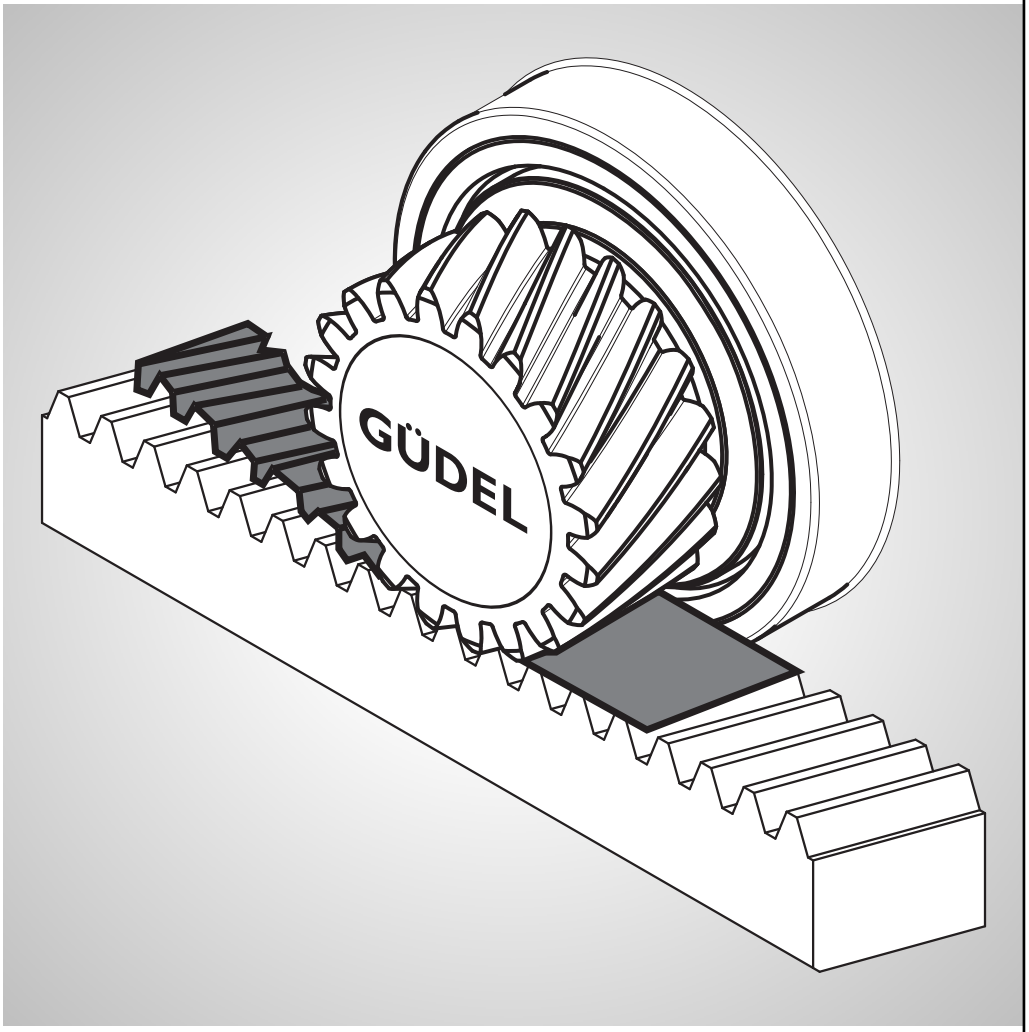
GÜDEL

SERVICE MANUAL

Setting the tooth flank backlash: Planetary gearbox Güdel



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

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.

134371467_v1.0_EN-US

Table of contents

1 Identifying backlash 7

2 Identifying module and number of teeth 9

3 Backlash P3/P5/P12 11

4 Backlash P0.5/P1 and rack quality Q6 13

5 Backlash P0.5/P1 and special components 15

6 Blocking input 17

6.1 Removing the motor 17

6.2 Installing transport securing device 19

6.3 Removing the transport securing device 20

6.4 Installing the motor 21

6.5 Final tasks 21

7 Inexact measuring method 23

8 Rack quality and module 25

9 Service departments 27

Index 29

134371467_v1.0_EN-US

134371467_v1.0_EN-US

In the following chapters, three different procedures are described. The procedure depends on the following factors:

- Backlash of planetary gearbox Güdel
- Rack quality
- Module and number of teeth

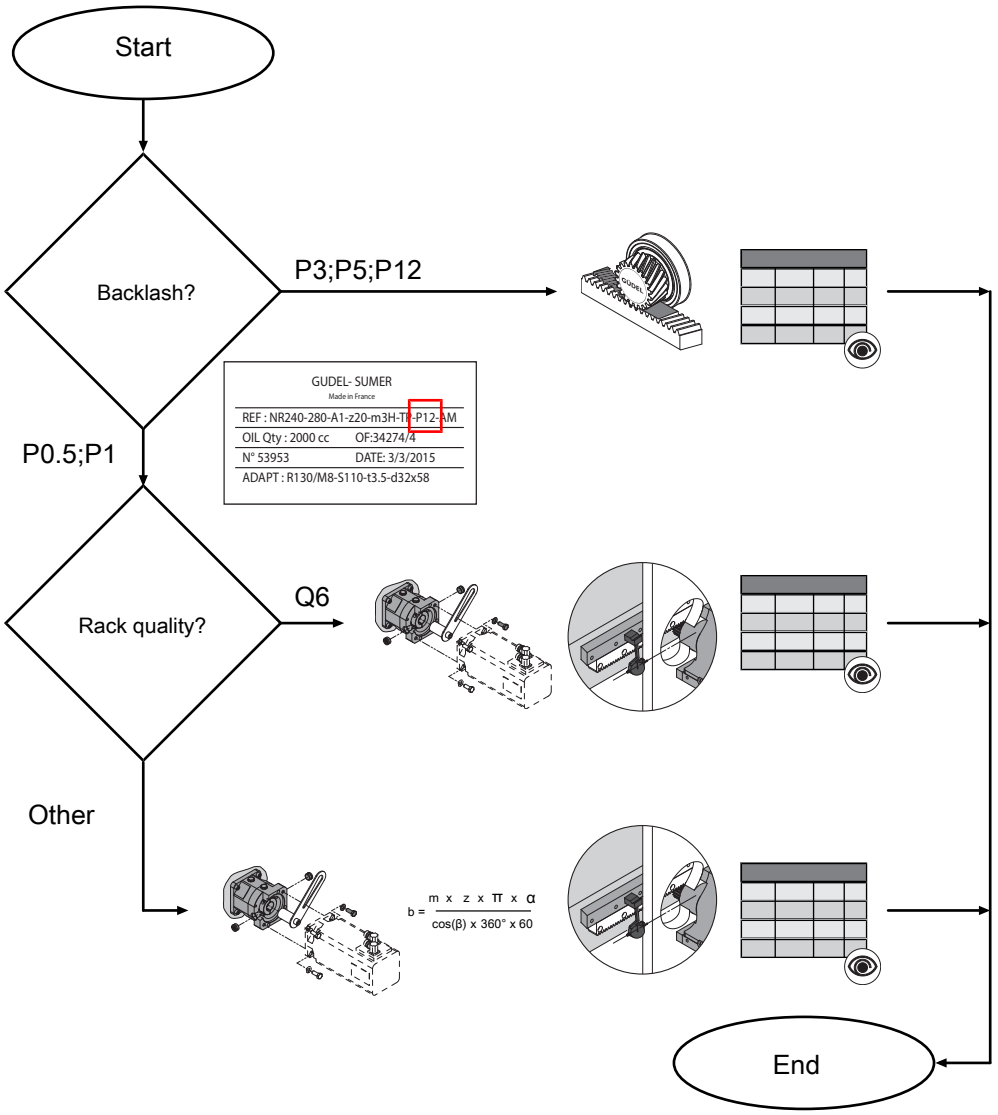


Fig. -1 *Checking the tooth flank backlash: Planetary gearbox Güdel*

134371467_v1.0_EN-US

1 Identifying backlash

Please find the backlash on the type plate.

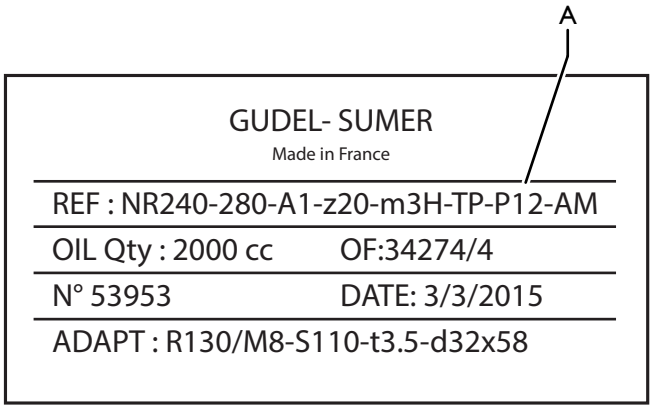


Fig. 1-1 *Identifying backlash: Planetary gearbox Güdel*

A *Backlash [arcmin]*

134371467_v1.0_EN-US

2 Identifying module and number of teeth

Please find on the type plate, module and number of teeth for directly mounted pinion.

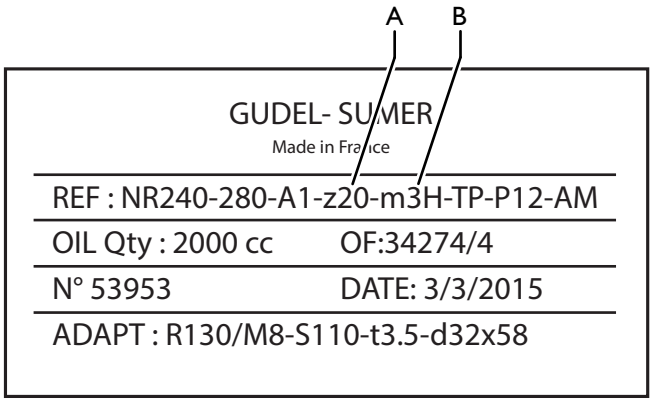


Fig. 2-1 *Identifying module and number of teeth: Planetary gearbox Güdel*

A *Number of teeth*

B *Module*

134371467_v1.0_EN-US

3 Backlash P3/P5/P12

Check the tooth flank backlash as follows:

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

2 Check tooth flank backlash using the inexact method
➲ Chapter 7, 🗎 23

3 If there are deviations:

3.1 Set the tooth flank backlash

3.2 Repeat process from step 2

The tooth flank backlash has been checked.

134371467_v1.0_EN-US

134371467_v1.0_EN-US

4 Backlash P0.5/P1 and rack quality Q6

Size	Module	Number of teeth	Tooth flank backlash [mm] Backlash P0.5	Tooth flank backlash [mm] Backlash P1
80	2	20	0.028	0.031
100	2	25	0.029	0.033
100	3	20	0.03	0.034
140	3	22	0.03	0.035
140	4	20	0.036	0.042
180	4	20	0.036	0.042
180	5	20	0.038	0.045
240	5	24	0.039	0.049
240	6	20	0.039	0.049

Table 4-1 *Tooth flank backlash: Planetary gearbox Güdel P0.5/P1, rack quality Q6*

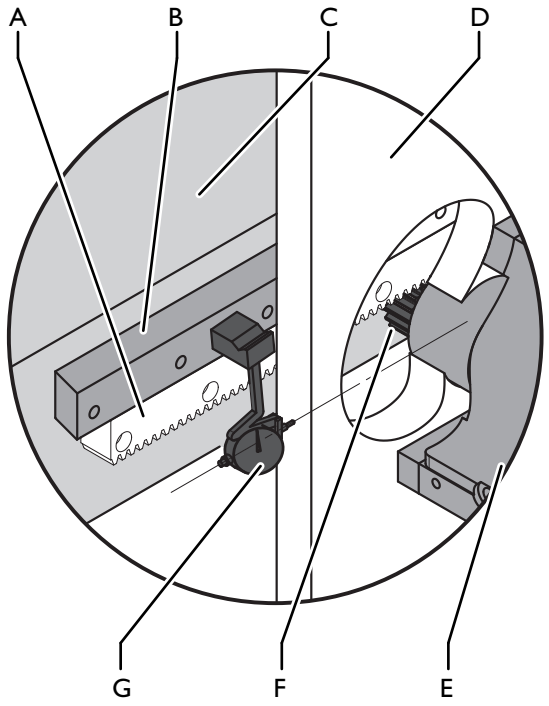


Fig. 4-1 *Checking the tooth flank backlash: Dial gauge (exact method)*

A	*Rack*	*E*	*Gearbox*
B	*Guideway*	*F*	*Drive pinion*
C	*Axle*	*G*	*Dial gauge*
D	*Carriage*		

Check the tooth flank backlash as follows:

Prerequisite: The rack has quality Q6 hardened and ground
➲ Chapter 8, 🗎 25

Prerequisite: The module and number of teeth correspond to the values in the preceding table

Prerequisite: The input is blocked ➲ Chapter 6, 🗎 17

1. Switch off the plant and padlock it to secure it against being switched on again
2. Mount dial gauge to the rack or guideway in the direction of travel aligned with the center of the drive pinion
3. Zero the dial gauge
4. Move the carriage or axis in the direction of travel
5. Read tooth flank backlash on the dial gauge
6. Interpret tooth flank backlash according to the previous table

The tooth flank backlash has been checked.

134371467_v1.0_EN-US

5 Backlash P0.5/P1 and special components

Rack quality, module and helix angle β ➲ Chapter 8, 🗎 25

$$b = \frac{m \times z \times \pi \times \alpha}{\cos(\beta) \times 360° \times 60}$$

Fig. 5-1 *Formula for calculating linear backlash*

b	*Linear backlash*	*α*	*Backlash [arcmin]*
m	*Module*	*β*	*Helix angle [°]*
z	*Number of teeth*		

Rack quality	Tooth flank backlash [mm]		
	Module m ≤ 3	Module 3 < m ≤ 8	Module 8 < m ≤ 12
Q4 h21	0.010+b	0.012+b	0.016+b
Q5 h22	0.016+b	0.019+b	0.025+b
Q6 h23	0.025+b	0.03+b	0.04+b
Q7 h25	0.059+b	0.079+b	0.099+b
Q8 h27	0.158+b	0.198+b	0.247+b
Q9 h27	0.158+b	0.198+b	0.247+b

Table 5-1 *Tooth flank backlash for planetary gearbox Güdel P0.5/1, special components*

134371467_v1.0_EN-US

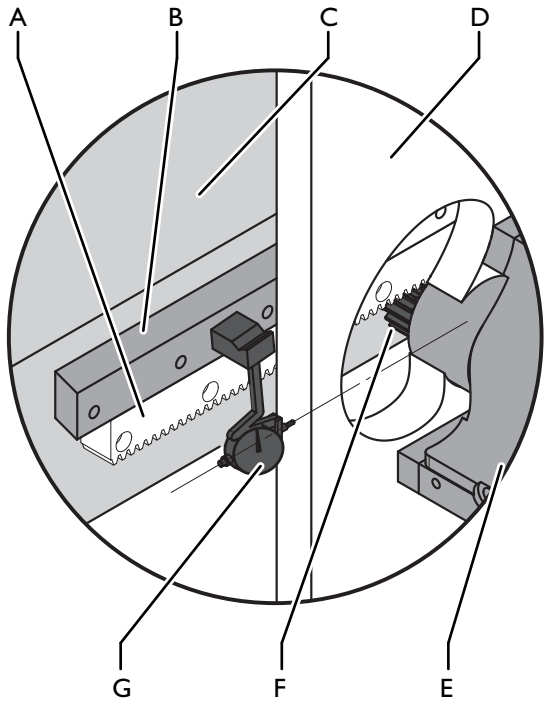


Fig. 5-2 *Checking the tooth flank backlash: Dial gauge (exact method)*

A	*Rack*	*E*	*Gearbox*
B	*Guideway*	*F*	*Drive pinion*
C	*Axle*	*G*	*Dial gauge*
D	*Carriage*		

Check the tooth flank backlash as follows:

Prerequisite:The input is blocked ➲ Chapter 6, 🗎 17

1. Switch off the plant and padlock it to secure it against being switched on again
2. Calculate linear backlash according to formula
3. Mount dial gauge to the rack or guideway in the direction of travel aligned with the center of the drive pinion
4. Zero the dial gauge
5. Move the carriage or axis in the direction of travel
6. Read tooth flank backlash on the dial gauge
7. Interpret tooth flank backlash according to the previous table

The tooth flank backlash has been checked.

134371467_v1.0_EN-US

6 Blocking input

Block the input to check the tooth flank backlash. Remove the block once you have completed the check.

6.1 Removing the motor

⚠ WARNING

Moving the axis

The maintenance or repair 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

134371467_v1.0_EN-US

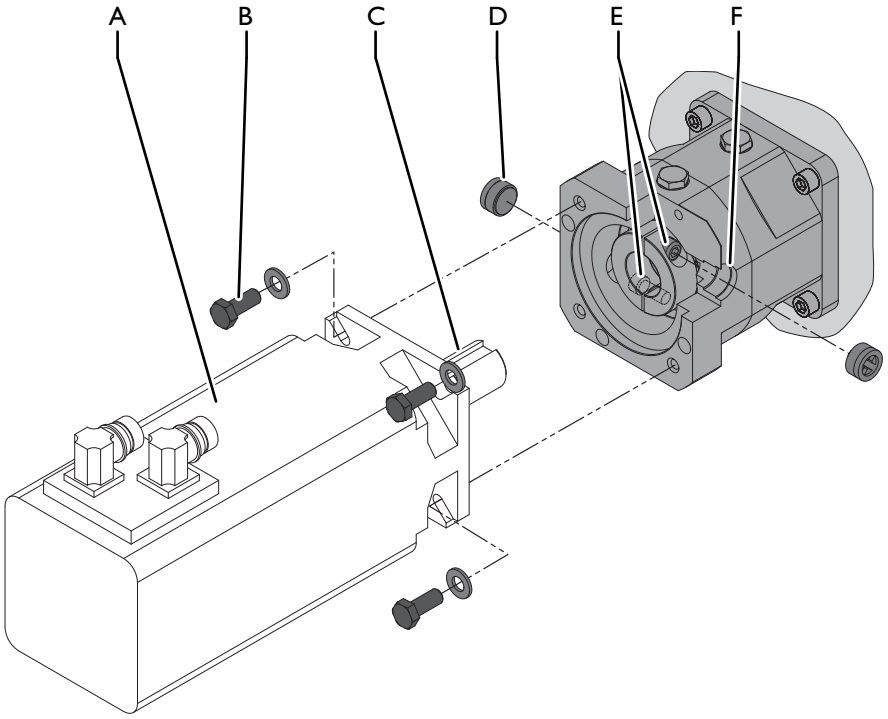


Fig. 6-1 *Removing motor: Planetary gearbox Güdel*

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 plant and padlock it to secure it against being switched on again
5. Attach slings to the motor
6. Loosen the coupling screws
7. Remove the motor screws
8. Remove the motor

The motor has been removed.

134371467_v1.0_EN-US

6.2 Installing transport securing device

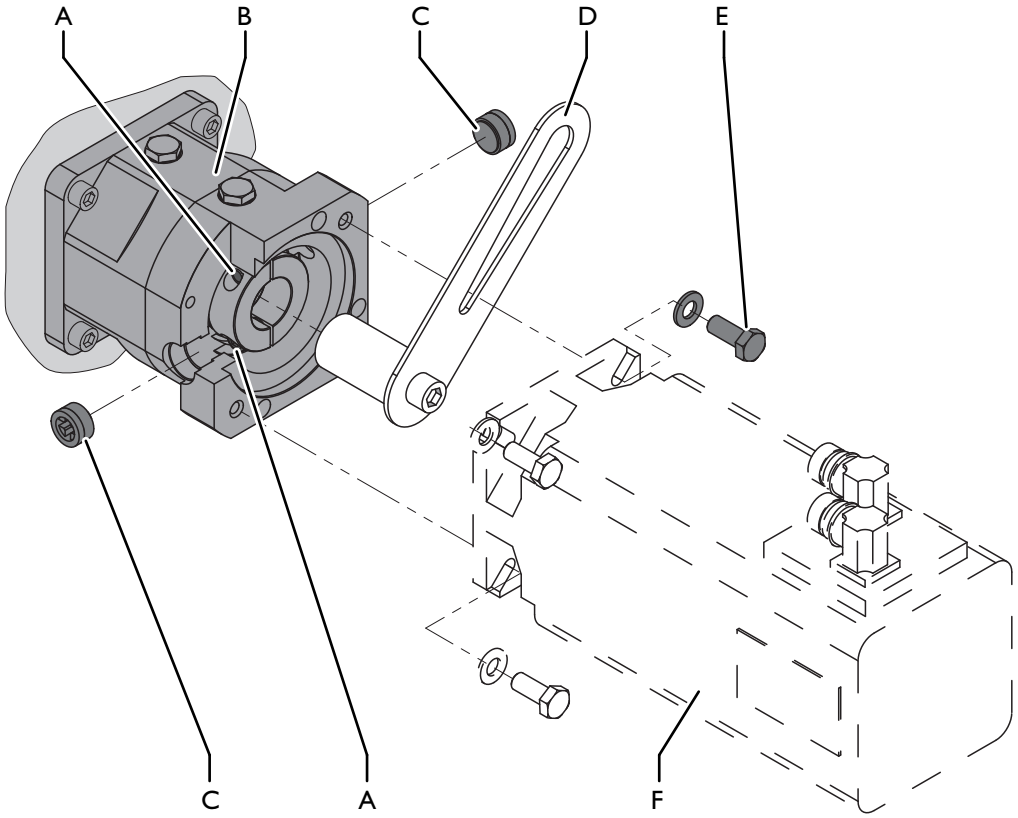


Fig. 6-2 *Installing transport securing device: Planetary gearbox Güdel*

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 plant 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 Removing the transport securing device

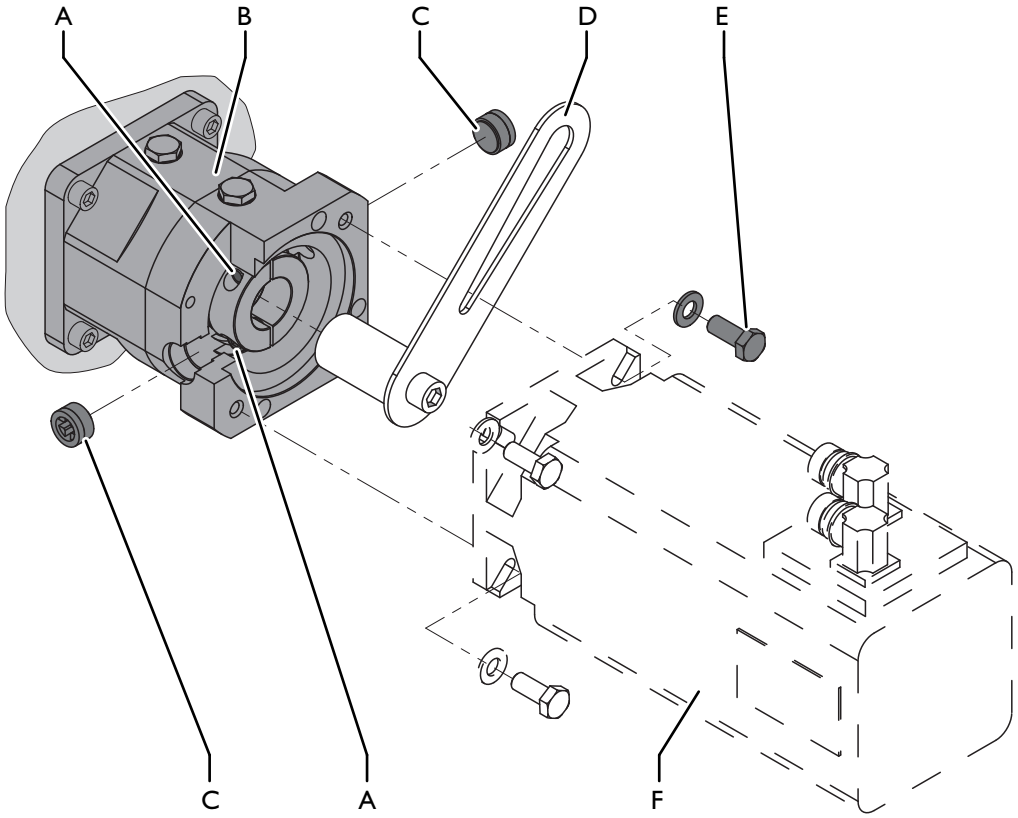


Fig. 6-3 *Removing transport securing device: Planetary gearbox Güdel*

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 plant and padlock it to secure it against being switched on again
2. Remove the plugs if necessary
3. Loosen the coupling screws
4. Remove motor screws
5. Remove transport securing device from the planetary gearbox

The transport securing device has been removed.

134371467_v1.0_EN-US

6.4 Installing the motor

Install the motor according to the separate documentation for the Güdel planetary gearbox.

6.5 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 plant or the motor)

The final tasks have been performed.

134371467_v1.0_EN-US

7 Inexact measuring method

NOTE

Damage resulting from inexact measuring method

The inexact measurement method described here can lead to incorrect interpretations and subsequent damage of every kind!

- Use it only when the exact method is not possible

Rack quality and module ➲ Chapter 8, 25

Rack quality	Tooth flank backlash [mm]		
	Module m ≤ 3	Module 3 < m ≤ 8	Module 8 < m ≤ 12
Q4 h21	0.010	0.012	0.016
Q5 h22	0.016	0.019	0.025
Q6 h23	0.025	0.03	0.04
Q7 h25	0.059	0.079	0.099
Q8 h27	0.158	0.198	0.247
Q9 h27	0.158	0.198	0.247

Table 7-1 *Tooth flank backlash: Paper strip (inexact method)*

134371467_v1.0_EN-US

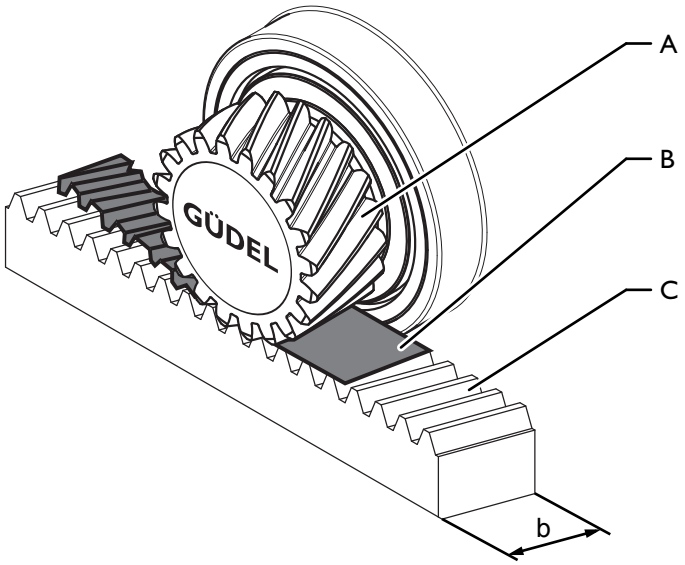


Fig. 7-1 *Checking the tooth flank backlash: Paper strip (inexact method)*

A *Drive pinion*
B *Paper strip*
C *Rack*

Check the tooth flank backlash as follows:

1. Switch off the plant and padlock it to secure it against being switched on again
2. Insert paper strip from DIN A4 80 g/m2 with width b between drive pinion and rack
3. Move carriage or axis
   (Paper strip is "turned through")
4. Paper strip worn:
   Tooth flank backlash <0.05 mm
5. Paper strip cut, partially disconnected pieces:
   Tooth flank backlash ~ 0.05 mm
6. Paper strips mildly cut, no disconnected pieces:
   Tooth flank backlash ~ 0.07 mm
7. Paper strip wavy:
   Tooth flank backlash ~ 0.1 mm
8. Paper strip undamaged:
   Tooth flank backlash >0.1 mm
9. Interpret tooth flank backlash according to the previous table

The tooth flank backlash has been checked.

134371467_v1.0_EN-US

8 Rack quality and module

Hardened racks can be recognized from the engraved Güdel logo.

The quality and module are found in the following table:

Rack quality	Module	Helix angle β [°]
according to your specifications	according to your specifications	19.5283

Table 8-1 Rack quality and module

134371467_v1.0_EN-US

9 Service departments

If you have questions on service, please use the service form at www.gudel.com or contact the offices in the appropriate country:

Austria:	+43 7226 20690-0
China:	+86 21 5055 0012
Czech Republic:	+420 602 309 593
Germany:	+49 6291 6446 792
France:	+33 1 30091545
India:	+91 20 6791 0221
Italy:	+39 02 9217021
South Korea:	+82 32 858 05 41
Mexico:	+52 81 8374 2500 x-103
Poland:	+48 33 819 01 25
Thailand:	+66 2 374 0709
United Kingdom:	+44 2476 695 444
USA:	+1 734 214 0000
Spain:	+34 93 476 0380
The Netherlands:	+31 541 66 22 50
Turkey:	+90 532 316 94 44
Russia:	+7 8482 735544
All other countries and Switzerland:	+41 62 916 91 70

Table 9-1 *National agencies*

134371467_v1.0_EN-US

For urgent service inquiries, our help desk provides after-hour assistance (24-hour support)

Europe/Asia:	+41 62 916 91 70	service@ch.gudel.com
USA:	+1 734 214 0000	service@us.gudel.com

Table 9-2 *24-hour Hotline*

Please have the following information at hand, as labeled on the type plate

- Product, type
- Project, sales order
- Serial number (parts list)
- Drawing number, if applicable

Index

A
Assembly
Motor: Planetary gearbox Güdel ... 21

B
Backlash
identifying ... 7
Blocking
Input: Planetary gearbox Güdel ... 17

G
Gear backlash
identifying ... 7

H
Helix angle ... 25

I
Input
blocking: Planetary gearbox Güdel ... 17

M
Module ... 25
identifying: Planetary gearbox Güdel ... 9
Motor
installing: Planetary gearbox Güdel ... 21
removing ... 17

N
Number of teeth
identifying: Planetary gearbox Güdel ... 9

P
Planetary gearbox Güdel
Backlash ... 7
Installing transport securing device ... 19
Removing the transport securing device ... 20

R
Rack quality ... 25
Removing
Motor ... 17

S
Service departments ... 27

T
Transport securing device
installing: Planetary gearbox Güdel ... 19
removing: Planetary gearbox Güdel ... 20

134371467_v1.0_EN-US

134371467_v1.0_EN-US

Version	1.0
Author	chrgal
Date	25.02.2016

GÜDEL AG
Industrie Nord
CH-4900 Langenthal
Switzerland

Phone	+41 62 916 91 91
Fax	+41 62 916 91 50
E-mail	info@ch.gudel.com

www.gudel.com

134371467_v1.0_EN-US

GÜDEL

GÜDEL AG
Industrie Nord
CH-4900 Langenthal
Switzerland
Phone +41 62 916 91 91
info@ch.gudel.com
www.gudel.com