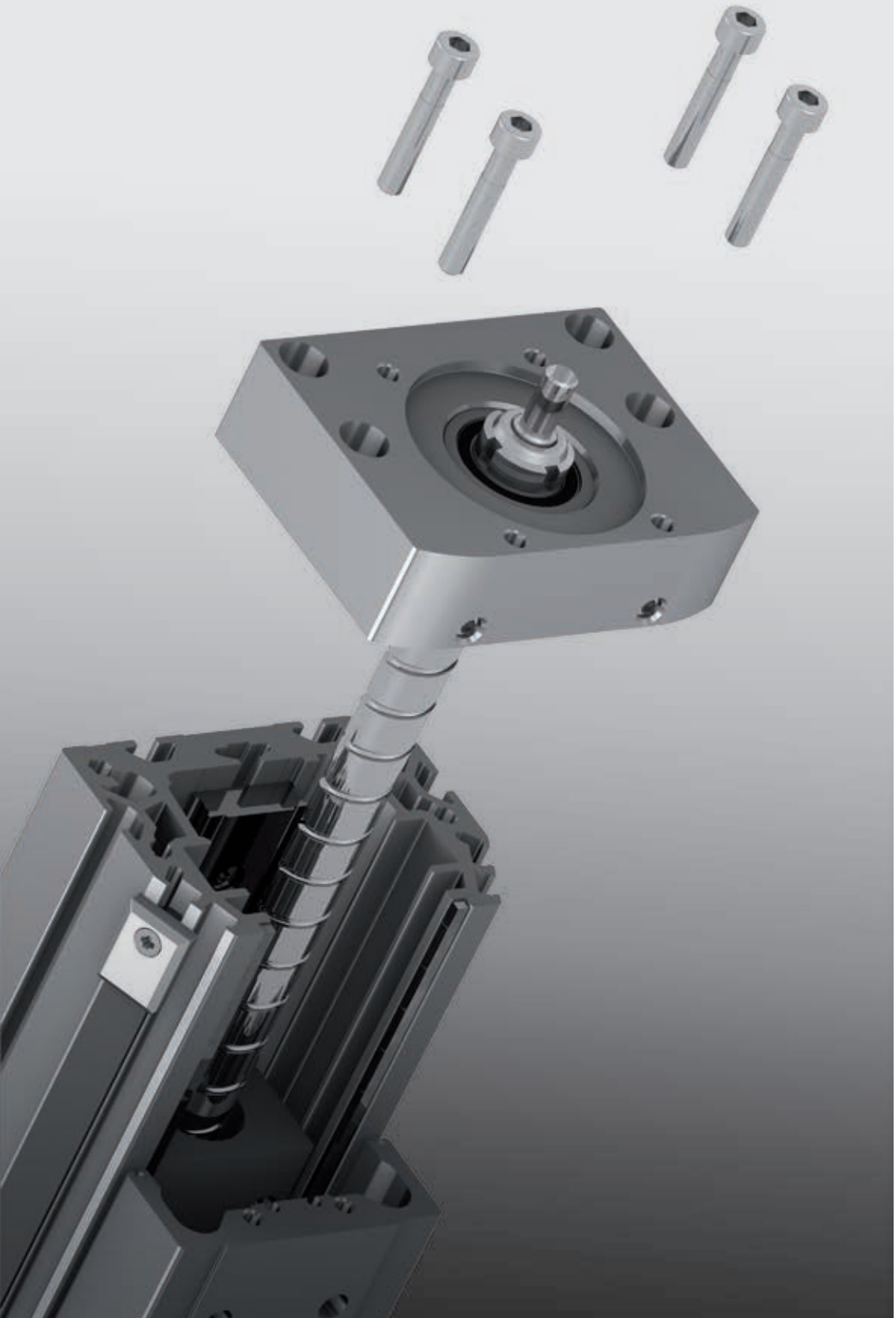
Spindle axis

ELGA-BS-KF-...



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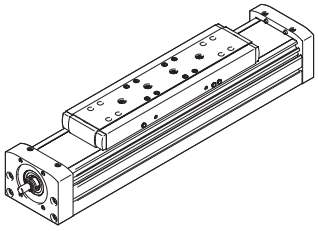
Repair instructions (en)



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Foreword

These repair instructions are valid for the spindle axis listed on the title page to the exclusion of any liability claims.

Differences compared to the descriptions in these repair instructions may arise depending on the design and/or modification status of the spindle axis. The user must check this prior to carrying out the repair and take the deviations into consideration if necessary.

These repair instructions have been prepared with care.

Festo AG & Co. KG does not, however, accept liability for any errors in these repair instructions or their consequences. Likewise, no liability is accepted for direct or consequential damage resulting from incorrect use of the products.

Further information is given in Chapter 9 on page 53.

The relevant regulations on occupational safety, safety engineering, and interference suppression as well as the stipulations contained in these repair instructions must be observed when working on the products.

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Table of Contents

Table of Contents

1 Important information

1.1 About these repair instructions

This document contains important information about professional repair of the spindle axis type ELGA-BS-KF.

However, the costs of carrying out a repair must be considered in the case of larger defects.

Before carrying out a repair, the relevant chapter in these instructions must be read in full and followed consistently.

For reasons of clarity, these repair instructions do not contain all detailed information. The following documents should therefore also be available when repairing the spindle axis:

- **Operating instructions**

  Contains information about the installation and removal of the motor, motor flange, coupling and coupling housing of the ELGA-BS-KF spindle axis and its function, structure, use, installation, commissioning, maintenance and care, etc. It can be found on the Festo website (➔ www.festo.com).

- **Spare parts documentation**

  Contains an overview of the spare and wearing parts as well as information on their installation. This can be found in the online spare parts catalogue on the Festo website (➔ www.festo.com/spareparts).

- **Information brochure – accessories, equipment and tools**

  Contains an overview of the available installation resources, e.g. lubricating greases, threadlocking agents, maintenance tools, etc. (resources for installation and maintenance). The brochure can be found in the online spare parts catalogue on the Festo website (➔ http://spareparts.festo.com/xdki/data/SPC/0/PDF_SAFE/Fitting%20aids.pdf).

1.2 Symbols used in these repair instructions

Danger categories

The following symbols identify text passages which draw attention to specific hazards.

Danger

Warning

Caution

Marking special information

The following symbols identify text passages which contain special information.

Note

Information

Environment

1.3 Text designations used in these repair instructions

- Activities that can be carried out in any order.

1. Activities which should be carried out in the specified order.

– General lists.

➔ Reference to further information.

Underlined, blue text indicates a cross-reference or hyperlink that you can click on in the PDF.

1.4 General safety instructions

Danger

Risk of fatal injury due to electric shock and uncontrolled movement of components.

– The spindle axis must be de-energised, depressurised and reliably secured against unauthorised switching back on again before the maintenance and repair work begins.

Caution

The spindle axis may only be repaired by authorised and trained persons in accordance with the specifications in the technical documentation and using original spare parts.

Installation and repair by unauthorised and untrained persons, repairs using non-original spare parts or without the technical documentation required for installation and/or repair are dangerous and therefore not permitted.

Repairs must only be carried out in conjunction with these repair instructions and the respective operating instructions for the device, as well as the documents listed in Chapter 1.1 on page 6.

Caution

Lifting large loads can lead to permanent injury.

– The spindle axis must be lifted by several people or with suitable lifting gear, depending on its size and weight.

Caution

Unintended switching on can trigger unexpected movements and cause bruises.

– Ensure that the unit is protected against restarting before any modification or maintenance work or inspections are carried out. Loosened parts can make unexpected movements or fall off.

– Secure parts against accidental movements or move them into a safe end position.

Note

Observe the given tightening torques. If no special information is given the tightening torques given in the relevant standard apply to the screws, bolts and nuts used.

Note the strength class of the screws, bolts and nuts!

Festo recommends use of LOCTITE 243 thread locking agent.

In the event of damage caused by unauthorised manipulation, improper use or use of non-original spare parts, all warranty and liability claims against the manufacturer expire.

Instead of carrying out the repair yourself, your local Festo sales office offers the option of having the repair carried out by Festo.

Components and equipment replaced during repair must be disposed of in accordance with the relevant local environmental protection regulations.

1.5 Technical requirements

Note

The following instructions for safe and proper use must be observed:

- Observe the connection and ambient conditions specified in the technical data of the products and all the connected components. The product can only be operated in compliance with the relevant safety guidelines if you comply with the limit values and load limits (see enclosed documentation).
- The spindle axis gantries must be in faultless technical condition.
- The spindle axis may only be operated in its original condition and without unauthorised modifications.
- The spindle axis is designed for industrial use.

1.6 Standards and test values

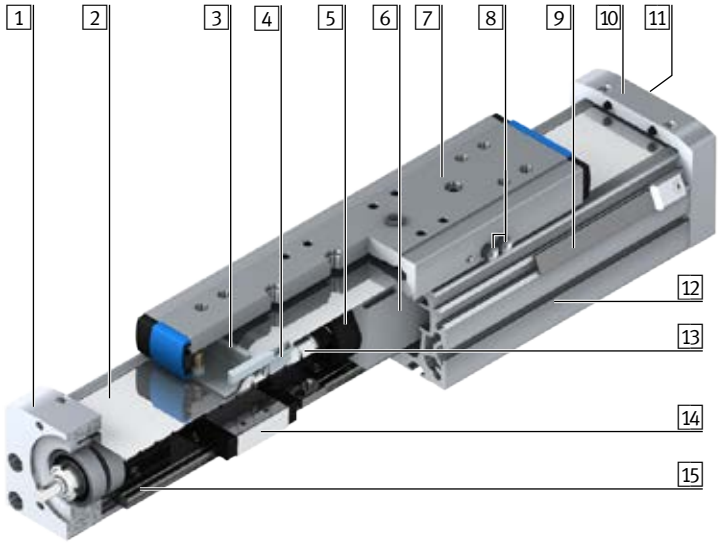
Standards and test values which products comply with and fulfil can be found in the “Technical data” sections of the enclosed documentation.

2 General product description

2.1 Functional description

The ELGA-BS-KF is a spindle axis, which is designed for movements with large forces and precise repetition accuracy. A rotating ball screw converts the rotational movement of a motor into linear motion. This causes the piston to move backwards and forwards. The mechanics of the spindle axis are not automatically locking. After the input torque is removed the slide module can move freely. The ELGA-BS-KF is approved for slide and yoke operation.

2.1.1 ELGA-BS-KF-...-ML



1 Bearing block
2 Cover band
3 Belt reversal, top
4 Belt reversal, bottom
5 Spindle nut
6 Retainer or retainer module
7 Slide module
8 Lubrication nipple
9 Displacement encoder
10 Bearing cap
11 Sealing air connections, not visible
12 Cylinder barrel
13 Spindle assembly
14 Roller carriage
15 Roller track

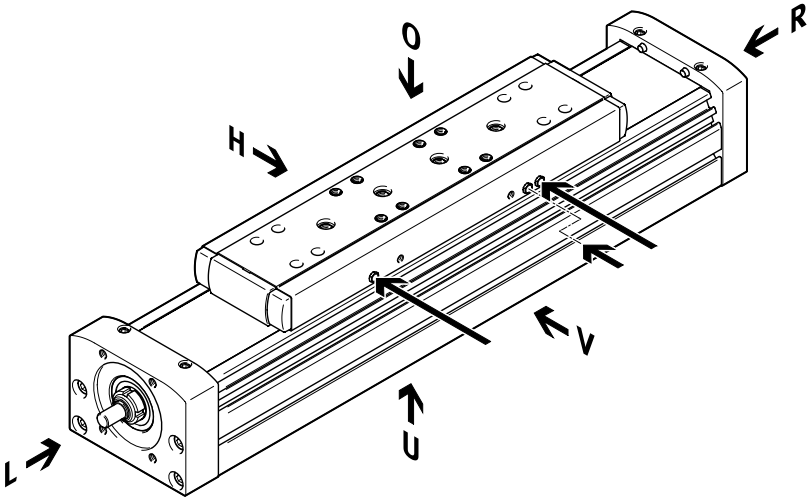
2.2 Sizes and part numbers

Size	Part number
ELGA-BS-KF-70-...-ML	8024918
ELGA-BS-KF-80-...-ML	8024919
ELGA-BS-KF-100-...-ML	8024920
ELGA-BS-KF-150-...-ML	8024921

The complete overview of features, accessories, type codes, technical data and dimensions of the ELGA-BS-KF spindle axes can be found in the product catalogue or on the Festo website (➔ www.festo.com).

2.3 Slide variants and orientation definition

This illustration gives you an overview of the mounting designations of the spindle axis.



Lubrication nipple = reference point

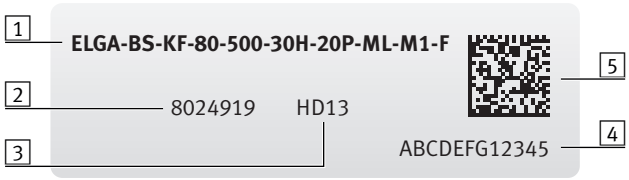
(The side with the lubrication nipples on the slide module is defined as the front).

O = top
U = bottom
R = right
L = left
V = front
H = rear

2.4 Type code

The precise features of a toothed belt axis can be determined with the help of the product labelling on the toothed belt axis. The order code describes the features of the toothed belt axis, separated by a hyphen "-".

Example:



1 Order code
2 Part number
3 Serial number
4 Product Key
5 Product Key Code
Data Matrix Barcode
(http://pk.festo.com/ + Product Key)

The order code on the product labelling provides the following information:

ELGA	ELGA type spindle axis
BS	Ball screw
KF	Recirculating ball bearing guide
80	Size
500	Stroke [mm]
30H	Stroke reserve [mm]
20P	Spindle pitch, 20 mm / spindle rotation
ML	Motor attachment position, left-hand side
M1	Incremental displacement encoder, resolution 2.5 µm
F	Displacement encoder attachment position, front

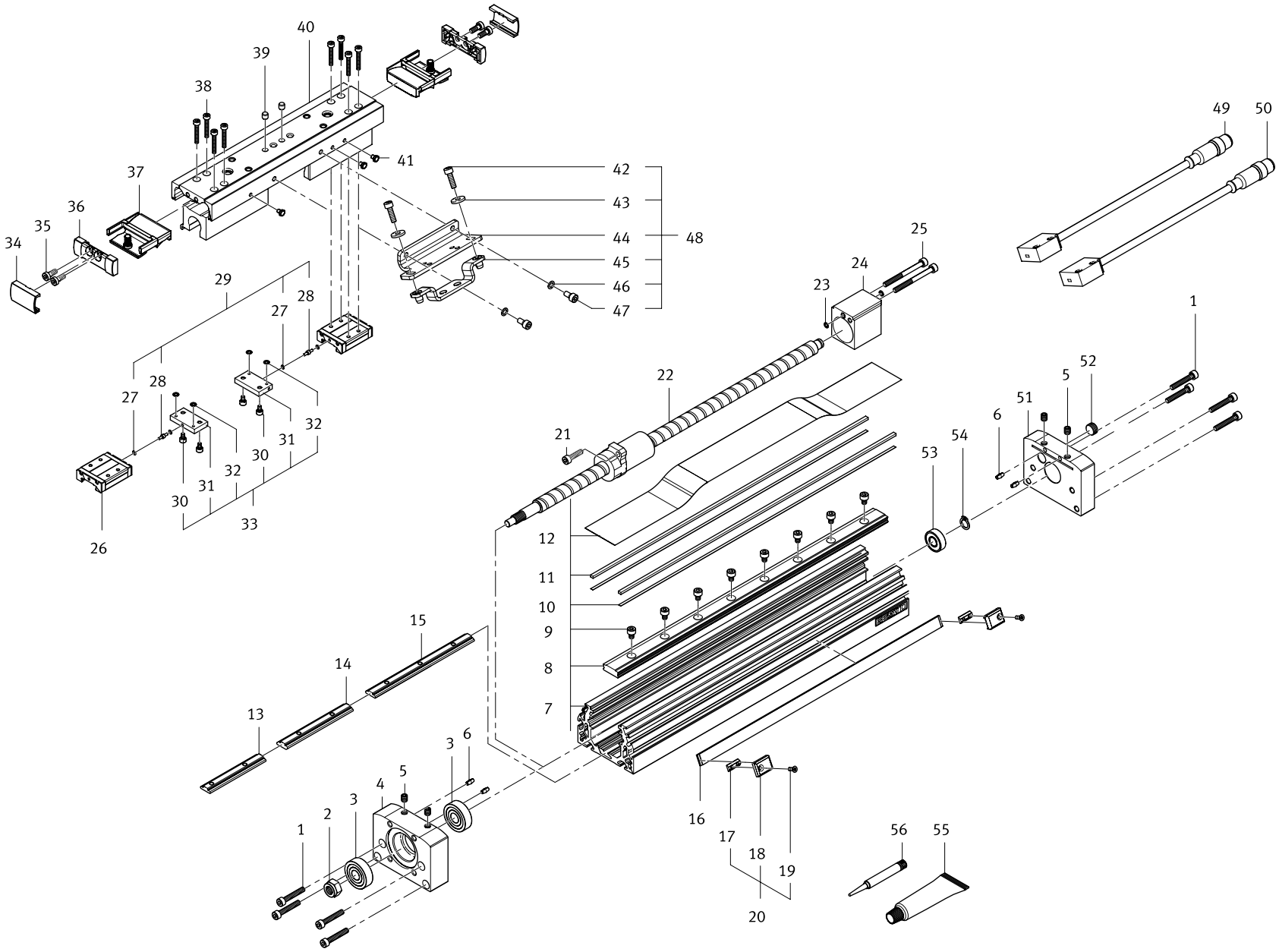
3 Component overviews and bill of materials

The component overviews with corresponding bills of materials for the following spindle axes are listed on the following pages:

Size	Part number	Components list	Bill of materials
ELGA-BS-KF-70-...-ML	8024918	➔ Chapter 3.1 on page 12	➔ Chapter 3.1.1 on page 13
ELGA-BS-KF-80-...-ML	8024919	➔ Chapter 3.2 on page 14	➔ Chapter 3.2.1 on page 15
ELGA-BS-KF-100-...-ML	8024920	➔ Chapter 3.3 on page 16	➔ Chapter 3.3.1 on page 17
ELGA-BS-KF-150-...-ML	8024921	➔ Chapter 3.4 on page 18	➔ Chapter 3.4.1 on page 19

The following diagrams are intended only to provide an overview of the individual components. To order spare and wearing parts, please use the online spare parts catalogue on the Festo website (➔ www.festo.com/spareparts).

3.1 ELGA-BS-KF-70-...-ML components overview

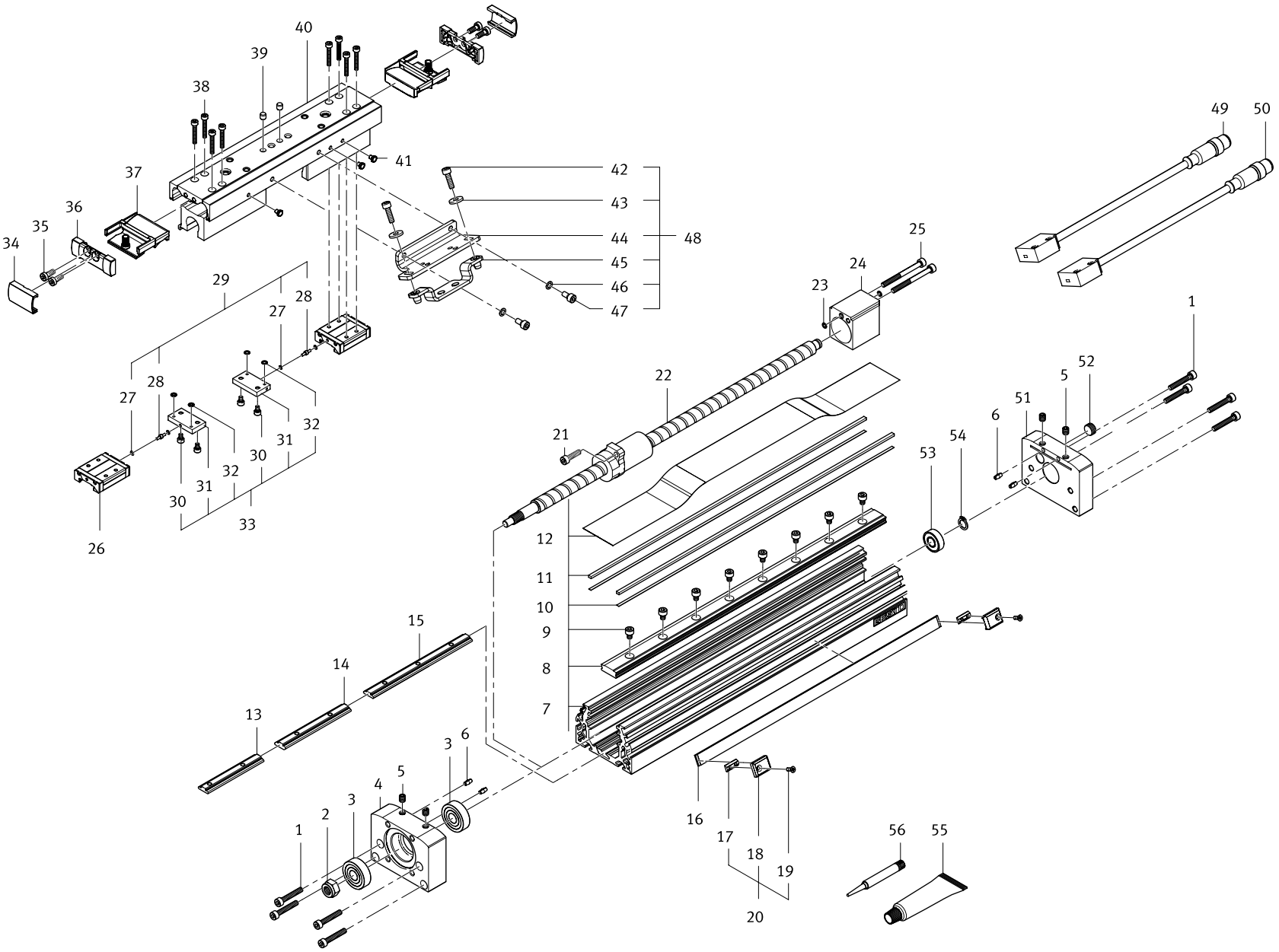


3.1.1 ELGA-BS-KF-70-...-ML bill of materials

No.	Designation, type
1	Socket head screw, DIN 912-M4×25-8.8
2	Hex nut, DIN 985-M8×1-8
3	Deep-grooved ball bearing, DIN 625-629-2RS
4	Bearing block
5	Grub screw, DIN 913-M5×6-45H
6	Buffer element
7	Cylinder barrel
8	Roller track
9	Socket head screw, F-M4×5.5-10.9
10	Adhesive tape
11	Magnetic strip
12	Cover band
13	Slot nut
14	Slot nut
15	Slot nut
16	Measuring tape
17	Slot nut
18	Measuring tape cap
19	Countersunk screw, DIN 965-M3×8-4.8-H
20	Cap
21	Socket head screw, DIN 912-M4×16-8.8
22	Spindle assembly
23	O-ring, 3×1-N-NBR70
24	Retainer
25	Socket head screw, DIN 912-M4×45-8.8
26	Roller carriage
27	O-ring, ISO 3601-B-1.5×1-N-NBR70
28	Lubricating channel
29	Lubricating channel
30	Socket head screw, DIN 912-M3×5-8.8
31	Lubricating head
32	O-ring, 3×1-N-NBR70
33	Lubricating head module
34	Clip
35	Socket head screw, DIN 6912-M4×6-A2-70
36	End cap
37	Belt reversal

No.	Designation, type
38	Socket head screw, DIN 912-M3×20-10.9
39	Centring pin, ZBS-5
40	Slide module
41	Lubrication nipple, D1 M3
42	Socket head screw, DIN 912-M4×14-10.9
43	Washer, DIN 7349-4.3
44	Sensor bracket
45	Sensor mounting
46	Retaining washer, S-4
47	Socket head screw, DIN 912-M4×8-8.8
48	Sensor bracket
49	Measuring unit
50	Measuring unit
51	Bearing cap
52	Sealing plug, G1/8-AL-SA
53	Deep-groove ball bearing, F-698-2RS
54	Retaining ring, DIN 471-8×0.8
55	Lubricating grease LUB-KC1, silicone free
56	Screw locking agent, LOCTITE-243

3.2 ELGA-BS-KF-80-...-ML components overview

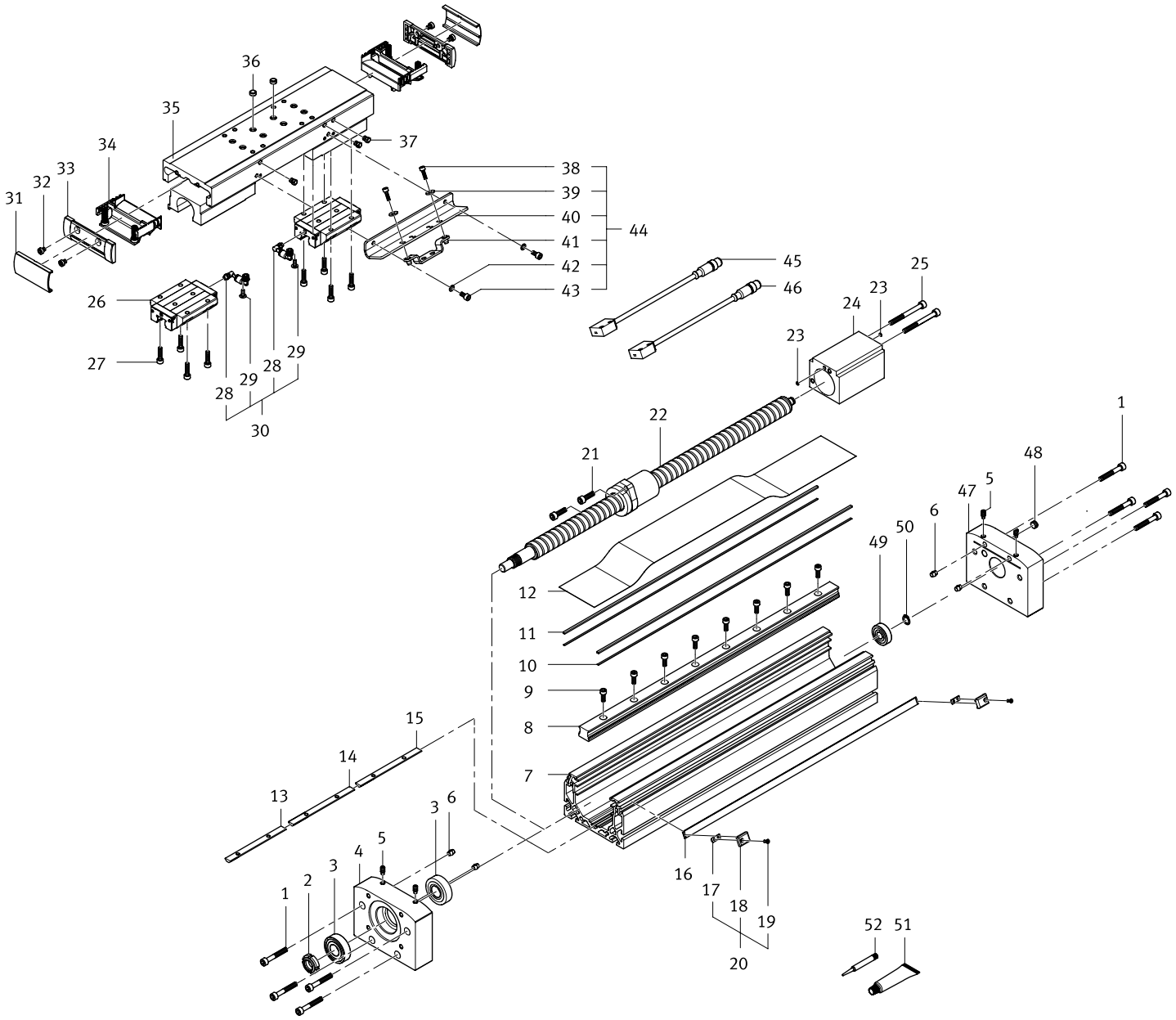


3.2.1 ELGA-BS-KF-80-...-ML bill of materials

No.	Designation, type
1	Socket head screw, DIN 912-M5×30-8.8
2	Slotted nut, GUK 10×0.75
3	Angular ball bearing, DIN 628-7200-B-2RS
4	Bearing block
5	Grub screw, DIN 915-M6×8-45H
6	Buffer element
7	Cylinder barrel
8	Roller track
9	Socket head screw, DIN 912-M4×7-12.9
10	Adhesive tape
11	Magnetic strip
12	Cover band
13	Slot nut
14	Slot nut
15	Slot nut
16	Measuring tape
17	Slot nut
18	Measuring tape cap
19	Countersunk screw, DIN 965-M3×8-4.8-H
20	Cap
21	Socket head screw, DIN 912-M5×22-10.9
22	Spindle assembly
23	O-ring, 3×1-N-NBR70
24	Retainer module
25	Socket head screw, DIN 912-M5×45-10.9
26	Roller carriage
27	O-ring, ISO 3601-B-1.5×1-N-NBR70
28	Lubricating channel
29	Lubricating channel
30	Socket head screw, DIN 912-M3×5-8.8
31	Lubricating head
32	O-ring, 3×1-N-NBR70
33	Lubricating head module
34	Clip
35	Socket head screw, DIN 6912-M4×6-A2-70
36	End cap
37	Belt reversal

No.	Designation, type
38	Socket head screw, DIN 912-M3×25-12.9
39	Centring pin, ZBH-9
40	Slide module
41	Lubrication nipple, D1 M3
42	Socket head screw, DIN 912-M4×14-10.9
43	Washer, DIN 7349-4.3
44	Sensor bracket
45	Sensor mounting
46	Retaining washer, S-4
47	Socket head screw, DIN 912-M4×8-8.8
48	Sensor bracket
49	Measuring unit
50	Measuring unit
51	Bearing cap
52	Sealing plug, G1/8-AL-SA
53	Deep-groove ball bearing, F-698-2RS
54	Retaining ring, DIN 471-8×0.8
55	Lubricating grease LUB-KC1, silicone free
56	LOCTITE 243 screw locking agent

3.3 ELGA-BS-KF-120-...-ML components overview

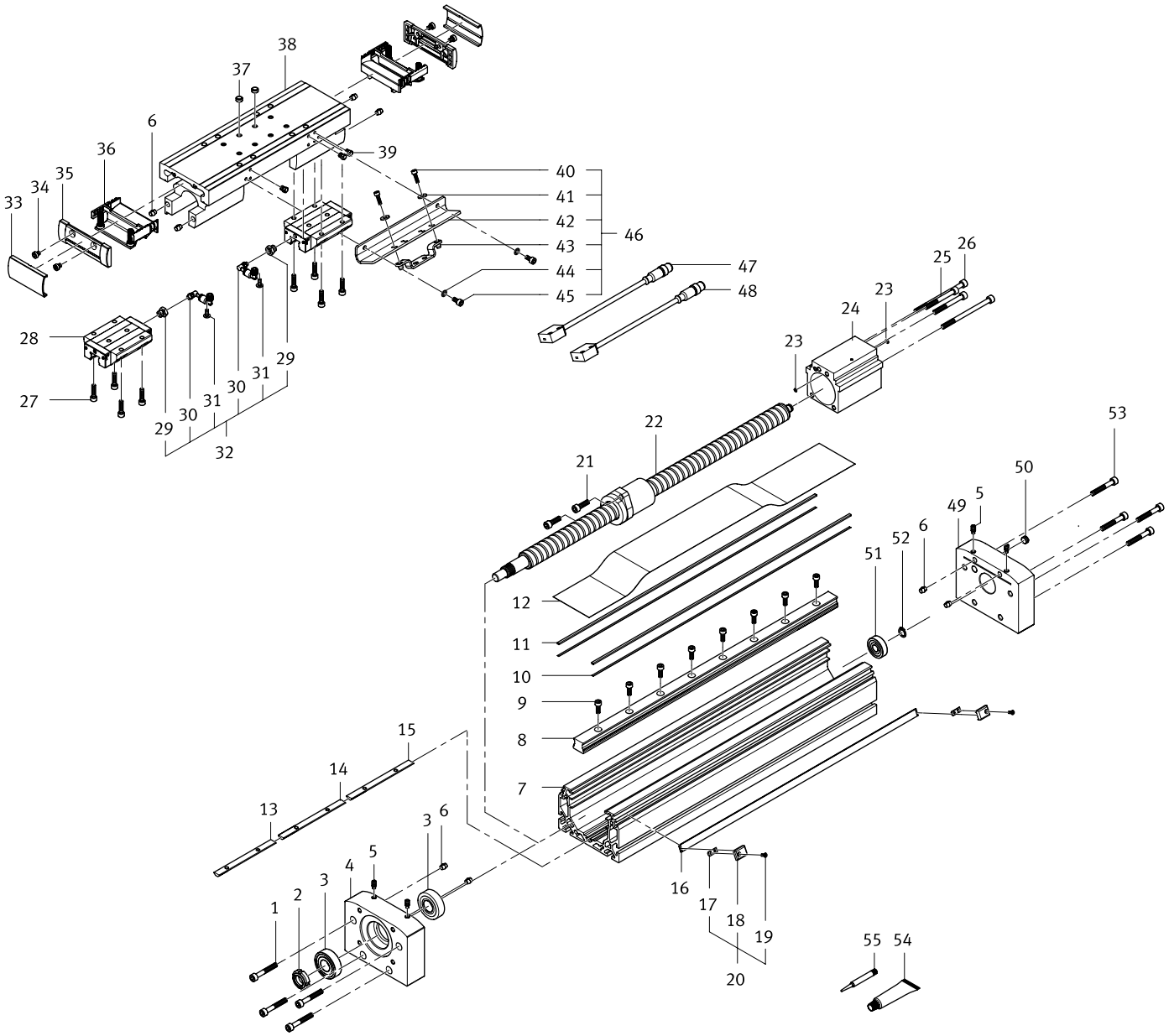


3.3.1 ELGA-BS-KF-120-...-ML bill of materials

No.	Designation, type
1	Socket head screw, DIN 912-M6×40-10.9
2	Slotted nut, GUK 16×1
3	Angular ball bearing, DIN 628-7203-B-2RS
4	Bearing block
5	Grub screw, DIN 915-M6×12-45H
6	Buffer
7	Cylinder barrel
8	Roller track
9	Socket head screw, DIN 912-M5×14-12.9
10	Adhesive tape
11	Magnetic strip
12	Cover band
13	Slot nut
14	Slot nut
15	Slot nut
16	Measuring tape
17	Slot nut
18	Measuring tape cap
19	Countersunk screw, DIN 965-M3×8-4.8-H
20	Cap
21	Socket head screw, DIN 912-M6×20-10.9
22	Spindle assembly ML
23	O-ring, 3×1-N-NBR70
24	Retainer
25	Socket head screw, DIN 912-M6×60-10.9
26	Roller carriage
27	Socket head screw, DIN 912-M5×20-10.9
28	Barbed L-fitting, LCN-M5-PK-2
29	Flange screw, F-M4×10-A-70
30	Fittings kit
31	Clip
32	Socket head screw, DIN 6912-M5×6-A2-70
33	End cap
34	Belt reversal
35	Slide module
36	Centring sleeve, ZBH-9
37	Lubrication nipple, DIN 3405-AM 6

No.	Designation, type
38	Socket head screw, DIN 912-M4×14-10.9
39	Washer, DIN 7349-4.3
40	Sensor bracket
41	Sensor mounting
42	Retaining washer, Böllhoff-53070-S5-A1
43	Socket head screw, DIN 912-M5×10-10.9
44	Sensor bracket
45	Measuring unit
46	Measuring unit
47	Bearing cap
48	Sealing plug, G1/8-AL-SA
49	Deep-groove ball bearing, XF+DIN 625-6200-2RS
50	Retaining ring, DIN 471-10×1
51	Lubricating grease LUB-KC1, silicone free
52	LOCTITE 243 screw locking agent

3.4 ELGA-BS-KF-150-...-ML components overview



3.4.1 ELGA-BS-KF-150-...-ML bill of materials

No.	Designation, type
1	Socket head screw, DIN 912-M8×60-10.9
2	Slotted nut, GUK 30×1.5
3	Angular ball bearing, DIN 628-7206-B-2RS
4	Bearing block
5	Grub screw, DIN 915-M6×12-45H
6	Buffer
7	Cylinder barrel
8	Roller track
9	Socket head screw, DIN 912-M6×20-12.9
10	Adhesive tape
11	Magnetic strip
12	Cover band
13	Slot nut
14	Slot nut
15	Slot nut
16	Measuring tape
17	Slot nut
18	Measuring tape cap
19	Countersunk screw, DIN 965-M3×8-4.8-H
20	Cap
21	Socket head screw, DIN 912-M8×30-10.9
22	Spindle assembly ML
23	O-ring, ISO 3601-B-5×1,5-N-NBR75
24	Retainer module
25	Socket head screw, DIN 912-M8×70-10.9
26	Socket head screw, DIN 912-M8×118-10.9
27	Socket head screw, DIN 912-M6×20-10.9
28	Roller carriage
29	Reducer, M6-M3-SW8
30	Barbed L-fitting, LCN-M3-PK-2-B
31	Flange screw, F-M4×10-A-70
32	Fittings kit
33	Clip
34	Socket head screw, DIN 6912-M5×6-A2-70
35	End cap
36	Belt reversal
37	Centring sleeve, ZBH-9

No.	Designation, type
38	Slide module
39	Lubrication nipple, DIN 3405-AM 6
40	Socket head screw, DIN 912-M4×14-10.9
41	Washer, DIN 7349-4.3
42	Sensor bracket
43	Sensor mounting
44	Retaining washer, Böllhoff-53070-S5-A1
45	Socket head screw, DIN 912-M5×10-10.9
46	Sensor bracket
47	Measuring unit
48	Measuring unit
49	Bearing cap
50	Sealing plug, G1/8-AL-SA
51	Deep-groove ball bearing, XF+DIN 625-6005-2RS
52	Retaining ring, DIN 471-25×1.2
53	Socket head screw, DIN 912-M8×50-8.8
54	Lubricating grease LUB-KC1, silicone free
55	LOCTITE 243 screw locking agent

4 Repair steps

Where possible, it is advisable to dismantle the spindle axis from the system entirely before carrying out the repair.

Before starting the repair, dismantle any attachment components in accordance with the instructions in the corresponding operating instructions.

Keep your working environment clean and tidy.

Before dismantling the spindle axis the cause of the failure must be investigated to prevent repeated and premature failure. A spindle axis that has been used as intended will not normally show any signs of premature failure.

This investigation is not necessary in the case of non-premature failure (fatigue time). However, the condition of the spindle axis (general condition, etc.) must always be checked.

In case of uncertainty, we recommend replacing all the components mentioned to rule out reciprocal effects during later operation.

In the event of premature failure of the spindle axis the operating conditions should be examined more closely.

The following possibilities should be considered, among other things:

– **Overloading**
  - In case of overloading, the application parameters (load, speed) should be adjusted accordingly.

– **Ambient conditions/material resistance**
  - Check whether the ambient temperature is within the permissible range.
  - Check the chemical and physical ambient conditions for harmful substances, such as dust, abrasive particles, cooling lubricants, solvents, ozone, radiation, water-soluble substances, greases and oils, etc.

Note

The repair should preferably be carried out on a stable and flat work surface with storage for small parts.

To prevent damage to the roller track and other components, do not use pointed or sharp-edged assembly tools.

Depending on the model, the attachment position of the motor for the ELGA-BS-KF spindle axis can either be on the left or the right-hand side.

The repair steps in these repair instructions only consider the left-hand motor attachment position.

The ELGA-BS-KF-...-MR spindle axis (right-hand motor mounting) differs from the ELGA-BS-KF-...-ML spindle axis (left-hand motor mounting) only in that, for the right-hand motor attachment position, the bearing block is on the right and the bearing cap is on the left and the corresponding spindle assembly MR (right-hand motor mounting) is installed.

4.1 Preparatory steps

Danger

Risk of fatal injury from electric shock.

The control of the drive motors is still charged after the voltage has been switched off (capacitor voltage). As such, you must wait approx. 3 minutes after switching off the voltage before the motor cables can be removed. The capacitors discharge their voltage during this time.

1. Disconnect the spindle axis from the power supply and secure it from being switched on again accidentally.
2. Remove the motor and encoder cables.
3. Dismantle the motor, axial kit or parallel kit.

4.2 Visual inspection

Check the spindle axis for visible damage that can impair its function, such as major defects in the roller track.
The entire spindle axis must be replaced if significant damage exists.

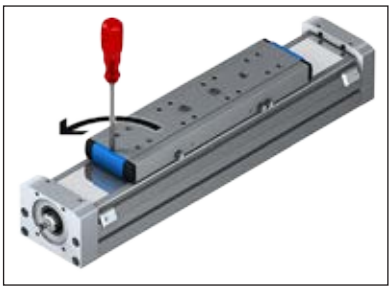
4.3 Dismantling the spindle axis

Note
Before starting to dismantle, clearly mark the attachment sides of the bearing block and the bearing cap on the cylinder barrel.

4.3.1 Removing the cover band

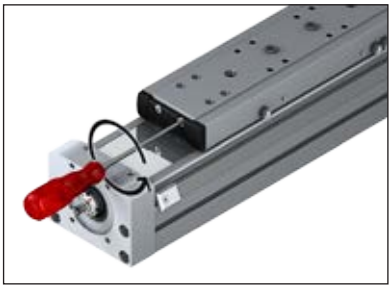
1. Place the spindle axis on the work surface with the slide module facing upwards.

2. Lever off the clips on both ends of the slide module.



After the covers have been removed, the top belt reversal can come out of the slide module when it is moved. If this happens, the compression springs of the belt reversal may be lost.

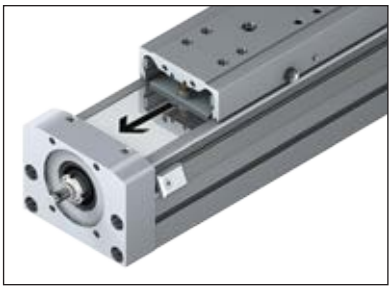
3. Unscrew the socket head screws at both ends of the slide module and remove the covers.



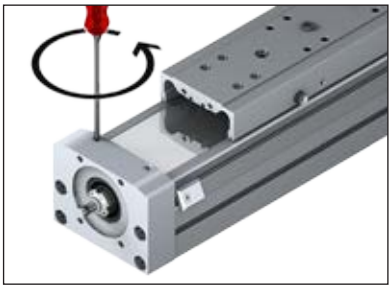
Secure the compression springs against springing out to the side on pulling out the top belt reversal.

- The ELGA-BS-KF-70 / 80 has **one** compression spring mounted on each upper belt reversal.
- The ELGA-BS-KF-120 / 150 has **two** compression springs mounted on each upper belt reversal.

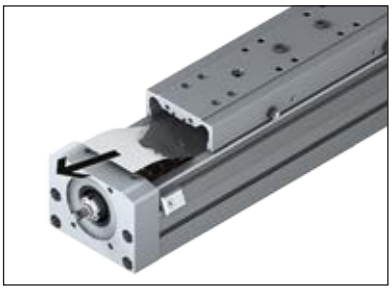
4. Pull out the top belt reversals on both sides of the slide module.



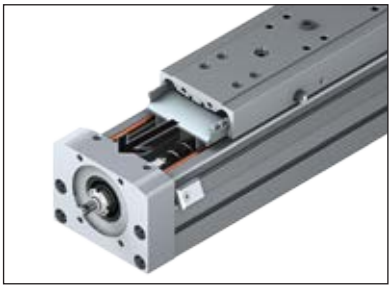
5. Unscrew the grubscrews in the bearing block and bearing cap.
6. Remove any locking agent residue from the thread.



7. Pull the cover band out of the bearing block, bearing cap and slide module.

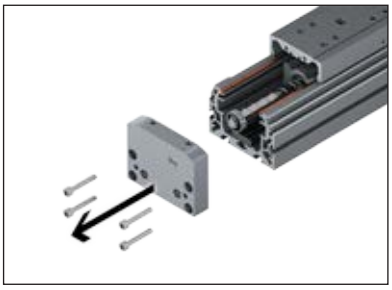


8. Pull out the bottom belt reversals on both sides of the slide module.



4.3.2 Removing the bearing cap, bearing block and spindle assembly with slide module

1. Unscrew the socket head screws from the bearing cap.



Note

When the bearing cap is pulled off the cylinder barrel, the bearing seat of the roller bearing is also pulled off the spindle assembly. After pulling off the bearing cap the spindle assembly must be supported so that torque / tilting moments do not damage the roller bearing on the opposite side of the spindle assembly.

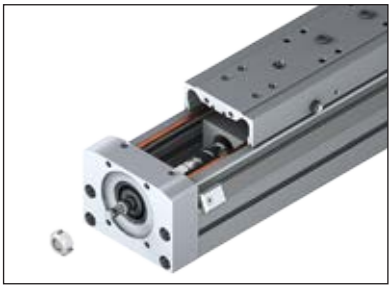
2. Carefully pull the bearing cap off the cylinder barrel.

ELGA-BS-KF-70

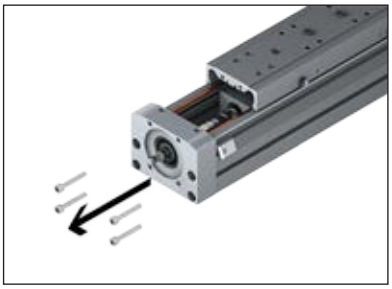
3. Unscrew the hex nut from the spindle assembly.

ELGA-BS-KF-80 / 120 / 150

3. Unscrew the slotted nut from the spindle assembly.



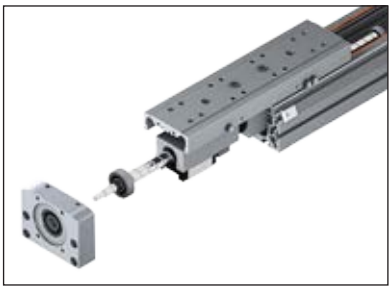
4. Unscrew the socket head screws from the bearing block.



Note

The recirculating ball bearing guide system is pretensioned. Therefore, on pushing the roller carriage off the roller track, individual balls can easily spring out and be lost.

Balls that have sprung out of the roller carriages must be re-inserted into the relevant roller carriages.



5. Carefully pull the spindle assembly and slide module together with the bearing block out of the cylinder barrel.
6. Carefully pull the bearing block off the spindle assembly.

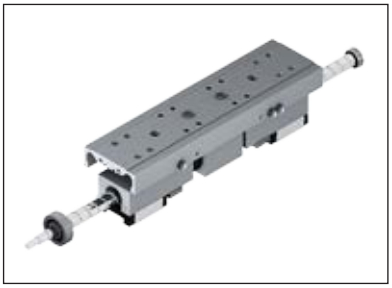
A certain amount of force is required to pull it off.

4.3.3 Disconnecting the retainer or retainer module with spindle assembly from the slide module

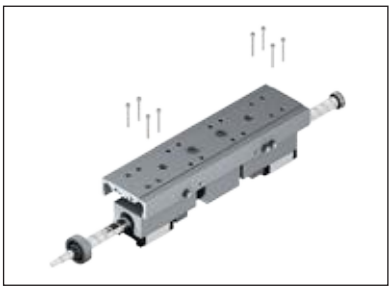
4.3.3.1 ELGA-BS-KF-70 / 80

Dismantling the roller carriage

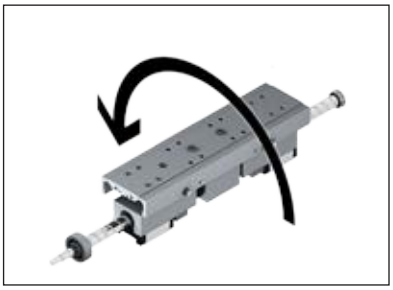
1. Place the slide module with the mounted on spindle assembly on the work surface.
   The slide module faces upwards.

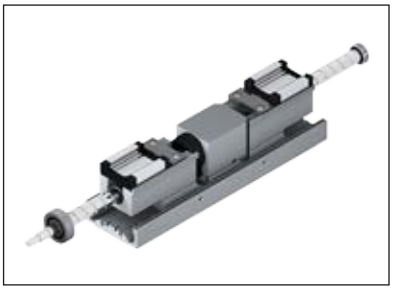


2. Unscrew the socket head screws from the roller carriage.

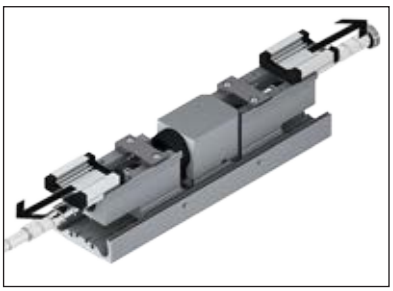


3. Turn the slide module with the mounted on spindle assembly through 180°. The roller carriages face upwards.



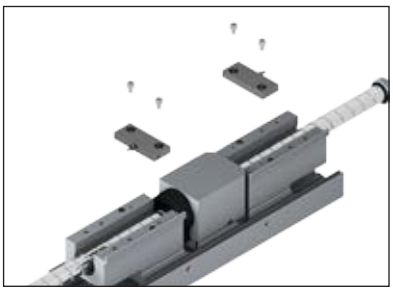


4. Pull off the roller carriages to the right and left and off the lubricating channels.
5. Remove the roller carriages.

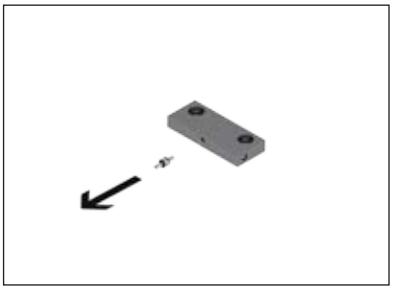


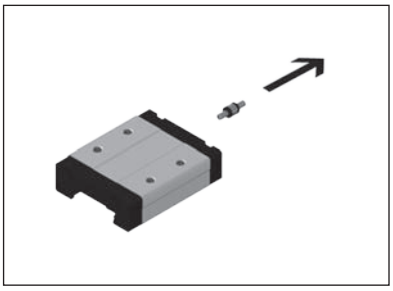
Dismantling the lubricating heads and lubricating channels

6. Unscrew the socket head screws from the lubricating heads.
7. Remove the lubricating heads.



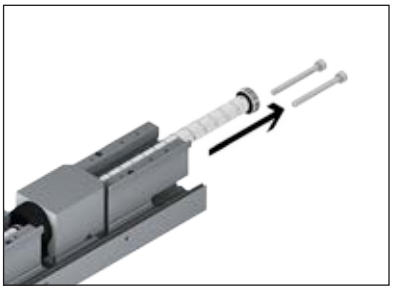
8. Pull the lubricating channels, each together with the two O-rings, out of the lubricating heads or rather out of the roller carriages.
9. Clean the lubricating heads.
10. Check the lubricating channels and O-rings for wear and replace if necessary.



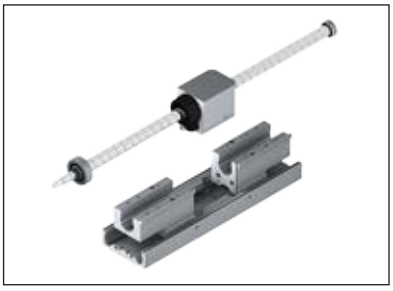


Dismantling the spindle assembly with retainer or retainer assembly

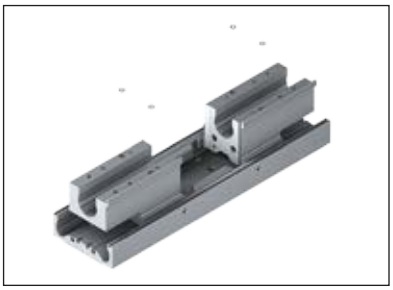
11. Unscrew the socket head screws for mounting the retainer or retainer module from the slide module.



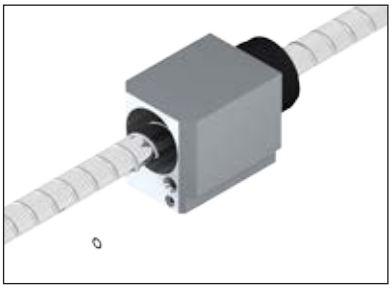
12. Remove the spindle assembly with retainer or retainer module from the slide module.



13. Remove the O-rings from the slide module.
14. Clean the slide module.
15. Check the O-rings for wear and replace if necessary.



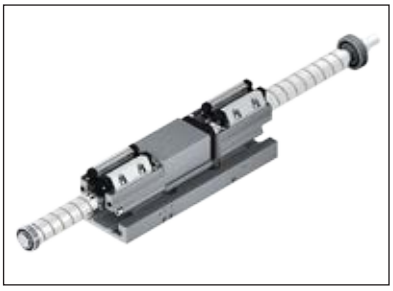
16. Remove the O-ring from the retainer or retainer module.
17. Check the O-ring for wear and replace if necessary.



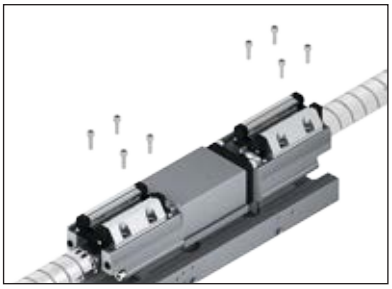
4.3.3.2 ELGA-BS-KF-120 / 150

Dismantling the roller carriage

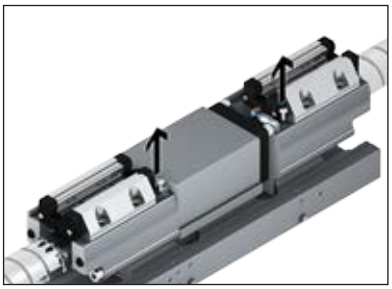
1. Place the spindle assembly on the work surface with the slide module facing downwards.



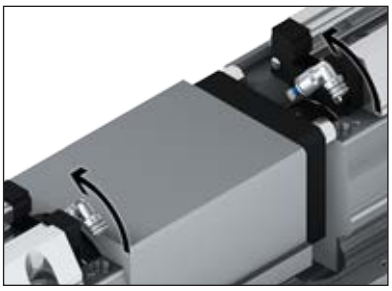
2. Unscrew the socket head screws from the roller carriage.



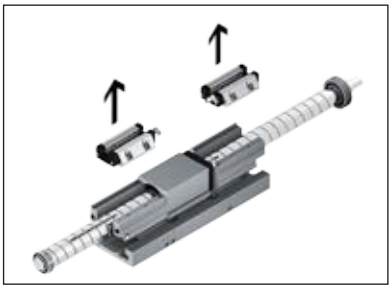
3. Unscrew the flange screws in the two barbed L-fittings of the lubrication.



4. Pull the cartridges out of the drill holes.

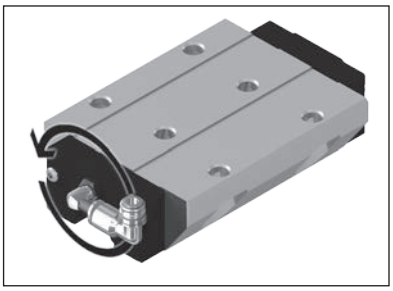


5. Remove the roller carriage from the slide module.



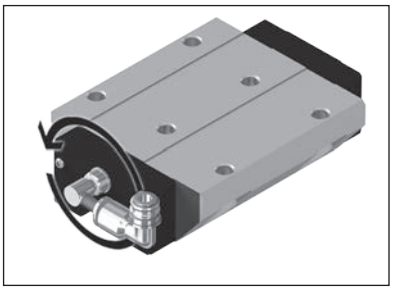
ELGA-BS-KF-120

6. Unscrew the barbed L-fitting from the roller carriage.
7. Check the lubricating unit for wear and replace if necessary.



ELGA-BS-KF- 150

6. Unscrew the adapter with mounted barbed L-fitting from the roller carriage.
7. Check the lubricating unit for wear and replace if necessary.



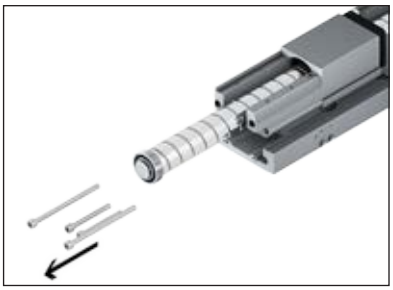
Dismantling the retainer or retainer module with spindle assembly

ELGA-BS-KF-120

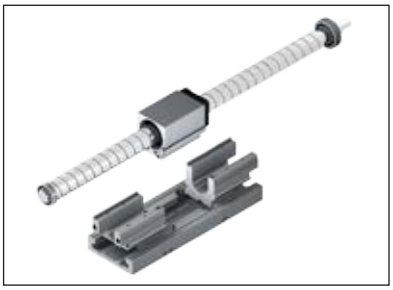
8. Unscrew the two socket head screws for mounting the retainer from slide module.

ELGA-BS-KF-150

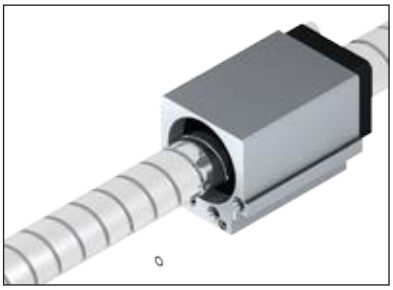
8. Unscrew the four socket head screws for mounting the retainer module from the slide module.
   The figure on the right shows ELGA-BS-KF-150.



9. Remove the spindle assembly with the retainer module from the slide module.
10. Clean the slide module.



11. Remove the O-ring from the retainer module.
12. Check the O-ring for wear and replace if necessary.

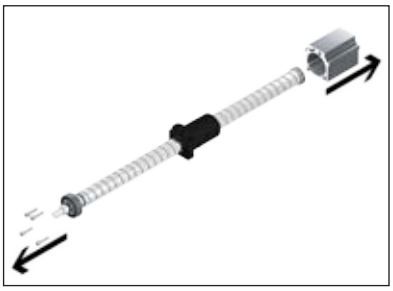


4.3.4 Replacing the retainer or retainer module

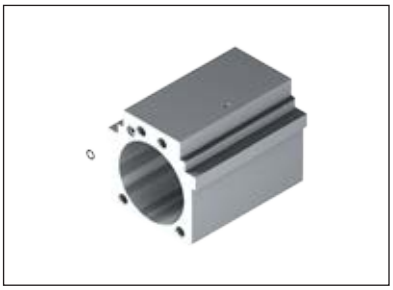
Depending on the size, the spindle assembly for spindle axes ELGA-BS-KF-70 /80 / 120 / 150 is mounted in the retainer or retainer module with a different number of socket head screws:

- ELGA-BS-KF-70 / 80: one socket head screw,
- ELGA-BS-KF-120: two socket head screws,
- ELGA-BS-KF-150: four socket head screws.

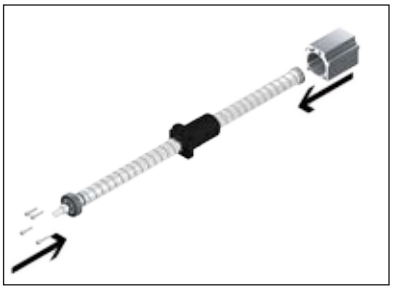
1. Unscrew the socket head screw from the retainer or retainer module.
2. Pull the retainer or retainer module off the spindle assembly.



3. Remove the O-ring from the retainer or retainer module.
4. Check the O-ring for wear and replace if necessary.
5. Lightly grease the O-ring.
6. Re-insert the O-ring.



7. Push the new retainer or new retainer module onto the spindle assembly.
8. Clean the socket head screw to remove the locking agent.
9. Wet the threaded hole with screw locking agent.
10. Screw in the socket head screw and tighten with the appropriate tightening torque.



Size	Number of socket head screws	Tightening torque
ELGA-BS-KF-70	1	2.5 Nm
ELGA-BS-KF-80	1	5 Nm
ELGA-BS-KF-120	2	3.5 Nm
ELGA-BS-KF-150	4	7 Nm

4.3.5 Checking and replacing the roller bearing and the spindle assembly

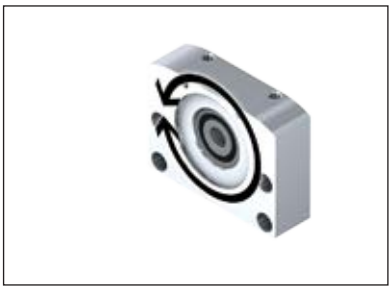
4.3.5.1 Checking and replacing the roller bearing with seat in the bearing block

In the spindle axes ELGA-BS-KF-70 /80 / 120 / 150, the bearing of the spindle module in the **bearing block** differs depending on the size:

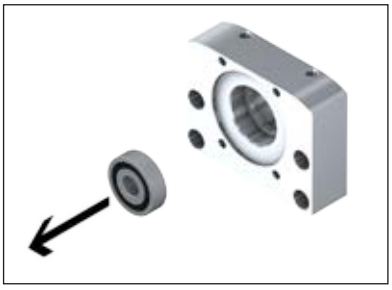
- ELGA-BS-KF-70 with two **deep-groove ball bearings**,
- ELGA-BS-KF-80 / 120 / 150 with two **angular ball bearings**.

The rolling behaviour of the roller bearing in the bearing block and the roller bearing on the spindle assembly must be checked with each repair. If the rolling behaviour of one of the two roller bearings is no longer perfect, e.g. due to increased scratching noises, both roller bearings must always be replaced.

1. Check the rolling behaviour of the roller bearing in the bearing block and the roller bearing on the spindle assembly.



Replacing the roller bearing



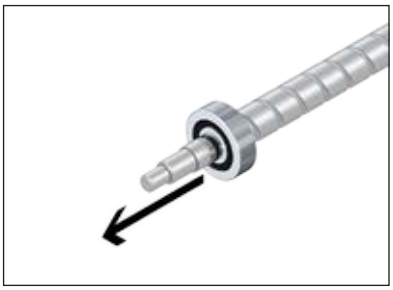
Note

When driving out the roller bearing, ensure that the bearing seat in the bearing block is not damaged.

1. Drive the roller bearing out of the bearing block.

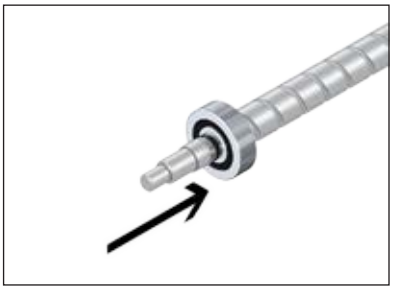
Note

Ensure that the seat of the roller bearing is not damaged when it is pulled off the spindle assembly.



2. Pull the roller bearing off the spindle assembly.

3. Apply a thin film of grease to the inner raceway of the new roller bearing.



Note

When pressing on the roller bearing, ensure that it does not tilt and become damaged.

ELGA-BS-KF-70

4. Press the deep-groove ball bearing over the inner raceway onto the spindle assembly.

ELGA-BS-KF-80 / 120 / 150

Note

When installing the angular ball bearing (in ELGA-BS-KF-80 / 120 / 150) ensure that the **wider** outer raceway face is **always** pointed towards the bearing block.

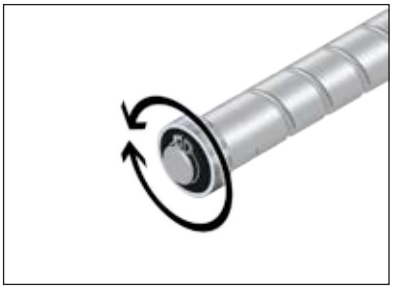
4. Press the angular ball bearing over the inner raceway onto the spindle assembly.

4.3.5.2 Checking and replacing the deep-groove ball bearing with seat in the bearing cap

In spindle axes ELGA-BS-KF-70 /80 / 120 / 150 the spindle assembly is mounted in the **bearing cap** by means of deep-groove ball bearings.

The rolling behaviour of the deep-groove ball bearing on the spindle assembly must be checked with each repair. If the rolling behaviour is no longer perfect, e.g. due to increased scratching noises, the deep-groove ball bearing on the spindle assembly must be replaced.

1. Check the rolling behaviour of the deep-groove ball bearing on the spindle assembly.



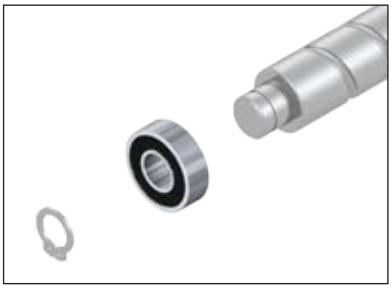
Replacing the deep-groove ball bearing

Note

Ensure that the seat of the deep-groove ball bearing is not damaged when it is pulled off the spindle assembly.

2. Remove the retaining ring from the spindle assembly.
3. Pull the deep-groove ball bearing off the spindle assembly.

4. Apply a thin film of grease on the inner raceway of the deep-groove ball bearing.
5. Press the deep-groove ball bearing over the inner raceway onto the spindle assembly.
6. Insert the retaining ring in the spindle assembly.



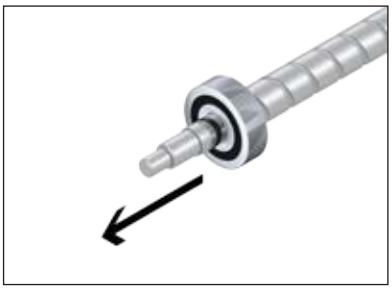
4.3.5.3 Checking and replacing the spindle assembly

The spindle assembly converts the rotational movement of the motor into a linear movement. The backlash free bearing enables very high repetition accuracy to be achieved.

If the rolling behaviour is no longer faultless, the spindle assembly must be replaced.

Note

Ensure that the seat of the roller bearing is not damaged when it is pulled off the spindle assembly.

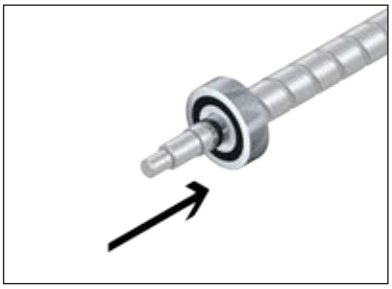


1. Pull the roller bearing with seat in the bearing block off the spindle assembly (➔ Chapter 4.3.5.1 on page 29).

2. Dismantle the deep-groove ball bearing with seat in the bearing cap from the spindle assembly (➔ Chapter 4.3.5.2 on page 30).
3. Replace the retainer or retainer module (➔ Chapter 4.3.4 on page 28).

4. Mount the deep-groove ball bearing with seat in the bearing cap (➔ Chapter 4.3.5.2 on page 30).

5. Apply a thin film of grease on the roller bearing with seat in the bearing block on the inner raceway.



Note

When installing the angular ball bearing (ELGA-BS-KF-80 / 120 / 150) ensure that the wider outer raceway face is **always** pointed towards the bearing block.

Note

When pressing on the roller bearing, ensure that it does not tilt and become damaged.

6. Mount the roller bearing with seat in the bearing block (➔ Chapter 4.3.5.1 on page 29).

4.4 Mounting the spindle axis

4.4.1 Greasing during assembly

- Grease the following parts as described.

Component	Lubricant	Greasing instructions
Spindle assembly	Festo LUB-KC1[1)]	Grease all round.
Roller track	Festo LUB-KC1[1)]	Grease the entire length.
Roller carriage	Festo LUB-KC1[1)]	➔ Chapter 7.4 on page 51

[1)] For further information, refer to the information brochure: **“Accessories, equipment and tools”**. The brochure can be found in the online spare parts catalogue on the Festo website (➔ http://spareparts.festo.com/xdki/data/SPC/0/PDF_SAFE/Fitting%20aids.pdf).

4.4.2 Mounting the retainer or retainer module with spindle assembly on the slide module

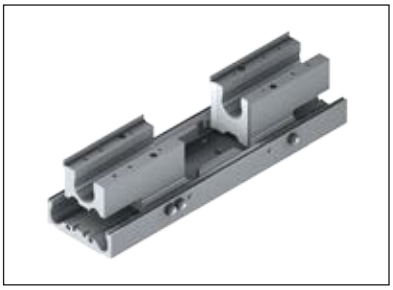
Requirement

The spindle assembly is mounted in the retainer or in the retainer module (➔ Chapter 4.3.4 on page 28).

Depending on the size, the spindle assembly for spindle axes ELGA-BS-KF-70 /80 / 120 / 150 is mounted on the slide module with a different number of socket head screws:

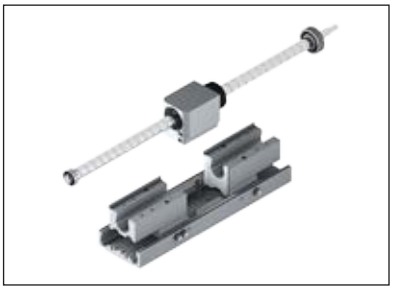
– ELGA-BS-KF-70 / 80 / 120: two socket head screws,
– ELGA-BS-KF-150: four socket head screws (2× M8×70 and 2× M8×118, ➔ Chapter 3.4 on page 18).

1. Place the slide module on the work surface with the attachment side facing downwards. The lubrication nipples face the front.



Note

The O-ring must be inserted on the lubricating channel of the retainer or the retainer module.

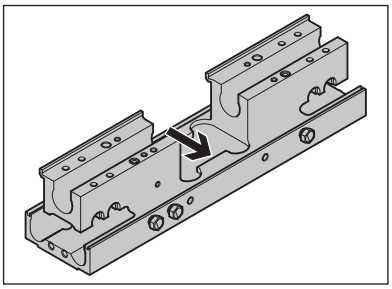


2. Align the retainer or retainer module so that the lubricating channel with the O-ring faces downwards.
3. Wet the threaded holes of the retainer or retainer module with screw locking agent.
4. Clean the socket head screws for mounting the retainer or retainer module to remove the screw locking agent.

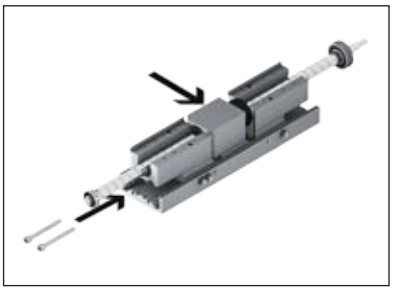
Note

When assembling, press the entire contact area of the retainer or retainer assembly onto the stop edge of the slide module.

The stop edge of the slide module is located on the side with the lubrication nipples.



5. Insert the spindle assembly with the retainer or retainer module into the slide module.
6. Press the entire contact area of the retainer or retainer assembly onto the stop edge of the slide module.
7. Screw the socket head screws for mounting the retainer or retainer module into the slide module.

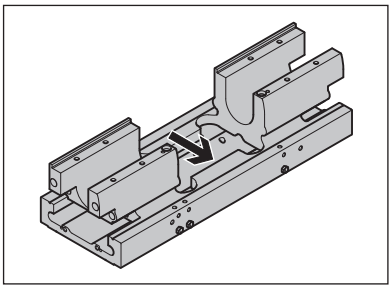


ELGA-BS-KF-150 only

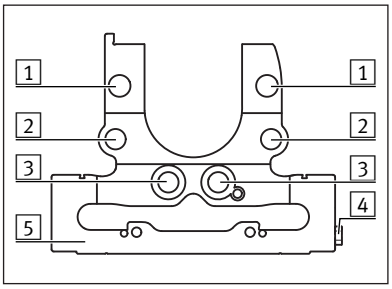
Note

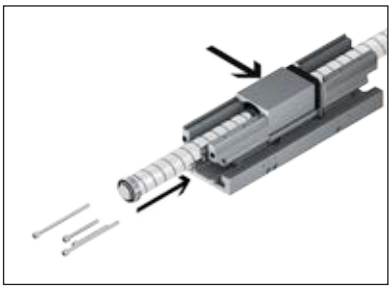
When assembling, press the entire contact area of the retainer assembly onto the stop edge of the slide module.

The stop edge of the slide module is located on the side with the lubrication nipples.



6. Press the entire contact area of the retainer or retainer assembly onto the stop edge of the slide module.
7. To mount the retainer module in the slide module [5], screw the socket head screws M8×118 through the holes [2] and the socket head screws M8×70 through the holes [3] in the retainer module ([4] lubrication nipple). Insert the buffers into the holes [1] (➔ Chapter 4.5.2 on page 45).



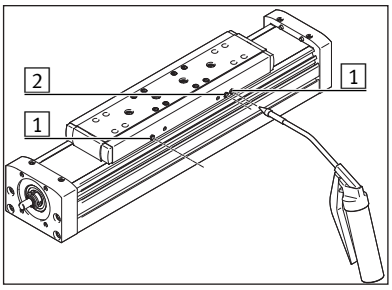


ELGA-BS-KF-70 / 80 / 120 / 150

8. Press the retainer or retainer module onto the stop edge and at the same time tighten the socket head screws with the appropriate tightening torque.

Size	Number of socket head screws	Tightening torque
ELGA-BS-KF-70	2	2.5 Nm
ELGA-BS-KF-80	2	3.5 Nm
ELGA-BS-KF-120	2	9 Nm
ELGA-BS-KF-150	4 (2× M8×70 and 2× M8×118)	22 Nm

9. Use the grease gun to grease the spindle nut via the lubrication nipple in the slide module; significant grease escape from the spindle nut must be visible.



[1] Lubrication nipple for the two roller carriages
[2] Lubrication nipple for the spindle assembly

4.4.3 Mounting the roller carriages

Requirement

The spindle assembly and the retainer or retainer module are mounted in the slide module (➔ Chapter 4.4.2 on page 32).

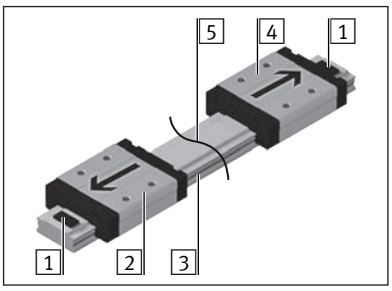
The new roller carriages are supplied as follows:
- for ELGA-BS-KF-70 / 80 in pairs on an assembly tool,
- for ELGA-BS-KF-120 / 150 individually, each on an assembly tool.

4.4.3.1 ELGA-BS-KF-70 / 80

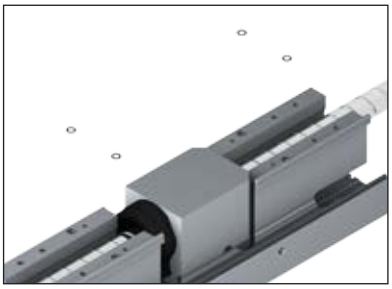
Note

The recirculating ball bearing guide system is pretensioned. Individual balls can therefore easily slip out and become lost when pushing the roller carriage off the assembly tool.

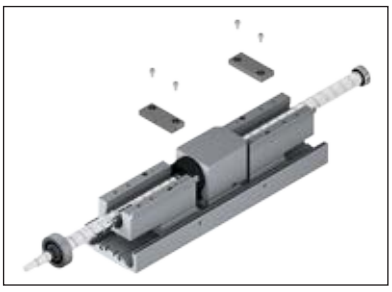
During assembly the roller carriages must remain on the assembly tool and are pushed directly from the assembly tool and onto the roller track in the cylinder barrel.



1. Push one roller carriage [2] all the way to the left and the other roller carriage [4] all the way to the right on the assembly tool [3], up to the respective stopper [1].
2. Use adhesive tape or similar to fix the assembly tool [3] between the roller carriages [2] and [4] so that the roller carriages cannot slide downwards after cutting the assembly tool.
3. Cut the assembly tool [3] in the middle [5].
   The roller carriages can be mounted on the slide module with the assembly tool.

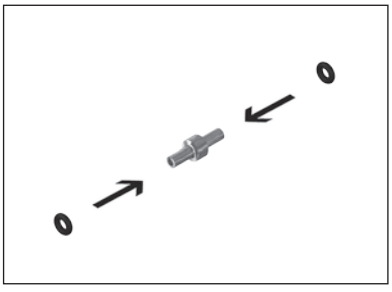


4. Place the slide module on the work surface with the attachment side facing downwards, the lubrication nipples face the **rear**.
5. Insert four O-rings into the holes in the slide module.



6. Wet the threaded holes for mounting the lubricating heads in the slide module with screw locking agent.
7. Clean the socket head screws for mounting the lubricating heads to remove the screw locking agent.
8. Position the lubricating heads; the die locating opening for the lubricating channel on the front sides of the lubricating heads point towards the right or left-hand edge of the slide module.
9. Press the lubricating heads onto the stop face.
10. Screw in the socket head screws and tighten with the appropriate tightening torque.

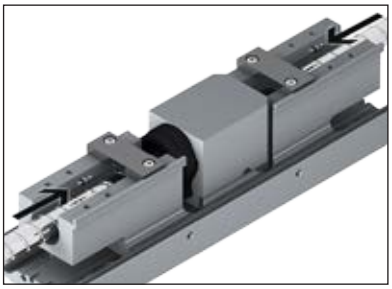
Size	Tightening torque
ELGA-BS-KF-70	1.5 Nm
ELGA-BS-KF-80	1.5 Nm



11. Push the O-rings right and left onto the lubricating channels.

12. Insert the lubricating channels into the lubrication holes of the lubricating heads.

    The O-ring must lie flush on the lubricating heads and lubricating channels.

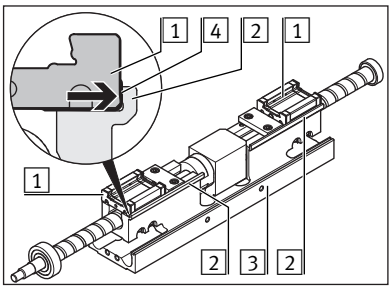


Note

During mounting on the slide module, the roller carriages must not be pushed off the assembly tools.

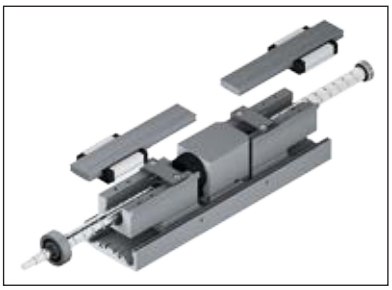
Note the alignment of the roller carriage [1] on assembling!

The ground sides of the roller carriages [4] must be installed facing the stop edge [2] of the slide module [3].

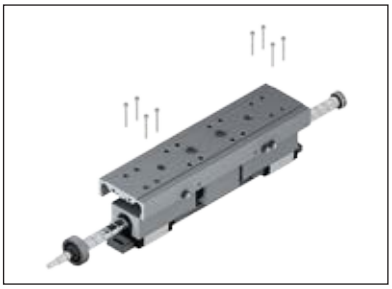


13. Wet the mounting holes in the roller carriages with screw locking agent.
14. Place the roller carriages with the assembly tool on the slide module, the ground side of the roller carriages faces the stop edge of the slide module and the assembly tool faces upwards.
15. Push the roller carriage onto the free ends of the lubricating channels.

    The O-ring must lie flush on the lubricating channel and on the roller carriage.



16. Carefully turn over the slide module with spindle assembly and the roller carriages and place on the assembly tools; the lubrication nipples face the front.
17. Screw the socket head screws through the slide module and into the roller carriages.
18. Press the roller carriages with the ground sides on the stop edge of the slide module and at the same time tighten the socket head screws with the appropriate tightening torque.

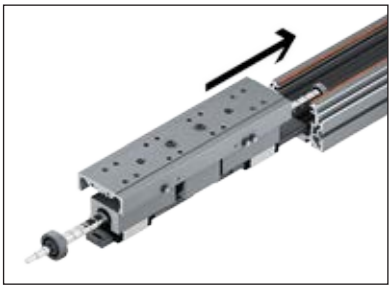


Size	Tightening torque
ELGA-BS-KF-70	1.5 Nm
ELGA-BS-KF-80	1.5 Nm

19. Use compressed air and a cloth to clean the cylinder barrel and roller track.

Note

- Ensure correct alignment of the cylinder barrel with respect to the attachment side for the bearing block or bearing cap in accordance with the markings you have made.
- The lubrication nipples on the slide module point towards the front.



20. Remove the stoppers or adhesive tape fixings from the assembly tools.
21. Position the assembly tool with slide module and spindle assembly on the roller track.
22. Carefully push the first roller carriage of the slide module (with the spindle assembly) onto the roller track, at the same time, make sure no balls spring out of the roller carriage.
23. Repeat the procedure for the second roller carriage.

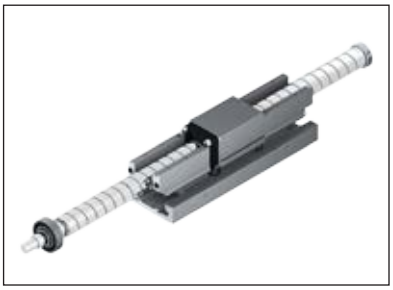
Balls that have sprung out of the roller carriages must be re-inserted in the relevant roller carriages.

Note

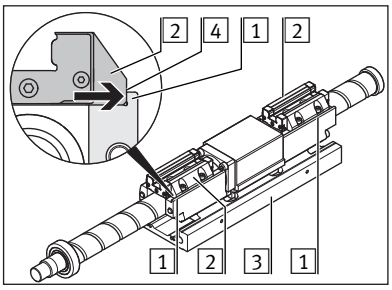
New roller carriages must be lubricated before commissioning the spindle axis (➔ Chapter 4.4.4 on page 41). Non-compliance can lead to unlubricated operation, and thus failure of the spindle axis before the next specified relubrication.

4.4.3.2 ELGA-BS-KF-120 / 150

1. Place the spindle assembly and retainer or retainer module on the work surface with the slide module facing downwards; the lubrication nipples face the rear.



All the spare parts required for lubrication of the roller carriage are supplied in a fittings kit.



Note

The recirculating ball bearing guide system is pretensioned. Individual balls can therefore easily slip out and become lost when pushing the roller carriages off the assembly tool.

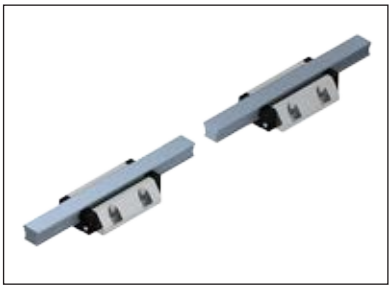
The roller carriages must remain on the assembly tool during the mounting of the lubrication spare parts from the fittings kit.

Note the alignment of the roller carriage [2] on assembling!

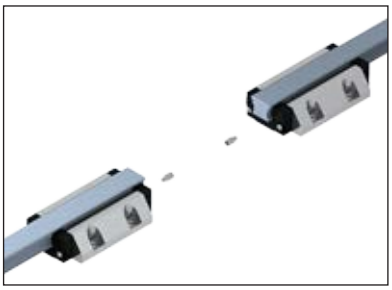
The ground sides of the roller carriage [4] must be installed facing the stop edge [1] of the slide module [3].

2. Place both roller carriages next to each other with the assembly tool facing upwards and the ground side facing the front.

   The assembly tool faces upwards.



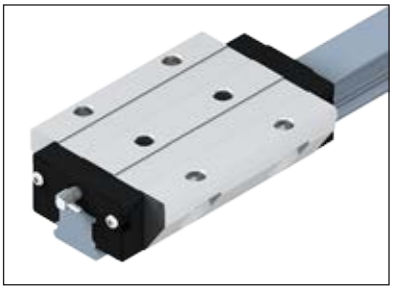
3. Unscrew the two grub screws facing each other from the front sides of the roller carriages.



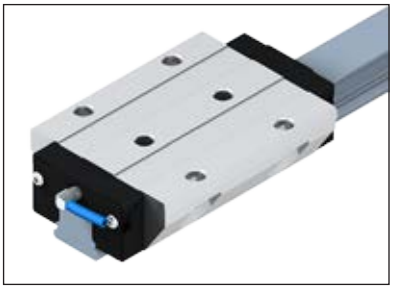
ELGA-BS-KF-120

4. Push the roller carriage to the end of the assembly aid, far enough to allow the barbed L-fitting to be mounted in the thread that has become free.
5. Screw the barbed L-fitting into the roller carriage and tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-120	0.5 Nm



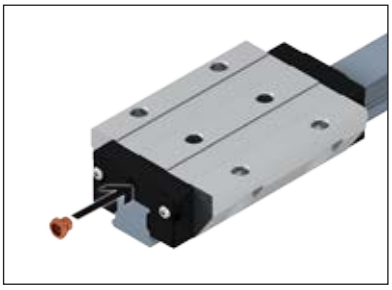
6. Push the plastic hose onto the barbed L-fitting.



ELGA-BS-KF-150

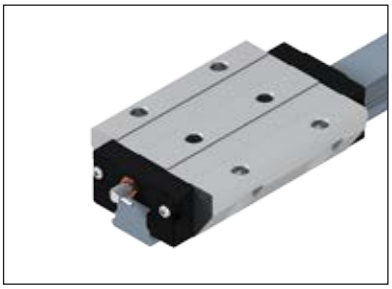
4. Push the roller carriage to the end of the assembly aid, far enough to allow the adapter to be mounted in the thread that has become free.
5. Screw the adapter into the roller carriage and tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-150	0.5 Nm



6. Screw the barbed L-fitting into the adapter and tighten with the appropriate tightening torque.

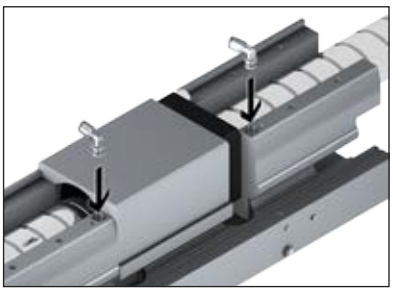
Size	Tightening torque
ELGA-BS-KF-120	0.5 Nm



7. Push the plastic hose onto the barbed L-fitting.

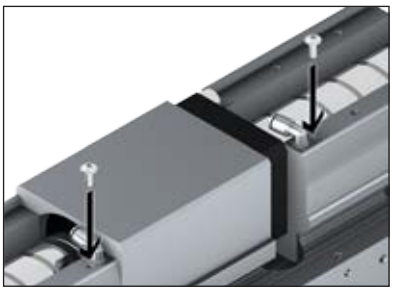
ELGA-BS-KF-120 / 150

8. Lightly grease the holes of the cartridge mountings in the slide module.
9. Insert the cartridges into the holes.
10. Wet the flange screws for mounting the two cartridges with screw locking agent.



11. Screw in the flange screws and tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-120	0.5 Nm
ELGA-BS-KF-150	0.5 Nm

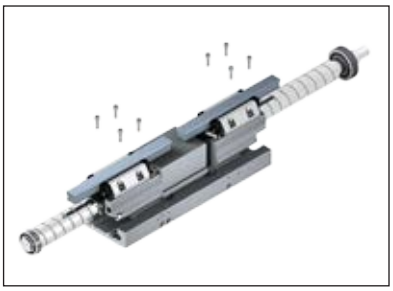


12. Wet the mounting holes for the roller carriages in the slide module with screw locking agent.

13. Insert the roller carriage with the assembly tools facing upwards into the slide module.

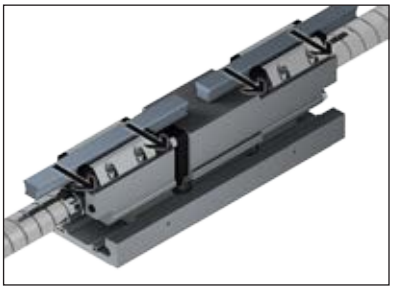
    The ground side of the roller carriage must touch the stop edge of the slide.

14. Push the cartridges onto the free ends of the plastic hoses.
15. Screw in the socket head screws loosely.



16. Push the roller carriage with the ground side onto the stop edge of the slide module and at the same time, tighten the socket head screws tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-120	7.5 Nm
ELGA-BS-KF-150	13 Nm



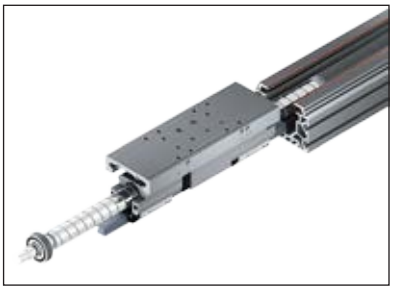
Note

New roller carriages must be lubricated before commissioning the spindle axis (➔ Chapter 4.4.4 on page 41). Non-compliance can lead to unlubricated operation, and thus failure of the spindle axis before the next specified relubrication.

17. Use compressed air and a cloth to clean the cylinder barrel and roller track.

Note

- Ensure correct alignment of the cylinder barrel with respect to the attachment side for the bearing block or bearing cap in accordance with the markings you have made.
- The lubrication nipples on the slide module point towards the front.



18. Carefully turn over the slide module with spindle assembly and the roller carriages; the lubrication nipples face the front.
19. Position the assembly tool with slide module and spindle assembly on the roller track.
20. Carefully push the first roller carriage of the slide module (with the spindle assembly) onto the roller track, at the same time, make sure no balls spring out of the roller carriage.
21. Repeat the procedure for the second roller carriage.

Balls that have sprung out of the roller carriages must be re-inserted in the relevant roller carriages.

Note

New roller carriages must be lubricated before commissioning the spindle axis (➔ Chapter 4.4.4 on page 41). Non-compliance can lead to unlubricated operation, and thus failure of the spindle axis before the next specified relubrication.

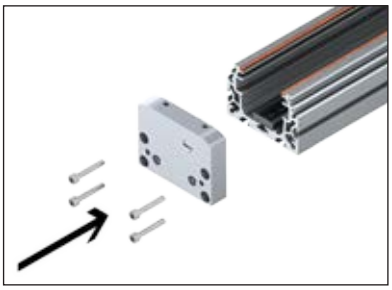
4.4.4 Relubricating the recirculating ball bearing guide

The recirculating ball bearing guides must be lubricated with a grease gun before commissioning and at certain intervals (➔ Chapter 7.4 on page 51).

Festo offers a one-hand high-pressure grease gun with a suitable pinpoint nozzle for greasing the lubricating holes (➔ Chapter 8.2 on page 52).

4.4.5 Assembling the spindle axis

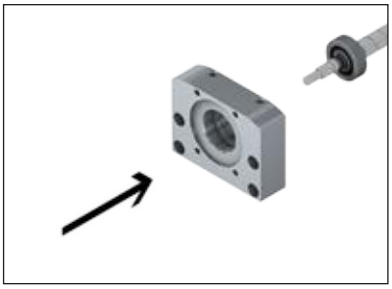
1. Clean the socket head screws for the bearing cap to remove the screw locking agent.
2. Wet the socket head screws with threadlocker.
3. Screw in the socket head screws loosely.



4. Apply a thin layer of grease on the outer raceway of the roller bearing on the spindle bearing.

Note

After the spindle assembly has been driven into the roller bearing in the bearing block, the spindle assembly must be supported. The self-weight and resulting torque / tilting moments can damage the roller bearings.

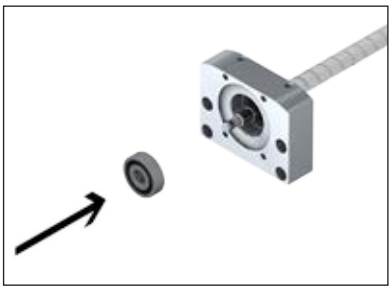


5. Carefully drive the spindle assembly into the bearing block and support the spindle assembly.

6. Apply a thin layer of grease on the outer and inner raceway of the roller bearing.

Note

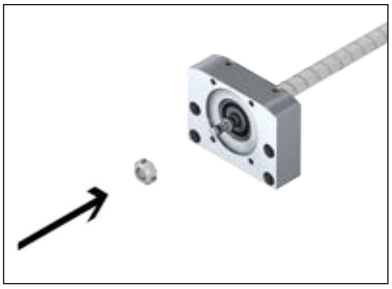
When installing the angular ball bearing (ELGA-BS-KF-80 / 120 / 150), ensure that the wider outer raceway face is facing inwards, in the direction of the stop face in the bearing block.



7. Carefully drive the roller bearing into the bearing block above the outer and inner raceway.

Note

The axial clearance of the roller bearing is adjusted by tightening the slotted nut. Overtightening reduces the life of the roller bearing. The correct tightening torque is chosen at the discretion of the skilled personnel.



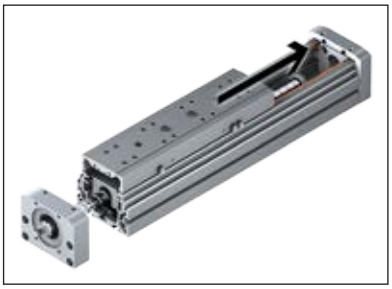
ELGA-BS-KF-70

8. Screw the hex nut onto the spindle and adjust the roller bearing axially so that it free from backlash.

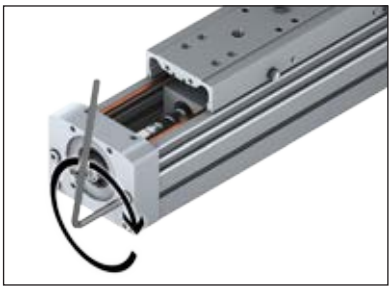
ELGA-BS-KF-80 / 120 / 150

8. Screw the slotted nut onto the spindle and adjust the roller axially so that it free from backlash.

9. Insert the roller bearing preassembled on the spindle assembly into the bearing cap.



10. Knock the bearing block onto the cylinder barrel.
11. Clean the socket head screws to remove the locking agent.
12. Wet the socket head screws with thread locking agent.
13. Screw in the socket head screws loosely.



14. Push the slide module in the direction of the bearing block until it stops.
15. Tighten the socket head screws using the appropriate torque.

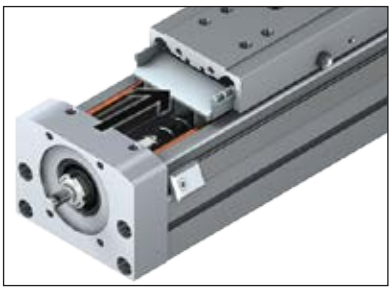
Size	Tightening torque
ELGA-BS-KF-70	2.5 Nm
ELGA-BS-KF-80	5 Nm
ELGA-BS-KF-120	12 Nm
ELGA-BS-KF-150	20 Nm

16. Push the slide module in the direction of the bearing cap until it stops.
17. Tighten the socket head screws using the appropriate torque.

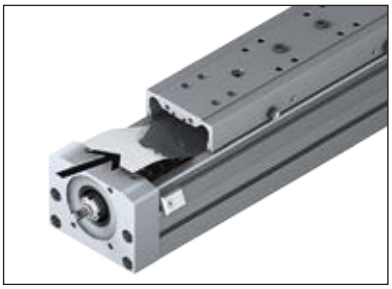
Size	Tightening torque
ELGA-BS-KF-70	2.5 Nm
ELGA-BS-KF-80	5 Nm
ELGA-BS-KF-120	12 Nm
ELGA-BS-KF-150	20 Nm

4.4.6 Mounting the cover band

1. Place the bottom belt reversals in the correct position on both sides of the slide module.



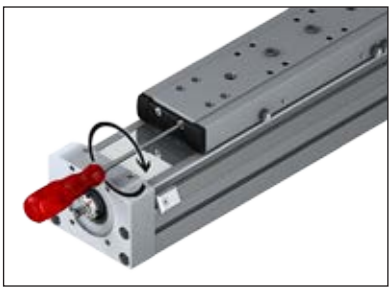
2. Guide the cover band through the slide module over the belt reversals.



At the top belt reversals:
- the ELGA-BS-KF-70 / 80 has **one** compression spring mounted on each.
- the ELGA-BS-KF-120 / 150 has **two** compression springs mounted on each.

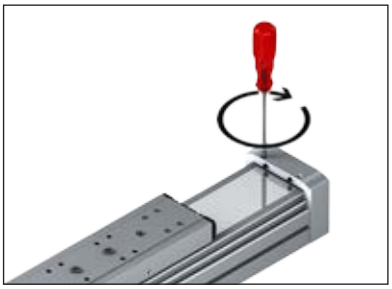
3. Insert the top band reversals together with the compression springs on both sides of the slide module.

4. Place the cover on both sides of the slide module.
5. Wet the socket head screws for the cover with locking agent.
6. Screw the socket head screws into the slide module through the cover on both sides of the slide module and tighten using the appropriate torque.



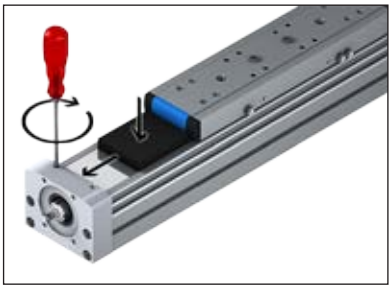
Size	Tightening torque
ELGA-BS-KF-70	1.2 Nm
ELGA-BS-KF-80	1.2 Nm
ELGA-BS-KF-120	2.0 Nm
ELGA-BS-KF-150	2.0 Nm

7. Push the cover band into the slots of the gearing block and the bearing cap.
8. Wet the two grub screws with locking agent.
9. Screw the grub screws into the bearing cap and tighten with the appropriate tightening torque (see Table).



Size	Tightening torque
ELGA-BS-KF-70	2.0 Nm
ELGA-BS-KF-80	2.0 Nm
ELGA-BS-KF-120	2.0 Nm
ELGA-BS-KF-150	2.0 Nm

10. Wet the two grub screws with locking agent.
11. Screw grub screws loosely into the bearing block. The cover band must not be fixed in place.
12. Select the suitable clamping element depending on the axis size, see Table (➔ Chapter 8.2 on page 52).

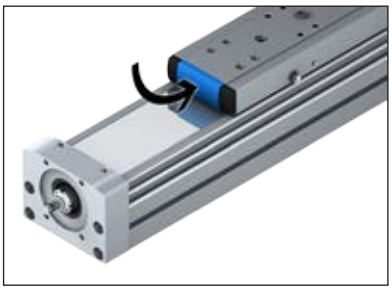


Size	Clamping element
ELGA-BS-KF-70	EADT-S-L5-70 (use lengthwise)
ELGA-BS-KF-80	EADT-S-L5-70 (use crosswise)
ELGA-BS-KF-120	EADT-S-L5-120 (use lengthwise)
ELGA-BS-KF-150	EADT-S-L5-120 (use crosswise)

13. Place the clamping element on the cover band.
14. Press the clamping element onto the cover band and at the same time push the cover band into the slot in the bearing block or bearing cap.
15. Tighten the grub screws in the bearing block or bearing cap with the appropriate tightening torque (see Table).

Size	Tightening torque
ELGA-BS-KF-70	2.0 Nm
ELGA-BS-KF-80	2.0 Nm
ELGA-BS-KF-120	2.0 Nm
ELGA-BS-KF-150	2.0 Nm

16. Move the slide module to check whether the cover band is securely in place. If the band ripples, the cover band must be pushed further into the bearing block or bearing cap.
17. Clip the clips onto the covers on both sides of the slide module.



4.5 Replacing the buffers or buffer elements

Note
Do not use any lubricant to mount the buffers or buffer elements.

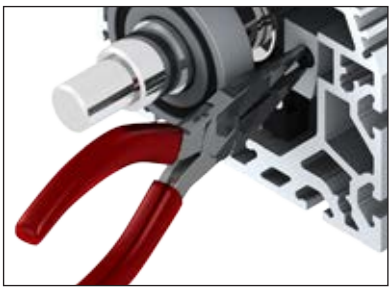
4.5.1 Replacing the buffers or buffer elements in the bearing block and in the bearing cap

Two buffers or buffer elements are inserted into both the bearing block and into the bearing cap. These buffers and buffer elements can be replaced at any time without dismantling the spindle axis.

1. Use pliers to pull out the buffers or buffer elements.
2. Replace the buffers or buffer elements in the bearing block and in the bearing cap.

4.5.2 ELGA-BS-KF-150 only – Replacing the buffers in the slide module

In the ELGA-BS-KF-150, two buffers each are inserted into the slide module on each front side.



4.5.2.1 Replacing the buffers which touch the bearing block

1. Do not push the slide module up to the stop in the direction of the bearing block, leave approx. 5 cm space.
2. Undo the cover band in the bearing block and in the bearing cap (➔ Chapter 4.3.1 on page 21).
3. Dismantle the bearing cap (➔ Chapter 4.3.2 on page 22).
4. Unscrew the socket head screws from the bearing block (➔ Chapter 4.3.2 on page 22).

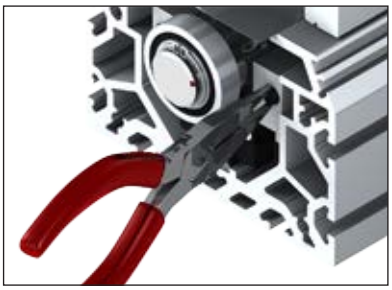
Note

The recirculating ball bearing guide system of the roller carriages is preloaded. Therefore, if the roller carriages are not pushed off the roller track carefully, individual balls can easily spring out and be lost.

Any ball bearings that spring out of the roller carriages must be re-inserted.

5. Push the spindle assembly with slide module and bearing block onto the roller track at the front end of the cylinder barrel – the roller carriages must remain on the roller track.
6. Use pliers to pull out the buffers.
7. Replace the buffers in the roller carriage.
8. Re-assemble the spindle axis (➔ Chapter 4.4.5 on page 41).
9. Mount the cover band (➔ Chapter 4.4.6 on page 43).

4.5.2.2 Replacing the buffers that touch the bearing cap

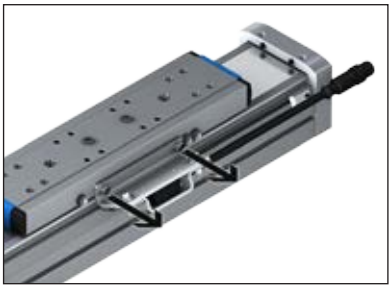


1. Push the slide module in the direction of the bearing cap until it stops.
2. Undo the cover band in the bearing cap (➔ Chapter 4.3.1 on page 21).
3. Dismantle the bearing cap (➔ Chapter 4.3.2 on page 22).
4. Use pliers to pull out the buffers.
5. Replace the buffers in the roller carriage.
6. Re-assemble the spindle axis (➔ Chapter 4.4.5 on page 41).
7. Mount the cover band (➔ Chapter 4.4.6 on page 43).

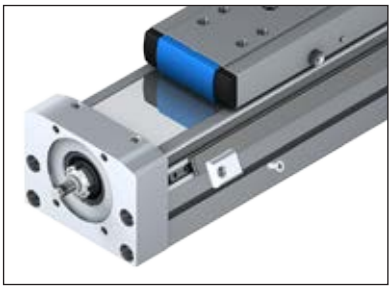
4.6 Replacing the measuring tape of the incremental displacement encoder

4.6.1 Remove the old measuring tape

1. Dismantle the sensor bracket the measuring unit.



2. Unscrew the countersunk screws of the caps from the slot nuts at both ends of the magnetic strip.
3. Remove the caps.



4. Remove the measuring tape carefully from the cylinder barrel, do **not** use any sharp-edged auxiliary means.
5. Clean the cylinder barrel to remove adhesive residues.

Festo recommends LOCTITE 7063 and LOCTITE 7070 for cleaning.

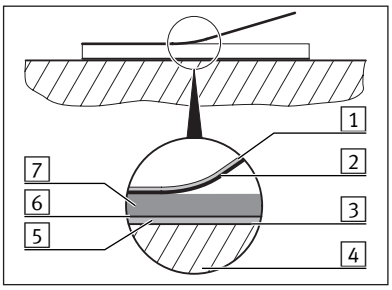
4.6.2 Sticking on the new measuring tape

Note

To prevent stresses in the magnetic strip, it must not be extended, twisted or supported or handled with the magnetised plastic strip facing inwards (min. radius of curvature 150 mm).

When sticking on the magnetic strip note the markings on the magnetic strip and on the sensor head. Incorrect assembly produces incorrect values. A magnetic strip that is already stuck on is irreparably damaged on removal and cannot be reused.

Structure of the measuring tape



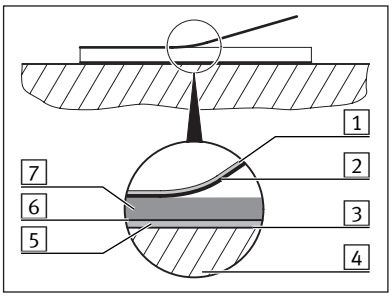
[1] Cover band
[2] Double-sided adhesive tape with protective film
[3] Double-sided adhesive tape with protective film
[4] Cylinder barrel
[5] Steel strip
[6] Adhesive tape
[7] Magnetic strip

– [1] and [2] are connected to each other in the factory
– [3], [5], [6] and [7] are connected to each other in the factory

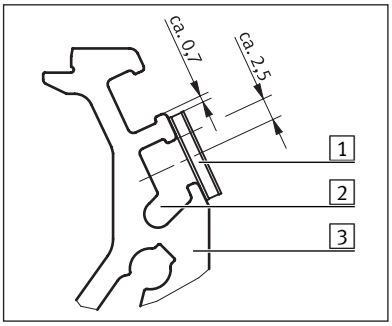
1. Push the slot nuts onto the bearing block and the bearing cap.

The magnetic strip [7] is glued onto a steel strip [5] (= carrier side) in the factory by means of adhesive tape [6]. On the other side of the steel strip [5] there is a double-sided adhesive tape [3] with protective film.

2. Pull the protective film off the adhesive tape [3].



3. Adjust the magnetic strip (incl. steel strip) [1] with the adhesive strip side in the middle on the cylinder barrel. A distance of 20 mm each must be maintained from the bearing block and bearing cap.
4. Stick the magnetic strip (incl. steel strip) [1] with the adhesive tape side above the slot [2] onto the cylinder barrel [3].

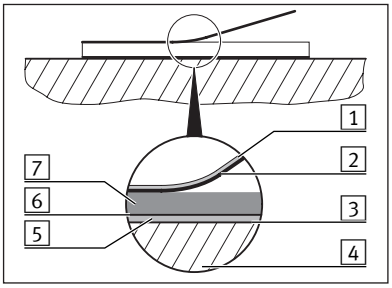


The easiest way is to stick on the magnetic strip in two steps:

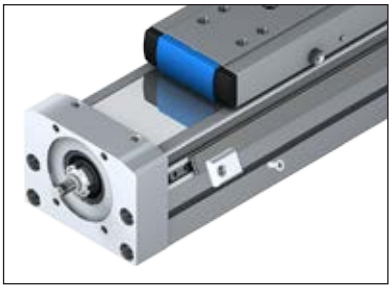
1. Remove half the protective film on the adhesive tape.
2. Stick on the magnetic strip corresponding to the removed film.
3. Remove the remaining length of the protective film from the adhesive tape.
4. Stick on the whole length of magnetic strip.

A double-sided adhesive tape [2] with protective film is stuck onto the cover band [1] in the factory.

5. Pull the protective film off the adhesive tape [2].
6. Stick the cover band [1] with adhesive tape [2] onto the magnetic strip [7].
7. In addition, use LOCTITE 401 to glue both ends of the cover band [1] onto the magnetic strip.

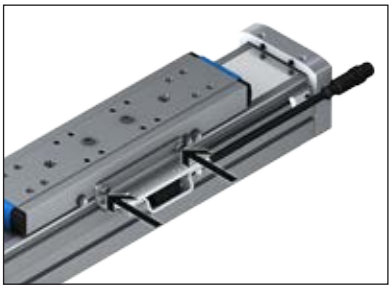


8. Place the caps on the two ends of the measuring tape. A distance of 5 mm each must be maintained from the bearing block and bearing cap.
9. Wet the countersunk screws with locking agent.
10. Screw countersunk screws through the caps and into the slot nuts and tighten with a tightening torque of 0.15 Nm.



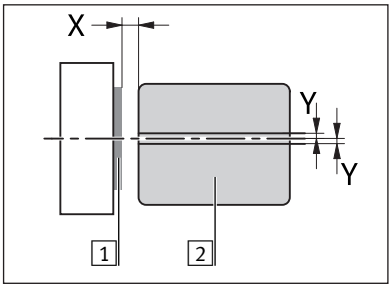
11. Use two socket head screws to screw the sensor bracket with measuring unit onto the slide module and tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-70	5 Nm
ELGA-BS-KF-80	5 Nm
ELGA-BS-KF-120	5.9 Nm
ELGA-BS-KF-150	5.9 Nm

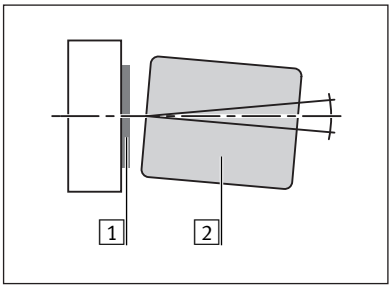


12. To obtain precise position information, the measuring unit must comply with the tolerances listed in the following for the distance and angle between the measuring unit and the measuring tape:

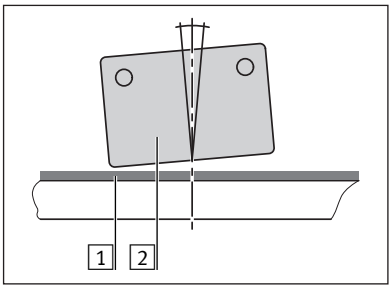
- The measuring unit [2] must be set on attachment with a distance **X** of 0.1 mm to 2 mm from the magnetic strip [1].
- The offset between the measuring unit and the horizontal middle axis of the magnetic strip [1] must not exceed Y = 2.5 mm.



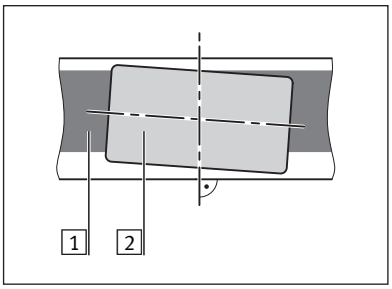
- The inclination between the measuring unit [2] and the magnetic strip [1] must not exceed ±5°.



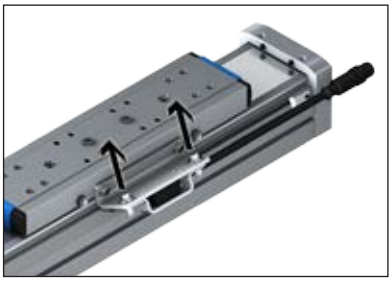
- The deviation in the parallelism between the measuring unit [2] and the magnetic strip [1] must not exceed ±5°.



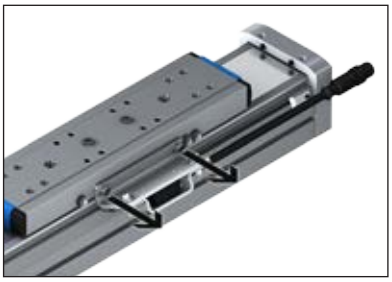
- The deviation in the parallelism between the measuring unit [2] and the magnetic strip [1] must not exceed ± 1.5°.



13. If these tolerances are not complied with, the measuring unit must be readjusted.
14. Undo the socket head screws of the sensor mounting.
15. Align measuring unit correctly.

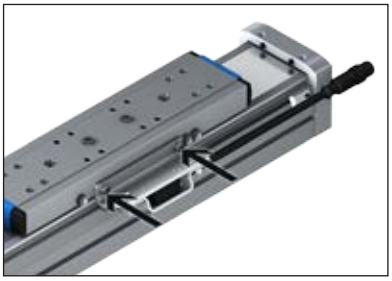


16. Undo the socket head screws of the sensor bracket.
17. Align measuring unit correctly.

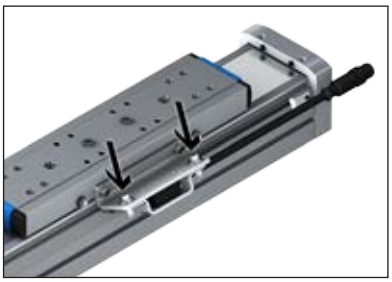


18. Use two socket head screws to screw the sensor bracket with measuring unit onto the slide module and tighten with the appropriate tightening torque.

Size	Tightening torque
ELGA-BS-KF-70	5 Nm
ELGA-BS-KF-80	5 Nm
ELGA-BS-KF-120	5.9 Nm
ELGA-BS-KF-150	5.9 Nm



19. Tighten the socket head screws of the sensor mounting with a tightening torque of 3.5 Nm.



5 Assembly and functional test

After completing the assembly work on the spindle axis, check that it functions faultlessly.

5.1 No-load torque

It must be possible to move the idling slide module, with no attached drive or coupled load, without much resistance or jerking.

This check is based on the technician's instinct and experience. It is not possible to specify precise test values.

5.2 Start-up

Commission the repaired spindle axis as described in the operating instructions (enclosed with the spindle axis or available on the Festo website (➔ www.festo.com)).

6 Cleaning

Note

Festo recommends LOCTITE 7061 or an alternative suitable cleaning product for cleaning.

When using other cleaning products, ensure that they do not corrode the non-metal parts of the linear drive. If in doubt, check the resistance of the non-metal parts with the help of the information on the Festo website (➔ www.festo.com).

- Use a soft cloth and a gentle cleaning product to clean the spindle axis as and when necessary.
- Use a mild cleaning product to clean the cover band and the roller track as and when necessary.

7 Maintenance

7.1 Check the reversing backlash

Note

The reversing backlash (reversing clearance) must be checked with each maintenance. Increased reversing backlash results in increased noise in the long term and ultimately to blocking of the lead screw or fracturing of the spindle nut.

	ELGA-BS-KF-70	ELGA-BS-KF-80	ELGA-BS-KF-120	ELGA-BS-KF-150
Max. allowable reversing backlash	0.1 mm	0.1 mm	0.2 mm	0.2 mm

- Check the reversing backlash of the slide module as described in the operating instructions (enclosed with the spindle axis or available on the Festo website, ➔ www.festo.com).

7.2 Checking the cover band

- Check the cover band after every 2000 km operating distance.
  Ripples on the cover band are a sign of belt reversal wear.
- If ripples form, retighten the cover band on both sides (➔ Chapter 4.4.6 on page 43).

If the cover band can no longer be retensioned:

- Replace the belt reversals (➔ www.festo.com/spareparts).

7.3 Relubricating the spindle axis

Lubricant for assembly and maintenance of the spindle axis:

Application	Designation
Assembly	Festo LUB-KC1[1)]
Maintenance	Festo LUB-KC1[1)]

[1)] See the “Accessories, equipment and tools” information brochure. The brochure can be found in the online spare parts catalogue on the Festo website (➔ http://spareparts.festo.com/xdki/data/SPC/0/PDF_SAFE/Fitting%20aids.pdf).

7.4 Relubricating the roller carriage and spindle assembly

The roller carriages and the spindle assembly should be relubricated after a load-dependent lubrication interval S_{int}. To determine the lubrication interval, the load comparison factor f_v must be calculated using the formula for combined loads, see operating instructions **Spindle axis ELGA-BS-KF** (➔ www.festo.com).

Note

The lubrication interval S_{int} depends on the load acting on the product.

Load factors:

- dusty and contaminated environment
- Nominal stroke, 2000 mm
- Speed, 2 m/s
- Travel profile ≙ triangular operation (frequent acceleration and braking)
- Ambient temperature, 40 °C
- Service life of the product, 3 years

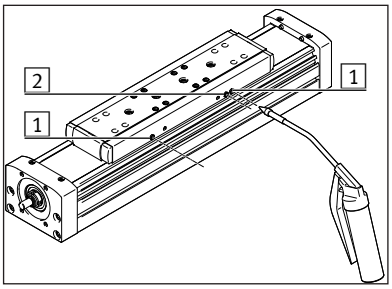
- If one of these factors applies, halve the lubrication interval S_{int}.
- If several factors apply at the same time, divide the lubrication interval by four.
- We recommend that you lubricate the spindle assembly and the roller carriages at the same time. In this case lubrication should take place according to the shorter lubrication interval.

Note

The slide module must be moved forwards and backwards on the roller track during relubrication so that the grease can fill all the spaces in the roller carriages.

For notes and information on greasing, refer to the **Spindle axis ELGA-BS-KF** operating instructions (➔ www.festo.com).

- Always insert the lubricant in all lubrication nipples; note the grease quantity per lubrication nipple (see Table).



1 Lubrication nipple for the two roller carriages

2 Lubrication nipple for the spindle assembly

	ELGA-BS-KF-70	ELGA-BS-KF-80	ELGA-BS-KF-120	ELGA-BS-KF-150
Roller carriage grease quantity **each** lubrication nipple 1	0.4 g	0.8 g	2.0 g	3.4 g
Spindle assembly grease quantity in lubrication nipple 2	2.0 g	2.5 g	3.0 g	15 g

Festo offers a one-hand, high-pressure grease gun with a suitable pointed nozzle for greasing the lubrication nipples (➔ Chapter 8.2 on page 52).

8 Tools

This chapter provides an overview of the tools and aids required to repair and maintain the spindle axis.

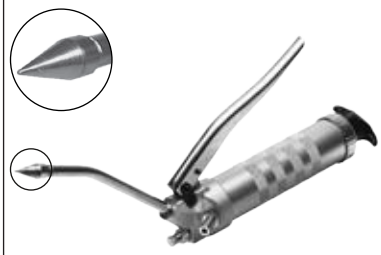
8.1 Standard tools

The following standard tools are required for repair and maintenance of the spindle axis:

- Plastic hammer
- Circlip pliers
- Pliers for retaining rings (inner retainer for bore)
- Ruler
- Allen key
- Torque wrench
- Torque screwdriver
- Flat pliers
- Sturdy general purpose scissors or metal shears

8.2 Special tools

The following special tools are required for repair and maintenance of the spindle axis:

Designation	Additional information	Festo order no.	Figure
One-hand grease gun LUB-1	Pinpoint nozzle for miniature, funnel-shaped lubrication nipples and lubricating holes	647958	
Lubrication adapter LUB-1-TR-I	Lubrication adapter (nozzle pipe Ø 6x200 axial)	647959	
Lubrication adapter LUB-1-TR-L	Lubrication adapter (nozzle pipe Ø 6x200 lateral)	647960	

Designation	Additional information	Festo order no.	Figure
Lubrication adapter LUB-1-TR-W	Lubrication adapter (nozzle pipe Ø 6×200 lateral, 45° angled)	8073388	
Clamping element EADT-S-L5-70	suitable for ELGA-BS-KF-70 / 80	8058451	
Clamping element EADT-S-L5-120	suitable for ELGA-BS-KF-120 / 150	8058450	

Further information on the special tools is included in the information brochure “Accessories, equipment and tools”. The brochure can be found in the online spare parts catalogue on the Festo website (➔ http://spareparts.festo.com/xdki/data/SPC/0/PDF_SAFE/Fitting%20aids.pdf).

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2. Copyright note

Every “electronic document” receives a copyright note. This note must be included on every copy and every printout.

Example: E 2003, Festo AG & Co. KG, D-73726 Esslingen

3. Transferring the authorisation of use

The user can transfer the authorization of use in the scope of and with the limitations of the conditions in accordance with items 1 and 2 completely to a third party. The third party must be made explicitly aware of these conditions of use.

II. Exporting the electronic documentation

When exporting the electronic documentation, the licence holder must observe the export regulations of the exporting country and those of the purchasing country.

III. Warranty

1. Festo products are being continuously developed with regard to hardware and software. The hardware status and, where applicable, the software status of the product can be found on the name plate of the product. If the electronic documentation, in whatever form, is not supplied with the product, i.e. is not supplied on a data storage device (diskettes, CD ROM, removable disk) as a delivery unit with the relevant product, Festo does not guarantee that the electronic documentation corresponds to every hardware and software status of the product. In this case, the printed documentation from Festo accompanying the product alone is decisive for ensuring that the hardware and software status of the product matches that of the electronic documentation.

2. The information contained in this electronic documentation can be amended by Festo without prior notice and does not commit Festo in any way.

IV. Liability/limitations on liability

1. Festo provides this electronic documentation in order to assist the user in creating his machine and system documentation. In the case that electronic documentation in the form of data storage devices (diskettes, CD ROM, removable disk) does not accompany a product, i.e. is not automatically supplied together with that product, Festo does not guarantee that the electronic documentation separately available/supplied matches the product actually used by the user.

The latter applies particularly to extracts of the documents for the user’s own documentation. The guarantee and liability for separately available/supplied portable data storage devices, i.e. with the exception of electronic documentation provided on the Internet/intranet, are limited exclusively to proper duplication of the software, whereby Festo guarantees that in each case the relevant portable data storage device or software contains the latest status of the documentation. In respect of the electronic documentation available on the Internet/Intranet, there is no guarantee that it will have the same version status as the last printed edition.

2. Furthermore, Festo cannot be held liable for the lack of economic success or for damage or claims by third parties resulting from the use of the documentation by the user, with the exception of claims arising from infringement of the protection rights of third parties concerning the use of the electronic documentation.

3. The limitations on liability as per paragraphs 1 and 2 do not apply if, in cases of intent or gross negligence or lack of warranted quality, a compulsory liability exists. In such a case, Festo’s liability is limited to the damage discernable by Festo when the concrete circumstances are made known.

V. Safety guidelines/documentation

Warranty and liability claims in conformity with the aforementioned regulations (points III. and IV) may be raised only if the user has observed the safety guidelines of the documentation in conjunction with the use of the machine and its safety guidelines. The user himself is responsible for ensuring that the electronic documentation, when not supplied with the product, matches the product actually used by the user.