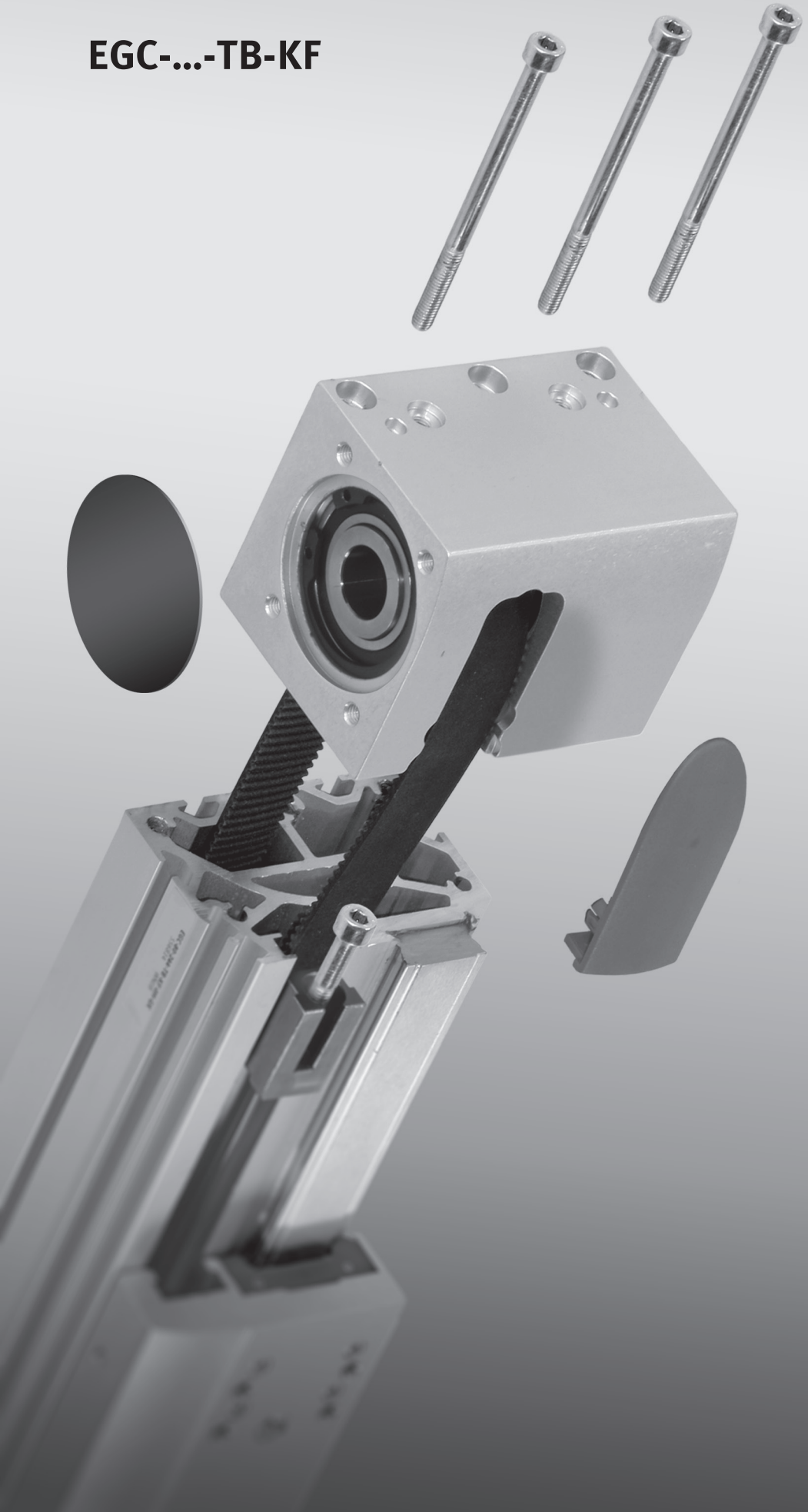
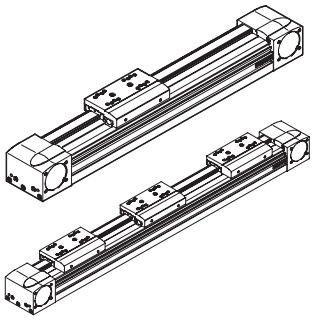
Toothed belt axis

EGC-...-TB-KF



FESTO

Repair instructions (en)



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Foreword

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

Differences compared to the descriptions in these repair instructions can arise depending on the design and/or modification status of the products. 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 SE & 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 55.

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.

FESTO

Table of Contents

1 Important information

1.1 About these repair instructions

This document contains important information about proper repair of the products listed on the title page.

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.

The toothed belt axis type EGC-...-TB-KF is also called the product in these repair instructions.

For reasons of clarity, these repair instructions do not contain all detailed information. The following documents should therefore also be available while carrying out repair work:

- **Toothed belt axis EGC-TB-KF operating instructions**

  Contains information on the product's peripherals as well as its function, structure, application, installation, commissioning, maintenance and care, etc. (➔ www.festo.com).
- **Assembly instructions for displacement encoder EGC-...-M-...**

  Contains information on the installation of the sensor bracket, sensor mounting and measuring unit of the displacement encoder on the EGC-70 / 80 / 120 / 185-TB-KF (➔ www.festo.com).

All available documents applicable to the product ➔ 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).
- **"Tools and repair accessories" information brochure**

  Contains an overview of available assembly aids (e.g. lubricants, locking agent), special tools, schematic diagrams, fixtures, measuring devices, etc. The information can be found in the online spare parts catalogue on the Festo website (➔ Tools and repair accessories.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

Documents

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 list

➔ Result of an activity / references to further information

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

1.4 General safety information

Warning

Failure to comply with these safety instructions and information can result in serious injuries.

- Read and follow all safety instructions and information.
- Wear personal protective equipment, depending on the work situation.
- For information on the potential risks to humans when handling lubricating grease, oil, locking agent, cleaning agent and other chemicals, which are used for the repair, protection against these risks and first aid measures, refer to the safety instructions on the packagings of the named materials and the current safety data sheets (in accordance with Regulation (EC) No. 1907/2006) (➔ www.festo.com/msds, ➔ Website of the product manufacturer).
- Take into consideration the legal regulations for the respective destination.
- Repairs must only be carried out in conjunction with these repair instructions as well as the respective operating instructions of the device and the documents named in Chapter 1.1 on page 6.

Danger

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

- Before carrying out maintenance and repair work, shut down the product as described in the operating instructions (➔ www.festo.com).
- Disconnect the product from the power supply and depressurise it.
- Reliably secure the product against unauthorised restarting.
- Secure the components against uncontrolled movements or move them into a safe end position.

The control of the drive motors is still charged after the voltage has been switched off (capacitor voltage).

- After switching off the voltage, wait approx. 3 minutes before removing the motor cables. The capacitors discharge their voltage during this time.

Caution

Lifting large loads can lead to permanent injury.

- Depending on their size and weight, the products must be lifted by several persons or using suitable lifting gear.

1.5 Product-specific notes and information

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!

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.

1.6 Service

Contact your regional Festo contact if you have any questions (➔ www.festo.com).

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

1.7 Qualification of personnel

Warning

Installation and repair of the product 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.

- The product may only be repaired by authorised and trained persons using original spare parts.
- Furthermore, they must have knowledge in the following areas:
  - the installation and operation of electrical control systems
  - the applicable regulations on the operation of safety systems
  - the applicable regulations on accident prevention and occupational safety.

1.8 Environment

- Components and equipment replaced during repair must be disposed of in accordance with the relevant local environmental protection regulations.
- When using lubricating grease, oil, screw locking agent, cleaning agents and other chemicals, the locally applicable environmental protection regulations must be followed.
- For environmentally relevant information on the lubricating greases, locking agents, cleaning agents, special oils and other chemicals, refer to the packaging of the named materials and the current safety data sheets (in accordance with Regulation (EC) No. 1907/2006) (➔ www.festo.com/msds, ➔ website of the product manufacturer).

1.9 Technical requirements

Note

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

- Comply with the connection and ambient conditions of the product and all connected components specified in the technical data. The product can only be operated in compliance with the relevant safety guidelines if it complies with the limit values and load limits (➔ see documentation enclosed with the product).
- The product must be in perfect technical condition.
- The product may only be operated in its original condition and without unauthorised modifications.
- The product is designed for industrial use.

1.10 Standards and test values

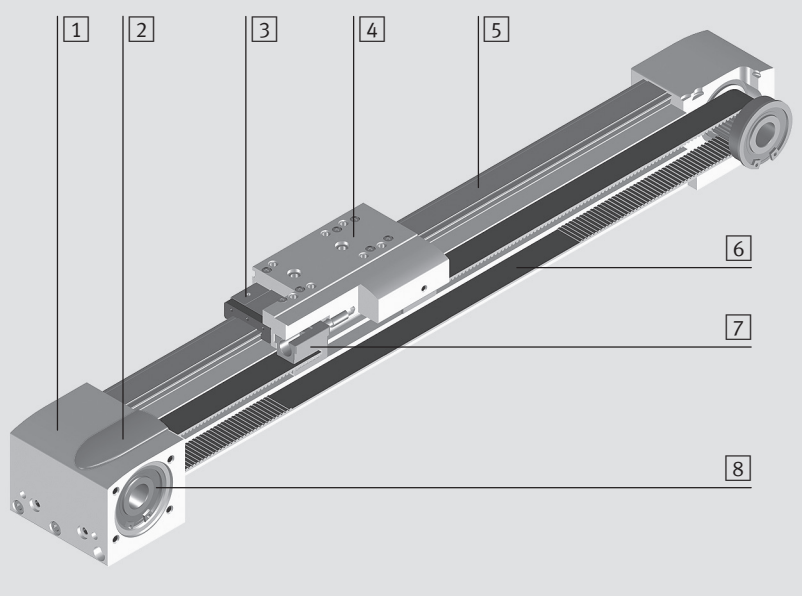
Standards and test values which the products comply with and fulfil can be found in the “Technical data” sections (➔ documentation enclosed with the product).

2 General product description

2.1 Functional description

The EGC-...-TB-KF is a toothed belt axis based on the operational principle of a circulating toothed belt for power transmission. The rotary motion of a servo or stepper motor produces a linear motion in a toothed belt with a pulley at both ends of the axis that is transmitted to the roller-guided slide fixed onto the toothed belt.

By minimising the moving dead weight, a high dynamic response and shorter cycle times can be achieved. The EGC-...-TB-KF is approved for slide operating mode.



1 Drive cover with corner pulley
2 Cover cap
3 Roller carriage
4 Slide
5 Guide rail
6 Toothed belt
7 Clamping part
8 Toothed belt with deep-groove ball bearings

2.2 Types and part numbers

A complete overview of features, accessories, type codes, technical data and dimensions of the product can be found in the product catalogue or on the Festo website (➔ www.festo.com).

2.2.1 Types and part numbers – core product range

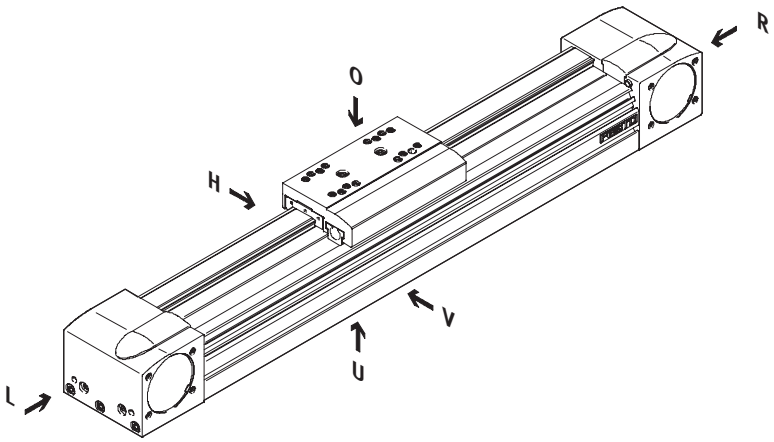
Type	Part number
EGC-70-300-TB-KF-0H-GK	3012492
EGC-70-400-TB-KF-0H-GK	3012493
EGC-70-500-TB-KF-0H-GK	3012494
EGC-70-600-TB-KF-0H-GK	3012495
EGC-70-800-TB-KF-0H-GK	3012496
EGC-70-1000-TB-KF-0H-GK	3012497
EGC-70-1200-TB-KF-0H-GK	3012498
EGC-80-400-TB-KF-0H-GK	575832
EGC-80-500-TB-KF-0H-GK	3013354
EGC-80-600-TB-KF-0H-GK	3013355
EGC-80-700-TB-KF-0H-GK	3013356
EGC-80-1000-TB-KF-0H-GK	3013357
EGC-80-1200-TB-KF-0H-GK	3013359
EGC-120-400-TB-KF-0H-GK	3013364
EGC-120-500-TB-KF-0H-GK	3013365
EGC-120-600-TB-KF-0H-GK	3013366
EGC-120-800-TB-KF-0H-GK	3013367
EGC-120-1000-TB-KF-0H-GK	3013368
EGC-120-1200-TB-KF-0H-GK	3013369
EGC-120-1500-TB-KF-0H-GK	3013370

2.2.2 Types and part numbers – product module

Type	Module number
EGC-50-TB-KF	556812
EGC-70-TB-KF	556813
EGC-80-TB-KF	556814
EGC-120-TB-KF	556815
EGC-185-TB-KF	556817

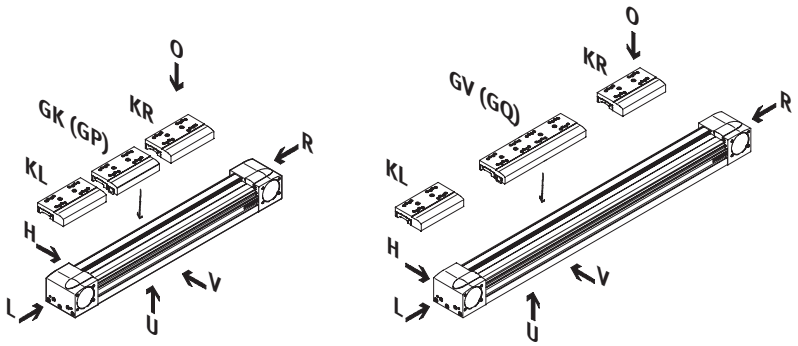
2.3 Orientation designations

These illustration provide an overview of the orientation designations.



Orientation:

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



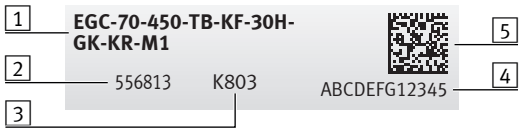
Versions:

GK = Standard slide
GV = Extended slide (not EGC-50)
GP = Protected standard slide (not EGC-50 or EGC-185)
GQ = Protected extended slide (not EGC-50 or EGC-185)
KL = Additional slide on left
KR = Additional slide on right

2.4 Type code

The precise product features can be determined with the help of the product labelling on the product. The order code describes the features, 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:

EGC	Toothed belt axis, type EGC
70	Size
450	Stroke [mm]
TB	Toothed belt
KF	Recirculating ball bearing guide
30H	Stroke reserve [mm]
GK	Slide, standard
KR	Additional slide, standard, right
M1	Displacement encoder, incremental (resolution 2.5 µm)

3 Component overviews and bill of materials

The data sheet contains a list and description of all possible equipment features of the product (➔ www.festo.com).

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

Core product range

Size	Part number	Components list	Bill of materials
EGC-70-...-TB-KF-0H-GK	3012492	➔ Chapter 3.2 on page 16	➔ Chapter 3.2.1 on page 17
	3012493		
	3012494		
	3012495		
	3012496		
	3012497		
	3012498		
EGC-80-...-TB-KF-0H-GK	575832	➔ Chapter 3.3 on page 18	➔ Chapter 3.3.1 on page 19
	3013354		
	3013355		
	3013356		
	3013357		
	3013359		
EGC-120-...-TB-KF-0H-GK	3013364	➔ Chapter 3.4 on page 20	➔ Chapter 3.4.1 on page 21
	3013365		
	3013366		
	3013367		
	3013368		
	3013369		
	3013370		

Modular product

Size	Module number	Components list	Bill of materials
EGC-50-TB-KF	556812	➔ Chapter 3.1 on page 14	➔ Chapter 3.1.1 on page 15
EGC-70-TB-KF*	556813	➔ Chapter 3.2 on page 16	➔ Chapter 3.2.1 on page 17
EGC-80-TB-KF*	556814	➔ Chapter 3.3 on page 18	➔ Chapter 3.3.1 on page 19
EGC-120-TB-KF*	556815	➔ Chapter 3.4 on page 20	➔ Chapter 3.4.1 on page 21
EGC-185-TB-KF*	556817	➔ Chapter 3.5 on page 22	➔ Chapter 3.5.1 on page 23

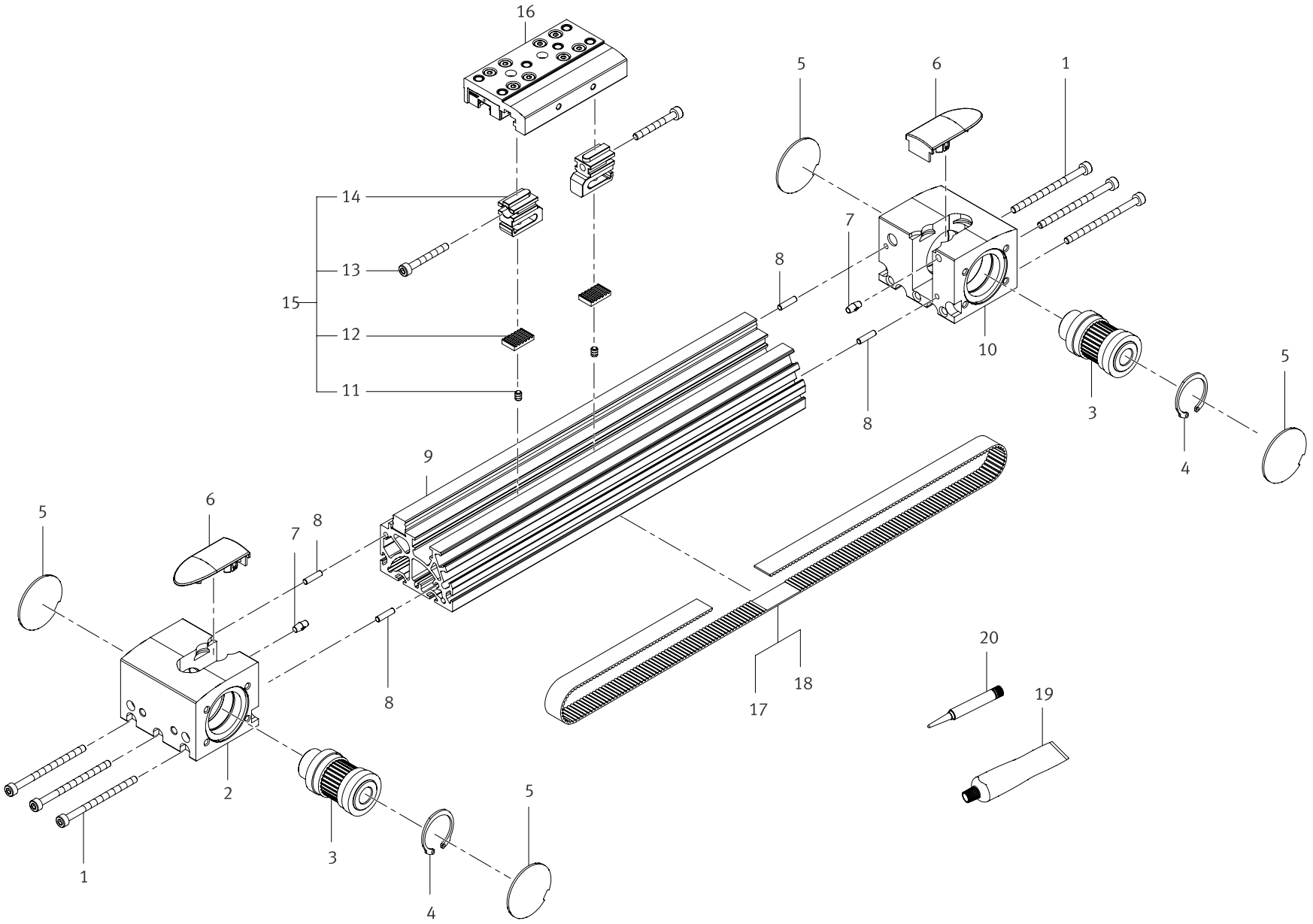
* Is the M1 or M2 displacement encoder installed ➔ “Displacement encoder” chapter

Displacement encoder

Type	Components list	Bill of materials
Displacement encoder EGC-70 / 80-...-M...-	➔ Chapter 3.6 on page 24	➔ Chapter 3.6.1 on page 25
Displacement encoder EGC-120-...-M...-		➔ Chapter 3.6.2 on page 25
Displacement encoder EGC-185-...-M...-		➔ Chapter 3.6.3 on page 25

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

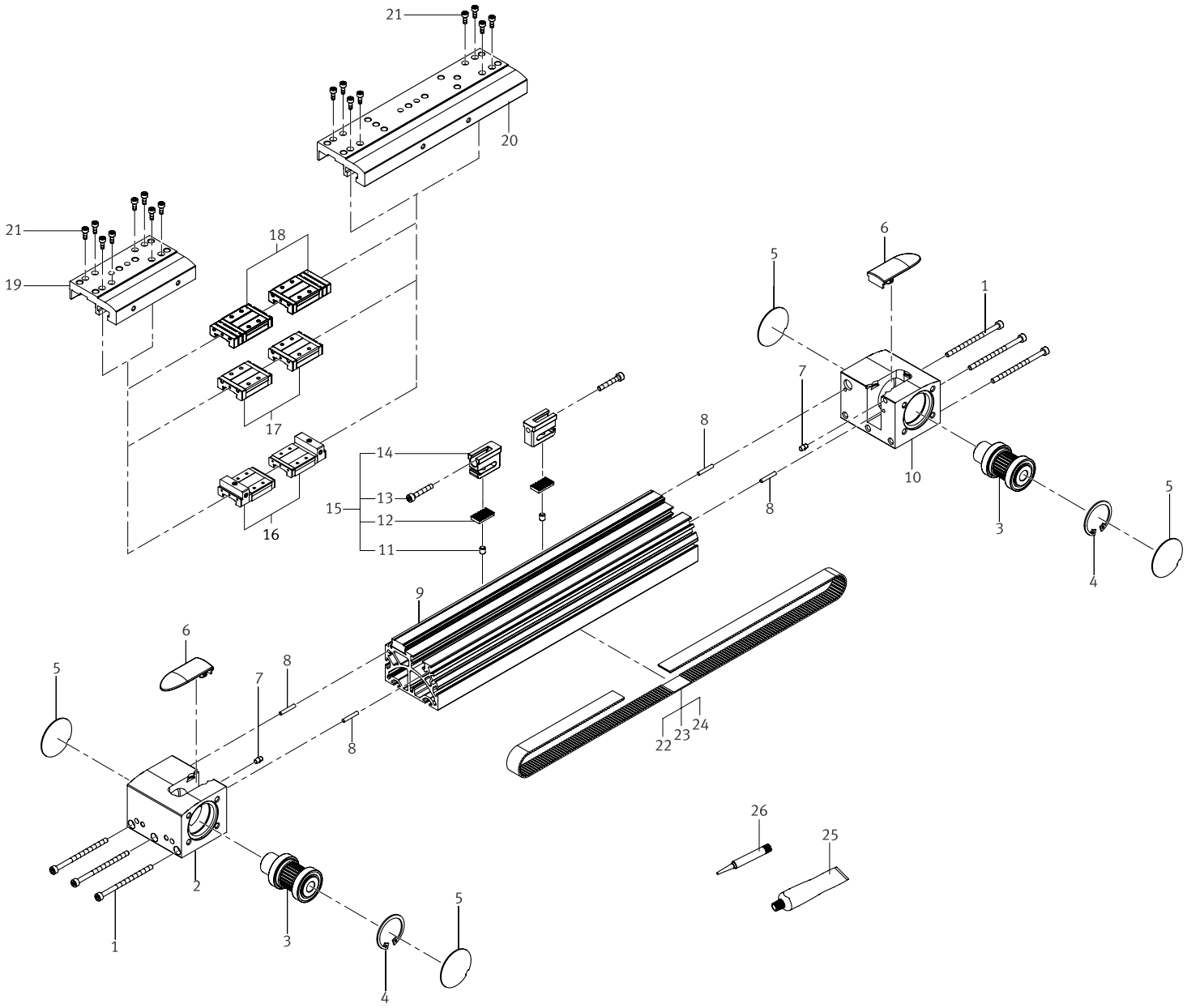
3.1 EGC-50-...-TB-KF components overview



3.1.1 EGC-50-...-TB-KF bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M3X45-8.8
2	Drive cover
3	Toothed belt pulley module
4	Retaining ring, JV-21
5	Sealing disc
6	Cover cap
7	Buffer element
8	Spring pin, DIN 7346-2.5×10
9	Cylinder barrel module
10	Drive cover
11	Threaded pin,ISO 4026-M3X4-45H
12	Clamping plate
13	Socket head screw, ISO 4762-M3X25-8.8
14	Clamping part
15	Clamping part
16	Slide unit
17	Toothed belt
18	Toothed belt, 5 m piece
19	Lubricating grease LUB-KC1, silicone free
20	Locking agent (threadlocker)

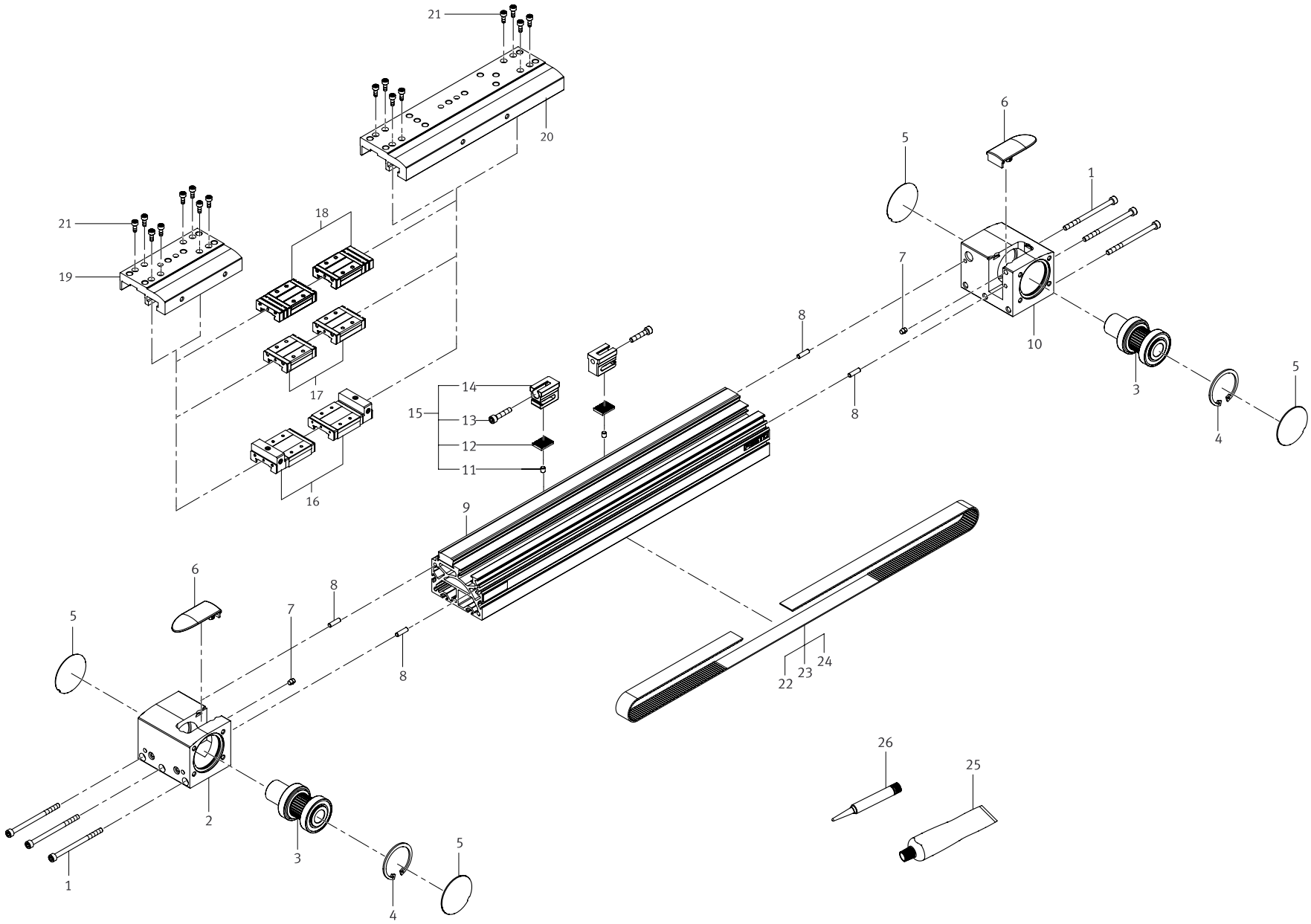
3.2 EGC-70-...-TB-KF components overview



3.2.1 EGC-70-...-TB-KF bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M4X65-8.8
2	Drive cover
3	Toothed belt pulley module
4	Retaining ring, DIN 472-32×1.2
5	Sealing disc
6	Cover cap
7	Buffer element
8	Spring pin, DIN 7346-3×18-A2
9	Cylinder barrel
10	Drive cover
11	Threaded pin, ISO 4026-M5X6-45H
12	Clamping plate
13	Socket head screw, ISO 4762-M4X25-8.8
14	Clamping part
15	Clamping part
16	Roller carriage, for standard slide with lubrication adapter or extended slide with lubrication adapter
17	Roller carriage, for standard slide or extended slide
18	Roller carriage, for standard slide or extended slide protected
19	Slide module, standard or protected slide
20	Slide module, extended slide or extended slide protected
21	Socket head screw, ISO 4762-M3X8-12.9
22	Toothed belt
23	Toothed belt [], 5 m piece
24	Toothed belt [PU2], 5 m piece
25	Lubricating grease LUB-KC1, silicone free
26	Locking agent (threadlocker)

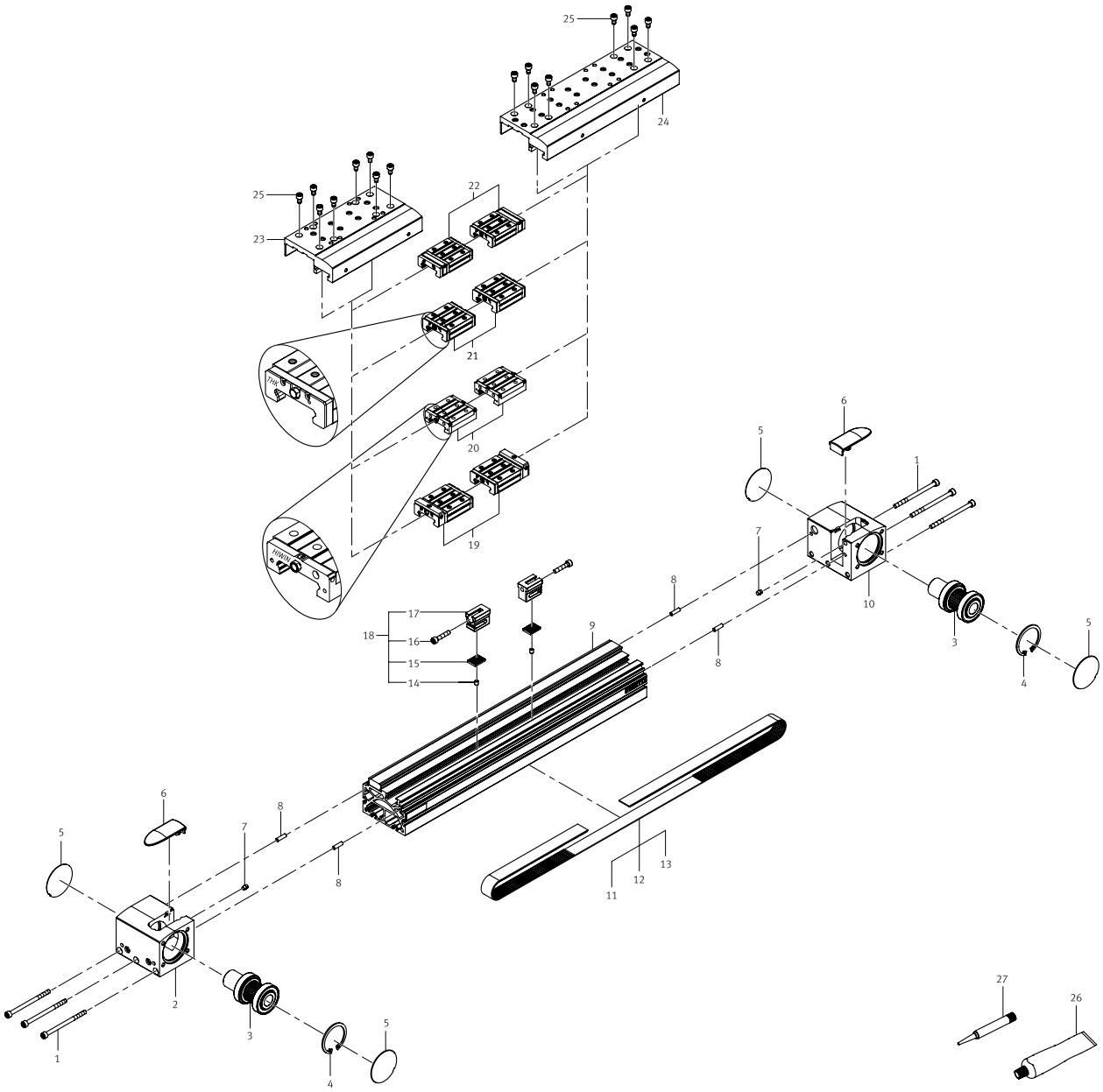
3.3 EGC-80-...-TB-KF components overview



3.3.1 EGC-80-...-TB-KF bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M5X75-8.8
2	Drive cover
3	Toothed belt pulley module
4	Retaining ring, DIN 472-42×1.75
5	Sealing washer
6	Cover cap
7	Buffer
8	Spring pin, DIN 7346-4.5×16
9	Cylinder barrel
10	Drive cover
11	Threaded pin, ISO 4026-M5X6-45H
12	Clamping plate
13	Socket head screw, ISO 4762-M5X25-10.9
14	Clamping part
15	Clamping part
16	Roller carriage , for standard slide with lubrication adapter or extended slide with lubrication adapter
17	Roller carriage , for standard slide or extended slide
18	Roller carriage, for standard slide or extended slide protected
19	Slide module, standard or protected slide
20	Slide module, standard slide or extended slide protected
21	Socket head screw, ISO 4762-M3X10-12.9
22	Toothed belt
23	Toothed belt [], 5 m piece
23	Toothed belt [PU2], 5 m piece
25	Lubricating grease LUB-KC1, silicone free
26	Locking agent (threadlocker)

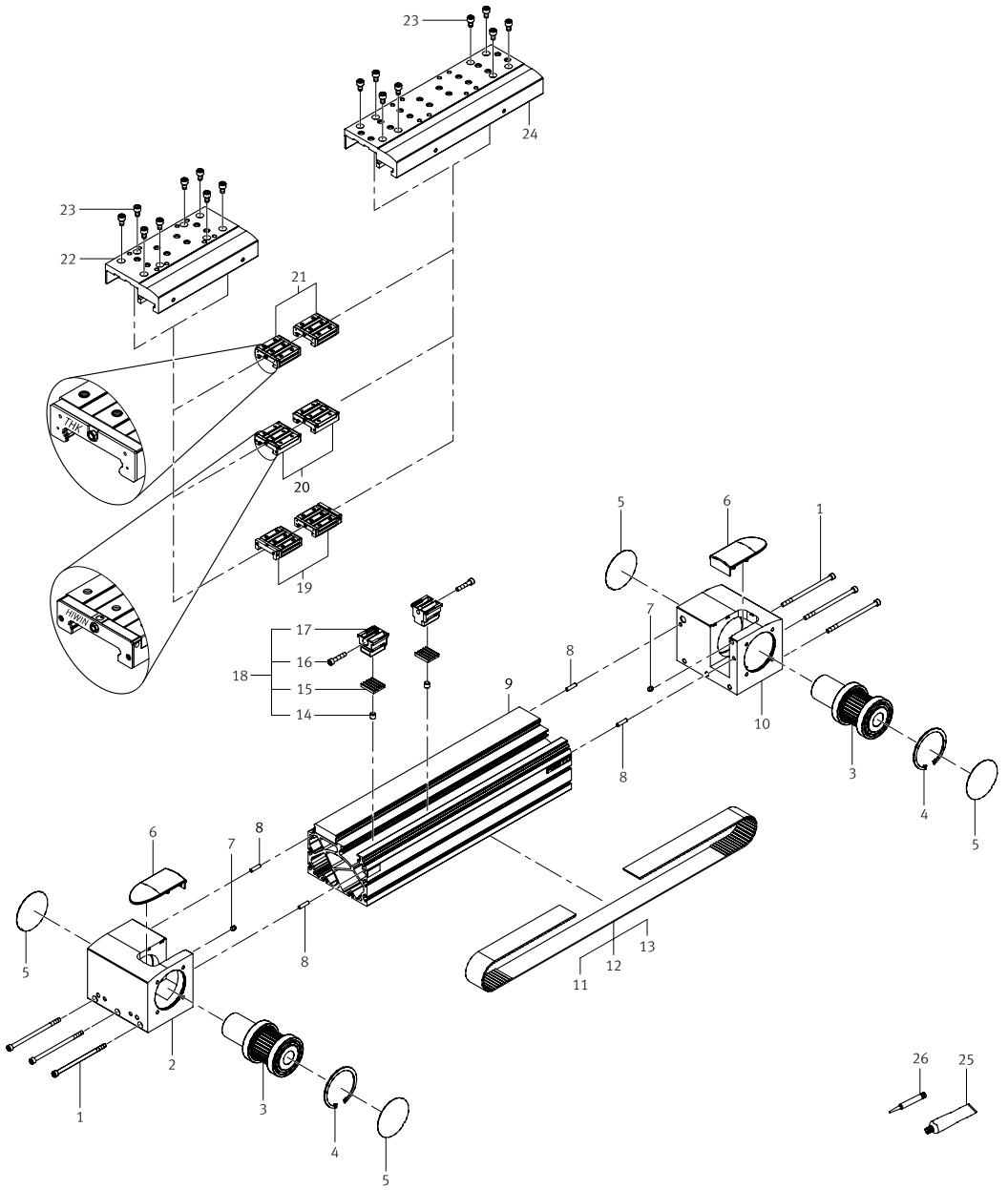
3.4 EGC-120-...-TB-KF components overview



3.4.1 EGC-120-...-TB-KF bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M6X110-8.8
2	Drive cover
3	Toothed belt pulley module
4	Retaining ring, DIN 472-62×2
5	Sealing washer
6	Cover cap
7	Buffer
8	Spring pin, DIN 7346-5X20
9	Cylinder barrel
10	Drive cover
11	Toothed belt
12	Toothed belt [], 5 m piece
13	Toothed belt [PU2], 5 m piece
14	Threaded pin, ISO 4026-M8X8-45H
15	Clamping plate
16	Socket head screw, ISO 4762-M6X40-10.9
17	Clamping part
18	Clamping part
19	Roller carriage , for standard slide with lubrication adapter or extended slide with lubrication adapter
20	Roller carriage (HIWIN), for standard slide or extended slide
21	Roller carriage (THK), for standard slide or extended slide
22	Roller carriage, for protected standard slide or protected extended slide
23	Slide module, standard or protected slide
24	Slide module, extended slide or protected extended slide
25	Socket head screw, ISO 4762-M6X10-10.9
26	Lubricating grease LUB-KC1, silicone free
27	Locking agent (threadlocker)

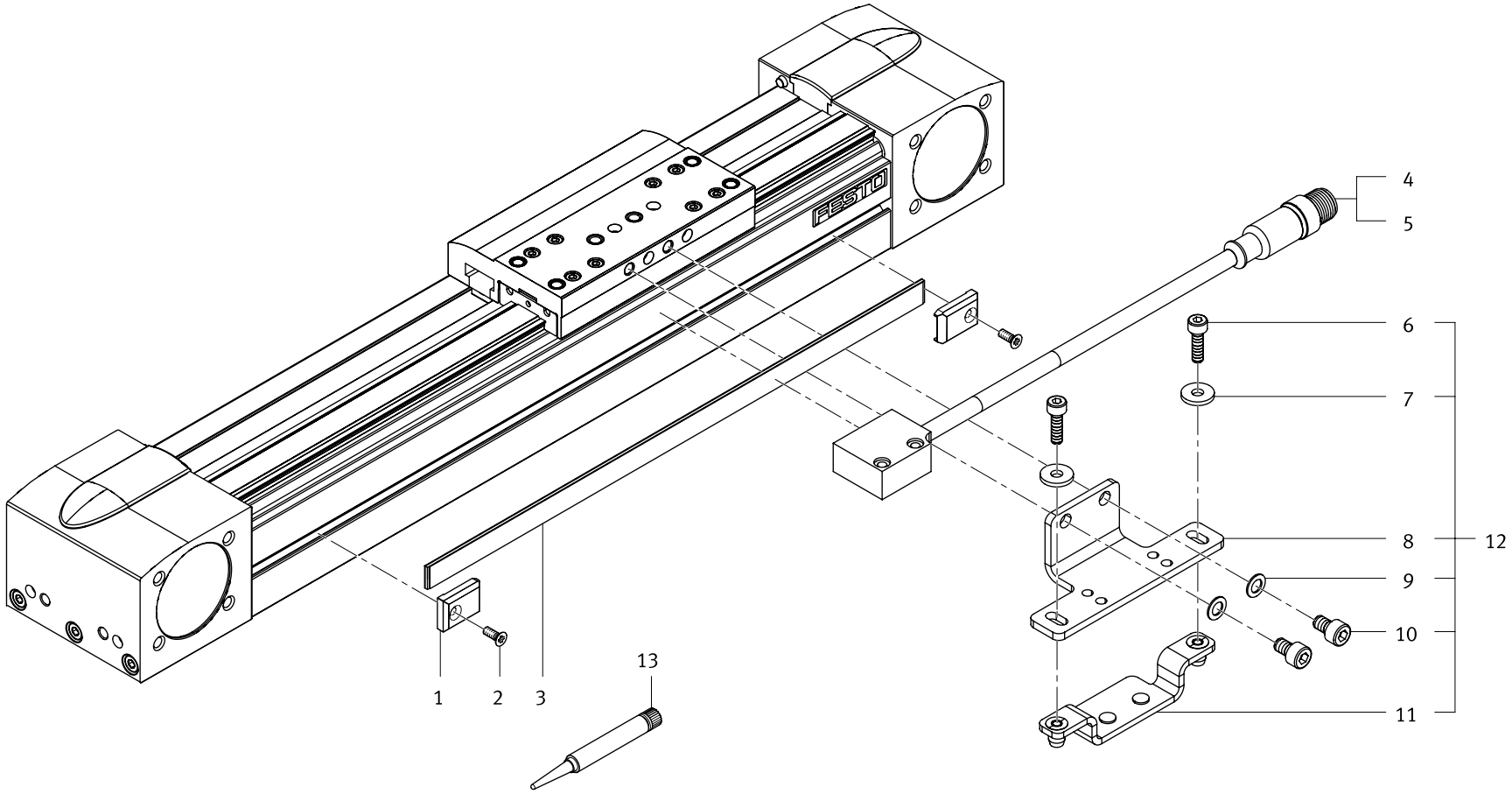
3.5 EGC-185-...-TB-KF components overview



3.5.1 EGC-185-...-TB-KF bill of materials

No.	Designation, type
1	Socket head screw, ISO 4762-M8X150-8.8
2	Drive cover
3	Toothed belt pulley module
4	Retaining ring, DIN 472-95×3
5	Sealing washer
6	Cover cap
7	Buffer
8	Spring pin, DIN 7346 7×28
9	Cylinder barrel
10	Drive cover
11	Toothed belt
12	Toothed belt [], 5 m piece
13	Toothed belt [PU2], 5 m piece
14	Threaded pin, ISO 4026-M12X12-45H
15	Clamping plate
16	Socket head screw, ISO 4762-M8X40-10.9
17	Clamping part
18	Clamping part
19	Roller carriage, for standard slide with lubrication adapter or extended slide with lubrication adapter
20	Roller carriage (HIWIN), for standard slide or extended slide
21	Roller carriage (THK), for standard slide or extended slide
22	Slide module, standard
23	Socket head screw, ISO 4762-M8X14-10.9
24	Slide module, extended slide
25	Lubricating grease LUB-KC1, silicone free
26	Locking agent (threadlocker)

3.6 Components overview for displacement encoder EGC-...-M...-



3.6.1 Bill of materials for displacement encoder EGC-70 / 80-...-M...-

No.	Designation, type
1	Cap
2	Countersunk screw, DIN 965-M3×8-4.8-H
3	Measuring tape
4	Measuring unit
5	Measuring unit
6	Socket head screw, ISO 4762-M4X14-10.9
7	Washer, DIN 7349-4.3
8	Sensor bracket
9	Retaining washer, S-5-1.4301
10	Socket head screw, ISO 4762-M5X8-8.8
11	Sensor mounting
12	Sensor bracket
13	Locking agent (threadlocker)

3.6.2 Bill of materials for displacement encoder EGC-120-...-M...-

No.	Designation, type
1	Cap
2	Countersunk screw, DIN 965-M3×8-4.8-H
3	Measuring tape
4	Measuring unit
5	Measuring unit
6	Socket head screw, ISO 4762-M4X14-10.9
7	Washer, DIN 7349-4.3
8	Sensor bracket
9	Retaining washer, S-6
10	Socket head screw, ISO 4762-M6X10-10.9
11	Sensor mounting
12	Sensor bracket
13	Locking agent (threadlocker)

3.6.3 Bill of materials for displacement encoder EGC-185-...-M...-

No.	Designation, type
1	Cap
2	Countersunk screw, DIN 965-M3×8-4.8-H
3	Measuring tape
4	Measuring unit
5	Measuring unit
6	Socket head screw, ISO 4762-M4X14-10.9
7	Washer, DIN 7349-4.3
8	Sensor bracket
9	Retaining washer, S-8
10	Socket head screw, ISO 4762-M8X12-8.8
11	Sensor mounting
12	Sensor bracket
13	Locking agent (threadlocker)

4 Repair preparation

4.1 Determining the causes for the repair

If it is necessary to change the toothed belt, always investigate the cause of the failure in order to prevent premature and repeated failure. A cantilever axis that has been used as intended and designed correctly will not normally exhibit any premature signs of failure.

This investigation is not necessary in the case of non-premature failure (fatigue time). However, the condition of the toothed belt pulley assembly (wear of the tooth surface/geometry, radial play of the bearing inner raceway with respect to the bearing seat: when new, it should fit tightly) and also the condition of the deep-groove ball bearings (e.g. perceptible bearing clearance, impaired roll-off behaviour and increased operating noise, etc.) should always be checked. In case of uncertainty, we recommend replacing all the components mentioned to rule out reciprocal effects during later operation.

Possible visible signs of wear of the toothed belt:

- Cracks on the back of the toothed belt indicate wear, for example, due to operation outside the allowed temperature range, impermissible chemical effects or possibly by reaching the end of the fatigue life.
- Wear of the nylon fabric (fabric cover) on the tooth side of the belt. This is indicated by lint formation and bobbling, for example, and constitutes primary wear (abrasion of the fabric).
- Visible individual glass fibre cords in the tooth gullet are secondary signs of wear due to primary wear of the nylon fabric. In this case, the toothed belt pulley module must be examined very carefully for wear, as visible glass fibre cords may have caused severe abrasive damage to the sides of the tooth tip of the toothed belt pulley.
  Replacement of the toothed belt pulley module together with the corresponding deep-groove ball bearings (➔ Chapter 5.2.2 on page 39).

In the event of premature failure of the product, the operating conditions should be examined more closely.

The following possibilities should be considered, among other things:

- **Overloading**

  Incorrect set values of the braking ramp in STOP states (e.g. EMERGENCY STOP, quick stop) result in overloading of the product and can irreparably damage it or reduce its life drastically.

  The elasticity of the toothed belt delays the acceleration and braking performance of the product and results in greater acceleration and deceleration than set at the controller (spring effect).

  Block-shaped acceleration and deceleration profiles (no jerk limitation) cause high peaks in the drive force that can lead to overloading of the drive. Positions outside of the permissible range can also occur. An acceleration and deceleration specification with jerk limitation reduces oscillations in the entire system and has a positive effect on the stresses to which the mechanical system is subjected.

  - Check which closed-loop controller settings can be adjusted (e.g. jerk limitation, smoothing of the acceleration profile).
  - Check the settings of all braking ramps in the controller or the higher-level control system (deceleration values and jerk).
  - Make sure that the deceleration values (braking deceleration, deceleration times) of the speed, the load to be moved and the mounting position (horizontal / vertical) and the specified maximum drive torque or the feed force correspond to the allowable values of the product used.
  - Use the Festo “Positioning Drives” engineering software to design the product (➔ www.festo.com).
- **Ambient conditions/material resistance**
  - Check whether the ambient temperature is within the permissible range.
  - Check the chemical and physical ambient conditions for hazardous substances, such as dust, abrasive particles, cooling lubricants, solvents, ozone, radiation, water-soluble substances, greases and oils, etc.

4.2 Preparatory work

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.
- Reliably secure the product against unauthorised restarting.

Note

- Before starting the repair work, dismantle existing attachments as described in the instructions in the corresponding operating and assembly instructions (➔ www.festo.com).

1. Remove the motor and encoder cables.
2. Dismantle the motor and axial kit.
3. Dismantle the shock absorber retainer (if mounted).

Note

- Where possible, we recommend completely removing the product from the system before carrying out the repair.
- The repair should preferably be carried out on a stable and flat work surface with storage for small parts.
- To prevent damage to the components, do not use pointed or sharp-edged assembly tools.
- Keep your working environment clean and tidy.

4.3 Visual inspection

- Check the product for visible damage that can impair its function.

The product must be completely replaced if significant damage exists.

5 Repair steps

This chapter describes the dismantling, repair and assembly of the toothed belt axis EGC-...-TB-KF. Note that the axis does not need to be completely dismantled for all repair work.

Depending on the cause of the defect to be eliminated, it may be necessary to replace several components. The cause of a defect must therefore always be determined before starting a repair.

The repair should preferably be carried out on a stable and flat work surface with storage for small parts. It is also possible to repair the toothed belt axis in installed condition, if required.

5.1 Replacing the toothed belt

The toothed belt is ordered from the online spare parts catalogue using the appropriate part number (depending on the size and version of the product) or it is ordered by the metre (5 m roll) (➔ www.festo.com/spareparts).

Note

Do not bend or fold the toothed belt, as this can result in damage to the tensile members and shorten its service life by cracking it. Note the minimum bending radius for assembly and storage:

Typ	Toothed belt material	Minimum bending radius R_{min}
EGC-50-TB-KF	Neoprene NP	10 mm
EGC-70/80-TB-KF	Neoprene NP	16 mm
EGC-120-TB-KF	Neoprene NP	34 mm
EGC-185-TB-KF	Neoprene NP	85 mm
EGC-70/80-TB-KF-...-PU2	Polyurethane PU2, coated	36 mm
EGC-120-TB-KF-...-PU2	Polyurethane PU2, coated	48 mm
EGC-185-TB-KF-...-PU2	Polyurethane PU2, coated	96 mm

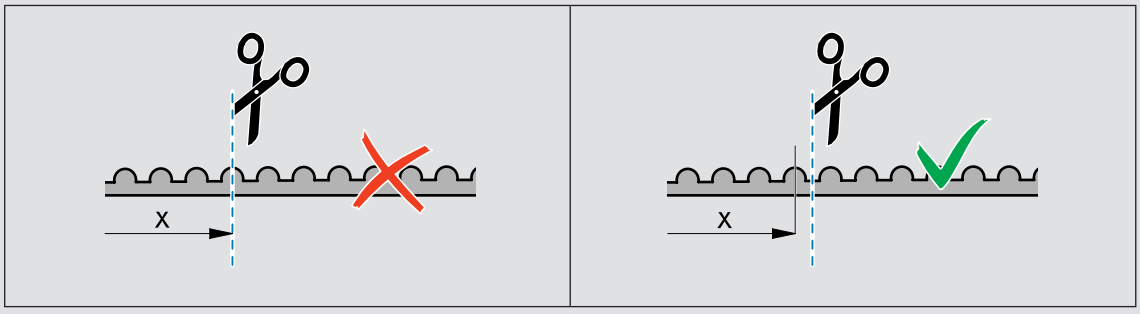
Ordering a precise fitting toothed belt:

The part number of the cantilever axis is a module number and is dependent on the size of the product. When ordering the toothed belt, in addition to the part number, the stroke and stroke reserve of the product must also be stated. The necessary information is given in the order code in the product labelling (➔ Chapter 2.4 on page 12).

Cutting the toothed belt to size if ordered by the metre

Note

- Use sturdy general-purpose scissors or metal shears to cut through the toothed belt.
- Round down the cut length (L) to an integer multiple of the pitch “C” (➔ table) to ensure that the belt can always be cut to size in a gap.



The precise length of the toothed belt is calculated as follows:

L (length of toothed belt in mm) = Multiplier “A” × (stroke + 2 × stroke reserve + factor “B”)

Values for multiplier “A” and factor “B” ➔ table

Type	Multiplier “A”, depending on the stroke		Factor “B”, depending on the slide type		Pitch “C”
EGC-50	all strokes	2.0	GK[1]	125	2
EGC-70	≤1500	2.0	GK[1] / GP[2]	201	3
	1500 – ≤2100	1.998	GV[3] / GQ[4]	251	
	>2100)	1.996			
EGC-70-...-PU2	all strokes	2,0	GK[1] / GP[2]	201	
			GV[3] / GQ[4]	251	
EGC-80	≤4800	1.994	GK[1] / GP[2]	232	3
	>4800	1.992	GV[3] / GQ[4]	282	
EGC-80-...-PU2	all strokes	2,0	GK[1] / GP[2]	232	
			GV[3] / GQ[4]	282	
EGC-120	all strokes	1.996	GK[1] / GP[2]	339	5
			GV[3] / GQ[4]	389	
EGC-120-...-PU2		2,0	GK[1] / GP[2]	339	
			GV[3] / GQ[4]	389	
EGC-185	≤1500	1.996	GK[1]	487	8
	>1500	1.994	GV[3]	537	
EGC-185-...-PU2	all strokes	2,0	GK[1]	487	
			GV[3]	537	

[1] GK = standard slide; [2] GP = protected standard slide (not EGC-50 and EGC-185)
[3] GV = extended slide (not EGC-50); [4] GQ = protected extended slide (not EGC-50 and EGC-185)

Example: **EGC** - **80** (Size) - **375** (Stroke) - **TB - KF -** **30H** (Stroke reserve) - **GK** (Slide type)

L (length of toothed belt in mm) = Multiplier “A” × (stroke + 2 × stroke reserve + factor “B”)

L = 1.994 × (375 + 2 × 30 + 232) mm

L = 1329.99 mm

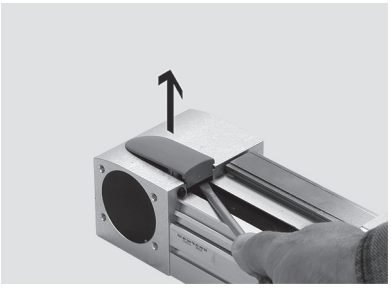
rounded down to an integer multiple of the pitch “C” (in this example: 3)

L = 1329 mm

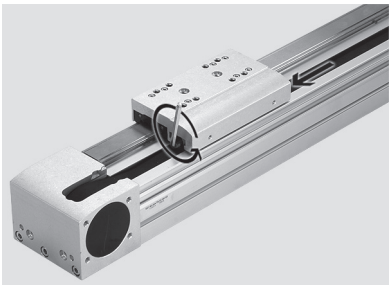
The toothed belt can be renewed with the toothed belt axis still installed if it is not torn or if the location of the tear is visible, as it is not necessary to remove the slide unit and drive cover in such cases (➔ Chapter 5.1.2 on page 30). If the location of the tear is in the drive covers or the cylinder barrel, then the drive covers must be removed (➔ Chapter 5.2.1 on page 37).

5.1.1 Removing Clamping parts

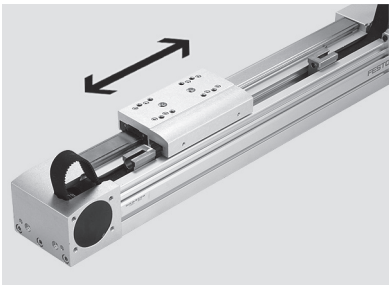
1. Place the toothed belt axis on the work surface as shown, with the slide unit facing upwards.
2. Lever off the cover caps at both ends from the Drive covers.



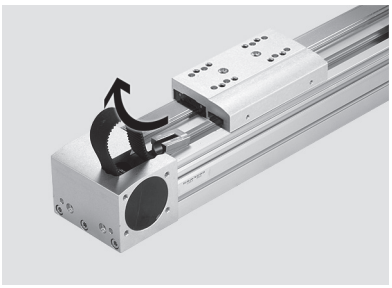
3. Unscrew the socket head screw in the Clamping parts.



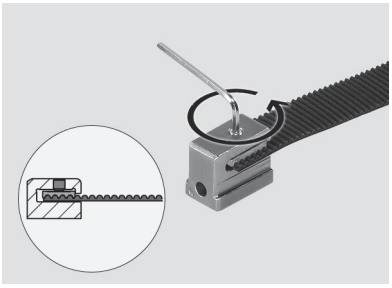
4. Push the slide to the left and right so you can pull the Clamping parts out of the slide.



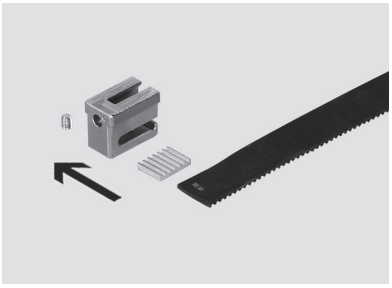
5. Push both Clamping parts out of the cylinder barrel through the cut-out in the Drive covers.



6. Unscrew the threaded pins in the Clamping parts at both ends of the toothed belt.



Take care to ensure that the clamping plate in the Clamping part does not fall out.

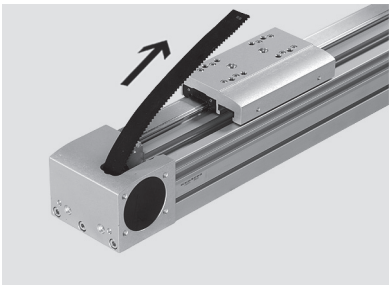


7. Pull the Clamping parts sideways off the toothed belt.
8. Remove the clamping plate from the toothed belt.

5.1.2 Replacing the toothed belt

Do not pull the old toothed belt out of the axis before you have joined it with the new toothed belt. Otherwise the Drive covers must be removed.

1. Use adhesive tape to join the old and new toothed belts at one end.
2. Pull the old toothed belt carefully out of the axis until the new toothed belt is pulled through the axis.
3. Separate the old toothed belt from the new one.

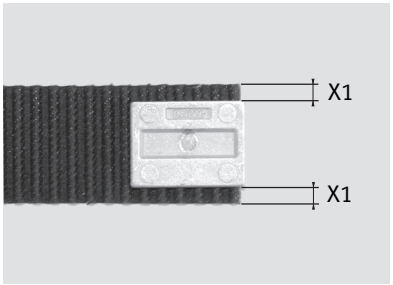


5.1.3 Attaching Clamping parts

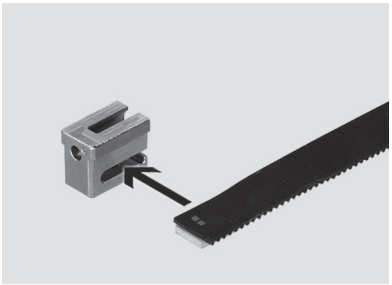
1. Place the clamping plate on the left end of the new toothed belt.

Note
The clamping plate must be positioned axially with the middle of the toothed belt to prevent damage to the toothed belt during operation.

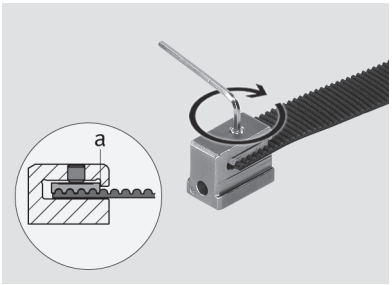
2. Align the clamping plate axially with the middle of the toothed belt.



Note
The threads of the Clamping parts must be recut before the threaded pins are screwed in. Residues of the old locking agent in the thread result in non-uniform and increased tightening torques of threaded pins, and correct tightening is thus not ensured.



3. Insert the left-hand end of the toothed belt together with the clamping plate into the Clamping part.
4. Align the toothed belt axially with the middle of the Clamping part.
5. Wet the threaded pin with threadlocker.
6. Screw the threaded pin into the Clamping part.
7. Push the clamping plate against the stop (a) on the Clamping part.



Note
The clamping plate must make contact with the stop, otherwise the toothed belt pretension will diminish during operation.

8. Tighten the threaded pins to the appropriate torque (see table).

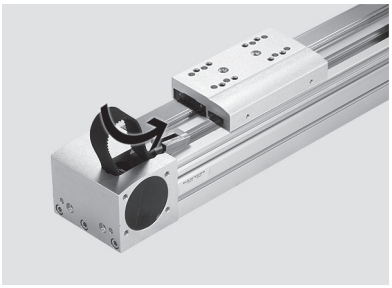
Note
It is critical that the tightening torques be observed. Excessive tightening torques will bend the Clamping part.

Type	Tightening torque
EGC-50	0.1 Nm
EGC-70	0.3 Nm
EGC-80	0.5 Nm
EGC-120	4.0 Nm
EGC-185	5.0 Nm

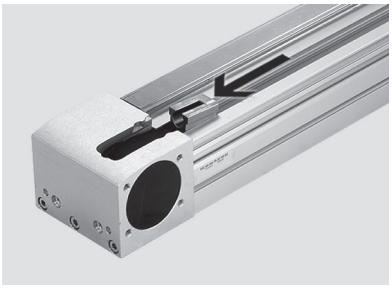
Note

Do not bend or fold the toothed belt, as this can result in damage to the tensile members and shorten its service life by cracking it.

Note the minimum bending radius for assembly and storage (➔ Chapter 5.1 on page 28).



9. Insert the Clamping part into the groove in the cylinder barrel through the cut-out in the Drive cover.



10. Pull on the other end of the toothed belt to push the Clamping part at the left end of the cylinder barrel.
11. Repeat the described steps at the other end of the axis to insert the second Clamping part.

Note

Do not bend or fold the toothed belt, as this can result in damage to the tensile members and shorten its service life by cracking it.

Note the minimum bending radius for assembly and storage (➔ Chapter 5.1 on page 28).

12. Insert the Clamping parts into the guide in the slide.

Threaded inserts with SCREWLOCK® are screwed into the slides. These have an incorporated screw-clamping area that serves as a screw lock. Multiple windings have a clamping effect on the edges of the screwed-in adjusting screws for the toothed belt pretension. The result is flexible frictional locking. This stops the adjusting screw from becoming loose and prevents adjustment of the set toothed belt pretension during operation.

Note

The clamping effect can damage the thread profile of the adjusting screw. As such, the use of new adjusting screws for assembly is recommended.

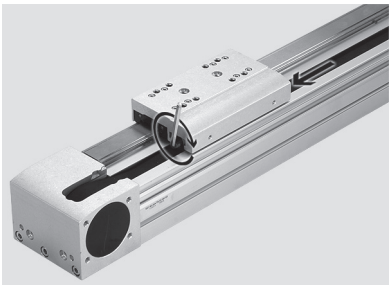
The use of the threaded inserts with SCREWLOCK® and the dynamic load on the adjusting screw call for the use of only original spare parts from Festo with the appropriate strength class. Otherwise, the screws can break prematurely.

The Clamping parts must not touch the slide when they are being screwed in as otherwise the toothed belt could become overstretched and the service life of the toothed belt would be reduced. Slowly increase the toothed belt pretension up to the correct value.

If the toothed belt is cut to the correct length, the Clamping parts should be at least flush with the cut-out in the slide.

If the Clamping parts protrude, the socket head screws will not reach the minimum length of engagement and could be pulled out.

13. Insert the socket head screw into the Clamping part and screw it a few turns into the slide.
14. Repeat the steps at the other end of the axis to insert the second Clamping part.
15. Screw the socket head screws evenly through the Clamping parts and into the slide.
16. Pretension the toothed belt by uniformly tightening the socket head screws by feel.



5.1.4 General information on the toothed belt pretension

A pulse is applied to the toothed belt to make it oscillate. The resulting natural frequency of the toothed belt is recorded using a measuring device and displayed as a frequency value in hertz.

Note

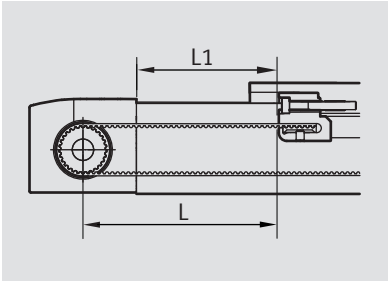
Correct toothed belt pretension is essential for the service life of the toothed belt as well as the positioning accuracy and operating performance of the toothed belt axis. The toothed belt pretension must therefore be checked extremely carefully.

A conventional method for measuring the toothed belt pretension using the deflection force is too inaccurate, and therefore cannot be used. Accurate results are achieved by measuring the oscillation frequency. The natural frequency of a belt is based on its tension (strand force), mass and strand length.

The strand length is the oscillating length of a belt.

Since the freely oscillating strand length (L) cannot be measured directly, the distance from the Clamping part to one of the drive covers (L1) is set by moving the slide.

The toothed belt pretensioning is determined by measuring the fundamental oscillation (natural frequency) of the toothed belt with a fixed and freely oscillating strand length (L).



The frequency value is calculated using the specified values for strand force (pretension force), belt mass and length of the free belt strand according to the following formula:

$$f = \frac{1}{2 \cdot L} \cdot \sqrt{\frac{F_V}{m}}$$

f	Natural frequency of the freely oscillating strand [Hz]
L	Strand length [m]
F_V	Pretension force [N]
m	Weight per metre of the toothed belt [kg / m]

The frequency that needs to be set can be calculated using the data from the following table:

Type	Weight per metre m	Freely oscillating strand length L	Pretension force F_V
EGC-50	0,0154 kg / m	20 mm + L1[1)]	51 – 53 N
EGC-70	0,0345 kg / m	30 mm + L1[1)]	120 – 125 N
EGC-70-...-PU2	0,04435 kg / m	30 mm + L1[1)]	120 – 125 N
EGC-80	0,0459 kg / m	35 mm + L1[1)]	408 – 426 N
EGC-80-...-PU2	0,05677 kg / m	35 mm + L1[1)]	405 – 424 N
EGC-120	0,1179 kg / m	50 mm + L1[1)]	811 – 852 N
EGC-120-...-PU2	0,1384 kg / m	50 mm + L1[1)]	817 – 861 N
EGC-185	0,2789 kg / m	70 mm + L1[1)]	3040 – 3166 N
EGC-185-...-PU2	0,415 kg / m	70 mm + L1[1)]	3046 – 3202 N

[1)] ➔ Chapter 5.1.5 on page 34

Note on measurement using the acoustic frequency meter

If the toothed belt is excited by means of a force pulse, the strand oscillates with its natural frequency; this decays more or less quickly depending on damping.

The frequency meter measures the natural frequency generated (transverse oscillation) using the acoustic operating principle. In addition to the basic oscillation (natural frequency), harmonic oscillation can also occur. From experience it is always the 1st harmonic. In other words, a further node is generated and therefore, in addition to the fundamental frequency, values that are twice the natural frequency can also be measured.

For this reason, several measurements should always be carried out to differentiate between the necessary basic oscillation (natural frequency) and the harmonic oscillation. Only this frequency can be used to conclude the force acting in the strand.

5.1.5 Checking the toothed belt pretension

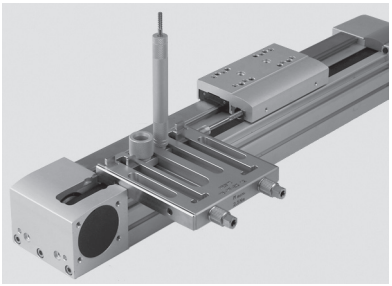
Before the toothed belt pretension can be measured, the slide must be moved back and forth several times so that the toothed belt can fully settle and differences in tension can be levelled out.

The easiest way to check the toothed belt pretension is using a test device (➔ Chapter 8.3 on page 54).

Measuring the toothed belt pretension using a test device

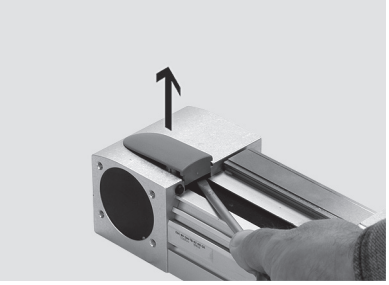
The distance between the Drive cover and Clamping part does not need to be set if the toothed belt pretensioning is measured using a test device. The correct strand length is achieved using the supplied spacers (➔ Chapter 8.3 on page 54).

The exact procedure for checking the toothed belt pretension can be found in the operating instructions "**Test device for toothed belt pretension TB-TE-EQ12**" (➔ TB-TE-EQ12_en.pdf).

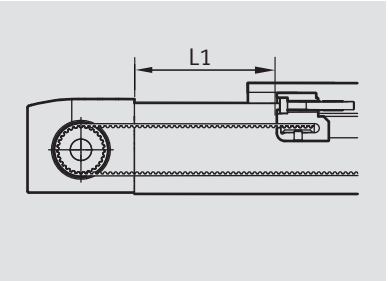


Measuring the toothed belt pretension without a test device

1. Place the toothed belt axis on the work surface as shown, with the slide unit facing upwards.
2. Lever off the cover cap from the drive cover.



3. Set the distance (L1) between the drive cover and Clamping part (➔ table).

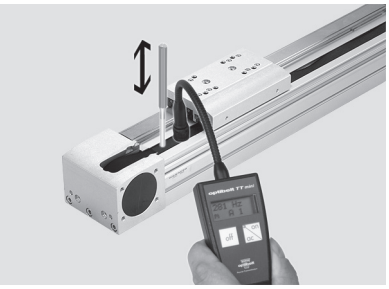


Type	Distance L1
EGC-50	140 mm / 50 mm[1)]
EGC-70	140 mm / 50 mm[1)]
EGC-80	290 mm / 50 mm[1)]
EGC-120	290 mm / 50 mm[1)]
EGC-185	290 mm / 50 mm[1)]

[1)] Alternatives for toothed belt axes with very short strokes.

The larger strand length should be set if possible. A longer, freely oscillating strand length reduces variation in the measurement results.

4. Align the acoustic frequency meter centrally on the toothed belt as described in the accompanying operating instructions.
5. Make the toothed belt oscillate by striking it with a thin, heavy object, such as an Allen key or punch.



Example representation

Several measurements should be taken to compensate for measurement tolerances.

The belt must be able to oscillate freely.

6. Compare the measurement with the specified value (➔ tables).

For normal strokes

Type	Minimum frequency (f)	Maximum frequency (f)
EGC-50	180 Hz	183 Hz
EGC-70	174 Hz	177 Hz
EGC-70-...-PU2	153 Hz	156 Hz
EGC-80	145 Hz	148 Hz
EGC-80-...-PU2	130 Hz	133 Hz
EGC-120	122 Hz	125 Hz
EGC-120-...-PU2	113 Hz	116 Hz
EGC-185	145 Hz	148 Hz
EGC-185-...-PU2	119 Hz	122 Hz

For short strokes

Type	Minimum frequency (f)	Maximum frequency (f)
EGC-50	411 Hz	419 Hz
EGC-70	372 Hz	380 Hz
EGC-70-...-PU2	328 Hz	334 Hz
EGC-80	555 Hz	563 Hz
EGC-80-...-PU2	499 Hz	505 Hz
EGC-120	416 Hz	424 Hz
EGC-120-...-PU2	384 Hz	390 Hz
EGC-185	437 Hz	443 Hz
EGC-185-...-PU2	358 Hz	364 Hz

5.1.6 Setting the toothed belt pretension

Note

The pretension of the toothed belt is not an indicator of wear!

The values specified here are relate to a new toothed belt.

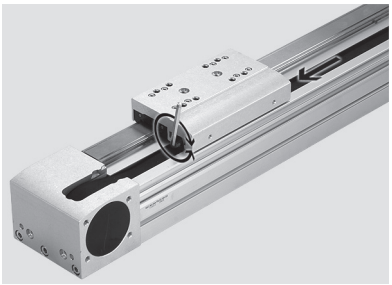
The toothed belt is set to the specified value in the factory, and is thus maintenance-free for its entire service life.

The pretension of the toothed belt reduces due to storage time and operation. This is not an indication of wear; it is a normal process that must not be changed by retensioning the toothed belt.

The toothed belt pretension may therefore only be set after renewing the toothed belt.

If the measured natural frequency of the toothed belt is outside the specified range, the toothed belt pretension must be adjusted as follows.

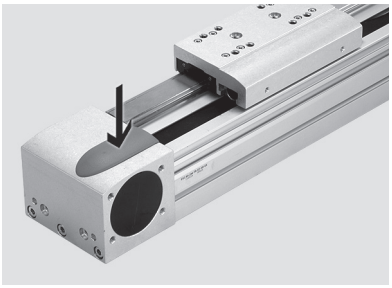
1. Adjust the toothed belt pretension by turning the socket head screws.
2. Before you measure the toothed belt pretension again, the slide must be moved back and forth a number of times so that the toothed belt can fully settle and differences in tension are compensated.



Turning the socket head screw clockwise increases the tension of the toothed belt, and thus its oscillation frequency.

Turning the socket head screw anticlockwise decreases the tension of the toothed belt, and thus its oscillation frequency.

3. Place the cover cap in the drive cover.



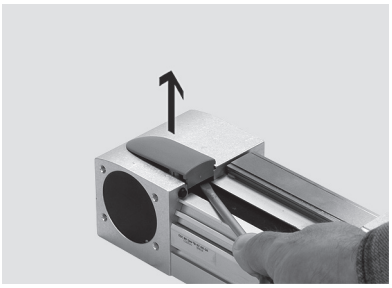
5.2 Dismantling the toothed belt axis

The toothed belt axis EGC-...-TB-KF is made up of the following modules:

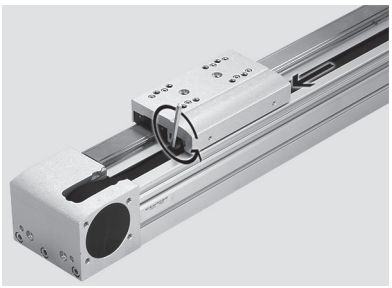
– Cylinder barrel with slide with recirculating ball bearings on a guide rail, driven via Clamping parts on the toothed belt.
– Drive cover with toothed-belt pulley and drive

5.2.1 Removing the Drive covers

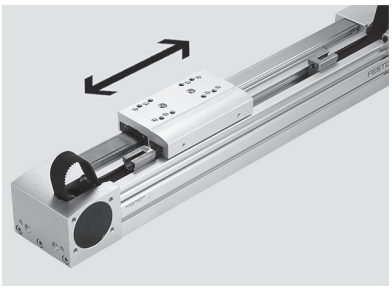
1. Place the toothed belt axis on the work surface as shown, with the slide unit facing upwards.
2. Lever off the cover caps at both ends from the Drive covers.



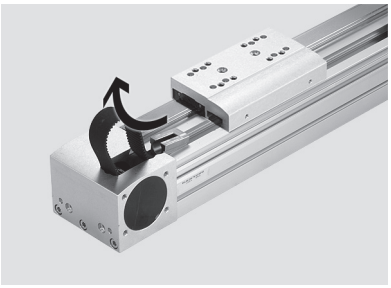
3. Unscrew the socket head screw in the Clamping parts.



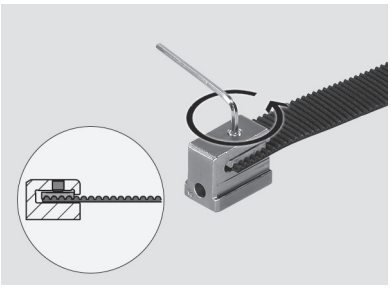
4. Move the slide to the left and right so you can pull the Clamping parts out of the slide.



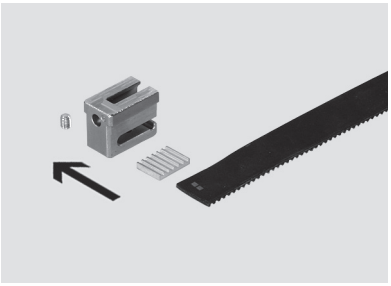
5. Push both Clamping parts out of the cylinder barrel through the cut-out in the Drive covers.



6. Unscrew the threaded pins in the Clamping parts at both ends of the toothed belt.

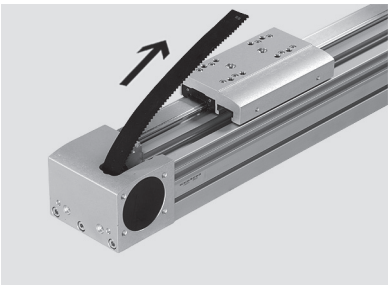


Take care to ensure that the clamping plate in the Clamping part does not fall out.

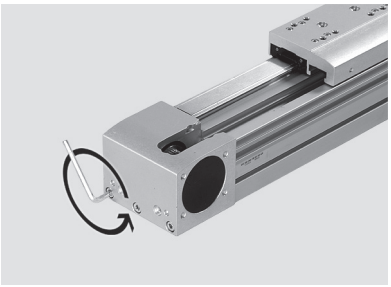


7. Pull the Clamping parts sideways off the toothed belt.
8. Remove the clamping plates from the toothed belt.

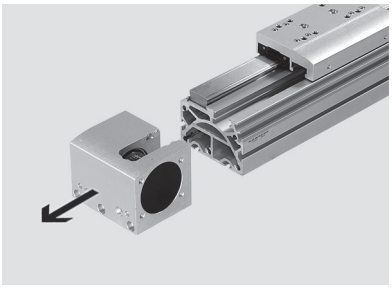
9. Carefully pull the toothed belt out of the axis.



10. Unscrew the socket head screws in the drive cover.

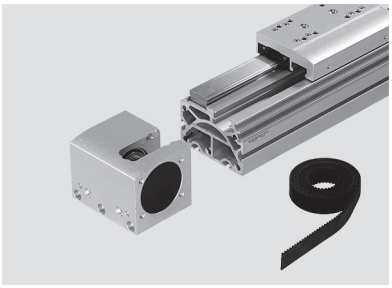


11. Pull the Drive covers off the cylinder barrel.



The Drive covers are connected to the cylinder barrel by spring pins. A certain amount of force is required to pull it off.

12. Repeat the steps on the other end of the axis to remove the second Drive cover.



5.2.2 Repairing the Drive cover

Spring pins and elastomer buffers

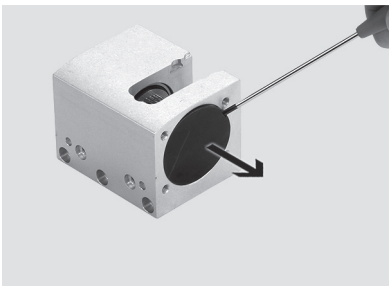
The spring pins and elastomer buffers are inserted into the Drive covers. However, the spring pins may also be located in the cylinder barrel after dismantling the Drive covers. Pull out the parts and replace them.

Toothed belt pulley module

The toothed belt pulley module sits with clearance fit of the Drive cover with two pressed-on deep-groove ball bearings, and is clamped axially by a retaining ring.

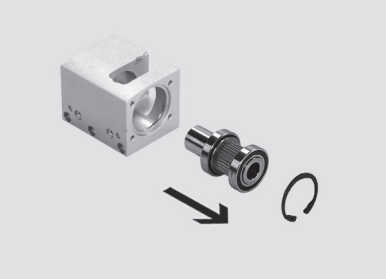
Removing the toothed belt pulley module

1. Lever the sealing discs out of the Drive cover.



2. Remove the retaining ring.

3. Remove the toothed belt pulley module with the two deep-groove ball bearings from the Drive cover.

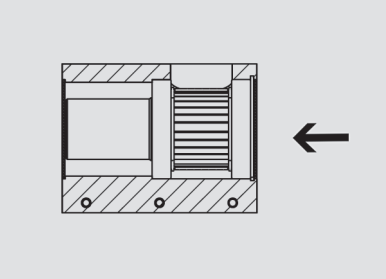


It is not necessary to pull off the deep-groove ball bearings, as the spare part includes both bearings and the shaft.

4. Check that the deep-groove ball bearings are seated securely on the toothed belt pulley module. If a bearing is not seated securely, the entire module will need to be replaced.

Installing the toothed belt pulley module

1. Apply a light coating of grease to the outside of the deep-groove ball bearings.
2. Push the deep-groove ball bearings in the toothed belt pulley module into the drive cover as shown, with the long end of the shaft in front.

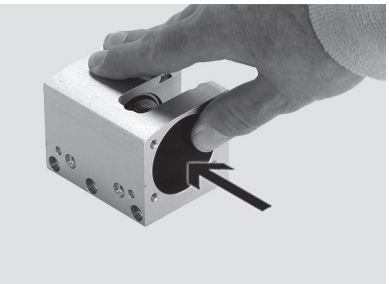


If necessary, use a plastic hammer to carefully drive the module into the drive cover.

3. Insert the retaining ring.

Check that the retaining ring is positioned correctly.

4. Press the sealing discs into the Drive cover to provide extra protection from contamination.



5.3 Linear recirculating ball bearing guide system

The linear recirculating ball bearing guide system consists of a guide rail and the associated four rows (EGC-50, two rows) of recirculating ball bearing units (roller carriages) with caged ball guide. The guide system has negative operating clear-

ance in all sizes, i.e. it is preloaded and therefore has no mechanical play. This results in high rigidity and load bearing capacity in all system directions, as well as more precise guiding. The specified pretension is achieved using the individual components and their manufacturing tolerances.

The guide rail is a component part of the cylinder barrel module and cannot be renewed. If a defect occurs in the guide rail, the entire toothed belt axis must be replaced.

Festo recommends, as a basic principle, that you always replace the entire drive if a defect occurs in the linear recirculating ball bearing guide system.

Replacement of the roller carriages is undertaken by users at their own risk.

Replacement of the toothed belt axis may be necessary under the following circumstances, for example:

The end of the linear recirculating ball bearing guide system's useful life has been reached as a result of material fatigue and wear. Signs of fatigue appear on the areas of material that are rolled over. If the roller bodies have fine cracks, pores and pits (depending on the level of wear) or show signs of deformation. Pitting on the bearing surface of the guide rail can be observed visually as the bearing surface is noticeably uneven. This can result in perceptible bearing clearance, impaired roll-off and increased operating noise, etc.

The application must be checked for the following causes in the event of premature failure due to increased wear:

- Poor lubrication; lubrication intervals not adhered to (unlubricated operation).
- Use of a lubricating grease not contained in the specification.
- Dirty and corrosive ambient conditions (dust, etc.).
- Impact and vibration.
- Technical limit data exceeded (torques, forces, speed, temperature range, etc.).
- Flatness of the attachments screwed onto the slide, setpoint value ‹ 0.01 mm (distortion).
- When using parallel axes, the following must be checked:
  - Parallelism of the guide rails with one another
  - Height misalignment between the slides

  Deviations can lead to strain in the recirculating ball bearing guide, thus overloading of the guiding system. It is not possible to evaluate the parallelism and vertical offset using the displacement force. The alignment should be performed based on measurement. If needed, use additional adjusting devices to align the axes of the linear drives with one another.

Note

Incorrect set values of the braking ramp for STOP statuses (e.g. EMERGENCY STOP, quick stop) result in overloading of the toothed belt axis and can irreparably damage it or reduce its service life drastically.

- Check the settings for all braking ramps in your controller or the higher-order control system (deceleration values and jerk).
- Make sure that the deceleration values (braking deceleration, deceleration times) for the speed, the load to be moved and the installation position (horizontal/vertical) as well as the specified maximum drive torque or the feed force correspond to the permissible values for the toothed belt axis used.
- Use the Festo "Positioning Drives" engineering software, available via the Festo website (➔ www.festo.com), to design the toothed belt axis.

Note

Block-shaped acceleration profiles (without jerk limitation) cause high peaks in the drive force that can lead to overloading of the drive. Positions outside of the permissible range can also occur.

An acceleration specification with jerk limitation reduces vibrations in the entire system and has a positive effect on the stresses in the mechanical system.

- Check which controller settings can be adjusted (e.g. jerk limitation, smoothing of the acceleration profile).

5.3.1 Renewing the roller carriages

Festo recommends, as a basic principle, that you always replace the entire drive if a defect occurs in the linear recirculating ball bearing guide system.

Replacement of the roller carriages is undertaken by users at their own risk.

In the case of the axis EGC-50, only the complete module comprising the slide and roller carriage can be replaced.

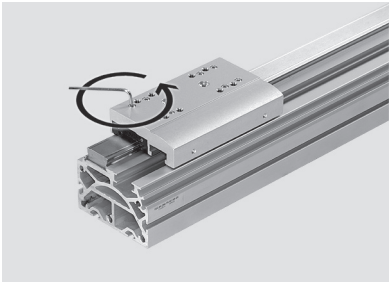
Note

Before replacing the roller carriages, check the guide rail for wear and damage. Defective or worn guide rails **cannot** be replaced. It is the responsibility of the user to assess the wear and damage to the guide rail.

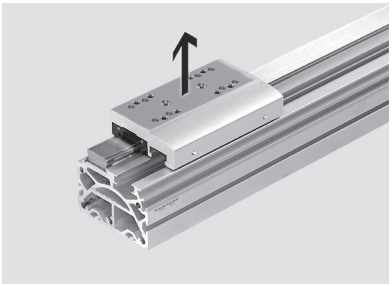
1. A drive cover must be removed in order to renew the roller carriages (➔ Chapter 5.2.1 on page 37).

The slide of the EGC-50 axis does not have to be dismantled, as the roller carriages are only supplied as a module together with the slide.

2. Unscrew the socket head screws in the slide.

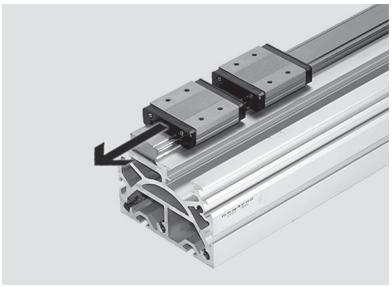


3. Lift the slide off the roller carriages.

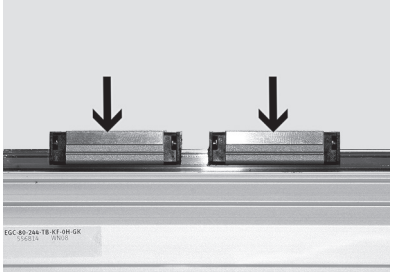


The recirculating ball bearing guide system is pretensioned. Individual bearings can therefore easily fall out and get lost when pushing the roller carriage from the guide rail. Only separate the roller carriages from the guide rail when replacing them.

4. Carefully push the roller carriages off the guide rail.

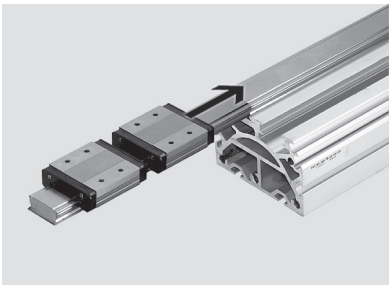


Pay attention to the installation position when positioning the new roller carriages. The partially ground side (stop side) of the roller carriage must face the front side of the toothed belt axis.



Note

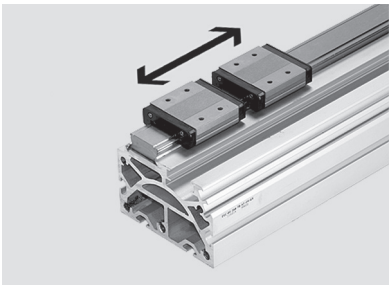
New roller carriages (standard design with variants GK and GV) must be greased before commissioning the toothed belt axis (➔ Chapter 6.2.1 on page 51). Non-compliance can lead to unlubricated operation, and thus failure of the toothed belt axis before the next specified lubrication.



5. Position the transport rail with the new roller carriages directly on the guide rail of the toothed belt axis.
6. Slowly push the new roller carriages onto the guide rail, ensuring that no ball bearings fall out of the roller carriages.

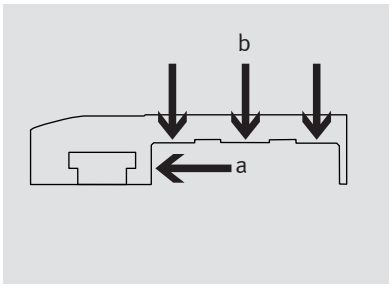
Balls that have come out of the roller carriages must be replaced in the corresponding bearing.

7. Check the guide backlash and the displacement resistance by moving the roller carriages several times.
   The roller carriages must move along the guide rail smoothly and without jerking.
   There must be **no** guide backlash.



The backlash of the roller carriages is not adjustable. If the operating behaviour is not correct, check the guide rail and replace the entire toothed belt axis if necessary.

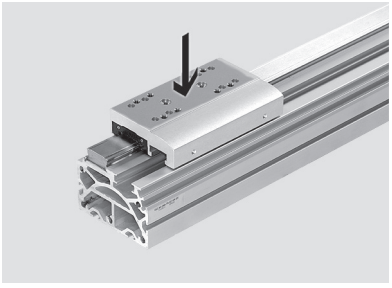
The stop side (a) and the mounting surface (b) of the slide for the roller carriages must not show any surface defects such as burr, chips, blemishes etc. or any residue from threadlocking agents.



a = Stop side

b = Mounting surface

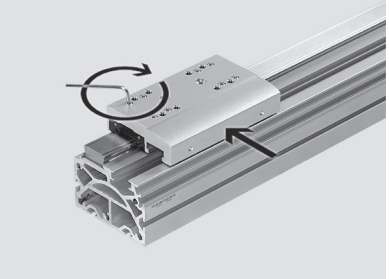
8. Place the slide on the roller carriages.



9. Wet the socket head screws with threadlocker and screw them into the roller carriages through the slide.
10. Tighten the socket head screws slightly and evenly.

11. Press the slide against the roller carriages.
12. Tighten the socket head screws to the appropriate torque (see table).

Type	Tightening torque
EGC-70	2.5 Nm
EGC-80	2.5 Nm
EGC-120	15 Nm
EGC-185	30 Nm



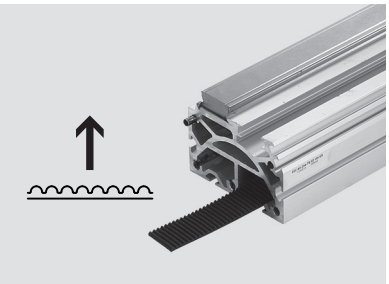
5.4 Assembling the toothed belt axis

5.4.1 Preparing the cylinder barrel

Clean the cylinder barrel with compressed air and a soft cloth.

5.4.2 Installing the Drive covers

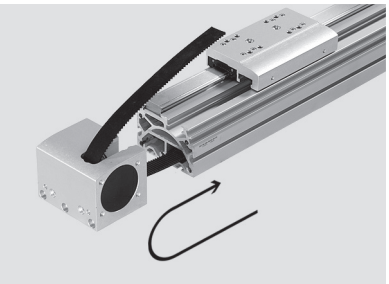
1. Place the cylinder barrel on the work surface as shown.
   The guide rail must be at the rear.
2. Guide the toothed belt through the toothed belt guide in the cylinder barrel as shown.
   The toothed profile must be facing upwards.



Note

Do not bend or fold the toothed belt, as this can result in damage to the tensile members and shorten its service life by cracking it.

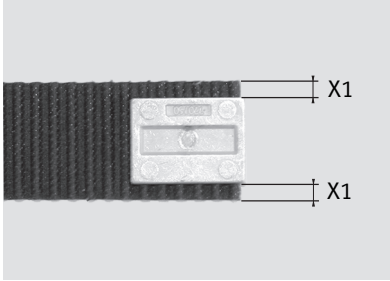
Note the minimum bending radius for assembly and storage (➔ Chapter 5.1 on page 28).



3. Guide the left end of the toothed belt through the prepared Drive cover for the left-hand side as shown.
4. Place the clamping plate on the left end of the new toothed belt.

Note

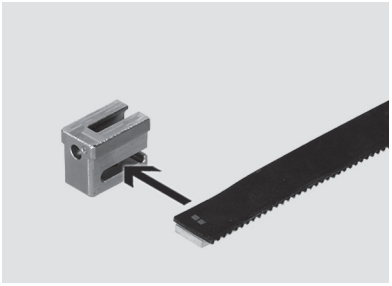
The clamping plate must be positioned axially with the middle of the toothed belt to prevent damage to the toothed belt during operation.



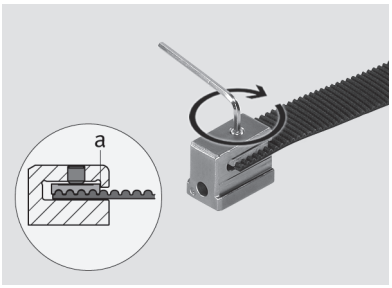
5. Align the clamping plate axially with the middle of the toothed belt.

Note

The threads of the Clamping parts must be recut before the threaded pins are screwed in. Residues of the old locking agent in the thread result in non-uniform and increased tightening torques of threaded pins, and correct tightening is thus not ensured.



6. Insert the left-hand end of the toothed belt together with the clamping plate into the Clamping part.
7. Align the toothed belt axially with the middle of the Clamping part.
8. Wet the threaded pin with threadlocker.
9. Screw the threaded pin into the Clamping part.
10. Push the clamping plate against the stop (a) on the Clamping part.



Note

The clamping plate must make contact with the stop, otherwise the toothed belt pretension will diminish during operation.

11. Tighten the threaded pin to the appropriate torque (see table).

Note

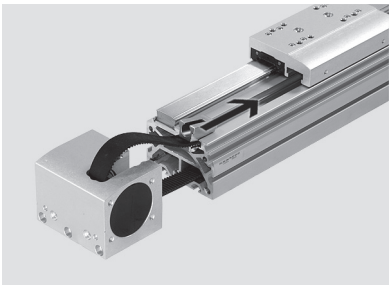
It is critical that the tightening torques be observed. Excessive tightening torques will bend the Clamping part.

Type	Tightening torque
EGC-50	0.1 Nm
EGC-70	0.3 Nm
EGC-80	0.5 Nm
EGC-120	4.0 Nm
EGC-185	5.0 Nm

Note

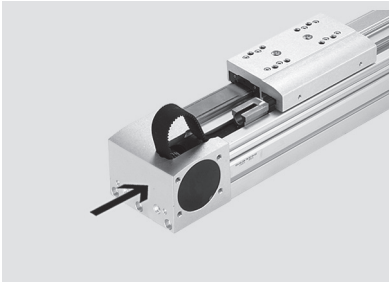
Do not bend or fold the toothed belt, as this can result in damage to the tensile members and shorten its service life by cracking it.

Note the minimum bending radius for assembly and storage (➔ Chapter 5.1 on page 28).



12. Insert the Clamping part into the groove in the cylinder barrel.

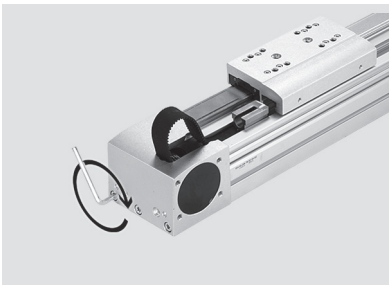
The Drive cover is centred by means of two spring pins. A certain amount of force may need to be applied for assembly.



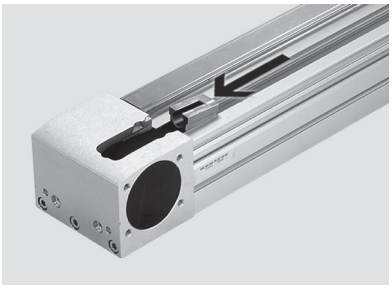
13. Place the left Drive cover on the cylinder barrel.

14. Wet the socket head screws with threadlocker.
15. Screw the socket head screws into the cylinder barrel through the Drive cover.
16. Tighten the socket head screws to the appropriate torque (see table).

Type	Tightening torque
EGC-50	1.2 Nm
EGC-70	2.5 Nm
EGC-80	5 Nm
EGC-120	11 Nm
EGC-185	11 Nm



17. Pull on the other end of the toothed belt to move the Clamping part to the left end of the cylinder barrel.
18. Repeat the steps on the other end of the axis to install the second Drive cover.



19. Push the Clamping parts into the guide in the slide unit.

Threaded inserts with SCREWLOCK® are screwed into the slides. These have an incorporated screw-clamping area that serves as a screw lock. Multiple windings have a clamping effect on the edges of the screwed-in adjusting screws for the toothed belt pretension. The result is flexible frictional locking. This prevents adjustment of the set toothed belt pretension (automatic unscrewing).

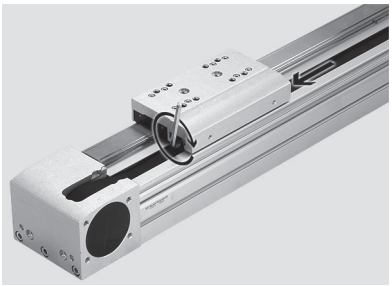
Note

The clamping effect can damage the thread profile of the adjusting screw. As such, the use of new adjusting screws for assembly is recommended.

The use of the threaded inserts with SCREWLOCK® and the dynamic load on the adjusting screw call for the use of only original spare parts from Festo with the appropriate strength class. Otherwise, the screws can break prematurely.

The Clamping parts must not touch the slide when they are being screwed in as otherwise the toothed belt could become overstretched and the service life of the toothed belt would be reduced. Slowly increase the toothed belt pretension up to the correct value.

20. Screw the socket head screws evenly through the Clamping parts and into the slide.
21. Pretension the toothed belt by uniformly tightening the socket head screws by feel.



Note

The Clamping parts must be at least flush with the slide.

If the Clamping parts protrude beyond this point, the socket head screws will not reach the minimum screw-in depth and could be torn out.

Adjust the toothed belt pretension (➔ Chapter 5.1.5 on page 34).

5.5 Replacing the measuring tape of the displacement encoder EGC-70 / 80 / 120 / 185-TB-KF-...-M1 / M2

Note

Destroyed coding of the magnetic strip surface due to external magnetic fields.

- Avoid external magnetic fields (> 64 mT) on the magnetic strip surface.

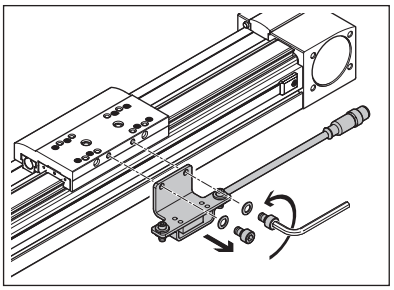
Note

Reduced system accuracy due to external magnetic fields.

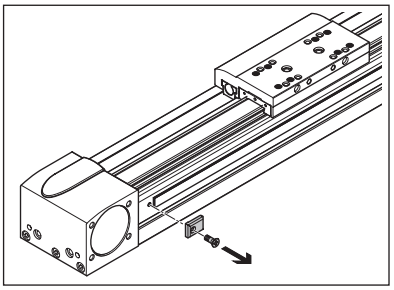
- Avoid external magnetic fields (> 1 mT) at the sensor.

5.5.1 Removing the old measuring tape

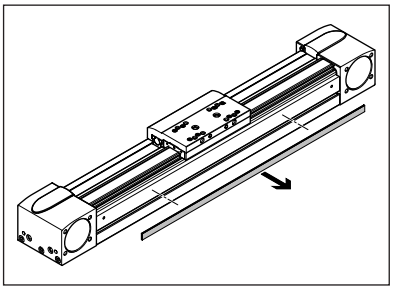
1. Dismantle the sensor bracket with the measuring unit from the slide.



2. Unscrew the countersunk screws (2x) of the caps (2x) at both ends of the measuring tape from the cylinder barrel.
3. Remove caps (2x).



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.



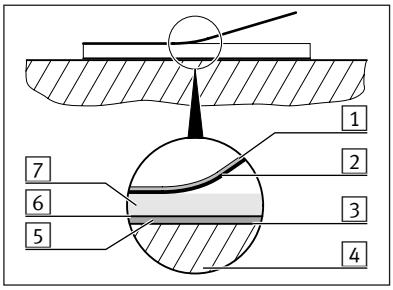
Typical solvents for cleaning surfaces are a 50 / 50 isopropyl-alcohol / water mixture or heptane.

5.5.2 Sticking on new measuring tape

Note

- The substrate must be clean, dry and free from dust, grease, oil as well as other contaminants.
- The best adhesive bonding temperature lies between + 21 °C and + 38 °C. Bonding is inadvisable if the surfaces to be bonded are colder than + 10 °C, as in this case the adhesive becomes too solid and thus may make adequate immediate adhesion hardly achievable. After proper bonding, the bond strength remains even at minus temperatures. From experience, the ultimate adhesion is reached after around 72 hours (at + 21 °C).
- Only use the adhesive tape supplied to stick on.
- To prevent stresses in the magnetic strip, it must not be pinned, 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.
- Note the count direction of the measuring system.

Structure of the measuring tape

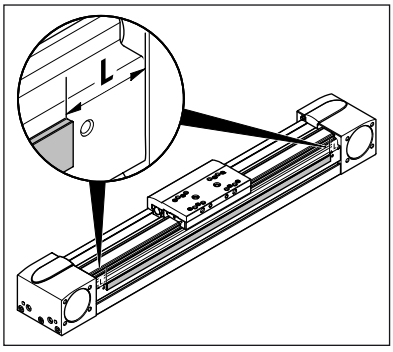


1 Cover band
2 Adhesive tape
3 Adhesive tape
4 Cylinder barrel
5 Steel strip
6 Adhesive tape
7 Magnetic strip

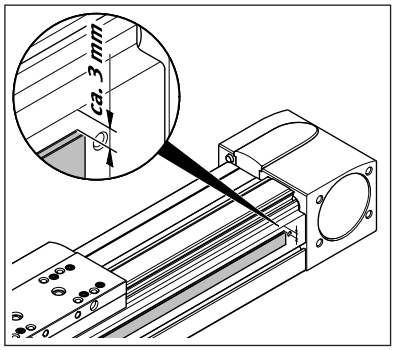
The magnetic strip 7 is already attached via an adhesive tape 6 to a steel strip 5 (= carrier side) in the factory.

1. Stick the adhesive tape 3 onto the steel strip (= carrier side) 5.

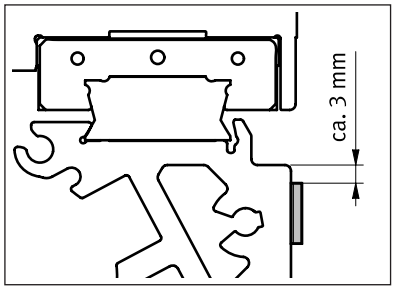
2. Adjust the magnetic strip with the steel strip so that it is centred with the middle of the cylinder barrel. A distance **L** of **20 mm** must be maintained from the ends of the cylinder barrel.



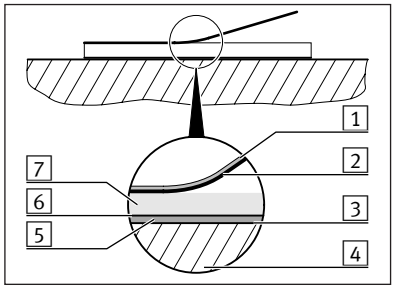
3. Adjust the magnetic strip with the steel strip on the cylinder barrel with a distance of **approx. 3 mm** from the rear top of the cylinder barrel.
4. Stick the magnetic strip onto the cylinder barrel.



The easiest way is to stick on the magnetic strip in two steps:
1. Remove half the protective film from 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.



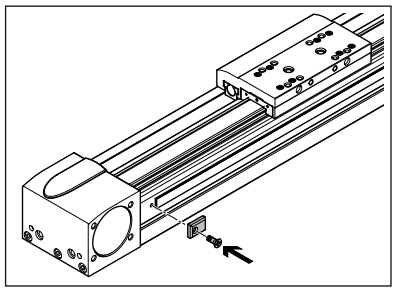
5. Stick the adhesive tape [2] onto the cover strip [1].



It does not matter on which side of the cover strip the adhesive tape is attached.

6. Stick the cover strip [1] with adhesive tape [2] onto the magnetic strip [7].

7. Place the caps (2x) on the ends of the measuring tape.
8. Clean the countersunk screws (2x) to remove locking agent.
9. Wet the countersunk screws (2x) with locking agent.
10. Screw the countersunk screws (2x) into the cylinder barrel and tighten to the appropriate tightening torque (➔ Table).



Type	Tightening torque
EGC-70	0.15 Nm
EGC-80	0.15 Nm
EGC-120	0.15 Nm
EGC-185	0.15 Nm

11. Mount the sensor bracket with the measuring unit on the slide (➔ “Assembly instructions for displacement encoder EGC-...-M-...”; www.festo.com).
12. Comply with the tolerances for the distance and angle of the measuring unit with the measuring tape (➔ Chapter 5.5.3 on page 50).

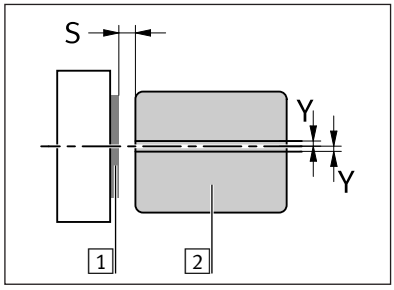
If these tolerances are not complied with, the measuring unit must be realigned.

13. Undo the socket head screws of the sensor mounting.
14. Align the measuring unit correctly (➔ Chapter 5.5.3 on page 50).
15. After aligning, tighten the socket head screws of the sensor mounting to 3.5 Nm ± 20 %.

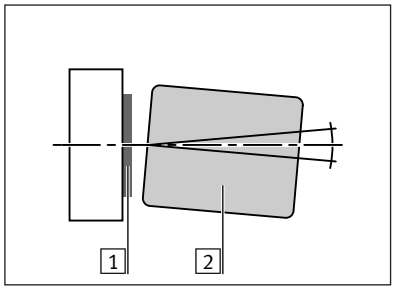
5.5.3 Aligning the measuring unit with the measuring tape

- 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:

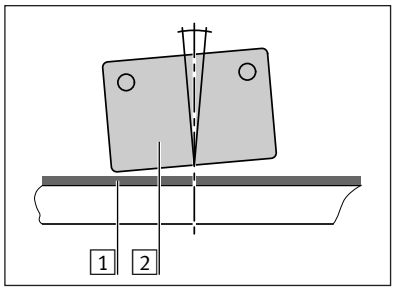
– On assembly, the measuring unit [2] must be set with a distance **S** of 0.1 mm to 2 mm from the magnetic strip [1].
– The offset **Y** of the measuring unit from the horizontal middle axis of the magnetic strip [1] must not exceed 2.5 mm.



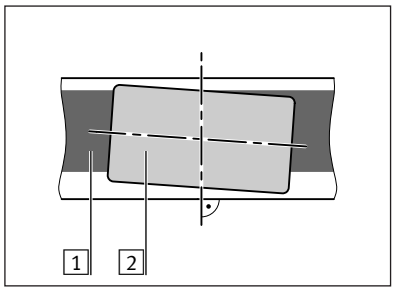
– The inclination between the measuring unit [2] and the magnetic strip [1] must not exceed ± 5°.



– The deviation in the parallelism of the distance 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°.



5.6 Assembly and functional test

- After completing the assembly work on the toothed belt axis, check that it function correctly.

5.6.1 No-load torque

It must be possible to move the slide unit without much resistance or jerking when it is idle without a drive attached or load connected.

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

5.6.2 Start-up

- Start up the repaired product as described in the operating instructions (➔ www. festo.com).

6 Maintenance

- Observe the general safety instructions (➔ Chapter 1.4 on page 7)!

This section contains important technical information about the maintenance work to be carried out on the product.

The maintenance and care work steps are described in the operating instructions (➔ www. festo.com).

6.1 Toothed belt pretension

Note

The toothed belt pretension is set to a specified value in the factory and is thus maintenance-free for its entire lifetime.

The pretension of the toothed belt reduces due to storage time and operation. This is a normal process and not an indication of wear.

Retensioning the toothed belt means increased wear and can lead to breaking of the toothed belt.

- Do not retension the toothed belt.

6.2 Relubricating the toothed belt axis

- Grease the surface of the guide rail if it no longer has a grease film.

Lubricants for assembly and maintenance of the toothed belt axis

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

[1)] See **"Tools and repair accessories"** information brochure. The brochure can be found in the online spare parts catalogue on the Festo website (➔ Tools and repair accessories.pdf).

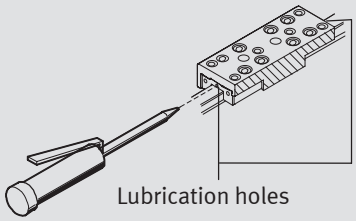
6.2.1 Relubricating the recirculating ball bearing guide

The recirculating ball bearing guide of the roller carriage must be relubricated at specific intervals (➔ Note on lubrication interval).

There are two different designs of roller carriage.

The slide variants GK and GV have lubrication holes on both end faces of the slide. The lubricant must be inserted in both holes, as the two roller carriages do not have a lubricant connection.

The slide variants GP and GQ have an integrated lubricating system that ensures a continuous supply of lubricating oil for the raceways. These designs cannot be regreased.



The recirculating ball bearing guide of the roller carriage 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 (➔ Operating instructions; 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 or < 300 mm
- Speed > 2 m/s
- Travel profile ≙ triangular operation (frequent acceleration and braking)
- Ambient temperature > 40 °C
- Product's time in operation > 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.

- Introduce the lubricant via the front lubrication hole at both ends of the slide. Half the amount of grease must to be applied to different carriage positions, corresponding to twice the carriage length.

Note

The slide must be moved forwards and backwards on the guide rail during relubrication so that the grease penetrates all the spaces in the roller carriages.

	EGC-50-TB-KF	EGC-70-TB-KF	EGC-80-TB-KF	EGC-120-TB-KF	EGC-185-TB-KF
Quantity of grease **per** lubrication hole	0.2 g	0.3 g	0.6 g	1.2 g	3.6 g

Festo offers a one-hand, high-pressure grease gun with suitable pointed nozzle for lubricating the lubrication holes (➔ Chapter 8.2 on page 53).

7 Cleaning

Note

- Clean with a soft, lint-free cloth and non-abrasive cleaning agents.
- Check the compatibility of the cleaning agent with the materials to be cleaned.

8 Tools

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

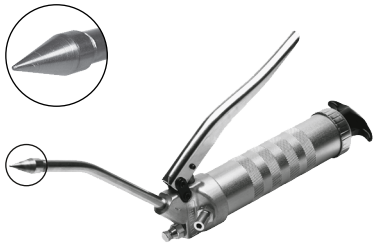
8.1 Standard tools

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

- Plastic hammer
- Pliers for retaining rings (inner retainer for bore)
- Ruler
- Allen key
- Torque wrench
- Torque screwdriver
- Screwdriver set
- 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 toothed belt axis:

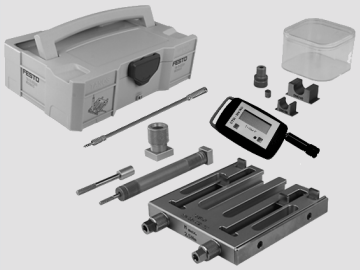
Designation	Additional information	Festo order no.	Figure
One-hand grease gun LUB-1	Pinpoint nozzle for miniature, funnel-shaped lubrication nipples and lubricating holes	647958	
Lubrication adapter LUB-1-TR-I	Lubrication adapter (nozzle pipe Ø 6x200 axial)	647959	
Lubrication adapter LUB-1-TR-L	Lubrication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

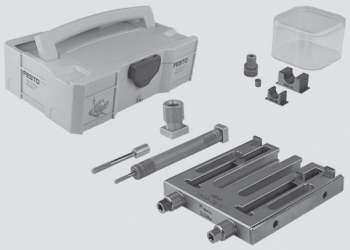
Designation	Additional information	Festo order no.	Figure
Lubrication adapter LUB-1-TR-W	Lubrication adapter (nozzle pipe Ø 6x200 lateral, 45° angled)	8073388	

For further information on the fixtures and measuring devices, refer to the **"Tools and repair accessories"** information brochure. It can be found in the online spare parts catalogue on the Festo internet site (➔ Tools and Repair Accessories.pdf).

8.3 Equipment and measuring devices

The following test devices and measuring devices can be used to check checking the toothed belt pretension:

Designation Order No.	Description	Figure
TB-TE-EQ10	Content: – Test device for checking the toothed belt pretension in the Systainer with foam insert. Suitable for the following toothed belt axes: – DGE-25 / 40 / 63-ZR(-KF) – DGE-25 / 40 / 63-ZR-RF – EGC-50 / 70 / 80 / 120 / 185-TB-KF – EGC-HD-125 / 160 / 220-...-TB-...(-GP) – ELGA-TB-G-70 / 80 / 120 – ELGA-TB-RF / KF-70 / 80 / 120-...(-F1) – ELGA-TB-KF-150 – DGEA-18 / 25 / 40-ZR – Acoustic frequency meter type TB-TE-EQ13 – Extension cable for acoustic frequency meter TB-TE-EQ13 – Clamping part for DGE-25-ZR-RF – Clamping part for DGE-40-ZR-RF – Round magnet (L = 6 mm) for DGE-63 – Plastic box for small parts The exact procedure for checking the toothed belt pretension can be found in the operating instructions **"Test device for toothed belt pretension TB-TE-EQ12"** (➔ TB-TE-EQ12_en.pdf).	

Designation Order No.	Description	Figure
TB-TE-EQ12	Content: – Test device for checking the toothed belt pretension in the Systainer with foam insert. Suitable for the following toothed belt axes: – DGE-25 / 40 / 63-ZR(-KF) – DGE-25 / 40 / 63-ZR-RF – EGC-50 / 70 / 80 / 120 / 185-TB-KF – EGC-HD-125 / 160 / 220-...-TB-...(-GP) – ELGA-TB-G-70 / 80 / 120 – ELGA-TB-RF / KF-70 / 80 / 120-...(-F1) – ELGA-TB-KF-150 – DGEA-18 / 25 / 40-ZR – Clamping part for DGE-25-ZR-RF – Clamping part for DGE-40-ZR-RF – Round magnet (L = 6 mm) for DGE-63 – Plastic box for small parts The exact procedure for checking the toothed belt pretension can be found in the operating instructions **"Test device for toothed belt pretension TB-TE-EQ12"** (➔ TB-TE-EQ12_en.pdf).	
TB-TE-EQ13	Acoustic frequency meter for measurement with and without a test device. An extension cable that can be installed between the frecuency meter and the acoustic test probe is included in the scope of delivery.	
O-ring 10x1 Order No. 200926	Mounting of the acoustic test probe of the frequency meter TB-TE-EQ13 in the test equipment by means of clamping friction. Included in the scope of delivery of the frequency meter TB-TE-EQ13.	

For further information on the fixtures and measuring devices, refer to the **"Tools and repair accessories"** information brochure. It can be found in the online spare parts catalogue on the Festo internet site (➔ Tools and Repair Accessories.pdf).

To order the Test device TB-TE-EQ10 / -EQ12 or Frequency meter TB-TE-EQ13, please **contact** your **local support**.

9 Liability

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