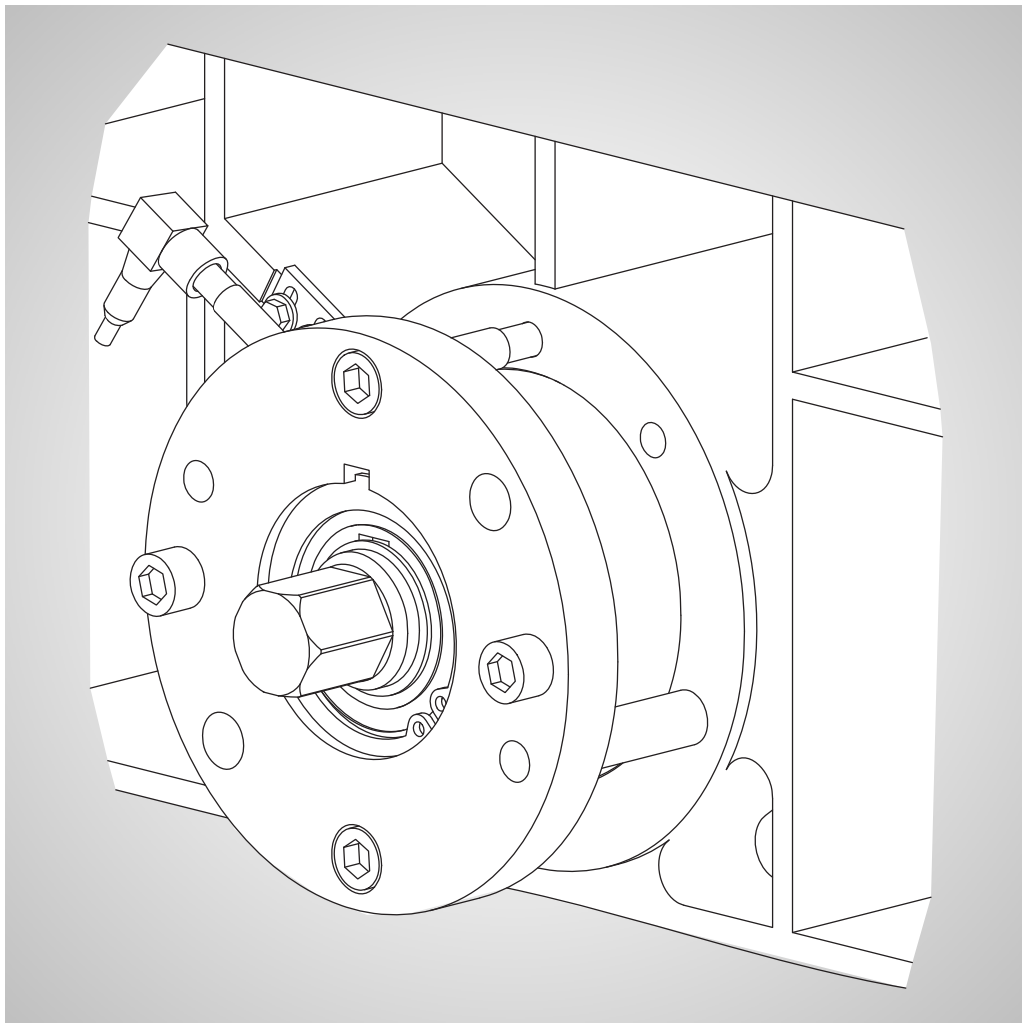


SERVICE MANUAL

Manual lifting and safety unit



Project / Order:

BIM.10xxxxxx-xxxx

Bill of materials:

902261; 902262; 10190664; 902264; 902269

Serial number:

Year of manufacture:

2016

© 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.

Revision history

Version	Date	Description
1.0	08.09.2016	Basic version

Table - I *Revision history*

Table of contents

I	General	9
1.1	Further applicable documentation	9
1.2	Purpose of the document	9
1.3	Explanation of symbols/abbreviations	10
2	Safety	11
2.1	Personnel qualifications	11
2.1.1	Fitters	11
2.1.2	Maintenance technicians	12
2.1.3	Service technicians	12
2.2	Product-specific hazards	13
3	Product description	15
3.1	Use	15
3.1.1	Intended use	15
3.1.2	Non-intended use	15
4	Design, function	17
4.1	Design	17
4.2	Function	17
5	Commissioning	21
5.1	Introduction	21
5.1.1	Safety	21
5.1.2	Personnel qualifications	21
5.2	Connecting proximity switch	21
5.3	Actuation	22

6	Operation	25
6.1	Introduction	25
6.1.1	Safety	25
6.1.2	Personnel qualifications	25
6.2	Blocking the vertical axis	26
6.3	Lifting the vertical axis	27
6.4	Unblocking the vertical axis	28
7	Maintenance	31
7.1	Introduction	31
7.1.1	Safety	31
7.1.2	Personnel qualifications	32
7.2	Maintenance tasks after 2,250 hours	32
7.2.1	General inspection	32
8	Repairs	35
8.1	Introduction	35
8.1.1	Safety	35
8.1.2	Personnel qualifications	36
8.2	Repairs	36
8.2.1	Replacing pinion, sprag clutches and plain bearings	36
9	Storage conditions	39
10	Spare parts supply	41
10.1	Service departments	41

II	Torque tables	43
II.1	Tightening torques for screws	43
II.1.1	Zinc plated screws	44
II.1.2	Black screws	45
II.1.3	Stainless steel screws	46
	Illustrations	47
	List of tables	49
	Index	51

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.

This product is an option for a Güdel product. It is only sold in combination with a Güdel product.

This manual only describes work related to the option. For more information, please refer to the superordinate manual.

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

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



Read the Safety chapter of the superordinate manual before working with the product. It contains important information for your personal safety. The chapter must be read and understood by all persons who work on the product in any of the product's phases. You are obligated to implement the information and warnings it contains, wherever they pertain to the product.

2.1 Personnel qualifications

WARNING



Lack of safety training

Incorrect behavior of untrained or insufficiently trained security staff 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.

2.1.1 Fitters

The fitter:

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

2.1.2 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

2.1.3 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

2.2 Product-specific hazards



⚠ 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

3 Product description

3.1 Use

3.1.1 Intended use

The product may only be operated as an option together with a Güdel product. The product is intended exclusively for the lifting and securing of the vertical axis during maintenance and repairs.

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 use in normal operation of the complete system. The pinion must not be permanently engaged with the rack or guideway.

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

Do not make any modifications to the product.

4 Design, function

4.1 Design

The product consists of the following components:

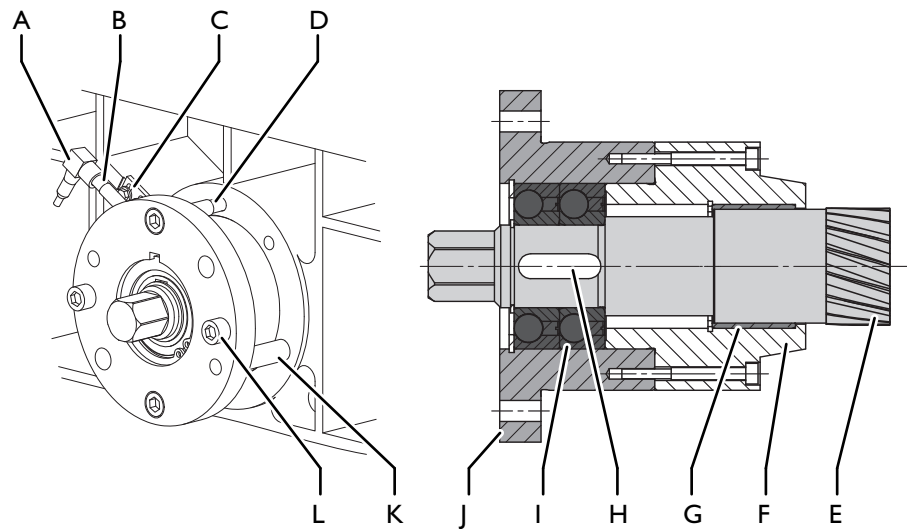


Fig. 4-1

Design

A	Plug connector	G	Plain bearing (size 6 only)
B	Proximity switch	H	Sunk key
C	Holder	I	Sprag clutch
D	Screw, long	J	Bearing housing
E	Pinion	K	Threaded bolt or bolt
F	Flange (size 6 only)	L	Screw, short

4.2 Function

With the manual lifting and safety unit you can block the vertical axis or even lift it by hand. To lift the vertical axis, the drive motor must be removed. A sprag clutch in the lifting and safety unit prevents the axis from moving downward. The safety unit is useful for repairs and maintenance tasks when you have to replace the gearbox or drive motor for the vertical axis.

Functional principle of sprag clutch

The outer ring is fixed. The inner ring can only be rotated in one direction. If the inner ring rotates in the opposite direction, the clamping elements become wedged in a force-fitting manner between the outer and inner ring.

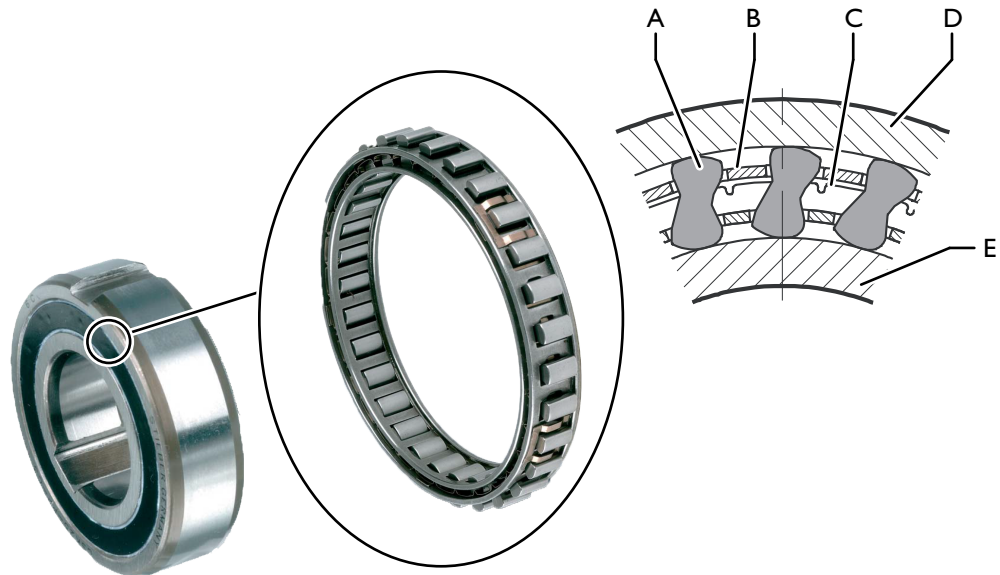


Fig. 4-2

Functional principle of sprag clutch

- | | | | |
|---|------------------|---|---------------|
| A | Clamping element | D | Outer ring |
| B | Retainer | E | Inner raceway |
| C | Spring | | |

Functional principle of the lifting and safety unit

In normal operation of the complete system, the pinion of the lifting and safety unit is not engaged with the guideway or rack. The proximity switch ensures that the vertical axis is unblocked.

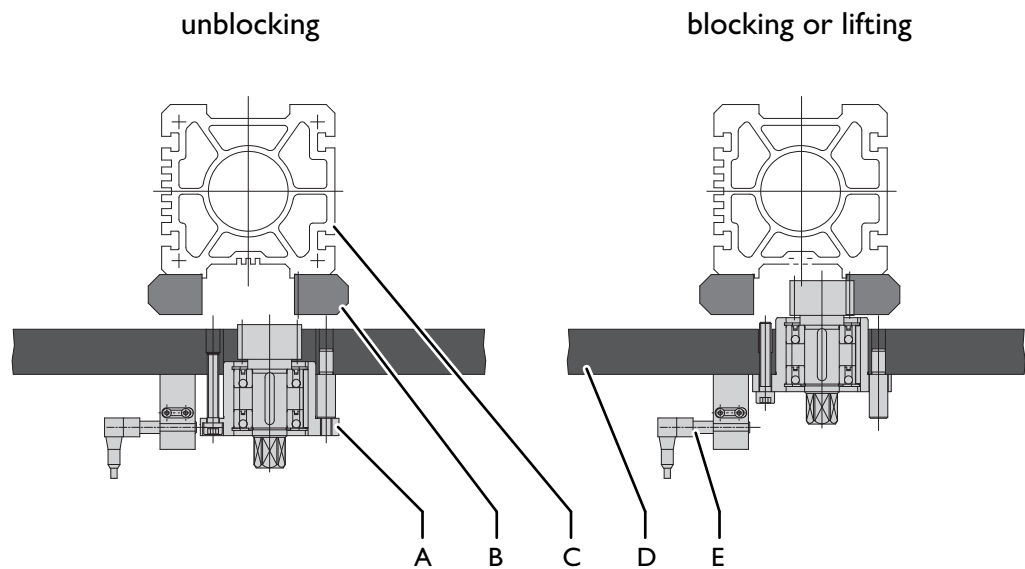


Fig. 4-3

Functional principle of the lifting and safety unit

- | | | | |
|---|-------------------------|---|------------------|
| A | Lifting and safety unit | D | Carriage |
| B | Guideway or rack | E | Proximity switch |
| C | Vertical axis | | |

5 Commissioning

5.1 Introduction

5.1.1 Safety

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

5.1.2 Personnel qualifications

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

5.2 Connecting proximity switch

Size 2

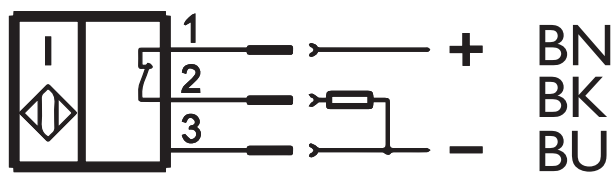


Fig. 5-1

Circuit diagram: BES M08EE-POC20B-S49G (image source: BALLUFF)

Remaining sizes

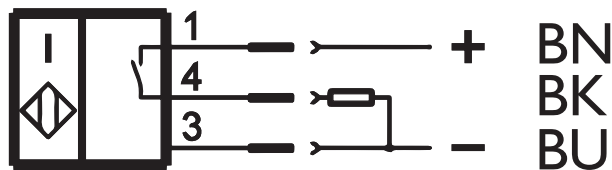


Fig. 5-2

Circuit diagram: BES M12MI-PSC40B-S04G (image source: BALLUFF)

5.3 Actuation



⚠ WARNING

Hurled objects

Cranks and screws mounted on the pinion are hurled away when the vertical axis moves upwards. This can lead to severe or fatal injuries!

- Use the proximity switch to ensure that the vertical axis is unblocked before you move the vertical axis.
- Take application-specific protective measures.

NOTE

Material damage

The lifting and safety unit is not designed for use in normal operation of the complete system. If the pinion is engaged with the guideway or the rack during normal operation, considerable damage will occur to the complete system.

- Use the proximity switch to ensure that the vertical axis is unblocked before you move the vertical axis.

In normal operation of the complete system, the pinion of the lifting and safety unit is not engaged with the guideway or rack. The proximity switch ensures that the vertical axis is unblocked.

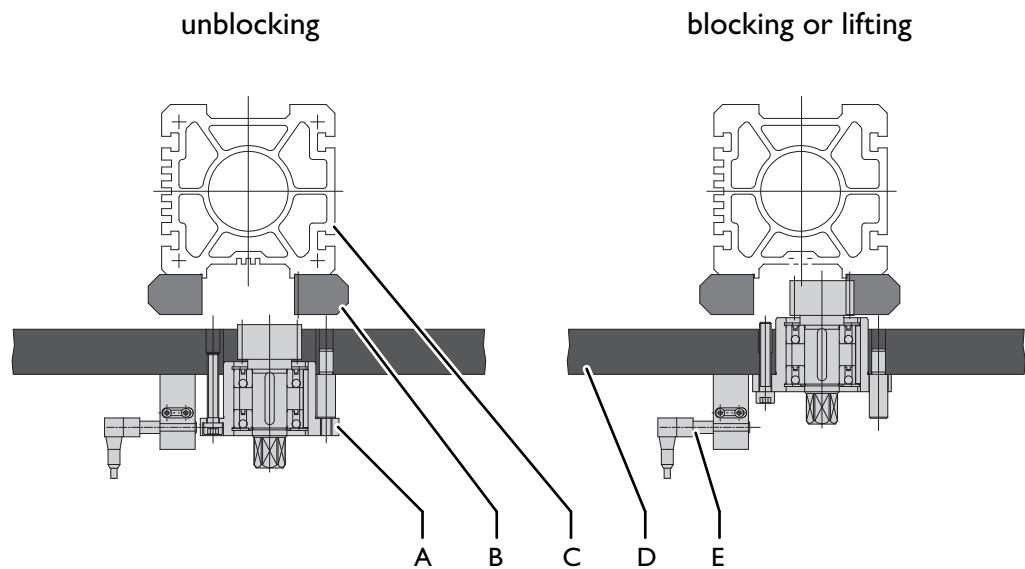


Fig. 5-3

Functional principle of the lifting and safety unit

- | | | | |
|---|-------------------------|---|------------------|
| A | Lifting and safety unit | D | Carriage |
| B | Guideway or rack | E | Proximity switch |
| C | Vertical axis | | |

6 Operation

6.1 Introduction

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel.
➔ Chapter 11, 43

6.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➔ 11
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

6.1.2 Personnel qualifications

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

6.2 Blocking the vertical axis

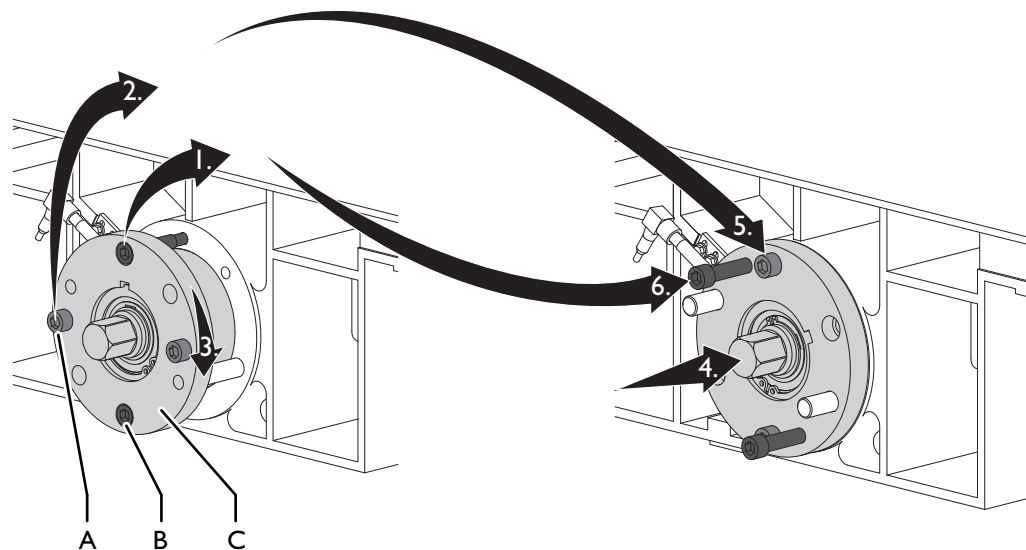


Fig. 6-1

Blocking the vertical axis

- A Screw, short
- B Screw, long
- C Lifting and safety unit

Block the vertical axis as follows:

Prerequisite: The system is switched off and secured with a padlock against being switched on again

- 1 Remove long screws
- 2 Remove short screws
- 3 Rotate lifting and safety unit 45° clockwise
- 4 Press in lifting and safety unit
- 5 Insert and tighten short screws
- 6 Insert and lightly tighten long screws

The vertical axis is blocked.

6.3 Lifting the vertical axis

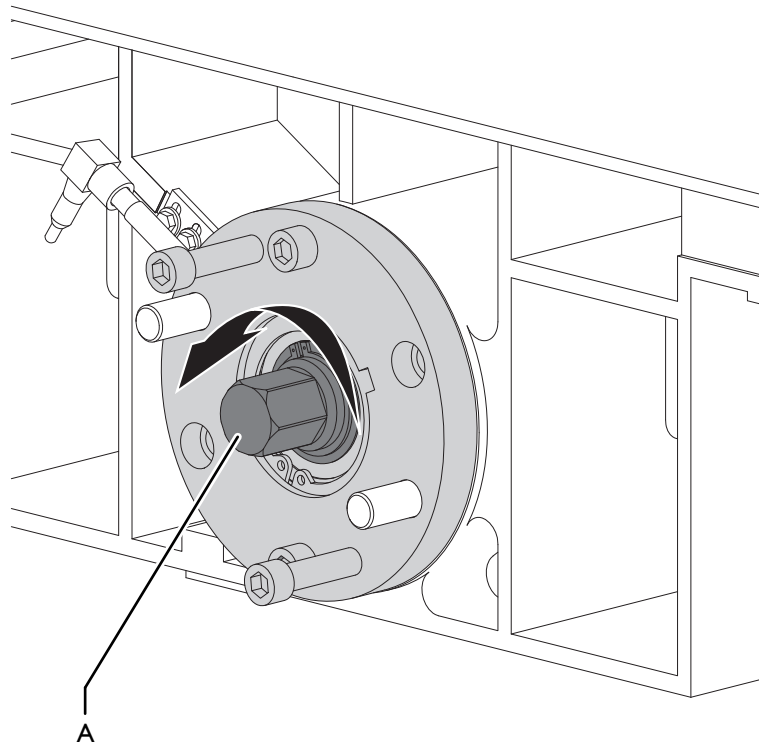


Fig. 6-2

Lifting the vertical axis

A Pinion

Lift the vertical axis as follows:

Prerequisite: The system is switched off and secured with a padlock against being switched on again

Prerequisite: The vertical axis is blocked → Chapter 6.2, 26

I Rotate pinion counterclockwise

The vertical axis is lifted.

6.4 Unblocking the vertical axis

⚠ WARNING



Falling axes

After the lifting and safety unit has been removed, the vertical axis falls downward. This can lead to severe or fatal injuries!

- Install the gearbox unit and drive motor before removing the lifting safety unit
- Never enter the area below suspended axes and workpieces



The lifting and safety unit is under load. You must remove it using force.

- If necessary, use the long screws to push off after you have removed the threaded bolts

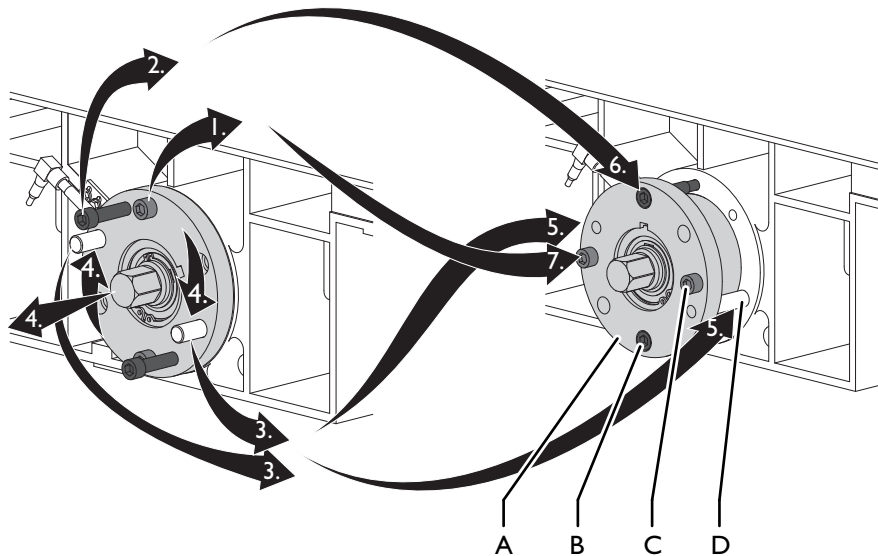


Fig. 6-3

Unblocking the vertical axis

- A Lifting and safety unit
- B Screw, long

- C Screw, short
- D Threaded bolt or bolt

Unblock the vertical axis as follows:

Prerequisite: The system is switched off and secured with a padlock against being switched on again

- 1** Remove short screws
- 2** Remove long screws
- 3** Remove threaded bolts
- 4** Turn lifting and safety unit clockwise and remove it
- 5** Install threaded bolts
- 6** Install and tighten long screws
- 7** Install and lightly tighten short screws

The vertical axis is unblocked.

7 Maintenance

7.1 Introduction

This chapter describes all maintenance tasks.

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. ➔ 41

Tightening torques

Unless otherwise indicated, adhere to the tightening torques of Güdel.
➔ Chapter 11, 43

7.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➔ 11
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

7.1.2 Personnel qualifications

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

7.2 Maintenance tasks after 2,250 hours

7.2.1 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.



⚠ 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




Inspection point	Description	Measures
Contamination		Immediately clean away any contamination
Loose components	Check the fit of the components: <ul style="list-style-type: none"> • Screws • Attachments 	<ul style="list-style-type: none"> • Immediately tighten loose screws to the required torque • Align and fasten loose attachments
Function	<ul style="list-style-type: none"> • Check blocking ➔ Chapter 6.2,  26 • Check lifting ➔ Chapter 6.3,  27 • Check unblocking ➔  28 • General visual inspection 	Replace worn and defective components

Table 7-1 Inspection table

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. ➔ 41

Tightening torques Unless otherwise indicated, adhere to the tightening torques of Güdel.
➔ Chapter 11, 43

8.1.1 Safety

Only perform the tasks described in this chapter after you have read and understood the chapter "Safety". ➔ 11
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

8.1.2 Personnel qualifications

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

8.2 Repairs

8.2.1 Replacing pinion, sprag clutches and plain bearings

WARNING



Falling axes

Sprag clutches mounted in a twisted manner do not block the vertical axis. The vertical axis falls down.

- Install the sprag clutches as shown in the illustration
- Check the sprag clutch direction before you install the lifting and safety device

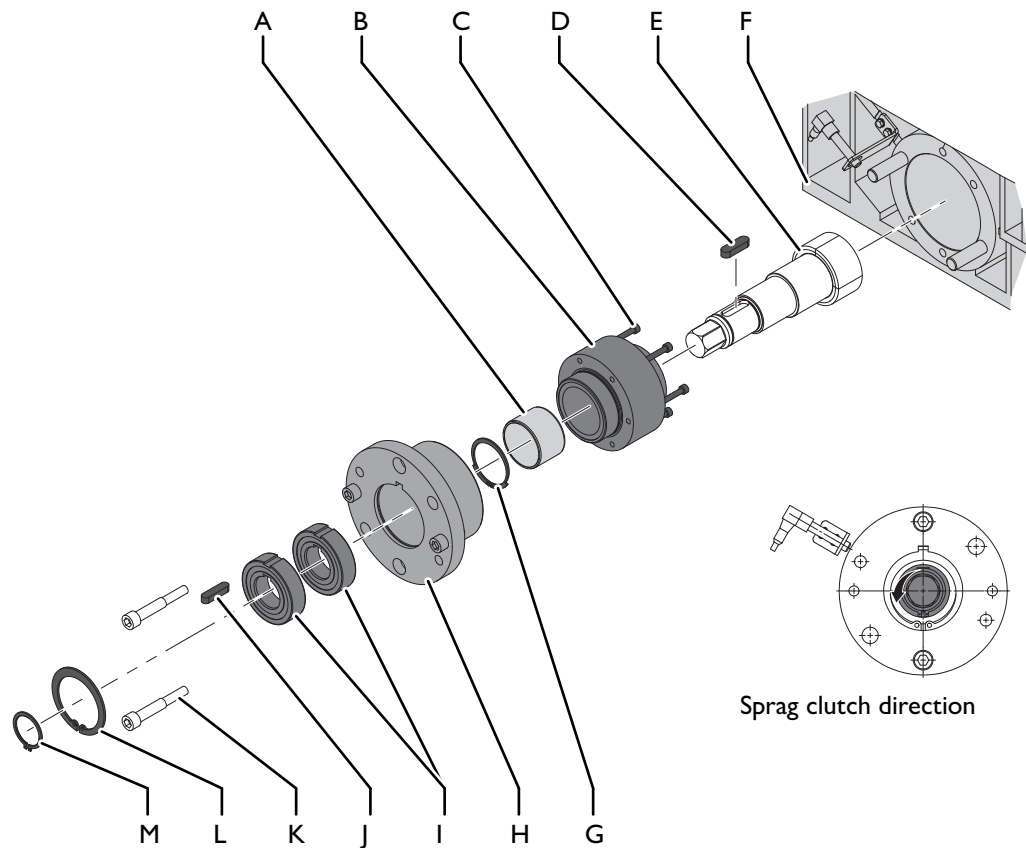




Fig. 8-1

Replacing pinion, sprag clutches and plain bearings

- | | | | |
|---|-------------------------------|---|-----------------|
| A | Plain bearing (only size 6) | H | Bearing housing |
| B | Flange (size 6 only) | I | Sprag clutch |
| C | Fastening screw (size 6 only) | J | Sunk key |
| D | Sunk key | K | Screw |
| E | Pinion | L | Retaining ring |
| F | Carriage | M | Retaining ring |
| G | Retaining ring (size 6 only) | | |

Replace pinion, sprag clutches and plain bearings as follows:

Prerequisite: The vertical axis is unblocked   28

- 1 Remove screws
 - 2 Remove lifting and safety unit
 - 3 Remove retaining ring M
 - 4 Remove pinion and sunk key D
 - 5 Only for size 6:
 - 5.1 Remove fastening screws
 - 5.2 Remove flange
 - 5.3 Remove retaining G
 - 5.4 Remove bearings
 - 6 Remove retaining ring L
 - 7 Remove sprag clutches and sunk key J
 - 8 Replace components
 - 9 To install the components, reverse the disassembly steps
- Pinion, sprag clutches and plain bearings are replaced.

9 Storage conditions

The sprag clutches can be mounted for up to 1 year. After that they must be replaced.

Temperature ranges

The following temperature and air humidity ranges apply:

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

Table 9-1 *Temperature ranges*

10 Spare parts supply

10.1 Service departments

For service queries, 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 10-1 National agencies

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 10-2 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

II Torque tables

II.1 Tightening torques for screws

NOTE

Vibrations

Screws without screw lock become loose.

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

11.1.1 Zinc plated screws

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

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

Table 11-1 Torque table for zinc-plated screws lubricated with Molykote (MoS₂) grease

11.1.2 Black screws

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

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

Table 11-2 Torque table for black oiled and non-lubricated screws

11.1.3 Stainless steel screws

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

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

Table 11-3 Torque table for stainless steel screws lubricated with Molykote (MoS₂) grease

Illustrations

Fig. 4 -1	Design	17
Fig. 4 -2	Functional principle of sprag clutch	18
Fig. 4 -3	Functional principle of the lifting and safety unit	19
Fig. 5 -1	Circuit diagram: BES M08EE-POC20B-S49G (image source: BALLUFF)	21
Fig. 5 -2	Circuit diagram: BES MI2MI-PSC40B-S04G (image source: BALLUFF)	21
Fig. 5 -3	Functional principle of the lifting and safety unit	23
Fig. 6 -1	Blocking the vertical axis	26
Fig. 6 -2	Lifting the vertical axis	27
Fig. 6 -3	Unblocking the vertical axis	28
Fig. 8 -1	Replacing pinion, sprag clutches and plain bearings	37

List of tables

Table -I	Revision history.....	3
Table I-1	Explanation of symbols/abbreviations.....	10
Table 7-1	Inspection table.....	33
Table 9-1	Temperature ranges.....	39
Table 10-1	National agencies.....	41
Table 10-2	24-hour Hotline.....	42
Table 11-1	Torque table for zinc-plated screws lubricated with Molykote (MoS ₂) grease.....	44
Table 11-2	Torque table for black oiled and non-lubricated screws.....	45
Table 11-3	Torque table for stainless steel screws lubricated with Molykote (MoS ₂) grease.....	46

Index

<p>A Air humidity 39</p> <p>B Blocking Vertical axis 26</p> <p>C Connecting Proximity switch 21 Control 22</p> <p>E Explanation of abbreviations 10 Explanation of symbols 10</p> <p>F Function 17</p> <p>G General inspection 32</p> <p>I Intended purpose 15</p> <p>L Lifting Vertical axis 27</p> <p>M Maintenance 31 Maintenance tasks After 2,250 hours 32</p> <p>O Original spare part 31, 35</p>	<p>P Personnel qualifications 21, 25 Pinion replacing 36 Plain bearing replacing 36 Proximity switch connecting 21 Purpose of the document 9</p> <p>R Releasing Vertical axis 28 Replacing Pinion 36 Plain bearing 36 Sprag clutch 36</p> <p>S Securing Vertical axis 26 Service departments 41 Spare part 31, 35 Sprag clutch 18 replacing 36 Storage conditions 39</p> <p>T Temperature range 39 Tightening torque 25, 31, 35 Tightening torques Screws 44 Torques 43</p>
---	---

U

Unblocking	
Vertical axis	28

V

Vertical axis	
blocking	26
lifting	27
unblocking	28

Version	1.0
Author	chrgal
Date	08.09.2016
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	

GÜDEL

GÜDEL AG

Industrie Nord

CH-4900 Langenthal

Switzerland

Phone +41 62 916 91 91

info@ch.gudel.com

www.gudel.com