packaging only to the degree necessary for company-internal transport.

Transport the pallet, crate, or case to the intended installation location. Use appropriate transport devices.

5.2 Industrial trucks

Industrial trucks have to be capable of handling the size and weight of the crate. The driver of the industrial truck must be authorized to drive the vehicle.

5.3 Transport securing devices

At delivery, a transport securing device is in effect at the gearbox. Remove all transport securing devices before moving the axes. Store the transport securing devices for future work.



⚠ 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

5.3.1 Removing the transport securing device

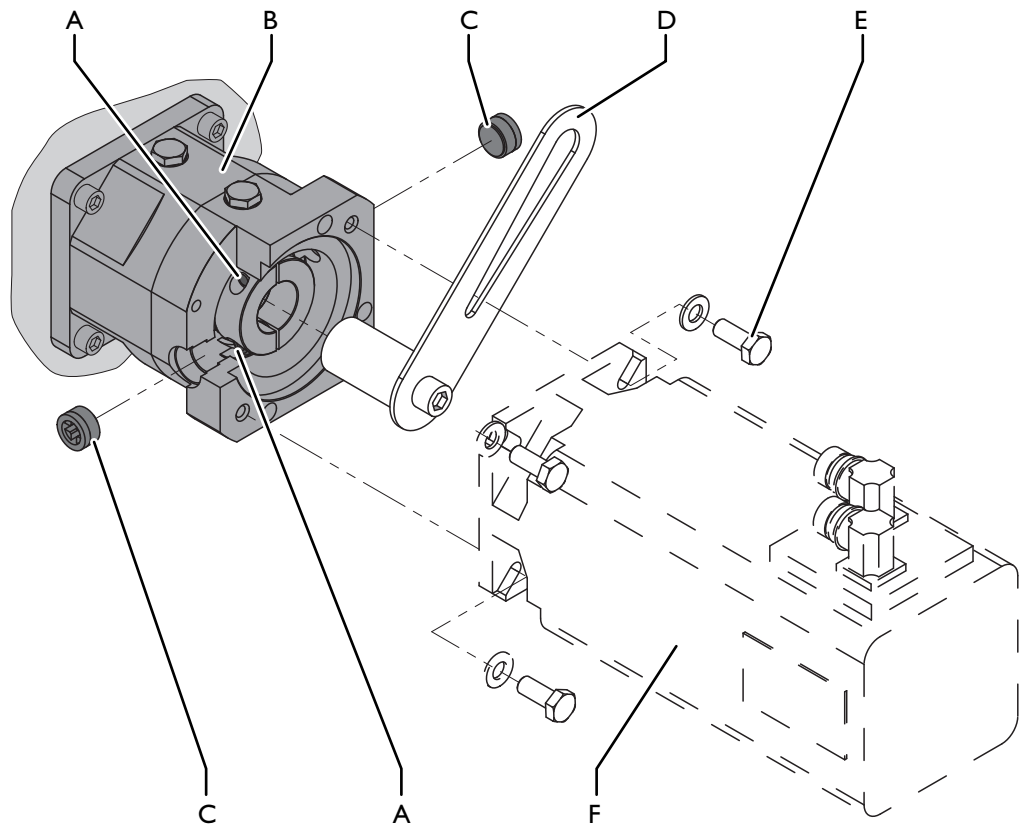


Fig. 5-3 Removing transport securing device: Güdel planetary gearbox

A	Coupling screw	D	Transport securing device
B	Planetary gearbox	E	Motor screw
C	Plug	F	Motor

Remove the transport securing device as follows:

- 1 Switch off the system and secure it with a padlock against being switched on again
- 2 Remove the plug
- 3 Release the coupling screws
- 4 Remove the motor screws
- 5 Remove the transport securing device from the planetary gearbox

The transport securing device has been removed.

5.4 Slings

Slings, chains, ropes or belts must be suitable for the load of weight of the crate. Fasten the slings to stable parts. Secure the slings against slipping. Make sure that no attachments are damaged by the slings.

5.4.1 Attaching the slings: Planetary gearbox

⚠ 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

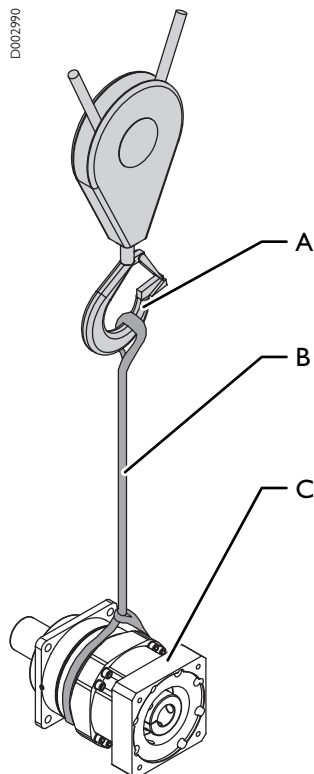


Fig. 5-4

Attaching the slings: Planetary gearbox

- A Crane hook
- B Lifting belt
- C Gearbox

Attach the slings as follows:

- 1 Loop the lifting belt around the planetary gear (be aware of center of gravity!)
- 2 Hook the lifting belt into the crane hook
- 3 Carefully lift the load
- 4 Check horizontal alignment of the load
- 5 If the load tilts, reposition the lifting belt loop

The slings are in place.

6 Commissioning

6.1 Introduction

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



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

6.1.2 Personnel qualifications

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

6.2 Intermediate storage

Observe the storage conditions if the product needs to be stored for a certain amount of time before assembly. ➔ 116

6.3 Installing

6.3.1 Attaching the slings: Planetary gearbox

⚠ 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

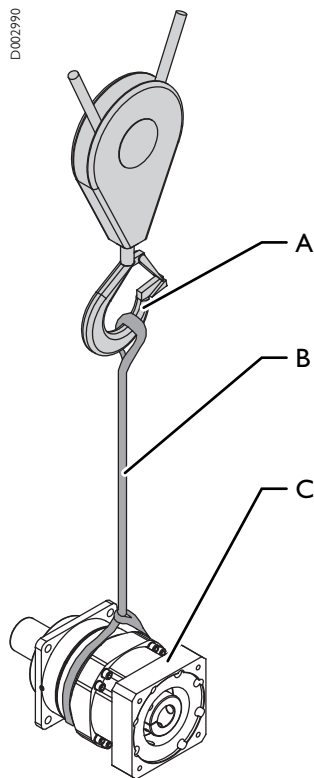


Fig. 6-1

Attaching the slings: Planetary gearbox

- A Crane hook
- B Lifting belt
- C Gearbox

Attach the slings as follows:

- 1** Loop the lifting belt around the planetary gear (be aware of center of gravity!)
- 2** Hook the lifting belt into the crane hook
- 3** Carefully lift the load
- 4** Check horizontal alignment of the load
- 5** If the load tilts, reposition the lifting belt loop

The slings are in place.

6.3.2 Mounting the planetary gearbox

⚠ 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

6.3.2.1 Installing transport securing device

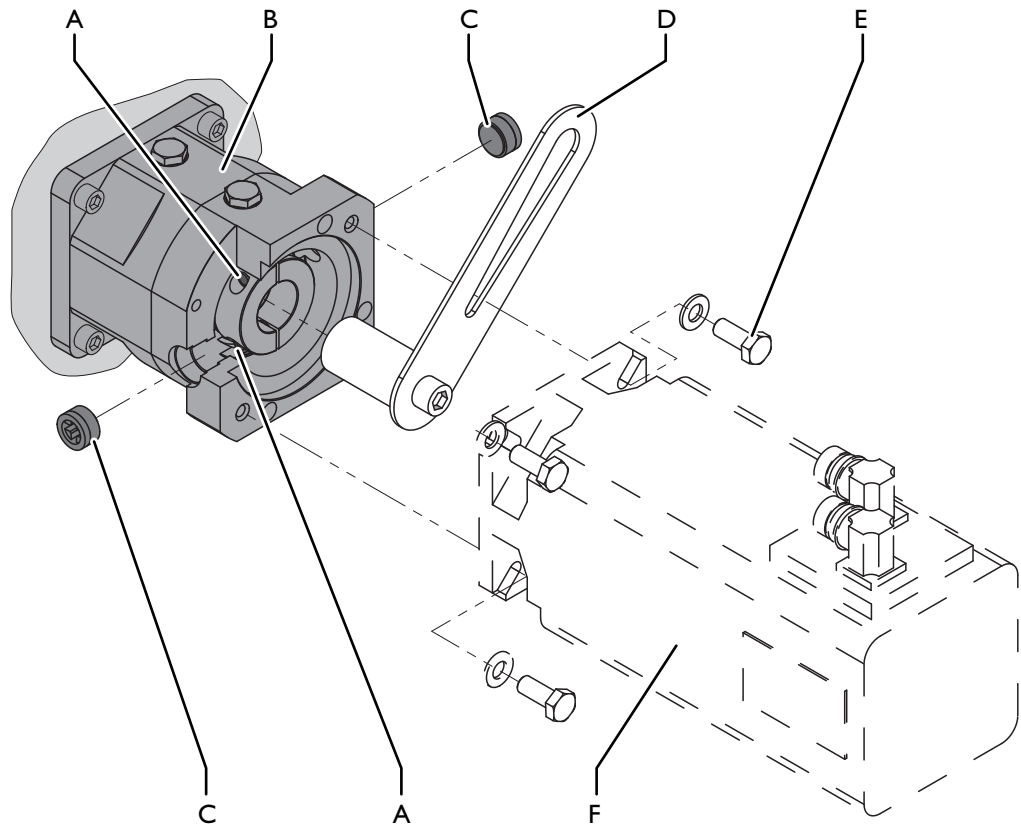


Fig. 6-2

Installing transport securing device: Planetary gearbox Güdel

A	Coupling screw	D	Transport securing device
B	Planetary gearbox	E	Motor screw
C	Plug	F	Motor

Install the transport securing device as follows:

- 1** Switch off the system and padlock it to secure it against being switched on again
- 2** Remove the plugs if necessary
- 3** Loosen the coupling screws
- 4** Attach the transport securing device to the planetary gearbox
- 5** Fix in place transport securing device using a motor screw
- 6** Tighten the coupling screws

The transport securing device is installed.

6.3.2.2 Mounting the NRH, NRHP

This description is valid as for the two planetary gear types NRH and NRHP.

NOTE

Distance of the mounting plate

A too small distance between the mounting plate and the carriage can lead to damage to the pinion or the rack.

- Position the mounting plate with sufficient distance to the carriage.
- Mount the gearbox carefully

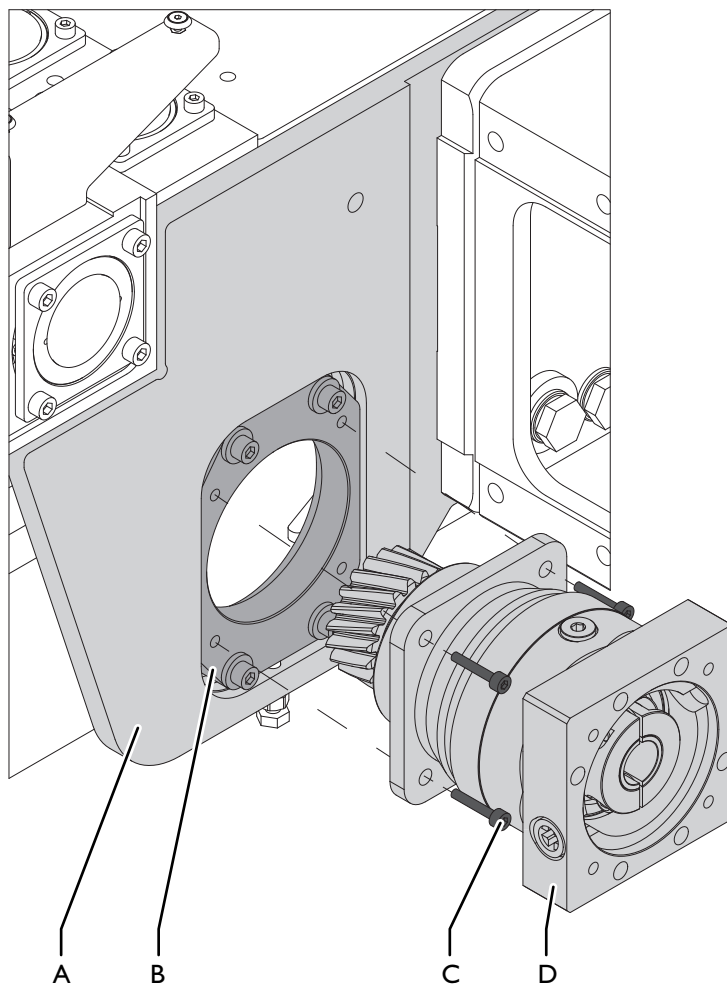


Fig. 6-3 Mounting the planetary gear: NRH, NRHP

A Carriage plate
B Mounting plate

C Screw (by customer)
D Güdel planetary gear

Install the planetary gear as follows:

- 1** Mount the planetary gear on the mounting plate
- 2** Tighten the screws
- 3** Set the tooth flank backlash if necessary as described in the superordinate operating manual

The planetary gear has been installed.

Removing the transport securing device

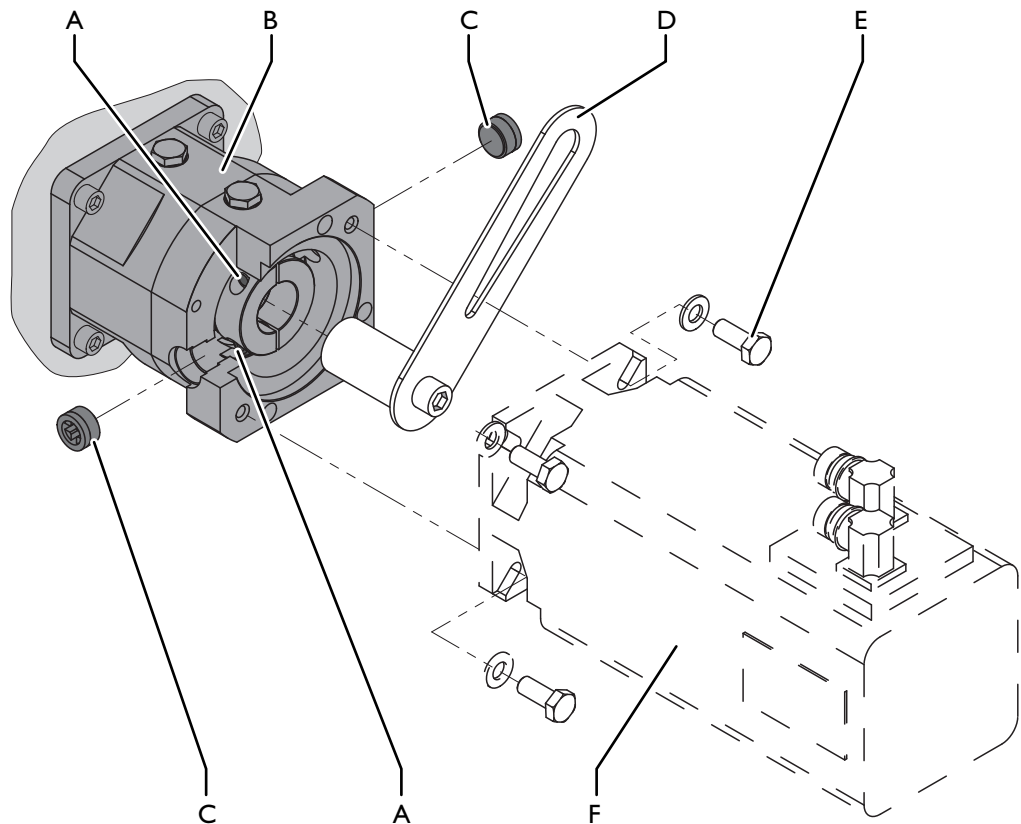


Fig. 6-4

Removing transport securing device: Güdel planetary gearbox

A	Coupling screw	D	Transport securing device
B	Planetary gearbox	E	Motor screw
C	Plug	F	Motor

Remove the transport securing device as follows:

- 1 Switch off the system and secure it with a padlock against being switched on again
- 2 Remove the plug
- 3 Release the coupling screws
- 4 Remove the motor screws
- 5 Remove the transport securing device from the planetary gearbox

The transport securing device has been removed.

6.3.2.3 Installing the NGHP



For help, use the QR code on the planetary gear NGHP or visit the Güdel website <http://gadjuster.gudel.com/>

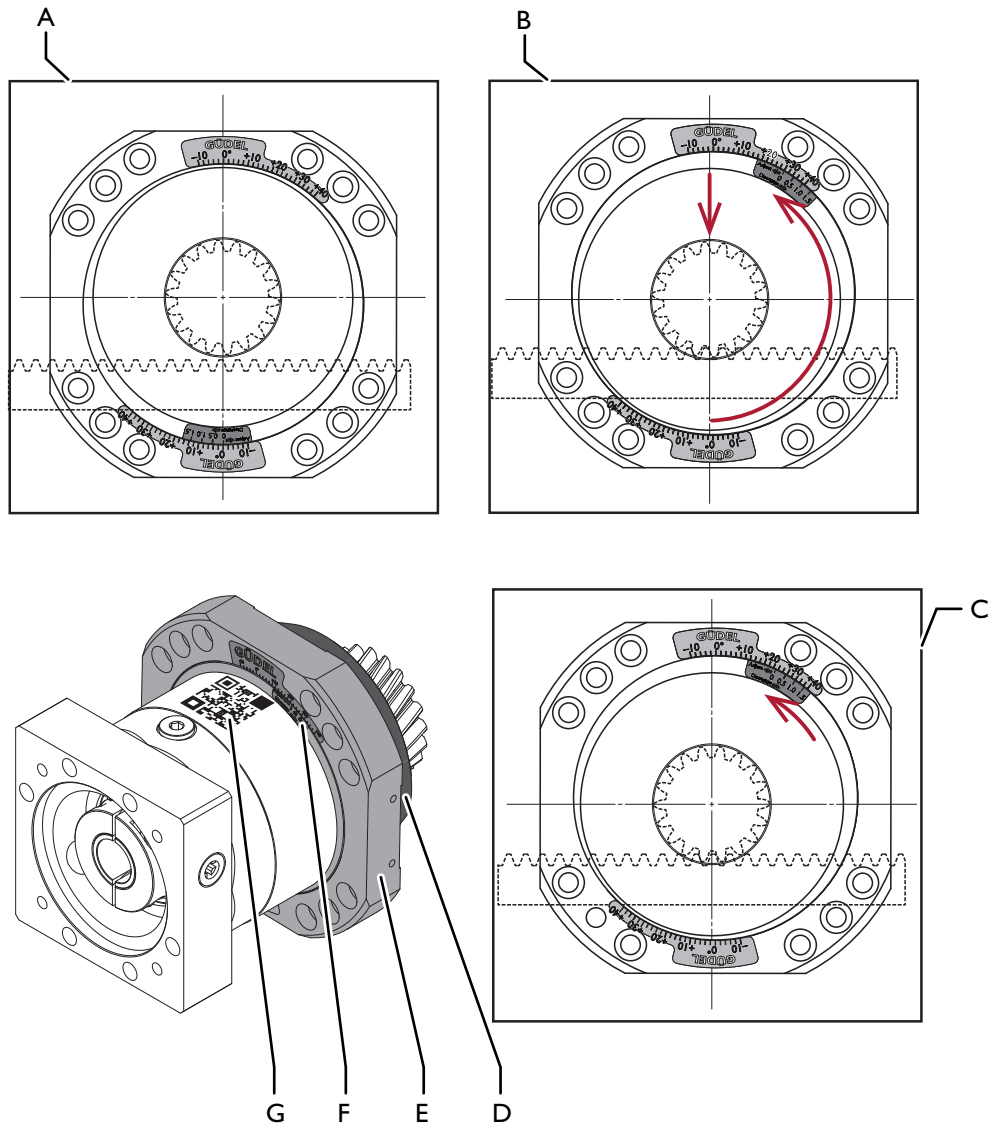


Fig. 6-5

Pre-assembling the NGHP planetary gearbox

- | | | | |
|---|---------------------------|---|-------------------|
| A | Installation position 0° | E | Gearbox flange |
| B | Installation position 30° | F | Eccentric marking |
| C | Operating position | G | QR code |
| D | Centering flange | | |

Pre-assembling the NGHP



Fig. 6-6

Pre-assembling the NGHP

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

Table 6-1

Lubricants:

Pre-assemble the planetary gearbox NGHP as follows:

Prerequisite: The assembly interface for the gearbox was drilled specifically according to the specifications from the Güdel sales documentation

Prerequisite: The planetary gearbox is blocked correctly   42

- 1 Determine the highest point of the rack pitch line
- 2 Align planetary gear NGHP and gearbox flange in assembly position 0°
- 3 Slightly grease the centering flange under the gearbox flange
- 4 Mount the planetary gearbox NGHP
- 5 Tighten the screws by hand
The planetary gear NGHP has to be manually adjustable with minimal force

The planetary gearbox NGHP has been pre-assembled.

Setting the NGHP

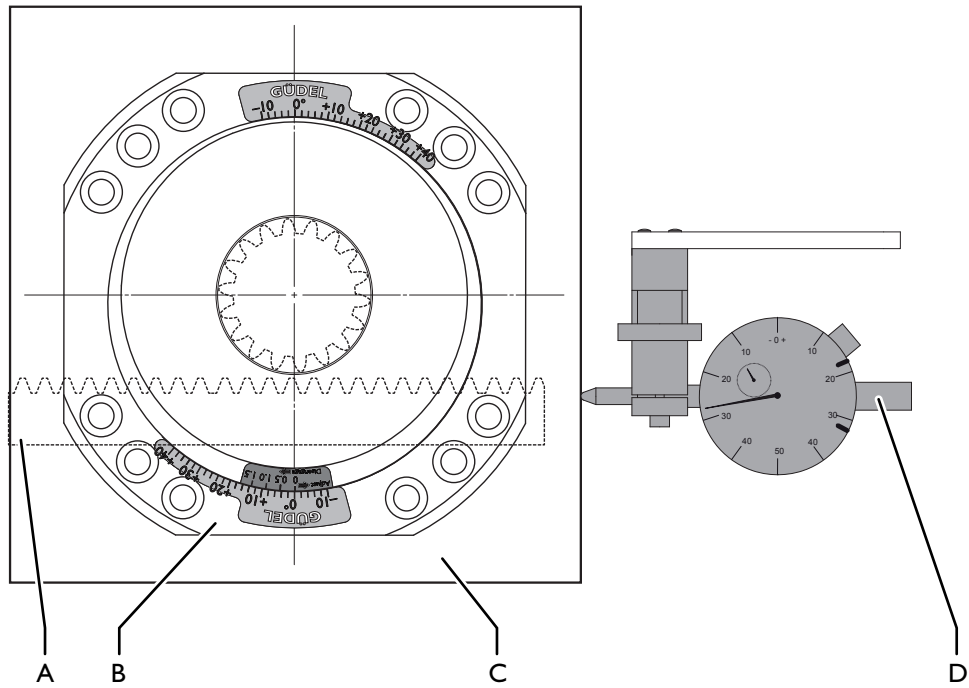


Fig. 6-7

Setting the planetary gear NGHP

A Rack

B Planetary gear NGHP

C Carriage

D Dial gauge

Set the planetary gearbox NGHP as follows:

Prerequisite: The planetary gearbox has been pre-assembled   48

Prerequisite: The planetary gearbox is blocked   42

Prerequisite: Also use the following values table according to the size you use.

- 1 Rotate the planetary gear counter-clockwise to mounting position 30°
- 2 Tighten the screws by hand
The planetary gear NGHP has to be secured against turning
- 3 Measure linear system backlash
Use suitable measuring device
 - 3.1 Push and measure carriage against the left side of the tooth flank
 - 3.2 Push and measure carriage against the right side of the tooth flank
- 4 Determine theoretical operating position by table or GAadjuster from Güdel
- 5 Set the planetary gear to the determined value
- 6 Check linear system backlash
 - 6.1 If there are deviations:
Repeat process from step 3
- 7 Tighten the screws by hand
 - 7.1 The planetary gear NGHP has to be secured against turning
- 8 Tighten screws with a torque wrench

The planetary gearbox NGHP has been set.

Value table size
80

Planetary gear NGHP	080					
	Z20-M2H			Z16-M2.5H		
Pinion	P1	P3	P5	P1	P3	P5
Precision class	P1	P3	P5	P1	P3	P5
Minimum setting value [µm]	13	24	35	13	24	35

Table 6-2

Dimension example NGHP 080

Planetary gear NGHP	080						Configura- tion Linear cor- rection fac- tor
	Z20-M2H			Z16-M2.5H			
Pinion							
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
290	-	-	10	-	-	10	7 µm per 0.5°
285	-	-	10.5	-	-	10.5	7 µm per 0.5°
280	-	-	11	-	-	11	7 µm per 0.5°
275	-	10	12	-	10	12	7 µm per 0.5°
270	-	11	12.5	-	11	12.5	7 µm per 0.5°
265	10	11.5	13.5	10	11.5	13.5	7 µm per 0.5°
260	11	12.5	13.5	11	12.5	13.5	7 µm per 0.5°
255	11.5	12.5	14	11.5	12.5	14	7 µm per 0.5°
250	12	13.5	15.5	12	13.5	15.5	7 µm per 0.5°
245	12.5	14	15	12.5	14	15	7 µm per 0.5°
240	13.5	15.5	15.5	13.5	15.5	15.5	7 µm per 0.5°
235	14	15	16	14	15	16	7 µm per 0.5°
230	14.5	15.5	16.5	14.5	15.5	16.5	7 µm per 0.5°
225	15	16	17	15	16	17	7 µm per 0.5°
220	15.5	16.5	17.5	15.5	16.5	17.5	7 µm per 0.5°
215	16	17	18	16	17	18	7 µm per 0.5°
210	16.5	17.5	18.5	16.5	17.5	18.5	7 µm per 0.5°

Planetary gear NGHP	080						Configura- tion Linear cor- rection fac- tor
	Z20-M2H			Z16-M2.5H			
Pinion							Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
205	17	18	19	17	18	19	7 µm per 0.5°
200	17.5	18.5	19.5	17.5	18.5	19.5	7 µm per 0.5°
195	18	19	19.5	18	19	19.5	7 µm per 0.5°
190	-	-	20	-	-	20	7 µm per 0.5°
185	-	-	20.5	-	-	20.5	7 µm per 0.5°
180	-	20	21	-	20	21	7 µm per 0.5°
175	-	20.5	21.5	20	21	21.5	7 µm per 0.5°
170	20	21	21.5	20	21	21.5	7 µm per 0.5°
165	20.5	21.5	22.5	20.5	21.5	22.5	7 µm per 0.5°
160	20.5	21.5	22.5	20.5	21.5	22.5	7 µm per 0.5°
155	21	22	22.5	21	22	22.5	7 µm per 0.5°
150	21.5	22.5	23	21.5	22.5	23	7 µm per 0.5°
145	22	22.5	23.5	22	22.5	23.5	7 µm per 0.5°
140	22	23	23.5	22	23	23.5	7 µm per 0.5°
135	22.5	23.5	24	22.5	23.5	24	7 µm per 0.5°
130	23	23.5	24.5	23	23.5	24.5	7 µm per 0.5°
125	23.5	24	24.5	23.5	24	24.5	7 µm per 0.5°

Planetary gear NGHP	080						
Pinion	Z20-M2H			Z16-M2.5H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
120	23.5	24.5	25	23.5	24.5	25	7 µm per 0.5°
115	24	24.5	25.5	24	24.5	25.5	7 µm per 0.5°
110	24.5	25	25.5	24.5	25	25.5	7 µm per 0.5°
105	24.5	25.5	26	24.5	25.5	26	7 µm per 0.5°
100	25	25.5	26.5	25	25.5	26.5	7 µm per 0.5°
95	25.5	26	26.5	25.5	26	26.5	7 µm per 0.5°
90	25.5	26	27	25.5	26	27	7 µm per 0.5°
85	26	26.5	27	26	26.5	27	7 µm per 0.5°
80	26	27	27.5	26	27	27.5	7 µm per 0.5°
75	26.5	27	28	26.5	27	28	7 µm per 0.5°
70	27	27.5	28	27	27.5	28	7 µm per 0.5°
65	27	27.5	28.5	27	27.5	28.5	7 µm per 0.5°
60	27.5	28	28.5	27.5	28	28.5	7 µm per 0.5°
55	27.5	28.5	29	28	28.5	29	7 µm per 0.5°
50	28	28.5	29	28	28.5	29	7 µm per 0.5°
45	28	29	29.5	28	29	29.5	7 µm per 0.5°
40	28.5	29	-	28.5	29	-	7 µm per 0.5°

Planetary gear NGHP	080						Configura- tion Linear cor- rection fac- tor
Pinion	Z20-M2H			Z16-M2.5H			
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						7 µm per 0.5°
35	29	29.5	-	29	29.9	-	

Table 6-3 Planetary gear NGHP table for setting the tooth engagement

Value table size
100

Planetary gear NGHP	100					
Pinion	Z25-M2H			Z20-M3H		
Precision class	P1	P3	P5	P1	P3	P5
Minimum setting value [μm]	17	31	44	19	34	50

Table 6-4 Dimension example NGHP 100

Planetary gear NGHP	100						
Pinion	Z25-M2H			Z20-M3H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [μm]	Recommended operating position of the planetary gear						
355	-	-	-	-	-	10	7 μm per 0.5°
350	-	-	10	-	-	10.5	7 μm per 0.5°
345	-	-	10.5	-	-	11	7 μm per 0.5°
340	-	-	11	-	10	11.5	7 μm per 0.5°
335	-	10	11.5	-	10.5	12	7 μm per 0.5°
330	-	10.5	12	-	11	12.5	7 μm per 0.5°
325	-	11	12.5	10	11.5	13	7 μm per 0.5°
320	10	11.5	13	10.5	12	13.5	7 μm per 0.5°
315	10.5	12	13.5	11	12.5	14	7 μm per 0.5°
310	11	12.5	14	11.5	13	14.5	7 μm per 0.5°
305	12	13	14.5	12	13.5	15	7 μm per 0.5°

Planetary gear NGHP	100						Configura- tion Linear cor- rection fac- tor
	Z25-M2H			Z20-M3H			
Pinion							
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
300	12.5	13.5	15	12.5	14	15.5	7 µm per 0.5°
295	13	14	15.5	13	14.5	16	7 µm per 0.5°
290	13.5	14.5	16	13.5	15	16.5	7 µm per 0.5°
285	14	15	16	14	15.5	16.5	7 µm per 0.5°
280	14.5	15.5	16.5	14.5	16	17	7 µm per 0.5°
275	14.5	16	17	15	16	17.5	7 µm per 0.5°
270	15	16	17.5	15.5	16.5	17.5	7 µm per 0.5°
265	15.5	16.5	17.5	16	17	18	7 µm per 0.5°
260	16	17	18	16	17.5	18	7 µm per 0.5°
255	16.5	17.5	18.5	16.5	17.5	18.5	7 µm per 0.5°
250	17	18	19	17	18	19	7 µm per 0.5°
245	17	18	19	17.5	18.5	19	7 µm per 0.5°
240	17.5	18.5	19.5	17.5	19	19.5	7 µm per 0.5°
235	18	19	20	18	19	20	7 µm per 0.5°
230	18.5	19.5	20	18.5	19.5	20.5	7 µm per 0.5°
225	18.5	19.5	20.5	19	20	21	7 µm per 0.5°
220	19	20	21	19	20	21	7 µm per 0.5°

Planetary gear NGHP	100						
Pinion	Z25-M2H			Z20-M3H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
215	19.5	20	21	19.5	20.5	21.5	7 µm per 0.5°
210	19.5	20.5	21.5	20	21	22	7 µm per 0.5°
205	20	20.5	22	20	21	22	7 µm per 0.5°
200	20.5	21	22	20.5	21.5	22.5	7 µm per 0.5°
190	21	22	22.5	21	22	23	7 µm per 0.5°
185	21.5	22	23	21.5	22.5	23	7 µm per 0.5°
180	21.5	22.5	23	21.5	22.5	23.5	7 µm per 0.5°
175	22	22.5	23.5	22	23	24	7 µm per 0.5°
170	22	23	24	22	23	24	7 µm per 0.5°
165	22.5	23.5	24	22.5	23.5	24.5	7 µm per 0.5°
160	23	23.5	24.5	23	23.5	24.5	7 µm per 0.5°
155	23	24	24.5	23	24	25	7 µm per 0.5°
150	23.5	24	25	23.5	24.5	25	7 µm per 0.5°
145	23.5	24.5	25	23.5	24.5	25.5	7 µm per 0.5°
140	24	24.5	25.5	24	25	25.5	7 µm per 0.5°
135	24	25	25.5	24	25	26	7 µm per 0.5°
130	24.5	25	26	24.5	25.5	26	7 µm per 0.5°

Planetary gear NGHP	100						Configura- tion Linear cor- rection fac- tor
	Z25-M2H			Z20-M3H			
Pinion							
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
125	24.5	25.5	26	24.5	25.5	26.5	7 µm per 0.5°
120	25	25.5	26.5	25	26	26.5	7 µm per 0.5°
115	25.5	26	26.5	25.5	26	27	7 µm per 0.5°
110	25.5	26.5	27	25.5	26.5	27	7 µm per 0.5°
105	26	26.5	27	26	26.5	27.5	7 µm per 0.5°
100	26	27	27.5	26	27	27.5	7 µm per 0.5°
95	26.5	27	27.5	26.5	27	28	7 µm per 0.5°
90	26.5	27	28	26.5	27.5	28	7 µm per 0.5°
85	27	27.5	28	27	27.5	28.5	7 µm per 0.5°
80	27	27.5	28.5	27	28	28.5	7 µm per 0.5°
75	27.5	28	28.5	27.5	28	29	7 µm per 0.5°
70	27.5	28	29	27.5	28.5	29	7 µm per 0.5°
65	28	28.5	29	28	28.5	29.5	7 µm per 0.5°
60	28	28.5	29.5	28	29	29.5	7 µm per 0.5°
55	28.5	29	29.5	28.5	29	-	7 µm per 0.5°
50	28.5	29	-	28.5	29.5	-	7 µm per 0.5°
45	28.5	29.5	-	28.5	29.5	-	7 µm per 0.5°

Planetary gear NGHP	100						Configura- tion Linear cor- rection fac- tor
	Z25-M2H			Z20-M3H			
Pinion	P1	P3	P5	P1	P3	P5	Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						Linear cor- rection fac- tor
40	28.5	29.5	-	29	-	-	
35	29	-	-	29	-	-	7 µm per 0.5°

Table 6-5 Planetary gear NGHP table for setting the tooth engagement

Value table size
140

Planetary gear NGHP	140					
Pinion	Z20-M2H			Z16-M2.5H		
Precision class	P1	P3	P5	P1	P3	P5
Minimum setting value [μm]	23	40	57	24	45	66

Table 6-6 Dimension example NGHP 140

Planetary gear NGHP	140						
Pinion	Z22-M3H			Z20-M4H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [μm]	Recommended operating position of the planetary gear						
475	-	-	-	-	-	-	7 μm per 0.5°
470	-	-	-	-	-	10	7 μm per 0.5°
465	-	-	-	-	-	10.5	7 μm per 0.5°
460	-	-	10	-	-	11	7 μm per 0.5°
455	-	-	10.5	-	-	11.5	7 μm per 0.5°
450	-	-	11	-	10	12	7 μm per 0.5°
445	-	10	11.5	-	10.5	12	7 μm per 0.5°
440	-	10.5	12	-	11	12.5	7 μm per 0.5°
435	-	11	12.5	-	11.5	13	7 μm per 0.5°
430	-	11.5	12.5	10	11.5	13.5	7 μm per 0.5°
425	10	11.5	13	10.5	12.5	13.5	7 μm per 0.5°

Planetary gear NGHP	140						Configura- tion Linear cor- rection fac- tor
	Z22-M3H			Z20-M4H			
Pinion							
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
420	10.5	12	13.5	10.5	12.5	14	7 µm per 0.5°
415	11	12.5	13.5	11	13	14.5	7 µm per 0.5°
410	11.5	13	14	11.5	13	14.5	7 µm per 0.5°
405	12	13	14.5	12	13.5	15	7 µm per 0.5°
400	12.5	13.5	15	12.5	14	15.5	7 µm per 0.5°
395	12.5	14	15	13	14.5	15.5	7 µm per 0.5°
390	13	14.5	15.5	13	14.5	16	7 µm per 0.5°
385	13.5	14.5	16	13.5	15	16.5	7 µm per 0.5°
380	14	15	16	14	15.5	16.5	7 µm per 0.5°
375	14	15.5	16.5	14	15.5	17	7 µm per 0.5°
370	14.5	15.5	16.5	14.5	16	17	7 µm per 0.5°
365	15	16	17	15	16	17.5	7 µm per 0.5°
360	15	16	17	15.5	16.5	17.5	7 µm per 0.5°
355	15.5	16.5	17.5	15.5	17	18	7 µm per 0.5°
350	16	17	18	16	17	18.5	7 µm per 0.5°
345	16	17	18	16	17.5	18.5	7 µm per 0.5°
340	16.5	17.5	18.5	16.5	17.5	19	7 µm per 0.5°

Planetary gear NGHP	140						Configura- tion Linear cor- rection fac- tor
Pinion	Z22-M3H			Z20-M4H			
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
335	16.5	17.5	18.5	17	18	19	7 µm per 0.5°
330	17	18	19	17	18	19.5	7 µm per 0.5°
325	17.5	18	19	17.5	18.5	19.5	7 µm per 0.5°
320	17.5	18.5	19.5	17.5	19	20	7 µm per 0.5°
315	18	19	19.5	18	19	20	7 µm per 0.5°
310	18	19	20	18	19.5	20.5	7 µm per 0.5°
305	18.5	19.5	20	18.5	19.5	20.5	7 µm per 0.5°
300	18.5	19.5	20.5	18.5	20	21	7 µm per 0.5°
295	19	20	20.5	19	21.5	21	7 µm per 0.5°
290	19	20	21	19	20.5	21.5	7 µm per 0.5°
285	19.5	20.5	21	19.5	20.5	21.5	7 µm per 0.5°
280	19.5	20.5	21.5	19.5	21	21.5	7 µm per 0.5°
275	20	21	21.5	20	21	22	7 µm per 0.5°
270	20	21	22	20	21	22	7 µm per 0.5°
265	20.5	21	22	20.5	21.5	22.5	7 µm per 0.5°
260	20.5	21.5	22	20.5	21.5	22.5	7 µm per 0.5°
255	21	22	22.5	21	22	23	7 µm per 0.5°

Planetary gear NGHP	I 40						
Pinion	Z22-M3H			Z20-M4H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
250	21	22	22.5	21	22	23	7 µm per 0.5°
245	21.5	22	23	21.5	22.5	23.5	7 µm per 0.5°
240	21.5	22.5	23	21.5	22.5	23.5	7 µm per 0.5°
235	22	22.5	23.5	22	23	23.5	7 µm per 0.5°
230	22	23	23.5	22	23	24	7 µm per 0.5°
225	22.5	23	23.5	22.5	23	24	7 µm per 0.5°
220	22.5	23	24	22.5	23.5	24.5	7 µm per 0.5°
215	22.5	23.5	24	22.5	23.5	24.5	7 µm per 0.5°
210	23	23.5	24.5	23	24	24.5	7 µm per 0.5°
205	23	24	24.5	23	24	25	7 µm per 0.5°
200	23.5	24	25	23.5	24.5	25	7 µm per 0.5°
195	23.5	24.5	25	23.5	24.5	25.5	7 µm per 0.5°
190	24	24.5	25	24	24.5	25.5	7 µm per 0.5°
185	24	24.5	25.5	24	25	25.5	7 µm per 0.5°
180	24	25	25.5	24	25	26	7 µm per 0.5°
175	24.5	25	25.5	24.5	25.5	26	7 µm per 0.5°
170	24.5	25.5	26	24.5	25.5	26.5	7 µm per 0.5°

Planetary gear NGHP	I 40						Configura- tion Linear cor- rection fac- tor
	Z22-M3H			Z20-M4H			
Pinion							
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
165	25	25.5	26	25	25.5	26.5	7 µm per 0.5°
160	25	25.5	26.5	25	26	26.5	7 µm per 0.5°
155	25	26	26.5	25	26	27	7 µm per 0.5°
150	25.5	26	26.5	25.5	26	27	7 µm per 0.5°
145	25.5	26	27	25.5	26.5	27	7 µm per 0.5°
140	26	26.5	27	26	26.5	27.5	7 µm per 0.5°
135	26	26.5	27.5	26	27	27.5	7 µm per 0.5°
130	26	27	27.5	26	27	28	7 µm per 0.5°
125	26.5	27	27.5	26.5	27	28	7 µm per 0.5°
120	26.5	27	28	26.5	27.5	28	7 µm per 0.5°
115	26.5	27.5	28	26.5	27.5	28.5	7 µm per 0.5°
110	27	27.5	28	27	27.5	28.5	7 µm per 0.5°
105	27	27.5	28.5	27	28	28.5	7 µm per 0.5°
100	27.5	28	28.5	27.5	28	29	7 µm per 0.5°
95	27.5	28	28.5	27.5	28.5	29	7 µm per 0.5°
90	27.5	28.5	29	27.5	28.5	29	7 µm per 0.5°
85	28	28.5	29	28	28.5	29.5	7 µm per 0.5°

Planetary gear NGHP	I 40						
Pinion	Z22-M3H			Z20-M4H			Configura- tion Linear cor- rection fac- tor
Precision class	P1	P3	P5	P1	P3	P5	
Measured lin- ear system backlash, pre- position of 30° [µm]	Recommended operating position of the planetary gear						
80	28	28.5	29	28	29	29.5	7 µm per 0.5°
75	28	29	29.5	28	29	29.5	7 µm per 0.5°
70	28.5	29	29.5	28.5	29	-	7 µm per 0.5°
65	28	29	-	28.5	29.5	-	7 µm per 0.5°
60	28.5	29.5	-	28.5	29.5	-	7 µm per 0.5°
55	29	29.5	-	29	29.5	-	7 µm per 0.5°
50	29	29.5	-	29	-	-	7 µm per 0.5°
45	29.5	-	-	29.5	-	-	7 µm per 0.5°
40	29.5	-	-	29.5	-	-	7 µm per 0.5°
35	29.5	-	-	29.5	-	-	7 µm per 0.5°

Table 6-7 Planetary gear NGHP table for setting the tooth engagement

Special pinion Calculate the setting angle for special pinions on the planetary gear NGHP according to the following formula:

$$D_0 = m_n \times z \times k$$

Fig. 6-8 Calculation formula: Pitch circle diameter of pinion

$$L_p = P_x \times D_0 \times 0.1454$$

Fig. 6-9 Calculation formula: Value from precision class

$$L_r = k \times ((1.712 + 2.222 \times \sqrt{m_n}) + (2.344 + 1.223 \times \log(m_n)) \times D_0^{0.25})$$

Fig. 6-10 Calculation formula: Value from pinion run-out

$$L_2 = 0.8 \times (L_p + L_r) + f$$

Fig. 6-11 Calculation formula: Recommended value for tooth flank backlash

$$\theta_2 = \frac{180}{\pi} \times \cos^{-1} \left[\frac{L_1 - L_2}{s} + 0.86603 \right] \text{ (Round to } 0.5^\circ \text{)}$$

Fig. 6-12 Calculation formula: Setting angle

Abbreviation	Measurement unit	Designation
D_0	[mm]	Pitch circle diameter of pinion
M_n	[mm]	Normal module
z		Number of pinion teeth
β	[°]	Helix angle of pinion teeth
P_x	[arcmin]	Gearbox precision class
f	[μm]	Assigned value: Lubrication
s	[μm]	Assigned value: Gearbox size
k		Assigned value: Helix angle
L_1	[μm]	Measured linear play at preset 30°
L_p	[μm]	Value from gearbox precision class
L_r	[μm]	Value from pinion run-out
L_2	[μm]	Recommended value for tooth flank backlash
θ_2	[°]	Calculated setting angle

Table 6-8 List of abbreviations

Basic values required for the calculation:

Gearbox precision P_x	f [μm]
0.5	1
1	2
3	3
5	4
12	5

Table 6-9 Assigned value: Lubrication

NGHP gearbox size	s [μm]
080	2124
100	2549
140	3398
180	4248
240	3398

Table 6-10 Assigned value: Gearbox size

Helix angle β	k
straight = 0°	1.000
angled = 19.5281°	1.061

Table 6-11 Assigned value: Helix angle

Removing the transport securing device

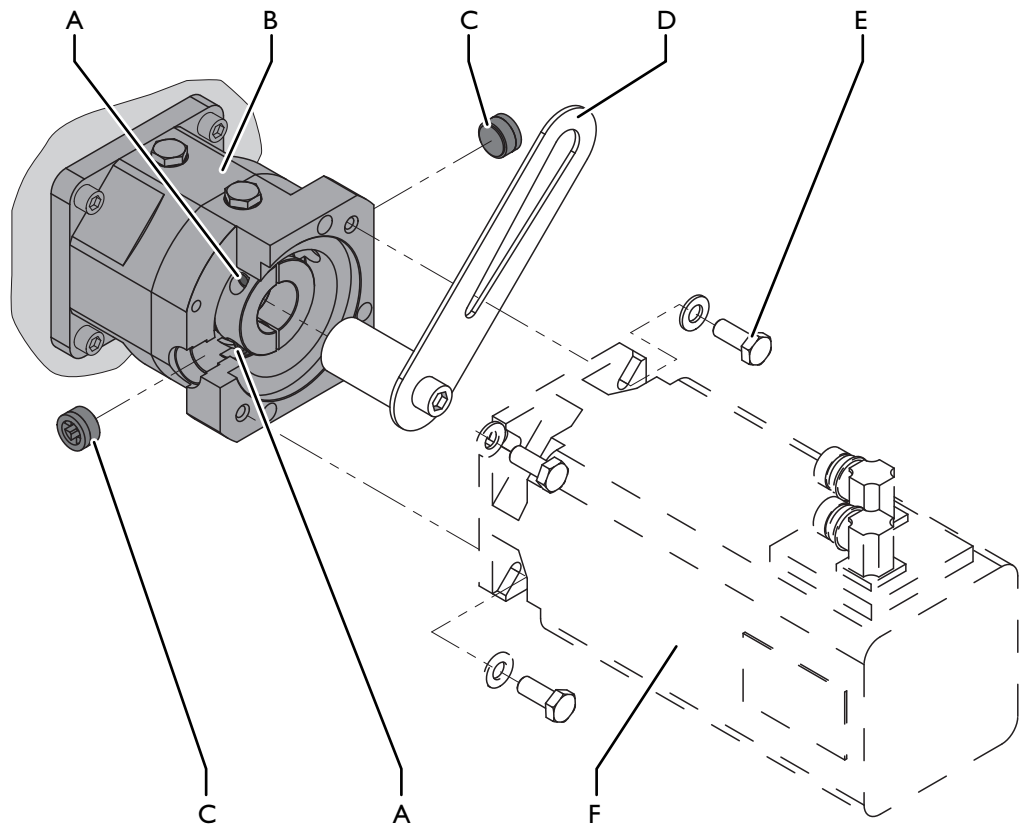


Fig. 6-13

Removing transport securing device: Güdel planetary gearbox

A	Coupling screw	D	Transport securing device
B	Planetary gearbox	E	Motor screw
C	Plug	F	Motor

Remove the transport securing device as follows:

- 1 Switch off the system and secure it with a padlock against being switched on again
- 2 Remove the plug
- 3 Release the coupling screws
- 4 Remove the motor screws
- 5 Remove the transport securing device from the planetary gearbox

The transport securing device has been removed.

6.3.3 Mounting the motor



If possible, mount the motor in the vertical direction (motor at top, motor shaft below)

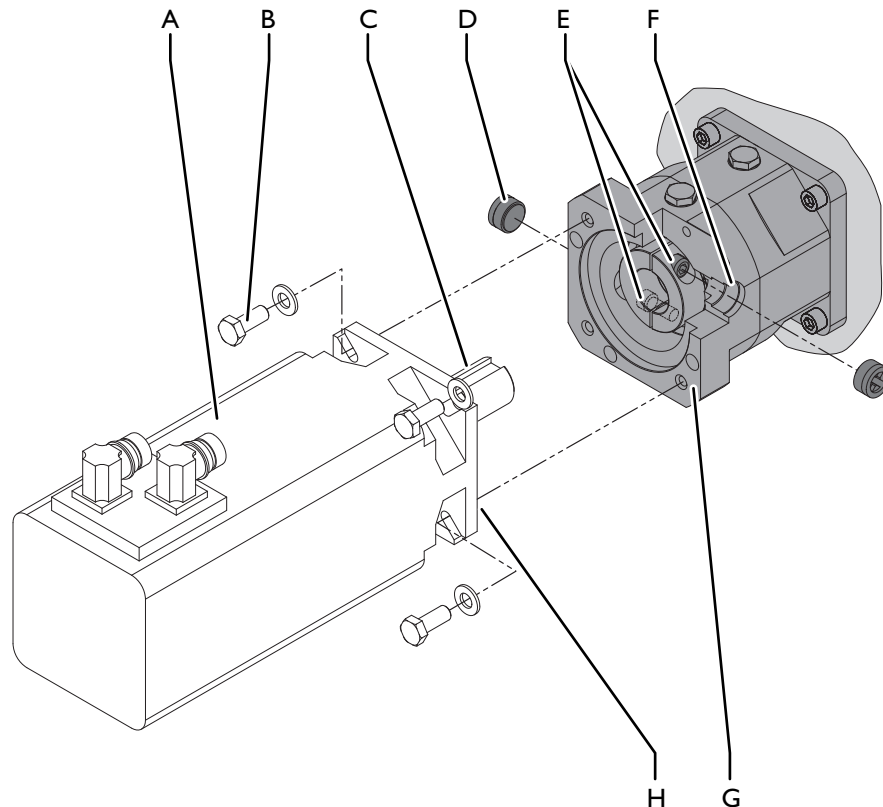


Fig. 6-14

Mounting the motor: Güdel planetary gear

A	Motor	E	Coupling screw
B	Motor screw (if necessary with washers according to motor manufacturer specifications)	F	Drill hole
C	Motor shaft	G	Gearbox contact surface
D	Sealing plug	H	Motor contact surface

Cleaning agents

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

Table 6-12

Cleaning agents: Coupling, contact surfaces, and motor shaft

Type / Size	Diameter, motor shaft	Coupling screw, quality 12.9	Tightening torque [Nm]
80-140	≤14	M6	19.1
80-140	15-24	M8	46
100 / 110	25-35	M8	46
140	25-48	M10	92

Table 6-13 Tightening torques, coupling screws: Güdel planetary gearbox

Mount the motor as follows:

- 1 Remove the sealing plug
- 2 If necessary, remove the burr of the keyway at the motor shaft
- 3 Clean the coupling, contact surfaces, and motor shaft to ensure that they are free of grease
- 4 Position the coupling as shown in the illustration and do not tighten the coupling screws
- 5 Mount the motor so that both contact surfaces fit flush on each other
- 6 Install the motor screws, but do not tighten
- 7 Tighten the coupling screws to about 60 % of the tightening torque
- 8 Tighten the motor screws
- 9 Tighten the coupling screws alternately in three consecutive sequences up to the tightening torque
- 10 Slightly loosen the motor screws
- 11 Tighten the motor screws cross-wise (tightening torque acc. to motor manufacturer specifications)

The motor has been installed.

7 Maintenance

7.1 Introduction

*Maintenance
tasks*

The listed tasks have to be carried out at the prescribed time intervals. If they are not carried out at the specified intervals or improperly, all warranty is voided. Observing these obligations is a significant condition so that the product performing without malfunction as well as its long service life.


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. ➔  123

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel.
➔ Chapter 12,  132

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



⚠ 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

Falling axes, workpieces

Falling axes or workpieces can cause physical damage, serious or fatal injuries!

- Set down any workpieces before working in the danger area
- Never enter the area below suspended axes and workpieces
- Secure suspended axes using the stipulated equipment
- Check the belts of the telescope axes for signs of breakage and tears

⚠ 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



7.1.2 Personnel qualifications

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

7.2 Maintenance tasks

7.2.1 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
  123

7.2.2 Maintenance intervals

The product is subject to natural wear and tear. When it wears out, unplanned downtimes of your system 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 100%. 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.



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 7-1 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 7-2 Maintenance intervals in shift operation (7 days a week)

7.2.3 Maintenance tasks after 150 hours

7.2.3.1 Lubricating the pinion

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

⚠ CAUTION

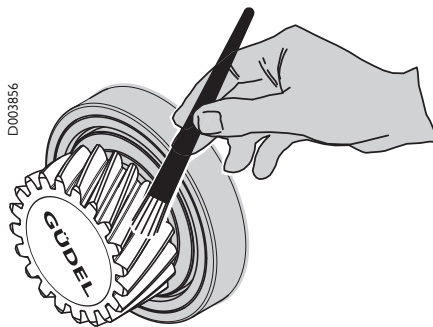


Danger of being crushed

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 7-3

Lubricants: Pinion

7.2.4 Maintenance tasks after 2,250 hours

7.2.4.1 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.

Inspection point	Description	Measures
Contamination	Check the planetary gear for contamination	Immediately clean away any contamination
Damage	Check the planetary gear for damage: <ul style="list-style-type: none"> • Paint damage • Bent components • General damage 	Immediately remedy all discovered damage
Loose components	Check the fit of the components: <ul style="list-style-type: none"> • Screws • Clamping sets 	Immediately tighten loose screws to the required torque
Loss of oil	Check the planetary gear and its surroundings for signs of the following: <ul style="list-style-type: none"> • Puddles of oil and oil spills on the floor or in the drip sheets • Leaks on the planetary gear 	<ul style="list-style-type: none"> • Repair or replace the gearbox • Remove puddles of oil and oil spills on the floor or in the drip sheets
Setting	Check the planetary gear for correct setting: <ul style="list-style-type: none"> • Pinions 	Set the tooth flank backlash

Table 7-4

Inspection table

7.2.5 Maintenance tasks after 22,500 hours

7.2.5.1 Replacing the Güdel planetary gearbox

Attaching the slings: Planetary gearbox

⚠ 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

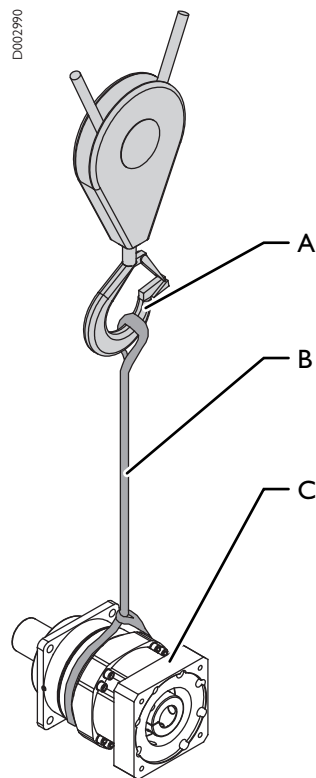


Fig. 7-1

Attaching the slings: Planetary gearbox

- A Crane hook
- B Lifting belt
- C Gearbox

Attach the slings as follows:

- 1 Loop the lifting belt around the planetary gear (be aware of center of gravity!)
- 2 Hook the lifting belt into the crane hook
- 3 Carefully lift the load
- 4 Check horizontal alignment of the load
- 5 If the load tilts, reposition the lifting belt loop

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

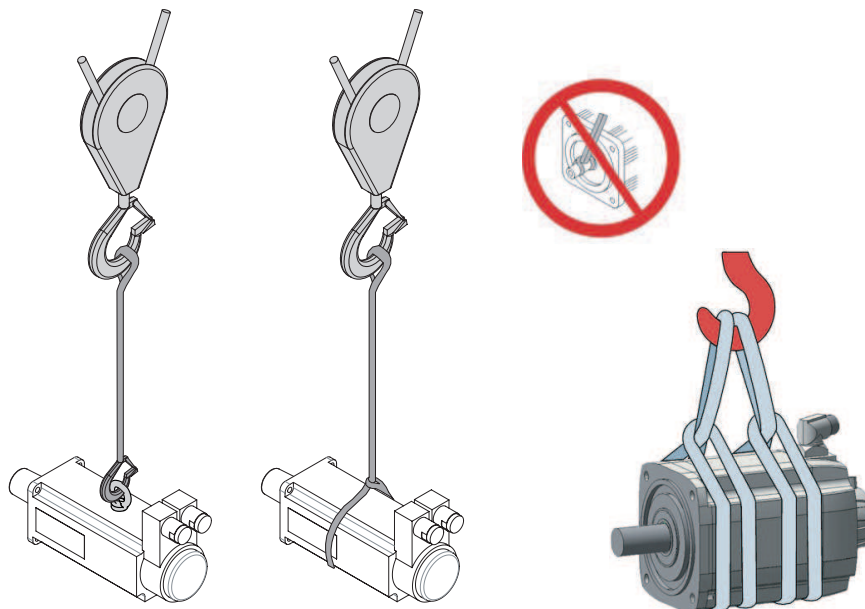


Fig. 7-2

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.

Remove motor



⚠ 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

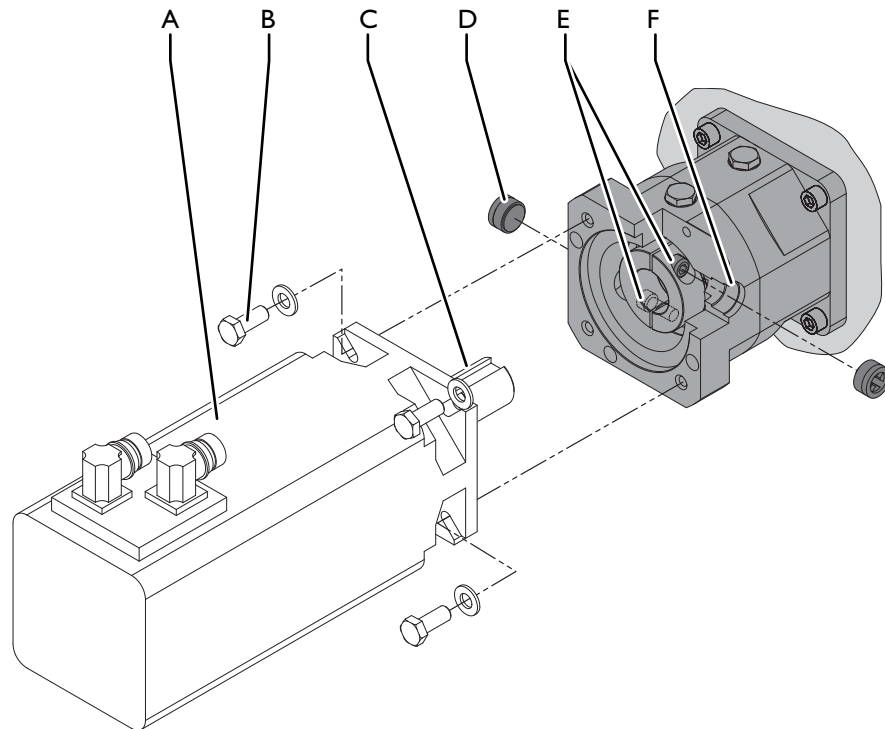


Fig. 7-3

Remove motor: Planetary gearbox Güdel

A	Motor	D	Plug
B	Motor screws (if necessary with spacers according to motor manufacturer specifications)	E	Coupling screws
C	Motor shaft	F	Drill hole

Remove the motor as follows:

- 1 Remove the plug
- 2 Check if the coupling screws can be reached through the drill hole
- 3 If there are deviations: Adjust axis until the coupling screws can be reached through the drill hole
- 4 Switch off the system and padlock it to prevent it from being switched on again
- 5 Attach slings to the motor ➡ 83
- 6 Release the coupling screws
- 7 Remove the motor screws
- 8 Remove motor

The motor has been removed.

Replacing the Güdel planetary gearbox

Replace the Güdel planetary gearbox as follows:

I Replacing the Güdel planetary gearbox

The planetary gear has been replaced.

Mounting the motor



If possible, mount the motor in the vertical direction (motor at top, motor shaft below)

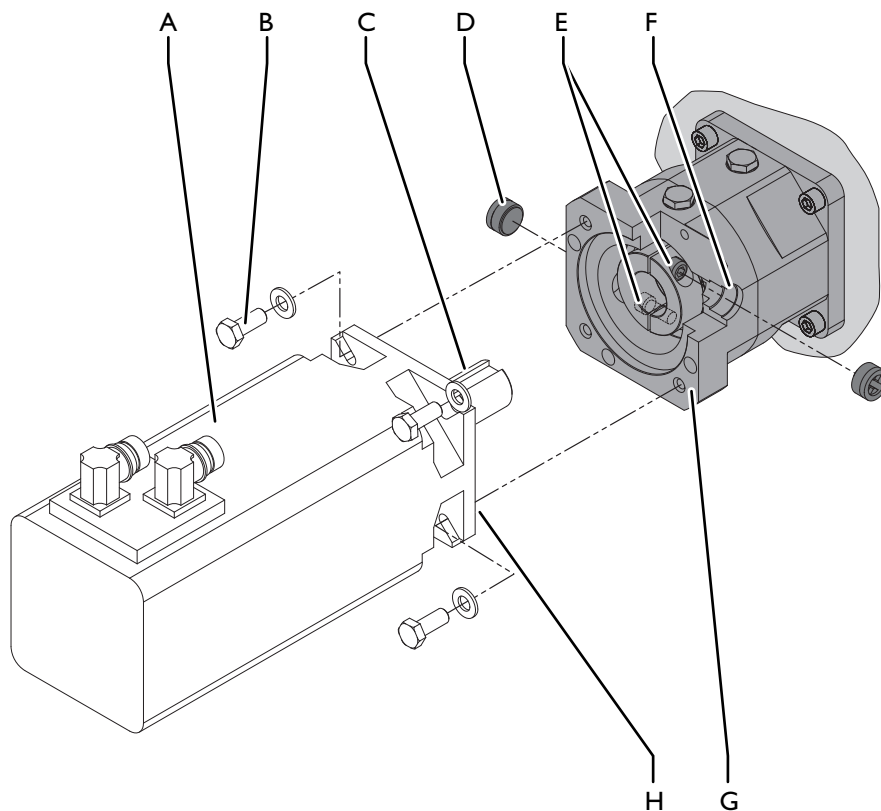


Fig. 7-4

Mounting the motor: Güdel planetary gear

A	Motor	E	Coupling screw
B	Motor screw (if necessary with washers according to motor manufacturer specifications)	F	Drill hole
C	Motor shaft	G	Gearbox contact surface
D	Sealing plug	H	Motor contact surface

Cleaning agents

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

Table 7-5 *Cleaning agents: Coupling, contact surfaces, and motor shaft*

Type / Size	Diameter, motor shaft	Coupling screw, quality 12.9	Tightening torque [Nm]
80-140	≤14	M6	19.1
80-140	15-24	M8	46
100 / 110	25-35	M8	46
140	25-48	M10	92

Table 7-6 *Tightening torques, coupling screws: Güdel planetary gearbox*

Mount the motor as follows:

- 1** Remove the sealing plug
- 2** If necessary, remove the burr of the keyway at the motor shaft
- 3** Clean the coupling, contact surfaces, and motor shaft to ensure that they are free of grease
- 4** Position the coupling as shown in the illustration and do not tighten the coupling screws
- 5** Mount the motor so that both contact surfaces fit flush on each other
- 6** Install the motor screws, but do not tighten
- 7** Tighten the coupling screws to about 60 % of the tightening torque
- 8** Tighten the motor screws
- 9** Tighten the coupling screws alternately in three consecutive sequences up to the tightening torque
- 10** Slightly loosen the motor screws
- 11** Tighten the motor screws cross-wise (tightening torque acc. to motor manufacturer specifications)

The motor has been installed.

Final tasks

Perform the following final tasks:

- 1 Set the tooth flank backlash as described in the superordinate operating manual
- 2 Calibrate the reference plane of the motor (this procedure is described in the documentation for the overall plant or the motor)

The final tasks have been performed.

7.3 Maintenance schedule: Planetary gear NRH, NRHP, NGHP

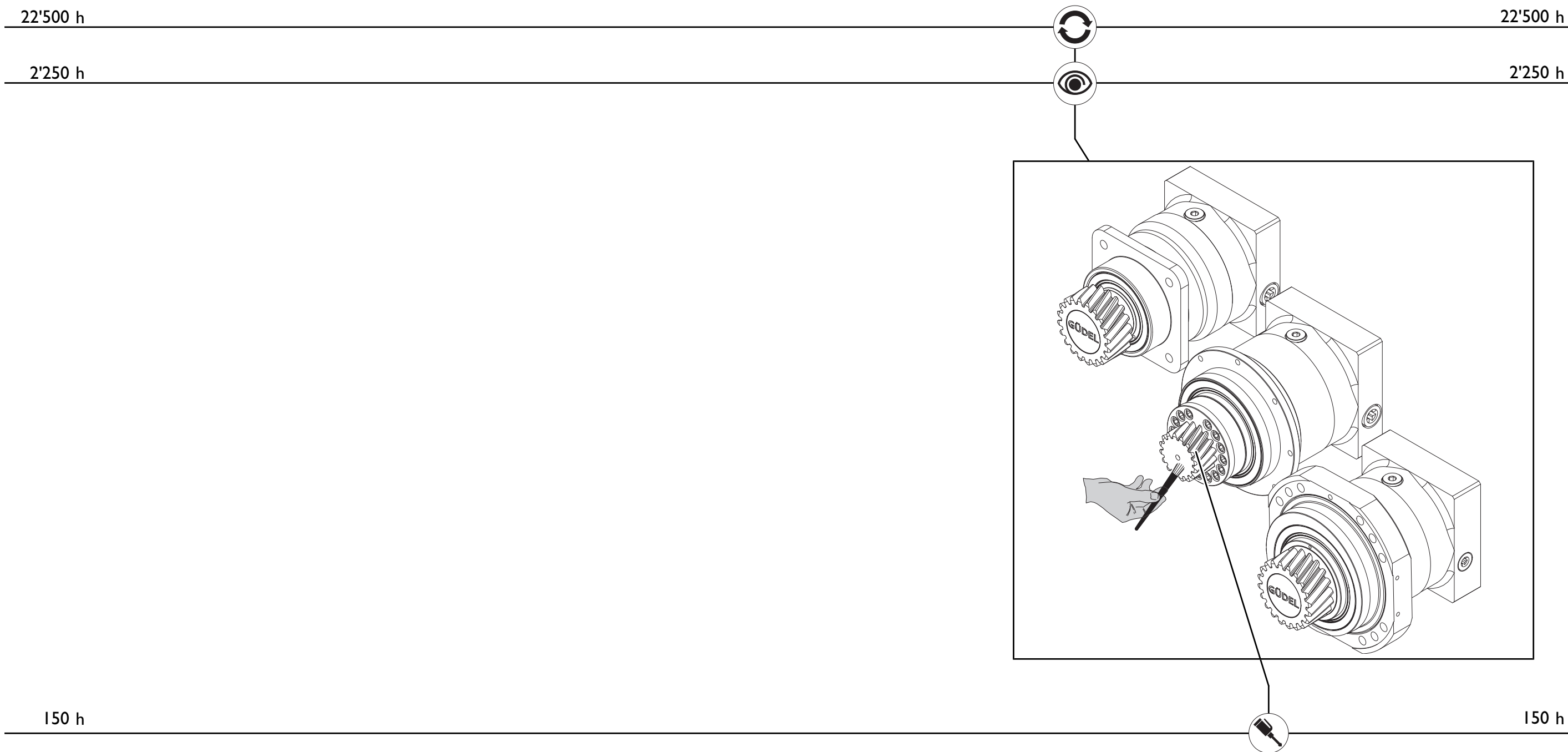


Fig. 7-5 Maintenance schedule: Güdel gearbox unit with elastomer coupling



Grease



Oil



Replacing



Clean



Replacing lubricant



Visual inspection

7.4 Maintenance table

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	➔ Chapter 7.2.3.1, 78
General inspection	2,250		Maintenance technicians The manufacturer's technicians		➔ Chapter 7.2.4.1, 79
Replacing the Gudel planetary gearbox	22,500	60	Service technicians The manufacturer's technicians Maintenance technicians		➔ Chapter 7.2.5.1, 81

This table does not purport to be exhaustive.

Table 7-7 Maintenance table

7.5 Intervention protocol: Maintenance

SERVICE MANUAL Planetary gear Güdel NRH, NRHP, NGHP

Project / Order:
 Bill of materials:
 Serial number:
 Year of manufacture:

Company :
 Address :
 Location :
 Country :

Complete the intervention report after every intervention. You can overwrite the data each time you complete the report. Send the intervention report to Güdel electronically. Use the "Send" button. Sending only works if you have completed the operator details in the intervention report as specified in the Maintenance chapter. Save the generated XML file as a backup. Copy the empty intervention report and scan it in after completing it if you are not working electronically. Send it to service@ch.gudel.com after every intervention.

Maintenance work	Maintenance cycle [h]	Effective operating hours ¹	Name ²	Comments ³	Date
Lubricating the pinion	150				

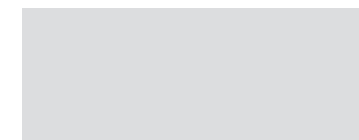
Effective operating hours¹ :
 Name² :
 Comments³ :

Service hours [h] of the entire system according to service hour counter in the control panel / Service hours [h] or kilometers [km] of the corresponding axis
 First and last name of the service or maintenance technician
 Amount of contamination, anomalies, defects, replaced components

Intervention protocol: Maintenance

SERVICE MANUAL Planetary gear Güdel NRH, NRHP, NGHP

Project / Order:
 Bill of materials:
 Serial number:
 Year of manufacture:



Complete the intervention report after every intervention. You can overwrite the data each time you complete the report. Send the intervention report to Güdel electronically. Use the "Send" button. Sending only works if you have completed the operator details in the intervention report as specified in the Maintenance chapter. Save the generated XML file as a backup. Copy the empty intervention report and scan it in after completing it if you are not working electronically. Send it to service@ch.gudel.com after every intervention.

Maintenance work	Maintenance cycle [h]	Effective operating hours ¹	Name ²	Comments ³	Date
General inspection	2,250				

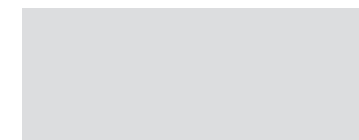
Effective operating hours¹ :
 Name² :
 Comments³ :

Service hours [h] of the entire system according to service hour counter in the control panel / Service hours [h] or kilometers [km] of the corresponding axis
 First and last name of the service or maintenance technician
 Amount of contamination, anomalies, defects, replaced components

Intervention protocol: Maintenance

SERVICE MANUAL Planetary gear Güdel NRH, NRHP, NGHP

Project / Order:
 Bill of materials:
 Serial number:
 Year of manufacture:



Complete the intervention report after every intervention. You can overwrite the data each time you complete the report. Send the intervention report to Güdel electronically. Use the "Send" button. Sending only works if you have completed the operator details in the intervention report as specified in the Maintenance chapter. Save the generated XML file as a backup. Copy the empty intervention report and scan it in after completing it if you are not working electronically. Send it to service@ch.gudel.com after every intervention.

Maintenance work	Maintenance cycle [h]	Effective operating hours ¹	Name ²	Comments ³	Date
Replacing the Güdel planetary gearbox	22,500				

This table does not purport to be exhaustive.

Effective operating hours¹ :
 Name² :
 Comments³ :

Service hours [h] of the entire system according to service hour counter in the control panel / Service hours [h] or kilometers [km] of the corresponding axis
 First and last name of the service or maintenance technician
 Amount of contamination, anomalies, defects, replaced components

7.6 Feedback on the instructions

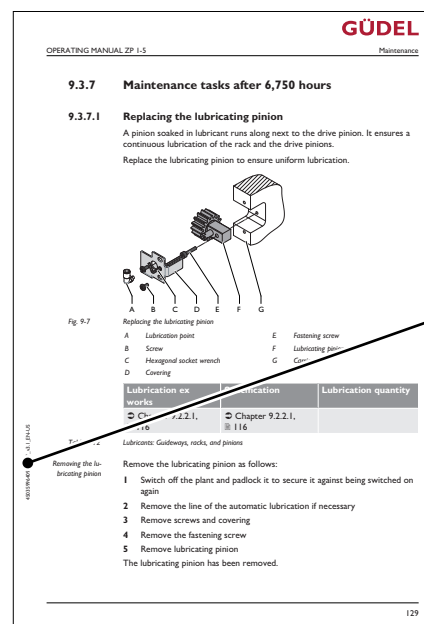
Your feedback helps us to keep improving these instructions. Thank you!

[mailto: docufeedback@ch.gudel.com](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:



45035996409887627_v3.1_EN-US

Fig. 7-6

Identification number of the instructions

8 Repairs

8.1 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. ➔ 123

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel. ➔ Chapter 12, 132

8.1.1 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

⚠ WARNING



Falling axes, workpieces

Falling axes or workpieces can cause physical damage, serious or fatal injuries!

- Set down any workpieces before working in the danger area
- Never enter the area below suspended axes and workpieces
- Secure suspended axes using the stipulated equipment
- Check the belts of the telescope axes for signs of breakage and tears



⚠ 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



8.1.2 Personnel qualifications

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

8.2 Repairs

8.2.1 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
  123

8.2.2 Replacing lubricant

Replace the lubricant at the latest every:

- 3 years in heavy-duty application conditions
- 5 years in normal application conditions

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

NOTE

Unsuitable lubricants

Using unsuitable lubricants can cause damage to the machine!

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

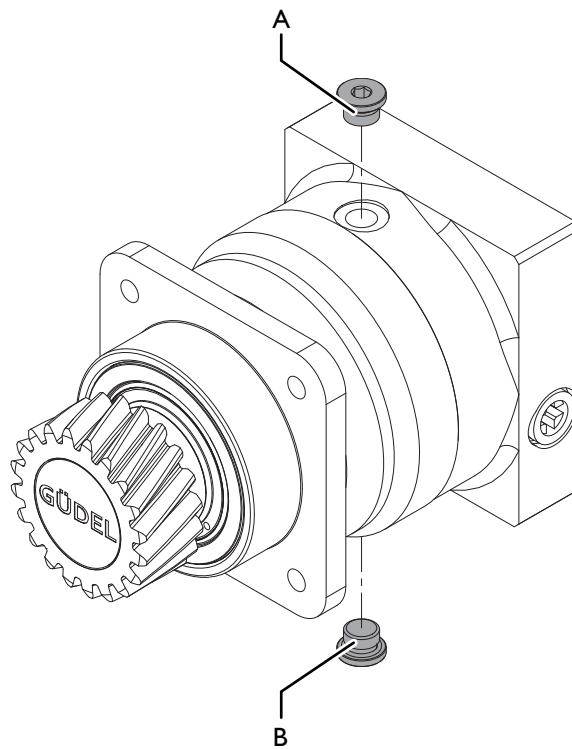


Fig. 8-1

Replace lubricant

A Filler screw

B Drain screw

Lubrication ex works	Specification	Lubrication quantity
Fuchs Renolin PG220	CLP PG 220 as per DIN 51517-3, polyglycol based	

Table 8-1

Lubricants: Güdel planetary gearbox

Replace the lubricant as follows:

- 1 Position the gearbox:
Drain screw at the bottom
Filler screw top
- 2 Position a suitable container below the drain screw
- 3 Remove the 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 filler screw

The lubricant has been replaced.

8.2.2.1 Identifying lubricant amount

The lubricant amount can be found on the type plate or the type key of the spare parts list. If you have any questions, please contact our service departments.

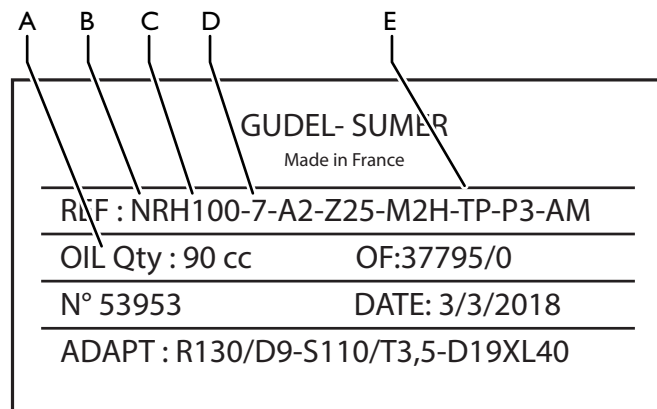


Fig. 8-2

Güdel planetary gearbox: Identifying lubricant quantity

A	Lubricant quantity [cm ³]	D	Ratio
B	Type	E	Installation position
C	Size		

Number of stages	Ratios
1	3, 4, 5, 7, 10
2	12, 16, 20, 25, 30, 35, 40, 50, 70, 100

Table 8-2 Güdel planetary gearbox: Ratio

Stage	Installation position	Type / Size		
		80	100	140
1	TP	30	90	130
2		50	130	190

Table 8-3 Güdel planetary gearbox: Lubricant quantity [cm³]

8.2.3 Replacing the pinion



If pins are defective, the gearbox will also be damaged internally! Send the gearbox to Güdel for repairs.

8.2.3.1 NRH and NGHP

Remove the pinion NRH and NGHP

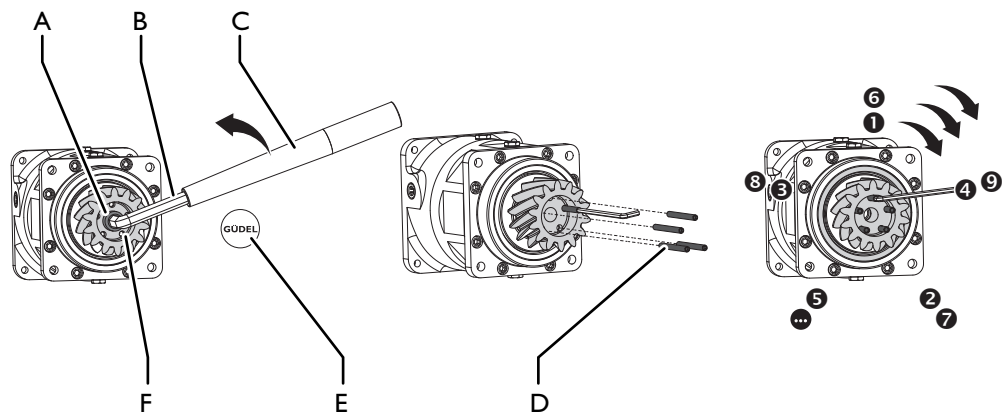


Fig. 8-3

Remove the pinion NRH and NGHP

- | | | | |
|---|-------------------------|---|--------------------|
| A | Fastening screw | D | Headless set screw |
| B | Hexagonal socket wrench | E | Cover |
| C | Elongation piece | F | Pin |

Property	Type / Size		
	80	110	140
Size	M5x40	M8x45	M8x60
Quality	12.9	12.9	12.9

Table 8-4

Properties of headless set screws

Remove the pinion as follows:

- 1** Remove gearbox unit from machine
- 2** Remove the cover using a screwdriver
- 3** Block the coupling, if necessary
- 4** Remove the fastening screw (elongation piece permitted)
- 5** Screw the headless set screws into the pins up to the limit stop
- 6** Pull the pinion off the pins using the headless set screws
(Screw in the headless set screws in the order shown in the illustration)
 - 6.1** Screw in the first headless set screw by $\frac{1}{8}$ of a rotation
 - 6.2** Repeat the previous step for the remaining headless set screws until the pinion is completely pulled off
 - 6.3** Remove the headless set screws from pinion

The pinion is removed.

Mount the pinion NRH and NGHP

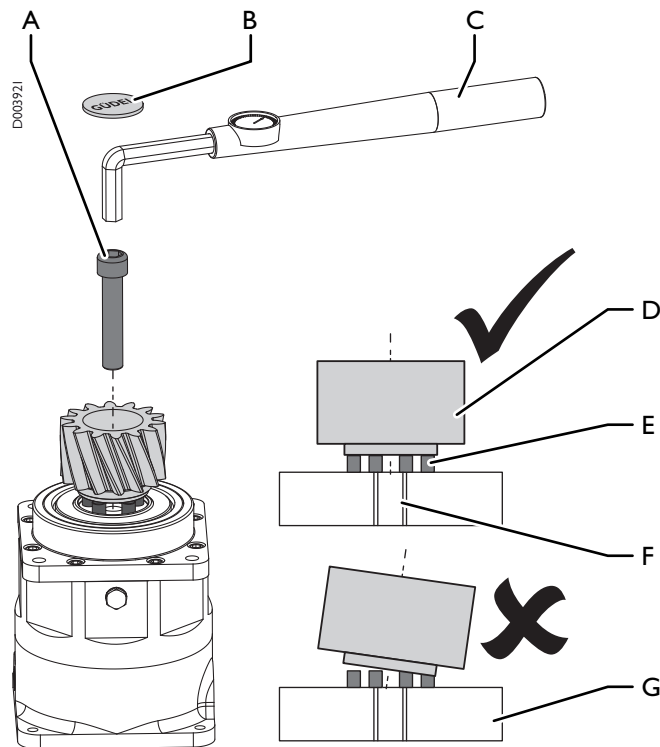


Fig. 8-4

Mount the pinion NRH and NGHP

- | | | | |
|---|-----------------|---|---------|
| A | Fastening screw | E | Pin |
| B | Cover | F | Thread |
| C | Torque wrench | G | Gearbox |
| D | Pinion | | |

Size	Module	Properties		
		Size	Tightening torque [Nm]	Quality
80	2	M8x50	31	12.9
110	2.5	M12x65	104	
	3	M12x70	96	
140	3	M16x70	200	
	4	M16x70	180	

Table 8-5

Properties of the fastening screw, depending on the pinion module

Install the pinion as follows:

- 1** Position the gearbox vertically
- 2** Lubricate the pins, thread, and bottom of the fastening screw head with a universal grease
- 3** Place the pinion exactly axial on the pins
- 4** Press the pinion up to the limit stop using the fastening screw
- 5** Remove the fastening screw
- 6** Degrease the fastening screw and thread
- 7** Apply Loctite 243 to the thread
- 8** Install and tighten the fastening screw
(Select tightening torque according to above table)
- 9** Mount the cover using Loctite 243

The pinion has been installed.

8.2.3.2 NRHP

Remove the pinion NRHP

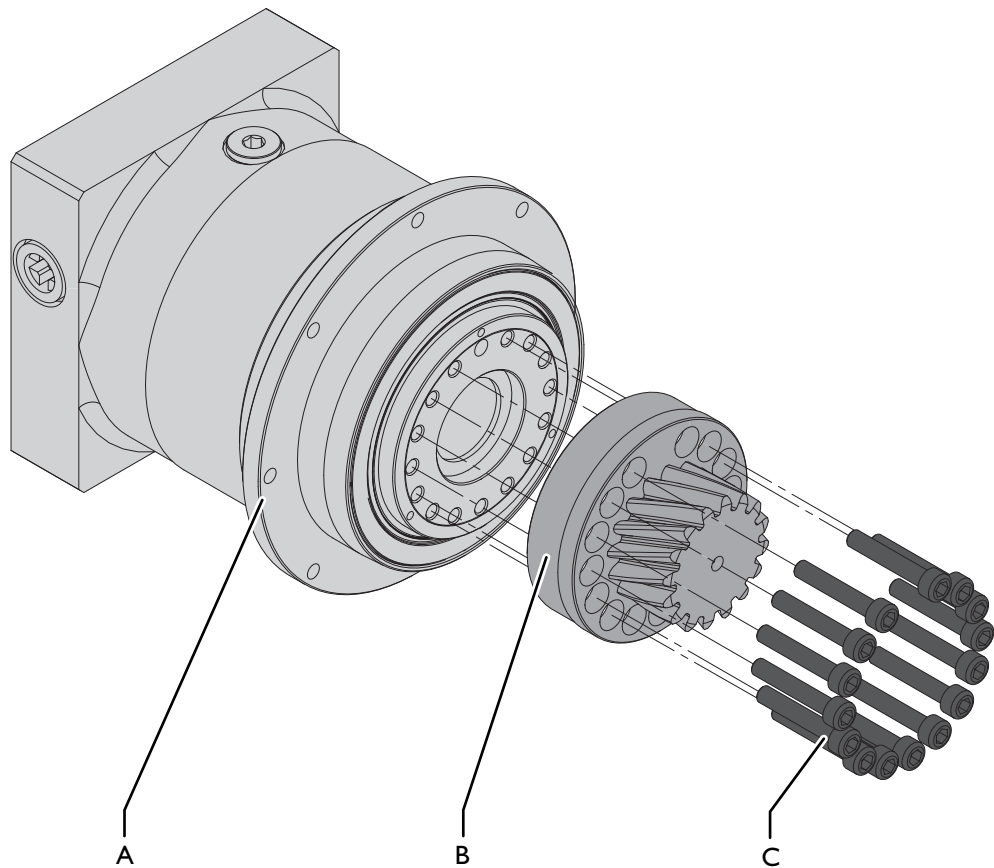


Fig. 8-5

Remove the pinion NRHP

- A Planetary gear NRHP
- B Pinion flange
- C Screw

Remove the pinion as follows:

- 1 Remove the screws
- 2 Remove pinion flange

The pinion is removed.

Mount the pinion NRHP

⚠ WARNING



Loose components

Incorrectly tensioned connection elements can lead to unexpected situations. Persons can be surprised by this and seriously injured as a result.

- Properly tighten the clamping sets
- Check all clamping sets after assembly
- Only replace missing or damaged straining screws with screws of quality grade 12.9

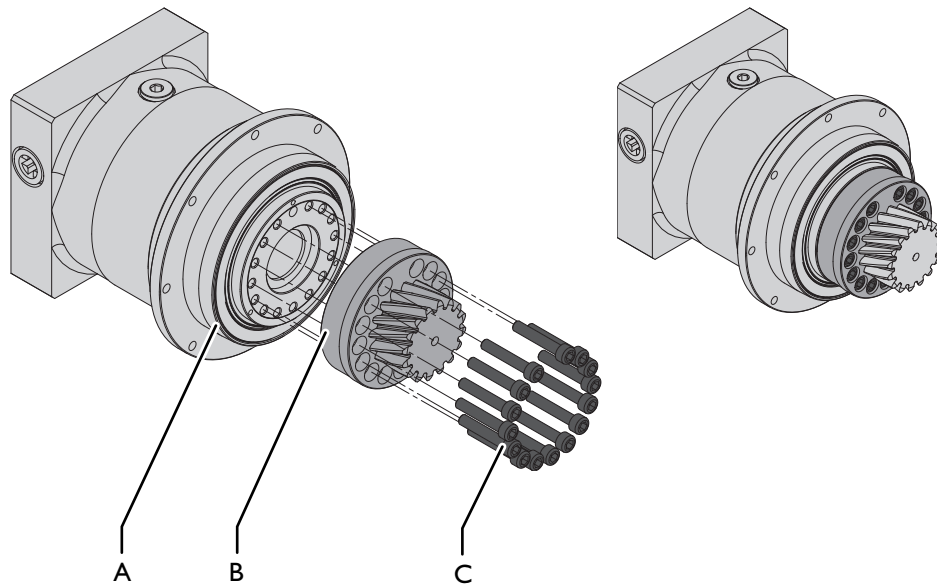
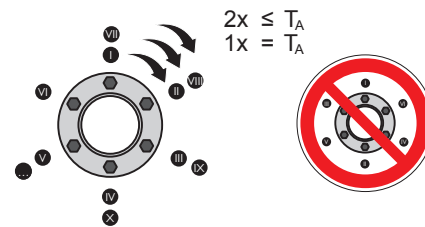


Fig. 8-6

Mounting the pinion NRHP

- A Planetary gear NRHP
- B Pinion flange
- C Screw

Install the pinion as follows:

- 1 Install the pinion flange
- 2 Tighten screws

The pinion has been installed.

8.4 Service departments

If you have questions, please contact the service departments. ↻ 📄 125

9 Decommissioning, storage

9.1 Introduction

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

9.1.1 Personnel qualifications

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

9.2 Storage conditions

⚠ CAUTION



Leaking fluids

During storage, substances that are hazardous to the environment can leak!

- Hazardous substances must be prevented from entering 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

Room

Store the product in a dry location. For information on the required space and the floor capacity, refer to the layout. Use a covering to protect the product against dust and dirt.

Temperature

The ambient temperature must remain between -10 and +40 °C. Make sure that the product is not subjected to great temperature fluctuations.

Air humidity

The air humidity must be below 75%.

9.3 Decommissioning

9.3.1 Cleaning, rust-proofing

Clean away any dirt and dust from the product. Clean the product thoroughly. Dispose of any cloths soaked in oil or grease in an environmentally friendly manner. ➡ 119

Apply corrosion protection to all bright parts.

9.3.2 Transport securing devices

On unbraked motors, mount the transport securing devices.

9.3.3 Identification

Label the product with the following data:

- Date of decommissioning
- Internal machine number/name
- Additional data as per internal guidelines

10 Disposal

10.1 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

10.1.1 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

⚠ WARNING



Falling axes, workpieces

Falling axes or workpieces can cause physical damage, serious or fatal injuries!

- Set down any workpieces before working in the danger area
- Never enter the area below suspended axes and workpieces
- Secure suspended axes using the stipulated equipment
- Check the belts of the telescope axes for signs of breakage and tears

⚠ 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

10.1.2 Personnel qualifications

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

10.2 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)

10.3 Waste management compliant assemblies

10.3.1 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

Disassemble the gearbox as follows:

- 1 Remove the connecting elements (cables / energy chains)
- 2 Disassemble the gearbox and drain the oil
- 3 Disassemble the assemblies and separate the different materials

The gearbox has been disassembled.

10.3.2 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 ➡ 24
Batteries	Battery collection
Metals	Scrap metal collection
Electrical material	Electrical waste

Table 10-1 Disposal: material groups

10.4 Disposal facilities, authorities

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

II Spare parts supply

11.1 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.



If you have questions or problems related to the planetary gear, please contact the following service department:

Güdel Sumer SAS
 Le Roqual Carsac-Aillac
 Zone industrielle
 24200 Sarlat-la-Canéda
 Telephone:+33 5 53 30 30 80
 E-mail address:info@gudel-sumer.com

Americas

Country	Relevant service department	Phone	E-mail
Brazil	Güdel Lineartec Comércio de Automação Ltda. Rua Américo Brasiliense nº 2170, cj. 506 Chácara Santo Antonio CEP 04715-005 São Paulo Brazil	+55 11 99590 8223	info@br.gudel.com
Argentina	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
Mexico			
Canada	Güdel Inc. 4881 Runway Blvd. Ann Arbor, Michigan 48108 United States	+1 734 214 0000	service@us.gudel.com
United States			

Table 11-1 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 Xinxu Road 250022 Jinan China	+86 531 81 61 6465	service@gudeljier.com

Country	Relevant service department	Phone	E-mail
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 11-2 Service departments in Asia

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			

Country	Relevant service department	Phone	E-mail
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
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

Country	Relevant service department	Phone	E-mail
Italy	Güdel S.r.l. Via per Cernusco, 7 20060 Bussero (Mi) Italy	+39 02 92 17 021	info@it.gudel.com
Belgium	Güdel Benelux Eertmansweg 30 7595 PA Weerselo The Netherlands	+31 541 66 22 50	info@nl.gudel.com
Luxembourg			
The Netherlands			
Estonia	Gudel Sp. z o.o. ul. Legionów 26/28 43-300 Bielsko-Biała Poland	+48 33 819 01 25	serwis@pl.gudel.com
Latvia			
Lithuania			
Poland			
Ukraine			
Russia	Gudel Russia Yubileynaya 40 Office 1902 445057 Togliatti Russia	+7 848 273 5544	info@ru.gudel.com
Belarus			
Ireland	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
United Kingdom			

Table 11-3 Service departments in Europe

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 11-4 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 11-5 Service departments outside of business hours

11.2 Explanations regarding the spare parts list

11.2.1 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.

D000094

Güdel AG Industrie Nord CH-4900 Langnethal phone +41 62 916 91 91 fax +41 62 916 95 29 info@ch.gudel.com			GÜDEL 14.07.2008 / Page 1 of 1			
VS0035		2-Amod ZP-4 M MO mec 3.10	I0947-001A			
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

A

Fig. 11-1 Explanation of symbols

A Spare part status

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

11.2.2 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.

12 Torque tables

12.1 Tightening torques for screws

NOTE

Vibrations

Screws without screw lock can come loose.

- Secure screw connections on moving parts with Loctite medium strength 243.
 - Apply the adhesive on the nut thread, not on the screw!
-

12.1.1 Zinc plated screws

Unless otherwise specified, the following tightening torques apply for zinc-plated screws lubricated with Molykote (MoS₂) grease or secured with Loctite 243:

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 12-1 Torque table for zinc-plated screws lubricated with Molykote (MoS₂) grease

12.1.2 Black screws

Unless otherwise specified, the following tightening torques apply for black oiled and non-lubricated screws, or screws secured with Loctite 243:

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 12-2 Torque table for black oiled and non-lubricated screws

12.1.3 Stainless steel screws

Unless otherwise specified, the following tightening torques apply for stainless steel screws lubricated with Molykote (MoS₂) grease or secured with Loctite 243:

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 12-3 Torque table for stainless steel screws lubricated with Molykote (MoS₂) grease

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Version	2.0
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